# Oral Sessions at a Glance

## ORAL SESSION 1: TRACK 1: PANDEMIC THREATS

<table>
<thead>
<tr>
<th>Date: Tuesday, 11 December</th>
<th>Time: 11:00 – 12:30</th>
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<tbody>
<tr>
<td><strong>Congress Hall</strong></td>
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<tr>
<td><strong>ORAL SESSION 1.1: Assessing the Burden of HIV, Tuberculosis and Malaria</strong></td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>OA-1.1-001</strong></td>
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<td>11:20 – 11:30</td>
<td><strong>OA-1.1-003</strong></td>
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<td>11:30 – 11:45</td>
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<td><strong>OA-1.1-004</strong></td>
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<td><strong>OA-1.1-006</strong></td>
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## ORAL SESSION 2: Assessing the Burden of Emerging Communicable and Non-Communicable Diseases

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<tr>
<th>Date: Tuesday, 11 December</th>
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<tbody>
<tr>
<td><strong>Niger/Enugu</strong></td>
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<td><strong>ORAL SESSION 1.2: Assessing the Burden of Emerging Communicable and Non-Communicable Diseases</strong></td>
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<td><strong>OA-1.2-007</strong></td>
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<td><strong>OA-1.2-009</strong></td>
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<td><strong>OA-1.2-010</strong></td>
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<td>11:55 – 12:05</td>
<td><strong>OA-1.2-011</strong></td>
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<td>12:05 – 12:15</td>
<td><strong>OA-1.2-012</strong></td>
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## ORAL SESSION 3: The Role of Laboratory for Understanding, Treating and Preventing Disease

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<tr>
<td><strong>Benue/Plateau</strong></td>
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<tr>
<td><strong>ORAL SESSION 1.3: The Role of Laboratory for Understanding, Treating and Preventing Disease</strong></td>
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<td>11:00 – 11:10</td>
<td><strong>OA-1.3-013</strong></td>
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<tr>
<td>11:45 – 11:55</td>
<td><strong>OA-1.3-016</strong></td>
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### ORAL SESSION 1.4: Combating Antimicrobial Resistance  
**Tuesday, 11 December**

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<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11:00 – 11:10</td>
<td>OA-1.4-019</td>
<td>Prevalence and Drug Susceptibility Pattern of Group B Streptococci (GBS) Among Pregnant Women Attending Antenatal Care (ANC) in Nekemte Referral Hospital (NRH), Nekemte, Ethiopia</td>
</tr>
<tr>
<td>11:10 – 11:20</td>
<td>OA-1.4-020</td>
<td>Laboratory-Based Surveillance of Bacteraemia and Antimicrobial Resistance at Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, 2017-2018</td>
</tr>
<tr>
<td>11:20 – 11:30</td>
<td>OA-1.4-021</td>
<td>Baseline Survey of Prescribers’ Knowledge and Attitudes Towards Antimicrobial Stewardship in a University Teaching Hospital</td>
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<td>11:30 – 11:45</td>
<td>Question &amp; Answer</td>
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<tr>
<td>11:45 – 11:55</td>
<td>OA-1.4-022</td>
<td>Relationship Between Antibiotic Sensitivity Testing and Antibiotic Prescribing Patterns in Children Under 10 Years Presenting with Diarrhea: Findings and Implications for Eswatini</td>
</tr>
<tr>
<td>11:55 – 12:05</td>
<td>OA-1.4-023</td>
<td>Evaluation of the HIV-1 Drug Resistance Among Patient Initiating Antiretroviral Treatment with WHO Guideline in Mali</td>
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<td>12:15 – 12:30</td>
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### ORAL SESSION 1.5: Laboratory Networks and Systems for Outbreak Response  
**Tuesday, 11 December**

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<tbody>
<tr>
<td>11:00 – 11:10</td>
<td>OA-1.5-025</td>
<td>Preparing Laboratories in Cameroon for a Rapid Response to a Cholera Threat – An Example for Coordinating a Global Health Security (GHS) Initiative</td>
</tr>
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<td>12:15 – 12:30</td>
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## ORAL SESSION 2: TRACK 2: LABORATORY RESPONSE

**DATE:** Wednesday, 12 December  
**TIME:** 11:00 – 12:30

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<thead>
<tr>
<th>Time</th>
<th>Oral Session Name</th>
<th>Presenters</th>
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<tbody>
<tr>
<td>11:00</td>
<td><strong>ORAL SESSION 2.1: Innovations to Achieve Universal Health Coverage and International Health Regulations</strong> Wednesday, 12 December Congress Hall</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>OA-2.1-001</strong></td>
<td>Application of Multiplex PCR for Direct Detection of Campylobacter Spps. and Salmonella Serovars in Children (0 – 5 years old) Diarrhoeic Stool</td>
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<tr>
<td>11:30 – 11:45</td>
<td>Question &amp; Answer</td>
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<tr>
<td>11:45 – 11:55</td>
<td><strong>OA-2.1-004</strong></td>
<td>Investigating Serum Leptin and Ghrelin levels as Metabolic Syndrome Biomarkers in Adult African Zambians with Type 2 Diabetes Mellitus at the University Teaching Hospital, Lusaka, Zambia</td>
</tr>
<tr>
<td>11:55 – 12:05</td>
<td><strong>OA-2.1-005</strong></td>
<td>Use of Pre-ART Laboratory Screening to Identify Renal, Hepatic, and Hematological Abnormalities in Côte D’ivoire– Past, Present, and Future</td>
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<tr>
<td>12:05 – 12:15</td>
<td><strong>OA-2.1-006</strong></td>
<td>e-PT Application is a Vital Data Management Tool in the Dried Tube Specimen Proficiency Testing (DTS PT) Program</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>ORAL SESSION 2.2: Improving Diagnostics to Achieve Universal Health Coverage and International Health Regulations</strong> Wednesday, 12 December Niger/Enugu</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>OA-2.2-007</strong></td>
<td>Improved Adherence to Early Infant Diagnosis Algorithm for HIV-Exposed Infants During Implementation of a Point-of-Care Early Infant Diagnosis Project in Kenya</td>
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<tr>
<td>11:10 – 11:20</td>
<td><strong>OA-2.2-008</strong></td>
<td>Integration of ChemBioTM DPP Syphilis Screen and Confirm Assay with Existing Technologies to Improve Clinical Diagnostics</td>
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<td>12:05 – 12:15</td>
<td><strong>OA-2.2-012</strong></td>
<td>Comparative Evaluation of Viral Load Testing Coverage and Viral Suppression among PLHIV on ART in Seven PHIA Countries</td>
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<td>Question &amp; Answer</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>ORAL SESSION 2.3: Improving Quality, Safety and Cost Effectiveness of Laboratory Systems</strong> Wednesday, 12 December Benue/Plateau</td>
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<tr>
<td>11:00 – 11:10</td>
<td><strong>OA-2.3-031</strong></td>
<td>Strengthening Laboratory Systems Through Mentorship and institution of QMS in Guinea</td>
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<tr>
<td>11:20 – 11:30</td>
<td><strong>OA-2.3-015</strong></td>
<td>Strengthening Laboratory Management Toward Accreditation (SLMTA) in 23 Sub-Saharan African Countries: Progress and Lessons Learned</td>
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<td>11:30 – 11:45</td>
<td>Question &amp; Answer</td>
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</table>
11:55 – 12:05  OA-2.3-017  | New Approaches to Procurement and Supply Chain Management for Scaling Up Viral Load Testing in Resource Limited Countries  

12:05 – 12:15  OA-2.3-018  | Implementing External Quality Assessment for Biochemistry in Low Resource Settings; the MSF Experience  
N. Kamau, N. Mutanyi, W. D. Kieviet

12:15 – 12:30  Question & Answer

ORAL SESSION 2.4: Workforce Development  
Wednesday, 12 December  

Kogi

11:00 – 11:10  OA-2.4-019  | Continuing Professional Development Training Needs of Medical Laboratory Personnel in KEMRI-Wellcome Trust Research Laboratories, Kilifi, Kenya  
H. Gumba

11:10 – 11:20  OA-2.4-020  | Developing Local Capacity for Standard Laboratory Biosafety and Biosecurity Practices in Nigeria: Outcome of Baseline and Follow-up Assessments of Target BSL-2/-3 Laboratories  


11:30 – 11:45  Question & Answer

11:45 – 11:55  OA-2.4-022  | Proficiency of laboratory and Non-Laboratory Personnel to Perform Point-of-Care Early Infant Diagnosis. Lessons From Eight Sub-Saharan Countries  
J. Lemaire, V. Andoseh, P. Fassinou, C. Otieno, M. Mokone, M. Sabonete, T. Masuku, A. Chadambuka, J. Cohn

11:55 – 12:05  OA-2.4-023  | Assessment of Knowledge, Practices Regarding Biomedical Waste Management in Health Care Workers in Hospitals in Eastern Uganda  
S. A. Okui

12:05 – 12:15  OA-2.4-024  | Improved Laboratory Compliance to Quality Standards in Cambodian Laboratories Through On-Site Trainings  
K. S. Ong, S. Sek, S. Song, N. Ndefru, P. Sadate-Ngatchou, L. Perrone

12:15 – 12:30  Question & Answer

ORAL SESSION 2.5: Strengthening the Laboratory-Clinic Interface  
Wednesday, 12 December  

Kano

11:00 – 11:10  OA-2.5-025  | Reducing Results Turnaround Time Using Remote Sample Logging Approach for Effective Patient Management – AMPATHPlus Care Laboratory Experience  
S. L. Kadima, T. Ngugi, C. C. Chege, S. Kimaiyo, J. Batuka

11:10 – 11:20  OA-2.5-026  | Improving Laboratory Information Management for a Stronger Clinical–Laboratory Interface: Successful Implementation of TBLIS® in Tuberculosis Laboratories in Africa  

11:20 – 11:30  OA-2.5-027  | Improved Viral Load Results Utilization for Non-suppressed Patient Management: A Uganda CQI Experience  
M. Zziwa

11:30 – 11:45  Question & Answer

11:45 – 11:55  OA-2.5-028  | Enhancing the Laboratory-Clinical Interface to Identify Reporting and Program Gaps to Achieve the Third “90” in Kenya  
D. Kimani, K. Masamaro, J. Mwangi, E. Ngugi, F. L. Basiye

11:55 – 12:05  OA-2.5-029  | Utility of GeneXpert MTB/RIF-diagnosed Rifampicin Resistant Tuberculosis Alerts for Linkage to Care in Gauteng, South Africa, 2017  
J. I. Etong, P. Mutevedzi, N. Ismail

12:05 – 12:15  OA-2.5-030  | LARC Quality Improvement Collaborative in Eswatini Yields Improved Tracking and Follow-up for HIV Patients with High Viral Load  
S. Dlamini, S. Kuhlase, B. C. McKinney

12:15 – 12:30  Question & Answer
### ORAL SESSION 3: TRACK 3: SYNERGIZING PARTNERSHIPS

#### ORAL SESSION 3.1: The One Health Approach

**Thursday, 13 December**

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<tr>
<th>Time</th>
<th>Presentation</th>
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| 11:00 – 11:10 | OA-3.1-001 | Contribution du laboratoire de Référence de l’Institut National de Recherche en Santé Publique Dans la Détexion Des Pathogènes Zoonotiques Associés à des Maladies Fébriles Aiguës au Mali
F. Sidibe |
| 11:10 – 11:20 | OA-3.1-002 | Seroprevalence and Determinants of Echinococcus Granulosus Infection in Owned Dogs in Ibadan, Oyo State, Nigeria
L. I. Adebudo |
| 11:20 – 11:30 | OA-3.1-003 | Re-emergence of Rift Valley Fever Virus in Uganda After 50 Years: Evidence From A Country-Wide Serological Study in Cattle
| 11:30 – 11:45 | | Question & Answer |
| 11:45 – 11:55 | OA-3.1-004 | A One Health Approach to Addressing Gaps in Laboratory Leadership Training
J. E. Isadore, L. Maryogo-Robinson |
| 11:55 – 12:05 | OA-3.1-005 | Prevalence of ESBL Producing Salmonella Typhimurium among Commercial Poultry and Poultry handlers in Keffi,Nasarawa State ,Nigeria
T. Ibrahim, N. Boyi, P . Tsaku |
| 12:05 – 12:15 | OA-3.1-006 | Is Housing (Roofing) Quality Associated with Malaria Incidence? The Findings in Nchelenge, Luapula Province
J. Sikalima |
| 12:15 – 12:30 | | Question & Answer |

#### ORAL SESSION 3.2: Partnerships and Collaborations for Universal Health Coverage and International Health Regulations

**Thursday, 13 December**

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<tr>
<th>Time</th>
<th>Presentation</th>
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| 11:00 – 11:10 | OA-3.2-007 | Strengthening Regional Capacity for Diagnostics Through Laboratory System Strengthening Using the WHO/ AFRO Strengthening Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) Program
T. Maruta, M. Matu |
| 11:10 – 11:20 | OA-3.2-008 | Strengthening Cross-Border Laboratories is Critical for Controlling Trans-Boundary Transmission of Diseases in East Africa
W. A. Were |
| 11:20 – 11:30 | OA-3.2-009 | Assuring Quality and Building Trust: Providing High Quality, Low Cost EQAS at Both Laboratory and Community Settings
L. M. Cabuang, D. Sahin, S. Land, W. Dimech |
| 11:30 – 11:45 | | Question & Answer |
| 11:45 – 11:55 | OA-3.2-010 | Regional Collaborations for Laboratory Systems Improvement Towards Accreditation: Lessons from East Africa Public Health Laboratory Network
M. Matu, M. Schneidman, B. A. Pius, W. A. Were, M. Joloba |
| 11:55 – 12:05 | OA-3.2-011 | Strengthening Clinical Laboratory Services for Malaria Vaccine Trial Initiative in Bioko Island of Equatorial Guinea
E. L. Nyakarungu |
| 12:05 – 12:15 | OA-3.2-012 | Addressing the Challenges of Laboratory Monitoring of Hepatitis C Treatment in Cameroon
R. Njouom, O. Njoe, C. Bilong, A. Boers, R. Coutinho, R. Nsaibim, M. Biwole Sida, F. Essomba, P. Ondoa |
| 12:15 – 12:30 | | Question & Answer |

#### ORAL SESSION 3.3: Science and Education to Prevent the Next Pandemic

**Thursday, 13 December**

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| 11:00 – 11:10 | OA-3.3-013 | Community Health Screening and Education through Laboratory Science: Clinical Laboratory Science Student Service-Learning and Study Abroad Collaboration Opportunities
J. R. Ellis |
| 11:10 – 11:20 | OA-3.3-014 | Development of a Clinical Trials Laboratory During an Epidemic
| 11:20 – 11:30 | OA-3.3-015 | Assessment of the Competency Assessment of HIV Rapid Testers and Functionality of Testing Points in Some HIV Testing Points Supported by APIN Public Health Initiative in Nigeria
| 11:30 – 11:45 | | Question & Answer |
| 11:45 – 11:55 | OA-3.3-016 | Renforcement des Capacites des Agents de Laboratoire en Guinee Dans le Cadre du Projet Labnet
S. Ouattara |
**ORAL SESSION 3.1: Thursday, 13 December**

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<tr>
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<tr>
<td>11:00 – 11:10</td>
<td>Surmounting Barriers to the 3rd ‘90’: How Inter-cadre Collaboration Improved Uptake of HIV Viral Load Results at Homa Bay Hospital, Kenya</td>
<td>B. Odindo, N. J. Bowen, R. Kuria, W. N. Shena, E. T. Kimaijo, R. Okova</td>
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<tr>
<td>11:10 – 11:20</td>
<td>Scaling up Early Infant Diagnosis (EID) Using Technical Assistance from ASLM, Sierra Leone’s Experience</td>
<td>Z. Koroma</td>
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**ORAL SESSION 3.2: Thursday, 13 December**

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**ORAL SESSION 3.4: Thursday, 13 December**

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<tr>
<td>11:20 – 11:30</td>
<td>country implementation of WHO recommendations on HIV testing strategies and testing algorithms</td>
<td>V. Forner, A. Sands, C. Figueroa, R. Baggaley, C. Quinn, C. Johnson, F. Jallow</td>
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<td>11:30 – 11:45</td>
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<td>11:45 – 11:55</td>
<td>exploring the adoption of lean principles in medical laboratory industry</td>
<td>H. D. Isack</td>
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<td>11:55 – 12:05</td>
<td>a successful implementation of a national laboratory equipment maintenance program through the global health security agenda (GHSA) program: Experience of Senegal</td>
<td>M. D. Bao</td>
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**ORAL SESSION 3.5: Implementing and Harmonizing Policies**

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## Oral Posters at a Glance

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**TRACK 1: PANDEMIC THREATS**

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### ORAL POSTERS 1.1: Assessing the Burden of HIV, Tuberculosis and Malaria

- **OP-1.1-001** | Préalence du VIH et des IST chez les MSM au Sénégal: Résultats de L’enquête De Surveillance Combinée de 2017  

### ORAL POSTERS 1.2: Assessing the Burden of Emerging Communicable and Non-Communicable Diseases

- **OP-1.2-002** | Descriptive Analysis of 2017 Lassa Fever Cases in Nigeria  
  O. A. Okoro

- **OP-1.2-003** | Mass Campaigns for HIV, HBV (HBsAg) and HCV Screening by Multiplex Rapid Diagnostic Test in Sub-Saharan Africa Using Mobile Units  
  G. Kalla, E. Voundi Voundi, R. Guiadem, F. Angwalo, L. Belec, F. Mbopi-Keou

- **OP-1.2-004** | An Ongoing Rift Valley Fever Outbreak in Two Refugee Settlement Camp in Isingiro District, Western Uganda, July 2018  

### ORAL POSTERS 1.3: Laboratory for Understanding, Treating and Preventing Disease

- **OP-1.3-005** | Latest Trick About H1N1 Influenza Vaccine Induced Autoimmunity and its Association with HLA-DQB1*0602 Genotype  
  D. G. Debebe

### ORAL POSTERS 1.4: Combatting Antimicrobial Resistance

- **OP-1.4-006** | Sierra Leone Road to AMR Surveillance – Antibiotic Sensitivity Trend  

  C. Yang, F. Jean Louis, N. segaren, O. Desinor, R. Beard, F. Kesner, J. Buteau, B. J. Marston, J. Domercant, M. Charles

- **OP-1.4-008** | Dispersin (aap), Transcriptional Activator (aggR) and aat Genes Are Not Restricted to Enteroaggregative Escherichia coli  
  E. Q. Nwoko, O. C. Akinlabi, G. Dougan, A. Adepoju, I. N. Okeke

- **OP-1.4-009** | Prevalence of Mutations of the PFDHFR / PFDHPS Genes in Isolates Collected in Senegal, Tanzania and Comoros  
  C. K. Diedhiou, A. D. Ahoudi, N. Papa Moe, A. K. Bei, S. Mboup

### ORAL POSTERS 1.5: Laboratory Networks and Systems for Outbreak Response

- **OP-1.5-010** | Networking a Laboratory Information System at Each Level of the Health System to Improve Quality, Timeliness and Real-Time Evaluation of Test Services. The Mozambique Model for Viral Load Testing Scale-Up  
  S. Kidane, R. Kakkar, E. Toure, I. Pinto, R. Timperi

- **OP-1.5-011** | Implementation of Laboratory-Based Surveillance for Antimicrobial Resistance in Burkina Faso  

- **OP-1.5-012** | The Ebola Virus Disease Outbreak in West Africa in 2014–2015: The Experience of the Nigerian Unit of the European Mobile Laboratory Consortium  
  D. I. Adomeh
**ORAL POSTER SESSION 2**

**TRACK 2: LABORATORY RESPONSE**

### ORAL POSTERS 2.1: Innovations to Achieve Universal Health Coverage and International Health Regulations

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### ORAL POSTERS 2.2: Improving Diagnostics to Achieve Universal Health Coverage and International Health Regulations

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### ORAL POSTERS 2.3: Improving Quality, Safety and Cost Effectiveness of Laboratory Systems

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<tr>
<td>13:00 – 13:05</td>
<td>OP-2.3-005</td>
<td>Site Implementation Monitoring (SIMS) HIV Proficiency Testing (PT) Scores Improved Following Implementation of the HIV-Rapid Test Continuous Quality Improvement (RTCOI) in Facilities Supported by the President Emergency Plan For Aids Relief (PEPFAR) in South Africa</td>
<td>M. Makanya, A. Adelekan, L. Berrie, L. Letcher, K. Diallo</td>
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### ORAL POSTERS 2.4: Workforce Development

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<td>OP-2.4-007</td>
<td>Survey on Challenges Facing Transporters Submitting Samples to the National HIV Reference Laboratory (NHRL), Nairobi, Kenya for Testing</td>
<td>H. K. Barsigan</td>
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<td>13:20 – 13:25</td>
<td>OP-2.4-009</td>
<td>Give Us This Day Our Daily Mentors: The Experience Of Onsite Quality Management Mentorship Towards Accreditation At The University Hospital, Lusaka, Zambia</td>
<td>M. Mubanga, C. Miyanda, J. Langu, P. Okuku, H. Mantina</td>
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### ORAL POSTERS 2.5: Strengthening the Laboratory-Clinic Interface

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<td>Integration of the HIV-Rapid Test Continuous Quality Improvement Program into the Clinic-Lab Interface Programs in Healthcare Facilities Supported by the United States President’s Emergency Plan for Aids Relief (PEPFAR) in South Africa</td>
<td>M. Makanya, D. Mtlango, R. Molale, K. Diallo, A. Adelekan, L. Berrie, M. Kalou, J. Davison, J. Honwani</td>
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<td>OP-3.1-001</td>
<td>The Need to Synergize Partnerships Toward One Health Approach for Effective Medical Laboratory Services in Africa</td>
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<td>OP-3.2-006</td>
<td>Newborn Screening Initiatives for Sickle Cell Disease in Africa</td>
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<td>13:00 – 13:05</td>
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<td>Supporting a Regional and Cross-Country Approach to the Strengthening of the Epidemiological Surveillance System In Four Countries in West Africa</td>
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*Tuesday, 11 December*

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- **PS-1.2** Assessing the burden of emerging communicable and non-communicable diseases
- **PS-1.3** Laboratory for understanding, treating and preventing disease
- **PS-1.4** Combatting antimicrobial resistance
- **PS-1.5** Laboratory networks and systems for outbreak response

**POSTER SESSION 2**

**TRACK 2: LABORATORY RESPONSE**

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- **PS-2.2** Improving diagnostics to achieve Universal Health Coverage and International Health Regulations
- **PS-2.3a** Improving quality, safety and cost effectiveness of laboratory systems
- **PS-2.4** Workforce development
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**POSTER SESSION 3**

**TRACK 2: LABORATORY RESPONSE**

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**POSTER NUMBERS:**

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**TRACK 3: SYNERGIZING PARTNERSHIPS**

**POSTER NUMBERS:**

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- **PS-3.2** Partnerships and collaborations for Universal Health Coverage and International Health Regulations
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PS-2.3b-067 Use of Quality Indicators to Evaluate Performance in Laboratories Preparing for ISO 15189-2012 Accreditation in Kenya
PS-2.3b-068 Lessons Learnt from the Helpdesk: Managing a Web-based Database for Proficiency Testing
PS-2.3b-069 Improving Knowledge of Quality Management Systems: The Quality Initiative Website
PS-2.3b-070 The Importance of Reporting Individual Laboratory Turn-Around-Time (TAT) Performance Weekly to Identify Outliers and Ensure Timely Intervention to Prevent Delays in Patient Results
PS-2.3b-071 Laboratory Continuous Quality Improvement: Implications for Scaling Up of HIV Viral Load and Early Infant Diagnosis in Kenya.
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PS-2.3b-080 Performance Evaluation of the HBV Quantitative DNA PCR Using Venous Plasma Samples On Existation Universal Molecular Diagnostic System (Bioneer)
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PS-2.3b-082 Using Rapid HIV Proficiency Testing Data to Monitor the Performance of Kenya’s National Rapid HIV Testing Algorithm
PS-2.3b-083 Introducing Post Market Validation of GeneXpert MTB/RIF Cartridges in Nigeria
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PS-2.3b-087 Successful Implementation of SLMTA and Challenges on the Road to Accreditation of the national Public Health Reference Laboratory in post-Ebola Liberia
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PS-2.3b-089 Implementation of a comprehensive Model of Quality Management System at county Referral Hospital Laboratories In Liberia During the Ebola Aftermath
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PS-2.4-106 Knowledge and Utilization of HIV Post Exposure Prophylaxis Among Health Care Workers at Busia County Referral Hospital
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PS-2.4-108 Using Modified SLMTA Facility-Focused Mentorship Approaches for Laboratory Quality Management Systems Improvement in Kenya
PS-2.4-109 Assessment of Knowledge and Perception of Medical Laboratory Microbiologists on Best Practices that Facilitate Implementation of Quality Management System
PS-2.4-110 Assessment of the Knowledge and Practices of Handling of Rowmanowsky-type Stains used for Malaria Microscopy among Suppliers in Plateau State, Nigeria, February to June, 2018
PS-2.4-111 Predictors of Malaria Microscopy Practices among Laboratory Personnel in Plateau State, Nigeria, February to June, 2018
PS-2.4-112 Flaccid Paralysis Surveillance: A Descriptive Assessment of the Knowledge of Community-based Health Workers in Plateau State, Nigeria.
PS-2.4-113 Predictors of Knowledge Malaria Microscopy among Laboratory Personnel in Plateau State, Nigeria, February to June, 2018
PS-2.4-114 A Descriptive Assessment of Knowledge of Laboratory Personnel on Malaria Microscopy in Plateau State, February to June 2018
PS-2.4-115 Task Shifting Prospects and Challenges of Implementation in Two Laboratories in Kano, Nigeria
PS-2.4-116 All-inclusive Mentorship Approach, a Game Changer in Accelerated QMS Establishment in Western Kenya
PS-2.4-117 Improving Retention: Predicting ART Retention Among PLHIV using a Supervised Machine Learning Approach
PS-2.4-118 Analysis of HIV Point of Care Testing Sites in Cote d’Ivoire Reveals Gaps in Tester Competence
PS-2.4-119 Training Impact on DBS specimen Integrity Logged at Lagos State University Teaching Hospital-Antiretroviral Clinic Laboratory (LASUTH-ART)
PS-2.4-120 Bridging the Gap Between Training and Implementation of Quality Management System Through Structured Mentorship
PS-2.4-121 Ongoing Competency Assessment to Maintain HIV Testing Skills
PS-2.4-122 Assessment of Tuberculosis Infection Control Knowledge, Attitude and Practices of Healthcare Workers in Jos North, Plateau State Nigeria
PS-2.4-123 The Impact of Mentorship Program in the Molecular Biology Laboratory of José Macamo General Hospital, Maputo/Mozambique
PS-2.4-124 Building Capacity for Sustainable Training and Credential Maintenance Systems for Laboratory Professionals to Address HR Concern in TB Laboratory Programs

PS-2.4-125 Biosafety Awareness and practices Among Medical Laboratory Personnel in Bayelsa state, Nigeria

PS-2.4-126 Mentorship and Supervisory Programme to Improve Quality of Tuberculosis Reference Laboratories in Nigeria: An Implementation Research

PS-2.4-127 Ensuring Quality of HIV Testing by Non-Laboratory Staff in TASO-Mbarara, 2018

PS-2.4-128 Impact of Personnel Training in Method Verification on Equipment Acceptance Testing in Mulago National Referral Hospital Laboratories

PS-2.4-129 The Impact of Personnel Training on Biosafety Practices in Private Laboratories Within Kampala District

PS-2.4-130 Implementation of a Professional Development Program in Laboratory Leadership and Quality Management in Zambia from 2016 - 2018

PS-2.5-131 Customer Satisfaction with Clinical Laboratory Service at Public Hospitals in Ethiopia, 2017

PS-2.5-132 The Role of Psychosocial Support in Improving Adherence and Viral Load Outcome Among Adolescents Living with HIV/AIDS in Tanzania

PS-2.5-133 Evaluation of Clinicians Satisfaction with the Laboratory Services at the Bamenda Regional Hospital Laboratory (BRHL), Cameroon

PS-2.5-134 Health Professionals Perception and Satisfaction on Quality of Laboratory Malaria Diagnostic Service; the Case Awi Zone, North Ethiopia

PS-2.5-135 Use of Point of Care Early Infant Diagnosis Reduces Time to Art Initiation in Lesotho

PS-2.5-136 Timeliness, Availability, and Utility of Viral Load Tests and Results at Health Facilities in Western Kenya

PS-2.5-137 eLABS: Digital Health Intervention Strengthens the Clinical-Laboratory Interface for the HIV Viral Load Value Chain in the Luanshya District, Zambia

PS-2.5-138 Role of Viral Load Remote Login System in Monitoring Antiretroviral Therapy for People Living with HIV

PS-2.5-139 Impact of Laboratory Test Turn Around Time (TAT) on Customers Satisfaction in PLASVIREC, Jos

PS-2.5-140 Using an MHealth Intervention to Link Health Facilities and Testing Laboratories in Improving the Uptake of Viral Load Testing in Southern Tanzania

PS-2.5-141 Exploring Automation of Viral Load Result Transmission from Reference Lab to Electronic Medical Record Systems in Central Kenya

PS-2.5-142 Improving the Turn-around-Time for Laboratory Tests in the Immuno-Heamatology and Chemistry Sections at Levy Mwanawasa University Teaching Hospital Lusaka, Zambia

PS-2.5-143 Factors That Determine Turn Around Time for HIV Viral Load Testing

PS-2.5-144 On-site EID and VL Testing Through Integration on GeneXpert Devices Leads to Increased and More Timely Clinical Action: Pilot Results From Zimbabwe

PS-2.5-145 Non-clinical Factors Associated with Unsuppressed Viral Load among Children on ART — Côte d’Ivoire, October 2016–September 2017

PS-2.5-146 Reducing the Viral Load and Early Infant Diagnosis Results’ Turnaround Time in Northwestern Province, Zambia


PS-3.1-092 Bacteria Flora of Some Vegetables Sold in Major Markets in Ado-Ekiti, Nigeria

PS-3.1-093 Ticks (Acari: Ixodidae) Infesting Cattle in Selected Districts of Uganda, 2017

PS-3.1-094 Antimicrobial Resistance in Food Producing Animals and Environment in Nigeria

PS-3.1-095 Antimicrobial Resistance of Escherichia coli isolated from Household Water in Municipal Ibadan, Oyo State, Nigeria
PS-3.2-096 Innovations and Medical Laboratory Practice in the Digital Economy Era: The Quintessential Role of Platforms
PS-3.2-097 Improved Upper Management Support for Sustainable Laboratory Improvement: Lodwar County Referral Hospital (LCRH), Kenya Experience
PS-3.2-098 BIOBANKING AND ME: A Speaking Book to Engage Communities on the Value of Biobanks
PS-3.2-099 G5 Sahel Biosafety Network: Successes and Challenges
PS-3.2-100 The Role of the International Research Center of Excellence in Building Research Capacity for Infectious and Non-Infectious Diseases Research in Nigeria: A South-Driven North-South Collaborative Approach in West Africa
PS-3.2-101 I-Lab: Connecting Clinical Laboratories to Infectious Diseases Surveillance Systems in Senegal
PS-3.2-102 Ministry of Health Led Development of a Sustainable Laboratory Equipment Management Program: the Kenyan Experience
PS-3.2-103 Developing a Sustainable National Laboratory Equipment Calibration Center in Nairobi, Kenya
PS-3.2-104 Improvement of Quality Management System Through Partnerships in Botswana
PS-3.2-105 Optimization of Laboratory and Sample Referral Networks: A critical Step to Adequate and Cost-Efficient Commodity and Procurement Management
PS-3.2-106 US – Nigeria Military to Military Partnership: A Key Strategy for Ownership and Sustainability of PEPFAR Investment
PS-3.3-107 Infection Prevention and Control in a Treatment Centre During a Lassa Fever Outbreak in Southeastern Nigeria - January, 2018
PS-3.3-108 Building Capacity for TB Data Analytics in Low- and Middle-Income Countries
PS-3.3-109 Tele-Mentoring to Improve Laboratory Capacity to Detect AMR in Kenya
PS-3.4-110 The Role of the Private Health Sector for Tuberculosis Control in Debre Markos Town, Northwest Ethiopia
PS-3.4-111 Accessibility of Early Infant Diagnostic Services by Under-5 Years and HIV Exposed Children in Muheza District, North-East Tanzania
PS-3.4-112 A Proactive Approach to Maximize Resources When Providing Technical Assistance for HIV Testing Services
PS-3.4-113 Scaling up Viral Load Monitoring Using Technical Assistance from ASLM, Sierra Leone’s Experience
PS-3.5-114 Antiretroviral Therapy (ART) as a Public Health Strategy for the Prevention of Mother to Child Transmission (PMTCT) of HIV in Kenya
PS-3.5-115 Implementing an Equipment Calibration Initiative Through the Global Health Security Agenda (GHSA) Program to Support National Laboratory Systems in Senegal
PS-3.5-116 Developing a National Action Plan on AMR for Nigeria
**Tuesday, 11 December**

**ORAL SESSION OA-1.1**

**ASSESSING THE BURDEN OF HIV, TUBERCULOSIS AND MALARIA**

**DATE:** Tuesday, 11 December  
**TIME:** 11:00 – 12:30  
**ROOM:** Congress Hall  
**CO-CHAIRS: Fausta Mosha, WHO/AFRO, Oyewale Tomori, Redeemer’s University**

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**OA-1.1-001 TIME: 11:00**

D. G. Debebe  
1. Medical Immunology, University of Gondar, Gondar, Amhara, Ethiopia.

**HIV and Its Co-infection with HBV Among Pregnant Women in Ethiopia and Its Implication for Preventing Vertical Transmission: A Systematic Review and Meta-Analysis**

**Background:** HIV causes millions of death worldwide, and the prevalence is surging again in Ethiopia. To date, the pooled prevalence of HIV infection among pregnant women was not conducted in Ethiopia. Thus, this systematic review and meta-analysis aimed to figure out the pooled prevalence of HIV and its co-infection with HBV among pregnant women in Ethiopia.

**Methods:** We searched PubMed, Google scholar, Science Direct and EMBASE databases from January 1 to 31, 2018 to select the most relevant studies published in Ethiopia. A total of 1405 titles were identified and 15 studies met the inclusion criteria. Descriptive and quantitative data of included studies were presented in tables and forest plots. The I2 statistics was used to assess heterogeneity between studies. The random effects model was used to determine the pooled prevalence analysis and 95% confidence intervals. The statistical analysis was performed using the Stata version 11.

**Results:** A total of 13,746 participants were considered from 15 included studies. Among subjects, 717 were infected by HIV only, and 12 were HIV-HBV co-infected pregnant women. In this meta-analysis, the pooled prevalence of HIV among pregnant women in Ethiopia was 5.74% (95% CI, 3.96%–7.53%). Regional analysis showed that 9.50% (95% CI; 7.76%–11.23%) in Amhara, 4.80% (95% CI; 3.12%–6.49%) in Addis Ababa, 2.14% (95% CI; -0.54%–4.82%) in SNNP and 4.48% (95% CI; 2.56%–6.41%) in Oromia region. Besides, six studies reported HIV-HBV co-infection and the pooled prevalence was 0.68% (95% CI; 0.27%–1.08%) among pregnant women in Ethiopia.

**Conclusion:** The pooled prevalence of HIV infection in pregnant women was considerably high in Ethiopia. Moreover, high prevalence of HIV infection was also determined in Amhara region, followed by Addis Ababa and Oromia compared to SNNP. This study also sought the burden of HIV-HBV co-infection. Therefore, national HIV prevention and interventional planning on pregnant women has to be based on the knowledge of HIV regional prevalence and its co-infection with HBV.

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**OA-1.1-002 TIME: 11:10**

G. Zhang, M. Kouakou-Adade, P. Minchella, L. Ya, K. Diallo, C. Zeh, C. Adje-Toure, L. G. Ouedraogo

1. US Centers for Disease Control and Prevention (CDC), Atlanta, GA, United States.  
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4. Centers for Disease Control and Prevention, Atlanta, GA, United States.

**Immunologic and Virologic Status in HIV-1-Infected Adults in Côte d’Ivoire (1998-2015)**

**Background:** To assess the prognosis of HIV-infected patients receiving long-term antiretroviral therapy (ART). This study evaluated longitudinal immunologic and virologic status from 1998-2015 in HIV-1-infected adults receiving ART in Abidjan, Côte d’Ivoire.

**Methods:** We identified 12,962 HIV-1-infected adults who initiated ART at clinics in Abidjan between 1998 and 2004 and had follow-up data through 2015. All patients received free CD4 count and viral load testing according to national guidelines at Projet Rétrovirus Côte d’Ivoire (RETO-CI). We retrospectively analyzed viral suppression (< 1000 copies/ml), CD4 count (cells/mm3) and ART data collected from patient medical records (1998-2015) in the RETO-CI laboratory information system. Logistic and multiple linear regression models were used for statistical analysis.

**Results:** From 1998 to 2015, the viral suppression rate in these patients increased from 34.0% to 81.3%. Logistic regression (adjusted for age and sex) results showed a significant increase in the viral suppression rate (P<0.001). Patients receiving ART were 12.6% (95% confidence interval [CI] 11.7%–13.5 %) more likely to achieve viral suppression after each year on ART. The median CD4 count increased from 147 (interquartile range [IQR]: 27-317) to 457 (IQR: 323-619) for men, and from 212 (IQR: 84-356) to 597 (IQR: 402-800) for women over the 17 years. Multiple linear regression (adjusted for age and gender) results showed a significant increase in CD4 count (P<0.001), with an average annual increase of 25.8 cells/mm3 (95% CI 25.4-26.4). Overall, of those eligible to receive it, ART coverage in Côte d’Ivoire increased from 1% in 2003 to 34% in 2015, and was significantly correlated with improved viral suppression rates (P<0.001) and increased CD4 counts (P<0.001).

**Conclusion:** This study demonstrated substantial improvement in virologic and immunologic parameters among HIV-1-infected adults receiving ART in Côte d’Ivoire between 1998 and 2015, especially after rapid scale-up of HIV treatment services since the inception of PEPFAR in 2004.
**OA-1.1-003  TIME: 11:20**

**C. Zeh**¹, G. Zhang², M. Kouakou-Adade³, L. Ya³, K. Diallo⁴, L. G. Ouedraogo¹, H. Alexander⁵, C. Adjé-Toure⁶

1. Laboratory, CDC Atlanta, GA, United States.
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5. U.S. Centers for Disease Control and Prevention, Atlanta, GA, United States.

**Anemia Among Adults Receiving Antiretroviral Therapy in Côte d’Ivoire, 1998-2015**

**Background:** Blood haemoglobin levels are used as a prognostic indicator in HIV-infected patients and to monitor drug-related abnormalities such as anemia, which may be associated with certain antiretroviral therapy (ART). We retrospectively analyzed hemoglobin levels and anemia rates among 12,962 HIV-1-infected adults who received laboratory services at Projet Rétrovirus Côte d'Ivoire (RETRO-CI) in Abidjan and had follow up data from 1998 to 2015.

**Methods:** We collected demographic data, mean hemoglobin levels, and anemia rates from patients medical records (1998-2015) in the RETRO-CI laboratory information system. At RETRO-CI hemoglobin levels were measured at each visit following ARV initiation. The Division of AIDS toxicity table was used to categorize anemia over time. Logistics and multiple linear regression models were used for statistical analysis.

**Results:** Patients median age at ART initiation was 36 years (interquartile range, 30-43 years) and most participants (56.7%) were women. Of all patients, 50.4% started on NRTI and NNRTI triple ART. From 1998 to 2015, the mean haemoglobin levels increased from 10.7 g/dl (95% confidence interval [CI] 6.3-15.1) to 13.46 g/dl (95% CI 11.2-15.8) in males and from 9.8 g/dl (95% CI 6.3-13.4) to 11.8 g/dl (95% CI 9.2-14.3) in women. From 1998 to 2015, anemia rates decreased from 82.8% to 30.0% in men and from 88.9% to 45.8% in women. Multiple linear regression (adjusted for age and sex) showed significant increasing mean haemoglobin levels (P<0.001) during the first six years of treatment, with average annual increase of 0.43 g/dl (95% CI 0.42-0.44). Logistic regression (adjusted for age and sex) results showed the anemia rate significant decreased (P=0.006) during the first six years of treatment. The anemia rates did not significantly differ between patients who received AZT and non-AZT based regimens (p>0.05).

**Conclusion:** Prolonged ART significantly reduces anemia over time, especially for men.

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**OA-1.1-004  TIME: 11:45**

**J. M. Kang’ethe**¹

1. Laboratory Medicine, CCC, Kenyatta National Hospital, Nairobi, Kenya.

**Virological Suppression Among HIV Infected Adolescents and Youths Receiving Art in the National Teaching and Referral Hospital in Kenya**

**Background:** HIV virological suppression is poor among the adolescents and youths which may be related to several factors including adherence to antiretroviral therapy. This study aimed to determine the HIV virological response and the associated risk factors among adolescents and youths on ART.

**Methods:** This was a cross-sectional study among adolescents and youths aged 10 to 24 years in Kenyatta National Hospital who were on ART for at least six months. Patient characteristics were captured in a questionnaire and viral load was abstracted from electronic medical records. Viral suppression was presented as a proportion based on viral load less than 1000 copies per milliliter of plasma. Viral suppression rate was associated with categorical independent factors using chi square test and means were compared using independent T –test.

**Results:** The mean age was 17 years (SD 4.3 years) and 55.6% were females. The median CD4 count was 573 cells per micro liter of blood (IQR: 344-1780). A total of 227 (74.2%) HIV infected adolescents and youths were virologically suppressed. As compared to children 10-14 years old who had 83.2% suppression rate, adolescents 15-19 years had poorer suppression rate at 69.6% [OR 0.5 (95% CI 0.2-0.9), P= 0.022]. Similarly youths 20-24 years had a lower suppression rate at 70.8% compared to the children [OR 0.5 (95% CI 0.2-0.9), P= 0.022]. Viral suppression rate was lower among ART defaulters (47.2%), those defaulting clinic appointments (51.7%) and those not honoring ART refill (50%).

**Conclusion:** HIV viral suppression among adolescents and youths was low and even much lower among 15 to 24 year-olds. Poor ART adherence and non-compliance to clinic appointments increased the risk of poor virological response.
High Rates of Virological Failure and HIV-1 Drug Resistance Among Children in the Northwest Region of Cameroon: An Appeal for Improved Laboratory Monitoring

Background: Virological failure (VF) among children is expected to be as high as 20%. Therefore, failure rates beyond this threshold call for urgent intervention, especially if associated with HIV drug resistance (HIVDR). We aimed to determine the prevalence of VF, evaluate acquired HIVDR and genetic diversity among children in urban and rural settings of Northwest Cameroon.

Methods: A study was conducted among 363 HIV-infected children (≤18 years) receiving ART in urban (Bamenda Regional Hospital) and rural (Mbingo Baptist Hospital) settings of Northwest Cameroon, from November 2017 through May 2018. Viral load was done using the Abbot m2000RealTime; HIVDR testing was performed by sequencing of the HIV-1 protease-reverse transcriptase and phylogeny using MEGAv.6. VF was defined as viral load (VL) ≥1,000 copies/ml while DR mutations (DRM) were interpreted using HIVdbv8.5. Data were compared between urban and rural, and p<0.05 was considered statistically significant.

Results: VL coverage was 100% (urban) versus 77% (rural). Overall, VF was 40.5% (39%/130/332) urban versus 41%/13/31) rural; p=0.45 while undetectable VL (<40 copies/mL) was 45.5% (46%/urban) versus 45% (rural); p=0.47. Among those experiencing VF (mean-viremia: 5.27log copies/ml) while DR mutations (DRM) were detected. Following WHO guidance, NNRTI TDR was classified as prevalent resistance, HIVDR testing and surveillance capacity in Malawi should be prioritized as scale-up and maturation of the ART program continues.

Conclusion: VF is very-high in children from both rural and urban settings, with less than half achieving viral control. Interestingly, VF is consistent with resistance to RTIs, indicating the inefficacy of these drug-regimens. With poor VL coverage in rural settings, the VF coupled with HIVDR accumulation call for improved VL coverage in rural settings and early VL monitoring to limit paediatric HIVDR emergence.
The Burden of Undiagnosed Diabetes Mellitus in Adult African Population: A Systematic Review and Meta-Analysis

Background: The prevalence of diabetes is rapidly increasing in Africa. Type two diabetes may remain undetected for many years, leading to severe complications and health care costs. This stresses the importance of understanding the burden of undiagnosed diabetes mellitus in different populations of Africa. This study was intended to summarize and pool the results of community-based studies to provide a regional level estimate of the undiagnosed diabetes mellitus.

Methods: We searched MEDLINE/PubMed, HINARI, Cochrane library and Google Scholar for community-based studies on diabetes mellitus in Africa. Descriptive information for the original studies was presented in a table, and the quantitative results were presented in forest plots. The Cochrane Q test and I2 test statistic were used to test heterogeneity across the studies. The pooled prevalence of undiagnosed diabetes mellitus and subgroup analyses within urban and rural population was computed by a random effects model from 2011 to 2017 years.

Results: Hundred and Fifty-seven articles, were identified through electronic searching using keywords. Of these, seventeen studies, with a total population of 20,350 were met the inclusion criteria. A random effect meta-analysis showed that the pooled prevalence of undiagnosed diabetes mellitus in African population was 5.37% (95 % CI: 4.57, 6.81). The pooled prevalence from subgroup analyses indicated that undiagnosed diabetes mellitus in the urban population, 8.68% (95 % CI: 5.33, 12.03) was twice higher than rural 3.93 % (95 % CI: 2.91, 4.95) populations.

Conclusion: This study found that there were higher proportions of undiagnosed diabetes mellitus cases in many areas of the African countries. Policymakers must consider strategies for screening of undiagnosed diabetes mellitus cases for the effective care, which can bring about a substantial reduction in diabetes related complications and mortality.
The Population Dynamics of Haemoglobins F, A2 and S in the Context of the Haemoglobinopathies HbS and α+thalassaemia among Kenyan Children 3-12 Months of Age

**Background:** While the pattern of haemoglobin switching has been well described in many populations, few studies have been undertaken in Africa where the presence of haemoglobinopathies including sickle cell anaemia (HbSS) and α+thalassaemia can complicate the picture.

**Methods:** In the current study, we used the BioRad Variant Classic™ HPLC device to document the production patterns of the common haemoglobin variants HbA, HbA2 and HbS by age and α+thalassaemia genotype among 15,301 3-12 month old children who were recruited from within a defined area on the Kenyan Coast.

**Results:** We found that HbF% was highest and declined most slowly among HbSS children. Consistent with previous studies, we found no significant association between HbF% and gender in children with HbSS but we did find an association in those with HbAA, in whom HbF% was consistently higher in females beyond the 5th month of life. We confirmed that HbA2 measurements using the BioRad Variant instrument are unreliable in HbAS and HbSS subjects but found that HbA2% exceeded 4.0% in 0.75% of HbAA children.

**Conclusion:** Beta-thalassaemia, a condition that has not been widely reported within the East African region previously, may therefore be present at low frequencies in the Kilifi population, a finding worthy of further investigation. Our study provides a rare description of the dynamics of Hb production in a large population of Kenyan children.

Prevalence of Colonizing Enterococci Species in Puerperal Mothers and Their Newborn in a Tertiary Hospital in North Central Nigeria

**Background:** Enterococci are often found colonizing mothers and their newborns. Increasing plasticity of the Enterococcus genome has resulted in the emergence of antibiotic-resistant and virulent strains of colonizing species. We determined the prevalence of Enterococci colonization among intrapartum mothers and their newborn and any association with maternal antimicrobial use.

**Methods:** Sera and vaginal swabs were obtained from women intrapartum and throat swabs from their newborn at birth in a Tertiary hospital in Abuja from April 2016 to March 2017. Swabs were processed using standard microbiological procedures to isolate Enterococcus species. Presence of antibiotic in maternal sera was determined using Micrococcus luteus inhibition assay. Isolates were screened by disc diffusion for Vancomycin susceptibility and interpretation was done using the M100-CLSI 2017 document.

**Results:** Enterococcus species were identified in 472/1272 (37.1 %) maternal and 146/1265 (11.5 %) newborn swabs. Concordant Enterococci colonization was identified in 96 mother-newborn pairs. There was antimicrobial activity in 165/697 (23.7 %) maternal sera tested, of which 84/165 (50.9 %) mothers were colonized with Enterococci, versus 222/532 (41 %) of non-exposed mothers who were colonized, [OR (95 % CI): 1.04 (0.34, 3.17)]. There were 4/119 (3.4 %) newborns of antibiotic-exposed mothers versus 16/494 (3.2 %) newborns of non antibiotic-exposed mothers with enterococci colonization [OR (95 % CI): 1.45 (1.022 - 2.06)]. Prevalence of Vancomycin Resistant/ Intermediate Resistant (VRE/ VIE) Enterococci was 19/48 (39.6 %). By maternal antibiotic exposure groups, VRE/VIE prevalence in the antibiotic-exposed group was 4/12 (33.3 %) versus 15/36 (41.7 %) in the antibiotic-unexposed group. [OR (95 % CI): 1.45 (0.18 - 2.76)].

**Conclusion:** Our findings suggest a high prevalence of enterococci colonization among women intrapartum and their newborns and an association with prior maternal antibiotic use. The high prevalence of VIE/VRE in this study sample indicates a need for better antibiogram stewardship in this setting.
High Prevalence of Hepatitis B Virus Among Volunteer Nonpaid Blood Donors in Post-Ebola Liberia: Results From the National Blood Safety Program Surveillance System

Background: The National Blood Safety Program (NBSP) is mandated to provide safe blood to clients and thus it screens every blood unit collected for common transfusion transmissible infections (TTIs). Serological assays are used to screen for malaria, human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis, using rapid diagnostic tests (RDTs).

Methods: A retrospective review of all potential donors at two Liberian regional blood centers between January 2017 and June 2018 was carried out to determine the prevalence of malaria, and sero-prevalence of HIV, HBV, HCV and syphilis. Potential donors were screened for malaria (Paracheck®) and anemia (HemoCue®), while donors were screened for HIV (Alere Determine™ HIV-1/2 Ab), HBV, HCV and syphilis (all SD-BIOLINE).

Results: There were 3,229 potential adult donors (≥18 years old) in the 18-month period. Donation was deferred in 1,119 (35%) potential donors, due to malaria (309/3,229 =9%), anemia (303/3,229 =9%) and miscellaneous reasons (426/3229 =13%). Among the 2,110 donors, the sero-prevalence of HBV was 13.4% (95% confidence interval (CI) 11.5%-15.3%). Prevalence of HBV among donor sub-populations ranged between 8.4% and 14%. The prevalence of HIV, HCV, and syphilis were 2.3% (95%CI 1.4%-3.0%), 0.05% (95%CI 0%-0.2%), and 1.7% (95%CI 0.9%-2.3%), respectively. Data shows that 0.5% donors had dual infections of HIV and HBV (0.25%) and HBV and syphilis (0.25%). Total transfusion transmissible infectious units discarded = 404/2110 (19%).

Conclusion: The sero-prevalence of HBV among donors was high, though similar to other West African countries, like Nigeria and Burkina Faso. There was also high prevalence of malaria and anemia among potential donors. The high prevalence of HBV and its corresponding greater potential window period infection, has prompted urgent public health interventions, including the development of a hepatitis-management task force, as well as HBV vaccination for health personnel and for vulnerable populations.
Background: Hepatitis B e Ag disease remains a global burden with more than 73% of Asian Chronic Hepatitis B patients (CHB) being HB e Ag negative when cirrhosis or hepatocellular carcinoma (HCC) develops. In Uganda a study done at MBN among HBV patients found a prevalence of 82.4% HB e Ag negative disease. The HB e Ag is crucial in the virus activity and transmission but little is known about its relationship with viral load in Uganda. The aim of this study was therefore, to determine the relationship between viral load and HB e Ag status in Uganda.

Methods: This was a prospective cross-sectional study where 296 samples from HBV chronic carriers in Kampala and Arua aged 1–60 years were collected from February to June 2017. All the samples were tested for HB e Ag using COBAS 311 at MBN laboratory. The samples were also tested for viral load at CPHL. Factors such as age, sex and regional differences were considered. The viral load of 20,000 IU/ml was used as a threshold for clinical interpretation as guided by the WHO guidelines for managing CHB. Data analysis was done using SPSS software.

Results: Of the 296 patients, 276 (93%) were negative for HB e Ag and 20 (7%) were positive for HB e Ag. Of the 276 HB e Ag negative patients, 33 (12%) and of the 20 HB e Ag positive patients, 16 (80%) had a viral load (VL) >20,000IU/ml. The rest of the patients i.e. 88% of HB e Ag negative and 20% HB e Ag positive had a VL <20,000IU/ml. The HB e Ag positivity had a significant relationship with HBV with an adjusted OR of 0.007 at 95% CI. The HB e Ag positivity was highest (55%) in adults aged 16-30 years. The 6 of 20 (30%) HB e Ag positives were from Arua and 14 of 20 (70%) came from Kampala. However, region, sex and age had no significant relationship with HB e Ag status (ORs 0.005, 0.508 and 0.962, respectively at 95% CI).

Conclusion: Active disease demonstrated by high viral load (>20,000IU/ml) still occurs in a small proportion of HB e Ag negative patients. The HB e Ag is a good marker for high viral replication and hence helping in treatment initiation for HB e Ag positive patients but it is not the only one especially in HB e Ag negative patients as it should be coupled with other tests like viral load to assess for treatment initiation. This study recommends a more detailed analysis of all the possible determinants of HB e Ag negative disease such as genotypes, mutations, HIV co infections in Uganda.

Safety and Immunogenicity of a Heterologous Prime-Boost Ebola Virus Vaccine Regimen – ChAd3-EBO-Z Followed by MVA-EBO-Z in Healthy Adults in Senegal: EBL06 Clinical Trial

Background: The 2014 West African outbreak of Ebola virus disease highlighted the urgent need to develop an Ebola vaccine. Protection against Ebola virus would require humoral and cellular responses by development of IgG directed against viral glycoprotein and activation of CTL responses. The objective of the EBL06 study was to evaluate the safety and the immunogenicity of the heterologous prime-boost regimen with ChAd3-EBO-Z followed by MVA-EBO-Z vaccine

Methods: Between July 2015 and March 2016, a randomized, open label Phase Ib clinical trial was conducted to assess the prime-boost regimen of ChAd3-EBO-Z followed by MVA-EBO-Z one week later, either in the same arm or in the contralateral arm, in healthy Senegalese adults. Safety was assessed by active and passive collection of local and systemic adverse events (AE). Immunogenicity was assessed by measuring the humoral and cellular responses. Vaccine-induced IgG antibodies were measured using a standardized ELISA against recombinant trimeric Zaire Ebola glycoprotein at different time points including day 0, 7, 14, 28, 56, 90 and 180. Cellular responses were measured using an ex-vivo IFN ELISpot (day 0, 7 and 14) and intracellular cytokine staining (day 14).

Results: There was no reported fever or severe AEs and only a low proportion of mild to moderate AEs. Cellular responses including vaccine-induced IgG antibody and IFN ELISpot peaked at day 14, one-week post MVA vaccination. No significant difference was observed between the ipsilateral and the contralateral groups for the vaccine-induced IgG and IFN ELISpot responses. However, the intracellular cytokine responses measured by flow cytometry were significantly greater in the vaccinees receiving ChAd3 and MVA vaccines in the same arm rather than the contralateral arm.

Conclusion: This accelerated heterologous prime-boost regime was well-tolerated and elicited potent cellular and humoral immunogenicity. This first trial of MVA-EBO-Z in African adults encourages further testing in Phase II studies with the one week prime-boost interval regimen appearing particularly suitable for outbreak control.
Ebola Virus Testing of Cervical Secretions of Women Surviving the West African Outbreak

**Background:** While it has been shown that the Cepheid Xpert Ebola assay is accurate and precise for detecting Ebola Virus (EBOV) in whole semen, a method for testing female genital secretions has not yet been established. We aimed to validate a test method for detecting EBOV in cervical secretions using spiked specimens from women without prior Ebola Virus Disease (EVD), as well as from EVD survivors in Liberia.

**Methods:** The Cepheid Xpert Ebola assay for EBOV RNA detection was validated for cervical secretion samples obtained from uninfected donors using Softcup cervical cups that were then swabbed using the Remel MicroTest M6™ Multi-Microbe Media (with 1.5ml Viral Transport Media + swab for women). The samples were spiked with inactivated EBOV. The validation procedure incorporated standards from CLSI and GCLP guidelines for evaluating molecular devices for use in infectious disease testing. Using this specimen collection method, we then obtained samples from EVD survivors in Liberia and were stored at -80°C until testing.

**Results:** The EBOV-spiked samples from 100,000-10,000cp/mL were all detected [94/94; 100% (100, 95)]; 1000cp/mL and 500cp/mL were detected inconsistently [86/140, 61% (53, 69) and 39/70, 56% (44, 67) respectively]. The assay produced a limit of detection of approximately 6,500 copies/mL. We obtained 123 samples from the EVD survival study cohort, 83 of 146 female participants donated at least one sample [median 1.5 donations (1, 2)]. Samples were collected between 677-1170 days after discharge from an Ebola Treatment Unit (ETU), an indicator of sample adequacy control (SAC) failures, suggesting that the specimens may have been collected incorrectly or that there may be an inhibitory factor on the PCR reaction present in the specimen.

**Conclusion:** We found that the methodology we applied for cervical secretion EBOV detection is suboptimal with a increased lower limit of detection and invalid result rate than has been reported in testing of semen for EBOV. Additional investigations are needed to identify the specimen collection procedure and test procedures that can reliably detect EBOV in female genital secretions.
**Evaluation of the Genetic Diversity of a Potential Candidate Vaccine MSP3 in Senegal, Comoros, Tanzania and Malawi**

**Background:** Malaria is the most widespread parasitic disease causing highest morbidity and mortality throughout the world. In front of this situation an antimalarial vaccine would be a major advantage to combat and eliminate this scourge. However most of the Plasmodium falciparum genes are characterized by a high allelic diversity, which is an obstacle for vaccine design. In this study we investigated the polymorphism of candidate vaccine Msp3 of Plasmodium falciparum which has two allelic families namely 3D7 and K1.

**Methods:** A total of 235 blood samples were collected: 100 in Senegal (50 from Pikine and 50 from Thies), 50 from Comoros islands, 35 from Malawi and 50 from Tanzania. Nested PCR was applied to determine the polymorphism of msp3 gene after DNA extraction.

**Results:** We found a predominance of the K1 allele in Thies (64%) and in Tanzania (52%). In contrast, the 3D7 allele was more represented in Pikine (52%), Comoros (53%) and Malawi (57%). No significant differences in allele frequencies were noted in these three localities. Additionally, the calculation of the Wright fixation index ($F_{st}$) gave low values in Senegal ($F_{st}=0.025$) and between Senegal and the other Africa localities (Comoros, Tanzania and Malawi) ($F_{st}=0.016$).

**Conclusion:** Our results showed that the distribution of msp3 polymorphism varies according to the localities. Analysis of $F_{st}$ values suggest that there is little genetic differentiation of msp3 gene in Africa. It will be interesting to investigate also the distribution of msp3 polymorphism outside Africa. These informations are very important for the design of a vaccine based on msp3.

**Rotavirus in Africa: Are We Seeing Differences in Genotypes and Virus Evolution Following Vaccine Introduction?**

**Background:** Rotaviruses cause acute pediatric gastroenteritis in sub-Saharan Africa. Two vaccines, RotaTeq® and Rotarix®, have been introduced in more than 37 countries of this region. The field of phylodynamics has increased our understanding of infectious disease evolution and temporal dynamics. The evolutionary rate and population history of viruses can vary over time and geography. Here, we investigate the evolutionary rates and effective population size of common rotavirus VP7 and VP4 genotypes from Africa during the pre- and post-vaccine introduction eras.

**Methods:** Sequences for common VP7 genotypes (G1, G2, G3, G6, G8, G9, G12), n = 655, and VP4 genotypes (P[4], P[6], P[8]), n = 800, were downloaded from GenBank based on sample collection dates spanning 1973-2013. Nucleotide substitutions/site/year and Maximum Clade credibility were calculated using the Bayesian Markov Chain Monte Carlo (MCMC) approach implemented in Beast v2.3.0 with an HKY-gamma model, a lognormal relaxed clock, and a coalescent Bayesian skyline tree prior. The MCMC analyses were run until convergence (250 million generations; effective sample size of >200) and assessed using Tracer v1.6.

**Results:** The mean evolutionary rates (nucleotide substitutions/site/year) estimated for the VP7 genotypes G1, G2, G3, G6, G8, G9 and G12 were $1.53 \times 10^{-3}$, $1.19 \times 10^{-3}$, $3.1 \times 10^{-3}$, $1.48 \times 10^{-3}$, $1.18 \times 10^{-3}$, $4.18 \times 10^{-3}$ and $2.95 \times 10^{-3}$, respectively; for the VP4 genotypes P[4], P[6] and P[8] they were $1.26 \times 10^{-3}$, $1.32 \times 10^{-3}$ and $1.2 \times 10^{-3}$, respectively. The demographic inference from the Bayesian skyline plot showed a significant decrease around 2009-2010, correlating with rotavirus vaccine introduction in Africa in 2009.

**Conclusion:** Continuous evolution of rotavirus in Africa has been observed until the introduction of vaccines. The observed decline in the effective population size of rotavirus from 2009 is possibly a result of vaccine introduction but warrants further study.
Prevalence and Drug Susceptibility Pattern of Group B Streptococci (GBS) Among Pregnant Women Attending Antenatal Care (ANC) in Nekemte Referral Hospital (NRH), Nekemte, Ethiopia

Background: Maternal colonization with GBS in the genitourinary or gastrointestinal tracts is the primary risk factor for disease. Maternal infections of GBS constitute one of the leading pathogens associated with both early and late-onset neonatal sepsis. The aim of this study was to determine the prevalence and drug susceptibility pattern of Group B Streptococci (GBS) among pregnant women.

Methods: A cross sectional study was conducted in Nekemte referral hospital (NRH) between March and May, 2016 on a total of 180 pregnant women. Vaginal swabs were aseptically collected from each pregnant woman using sterile cotton swabs, inoculated in 1.5 ml Todd Hewitt broth (supplemented with colistin and nalidixic acid) and sub-cultured on 5% sheep blood agar. Gram staining, Bacitracin sensitivity test, CAMP test and Drug susceptibility tests were performed. Data on socio-demographic characteristics and associated risk factors were collected using structured questionnaires. Cleaned and coded data were analyzed by SPSS software version 20. P value <0.05 was used as a significance level.

Results: The median age of the participants was 24.5 years (range: 16-38) and 86% participants were urban residents. The total prevalence of maternal GBS colonization from vaginal swab culture was 12.2% (22/180). The prevalence of GBS colonization rate was significantly higher in those pregnant women above 37 weeks of gestation [AOR, 95% CI: 2.1(1.2, 11.6), P= 0.03] and married ones [AOR, 95% CI: 3.2(1.8, 11.6), P< 0.021]. Twenty (91%) of GBS isolates were sensitive to vancomycin and the highest resistance was observed against penicillin G (77.3%).

Conclusion: The prevalence of GBS colonization in this study is significantly high and differed by gestational age and marital status. None of the GBS isolates were resistant to vancomycin but higher resistance was shown against Penicillin G. Screening of pregnant women for GBS colonization, large scale longitudinal studies with molecular characterization of GBS in both mothers and neonates is recommended. Further, antimicrobial prescriptions should be made based on antimicrobial susceptibility test results.

Laboratory-Based Surveillance of Bacteraemia and Antimicrobial Resistance at Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, 2017-2018

Background: Bloodstream infections (BSIs) are a leading cause of mortality particularly in low- and middle income countries (LMICs). The increasing global threat of antimicrobial resistance is impacting negatively on effective treatment of BSIs. Continuous monitoring of resistance pattern is essential to inform rational prescribing. We report our first year experience in institutionalizing routine surveillance of AMR at a university teaching hospital in Nigeria.

Methods: It was a descriptive cross-sectional laboratory-based surveillance of AMR spanning May 2017 and June 2018. Blood culture samples from cases of clinical sepsis were collected and processed using semi-automated BACTEC (Oxoid) blood culture system according to manufacturer’s protocols. Bacteria were identified by standard microbiological techniques. Susceptibility to antibiotics was assessed by disc diffusion technique, and vancomycin E-test. MDR phenotypes were detected according to CLSI 2017 guidelines and other standard protocols. Demographic and microbiology data were entered into WHONET®.

Results: Of the 6,519 admissions during the study period, 601 blood culture requests were made of which 125 (20.8%) were positive with 126 isolates. The main pathogens recovered included the six priority pathogens in blood, reportable on WHO Global Surveillance of AMR spanning May 2017 and June 2018. Twenty (91%) of GBS isolates were sensitive to vancomycin and the highest resistance was observed against penicillin G (77.3%).

Conclusion: A wide spectrum of bacteria is responsible for bacteraemia with half being multidrug-resistant. There is a compelling need for institutionalizing antimicrobial stewardship to optimize use of available antibacterial agents.
Baseline Survey Of Prescribers’ Knowledge and Attitudes Towards Antimicrobial Stewardship in a University Teaching Hospital

Background: Antimicrobial stewardship (AMS) is a core strategy in the global response to the emerging and increasing threat of antimicrobial resistance (AMR). However, there is little evidence for practice of hospital AMS in low- and middle-income countries. As part of initial efforts in setting up hospital AMS, we carried out a survey to assess the knowledge, attitudes and practices of prescribers towards AMS.

Methods: This was a cross-sectional study amongst prescribers at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife employing anonymous self-administered questionnaires, March-July 2018. Participants responded to questions with 5-point Likert items and the scores aggregated to Likert scales for knowledge and attitude. Data was analysed using descriptive and inferential statistics.

Results: Respondents totalled 130 (house officers: n=4/3.1%, medical officers: n=7/5.4%, residents: n=64/49.2% and consultants: n=55/42.3%). Eighty-four (64.6%) had good knowledge (Likert scale >3.5) of AMS. Of these, 76 (58.4%) and 78 (60%) were familiar or very familiar with the terms “antimicrobial stewardship” and “antibiogram” respectively. Ninety-one (70%) reported above average knowledge of spectrum of coverage of antimicrobials while only 48 (36.9%) knew how to interpret antibiograms. Positive attitudes (Likert scale >3.5) were recorded in 126 (96.9%). Majority agreed that education (n=130; 100%), guidelines (n=128; 98.5%) and improved microbiology support (n=120; 92.4%) would improve prescribing practices while 74 (56.9%) and 90 (69.2%) agreed with formulary restriction and prior authorisation respectively. Antibiotic choice was often or always influenced by immunocompromise or critical illness amongst 77 (59.3%) respondents while 69 (53%) rarely or never considered risk of Clostridium difficile colitis. Knowledge correlated positively with attitude (r=0.439, p<0.001).

Conclusion: Tertiary-care prescribers have positive attitudes towards AMS although less than two-thirds of them have good knowledge. Interventions including improved microbiology services, education and guidelines should be prioritised in institutionalizing AMS program.

Relationship Between Antibiotic Sensitivity Testing and Antibiotic Prescribing Patterns In Children Under 10 years Presenting with Diarrhea: Findings and Implications for Eswatini

Background: Microbial culture and antibiotic sensitivity testing plays an important role in controlling antibiotic overuse, a major driver of antimicrobial resistance (AMR), by effectively identifying the infecting pathogen and the antibiotics mostly likely to inhibit its growth. Eswatini has two health facilities with microbiology laboratory, resulting in long turnaround time for further facilities, particularly clinics. This retrospective analysis examined relationship between antibiotic prescriptions and laboratory sensitivity results for patients with diarrhea.

Methods: We analyzed 445383 prescriptions from Client Management Information System (CMIS) of patients (<10 years) between January 2016 and Dec 2017 at 95 facilities and 295 susceptibility results from the only two hospitals accessing microbiology for diarrheal samples during same period captured through the laboratory information system, DISA. Revisits patterns were analyzed to determine efficacy of treatment and preliminary signs for AMR. Descriptive and logistic regression analyses were conducted using S.TATA 14.

Results: Probability of antibiotic prescriptions for diarrheal cases increased from 86% (2016) to 88% (2017) in clinics, and 45% (2016) to 49 % (2017) in hospitals. The most common antibiotics were Metronidazole 45%, Co-trimoxazole 24%, and Amoxycilin 11%. Culture results showed E. coli was the predominant pathogen (38%). Antibiotic sensitivity results showed that 86% of E. coli cases were resistant to Co-trimoxazole and 43% to Amoxylin. Metronidazole sensitivity results were not available. Diarrheal revisits only occurred in clinics and decreased from 11 % (2016) to 7% (2017) and 75 % of these had been prescribed Metronidazole on first visit.

Conclusion: Antibiotic prescription for diarrheal infections is less targeted at clinics partly because of unavailability of sensitivity testing. There is evidence for misaligned clinical prescription and sensitivity results, suggesting a need for increased investments in microbiology capacity for health facilities and strengthened specimen transportation system for clinics. Antibiotic sensitivity results for Metronidazole are necessary to guide the prescribing and development of antibiotic prescription guidelines informed by robust AMR surveillance.
Evaluation of the HIV-1 Drug Resistance Among Patient Initiating Antiretroviral Treatment with WHO Guideline in Mali

**Background:** Despite advances in antiretroviral therapy, HIV infection is increasing worldwide with increasing drug resistance (DR) rate. DR is caused by difficulties of non-observance or suboptimal treatment. WHO recommends periodic evaluation of primary resistance the aim of this study was to evaluate the prevalence of the resistant virus in HIV-1 infected patient initiating a first ARV treatment.

**Methods:** HIV-1 patients were recruited at the Center for HIV Care (CESAC and USAC). Resistance testing were done, in-house ANRS technique have been used for sequencing and data was interpreted according to ANRS, STANFORD and REGA algorithms to identify the subtypes, mutations and resistance and made some comparison between the algorithms.

**Results:** We recruited 175 patients and 135/175 (85.98%) was successfully sequenced. 131/135(97.04 %) of patients were naive to ARV treatment. Females were the most represented with 83/135(61.48%) and 86/135(63.704%) had a CD4 cell count < 200. Strain determination using RT sequences indicated that CRF02_AG is the most prevalent with 80.74% (ANRS), 83.7% (STANFORD and REGA). On the other hand, Prot sequences shows that CRF02_AG is the most important with 86.67% (ANRS), and 91.11% (STANFORD and REGA). REGA and STANFORD algorithms reported 9.63% resistance to one ARV class and 0.74% to two classes. On the other hand, the ANRS algorithm indicated 18.52% and 3.7% for one and two families respectively.

**Conclusion:** This study shows an overall prevalence of primary resistance of 9.63% and 18.52% with the Stanford and ANRS algorithms respectively. It has also highlighted the need to extend this study to rural and peri-urban health facilities.

An Analysis of Antibiotic Consumption Situation in Nigeria and its Contribution to Antimicrobial Resistance

**Background:** Globally, human antibiotic consumption rate grew by >30% between 2000 and 2015 with significant increases recorded in low to middle-income countries. A Technical Working Group was set up to conduct a situation analysis on antibiotic consumption. Its objectives were to describe antibiotic use in humans and animals, define its potential impact on the occurrence of antimicrobial resistance (AMR) and to sync with building a laboratory-based surveillance system for AMR.

**Methods:** The assessment took place between January and April 2017. We reviewed online literature, reports, programmatic data and documents and key informant interviews with stakeholders in human and animal health sector. A systematic review of observational studies on antibiotic use in humans was conducted and primary data on antibiotic consumption in animals was reviewed. For numeric data, frequencies and proportions were calculated and free-text responses were analysed thematically.

**Results:** Five regulatory bodies and 22 laws and policies exist to streamline medicine distribution and use. However, the medicine distribution system was deemed to be chaotic and the ratio of licensed pharmacies to unlicensed premises was 1:5. Antibiotics account for 15% of locally produced medicines market share and 24% of registered medicines in Nigeria. Up to 16 billion grams and litres of antibiotic tablets and syrup are manufactured locally, 24% of registered medicines in Nigeria. Up to 16 billion grams and litres of antibiotic tablets and syrup are manufactured locally, but significant proportion supplemented through importation. The systematic review determined the median prevalence of persons using antibiotics without prescription in Nigeria at 46.8%. The proportion of antibiotics used in animal health rose from 8% in 35 % between 2014 and 2015, with a 2000% increase for tetracycline.

**Conclusion:** Potential drivers include an over-reliance on imported pharmaceuticals and shortage of licensed prescribers contributes to unregulated antibiotic sales; a major driver for AMR. The identified gaps were used to determine priorities for AMR surveillance in the National Action Plan.
Laboratory Networks and Systems for Outbreak Response

**DATE:** Tuesday, 11 December  
**TIME:** 11:00 – 12:30  
**ROOM:** Kano  
**CO-CHAIRS:** Oni Idigbe, National Institute of Medical Research  
Abdoulaye Nikiema, African Society for Laboratory Medicine

**ORAL SESSION OA-1.5**

**LABORATORY NETWORKS AND SYSTEMS FOR OUTBREAK RESPONSE**

**M. Turnsek**, M. Okomo Assoumou, A. Sabol, J. Shang, G. Okpu, V. Kame, A. Nzouankeu, E. Nzeko, M. Keita, E. Nzeko

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5. ASLM, Addis Ababa, Ethiopia.  
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**Preventing Laboratories in Cameroon for a Rapid Response to a Cholera Threat – An Example for Coordinating a Global Health Security (GHS) Initiative**

**Background:** Cholera is a public health concern in Cameroon. After the large 2010-2011 outbreak, resulting in approximately 33,200 cases with a 4% mortality rate, the country responded by initiating actions to prevent future threats of this magnitude. A rapid laboratory confirmation is a critical component of the surveillance and outbreak response for cholera. With the support of partners, the Ministry of Health (MOH) mitigation strategy and plan to respond rapidly and efficiently includes reinforcement of the role of the laboratories. This presentation aims to describe the strategy, accomplishments, successes, challenges and lessons learned from the initiative started in 2016.

**Methods:** Three high-risk regions were chosen as project targets. Laboratory capacities were assessed and strengths leveraged to improve the response time for the detection and confirmation of suspected cholera cases within the existing network.

**Results:** At least one laboratory per region was chosen for building cholera diagnostic capacity. Trainings in cholera confirmation were conducted for hospital laboratory staff and National Public Health Laboratory (NPHL) microbiologists. District level staff training included specimen collection, transport, referral, and rapid diagnostics using Crystal® VC. The development of a quality assurance program is in progress. Procurement and delivery to site of missing key bacteriology equipment and supplies are underway. Sporadic cholera suspected cases were reported between 2016 and 2018 and collected specimens were referred and tested by the closest reference laboratory.

**Conclusion:** Building cholera laboratory capacity in Cameroon is a continuous effort that needs the engagement of the MOH at the national and regional levels, along with key country stakeholders. In addition to trainings and capacity improvement, it is critical that all vested parties with clearly defined roles work towards building a strong laboratory network to effectively respond to cholera outbreaks and other infectious disease threats. A budgeted sustainability plan to understand what the country can realistically maintain is essential.

**Increasing Diagnostic Capacity for Epidemic-Prone Diseases: Mali’s Experience Expanding Peripheral Meningitis Testing**

**Background:** Catholic Relief Services (CRS), with the Government of Mali (GoM), implements Project Djomi to strengthen Mali’s laboratory system to detect diseases, including meningitis. In 2016, 170 meningitis cases were confirmed out of 680 tested; 15 deaths were recorded. In 2017, Mali received a score of 3/5 on the International Health Regulations (IHR2005)’s Joint External Evaluation (JEE) for “modern, effective diagnostic laboratory and point-of-care tests,” highlighting the need to decentralize testing capacity. For meningitis, district laboratories should perform rapid diagnostic tests (RDTs) and Gram coloring, while regional laboratories and the national reference laboratory (INRSP) confirm results.

**Methods:** After evaluating existing capacity, a multilevel approach was used, with INRSP leading directive development and coordination; district/regional levels providing tier-appropriate testing; and community health centers supporting referral, sample collection, and case-by-case surveillance. In 23 districts, partners trained and supervised laboratory workers on bacteriological diagnostics, equipping labs with RDTs and Gram coloring materials. Two regional laboratories are receiving inputs and training for confirmation processes.

**Results:** In 2017, 96 lab workers and 632 CSCOM staff were provided with training and materials for testing, surveillance and referral. In CRS-covered districts, following training, eight RDTs were done. Specimens were collected for 100% of suspected cases. Only 22% of samples from peripheral laboratories underwent Gram coloring— an increase from 12% in 2016, but far from the 70% target. GoM /Laboratory Sub-Commission coordination, and collaboration amongst partners, were essential in increasing coverage, which remains suboptimal (23/68 districts). Supervision is critical for districts with low test utilization. Remaining challenges relate to incomplete data entry and last-mile specimen transport.

**Conclusion:** The GoM and partners have implemented a coordinated, multilevel approach to expand district-level meningitis diagnostic capacity and strengthen community-level specimen collection, with regional laboratory strengthening ongoing. Scaleup of diagnostic decentralization must incorporate improvements to laboratory data and specimen transport systems.
Mapping Laboratory Capacity and Networks: Promoting Evidence-Based Planning of Laboratory Services in Ethiopia

Background: Information on laboratory capacity and coverage is scarce in Africa, limiting small or large-scale efforts to address laboratory system gaps and support the eradication of diseases. ASLM and its partner instead developed a system allowing laboratory capacity to be continuously assessed, visualized, and analyzed to optimize network configuration at both country level and through a centralized platform for coordinated action. We set out to collect data on laboratory capacity in level 3 laboratories in Ethiopia. The current testing capacity was compared to basic requirements for the detection of priority diseases and identification of outbreak.

Methods: Data were digitally collected through on-site visits in collaboration with EPHI and compared to the national staffing requirements and the minimum testing packaged required for level 3 laboratories in Ethiopia.

Results: A team of two field investigators and one supervisor collected data in 35 laboratory data across eleven regions between January and February 2018. 7/35 of the laboratories lacked microbiologists. A third had no PCR equipment to quantify HIV and Hepatitis C and B viral load. Less than 40% of laboratories could test for tuberculosis susceptibility to 2nd-line drug. No laboratories had the capacity or linkage to a sample referral network for the detection of major viral hemorrhagic fevers, while 4/35 had access to rapid tests for the screening of cholera. Only 14/35 of laboratories were connected to the national AMR surveillance network 17/35 were not testing for the identification of hemolytic beta streptococcus, while 21/35 had no capacity to diagnose bacterial meningitis.

Conclusion: Conclusions: Mapping laboratory capacity in high level facilities is feasible in Ethiopia. Here we highlight critical gaps in the capacity to diagnose and monitor priority diseases e.g. HIV and tuberculosis, and in the surveillance capacity of epidemic-prone pathogens and AMR. Additional analysis factoring in disease burden, population coverage and routes of specimen referral is ongoing to inform the expansion of laboratory testing capacity and the placement of specialized workforce.

Comprehensive Evaluation of National Lab System Capabilities Using an Electronic Survey Tool and Geo Codes: The Kenya Laboratory Mapping Project

Background: Accurate, current knowledge of national laboratory capabilities is paramount in this era of emerging and reemerging infectious diseases caused by especially dangerous pathogens. Access to current data of laboratory capacity and a system to store, organize, analyze and display laboratory resources in relation to place is essential. These data and information can be used to guide policy and strategy to effectively manage laboratory resources especially dangerous pathogens Kenya National Public Health Laboratory in collaboration with the Association of Public Health Laboratories and Centers for Diseases Control and Prevention with funding provided by the Defense Threat Reduction Agency, developed a laboratory mapping tool to assess the capacity and capability of diagnostic public health and research laboratories.

Methods: An electronic version of a questionnaire was developed to capture data on 13 core capability elements of the laboratory system and services in all 47 counties of Kenya. Facilities in hospital laboratories tiers 2-6 were assessed. Surveys were done on-site by MoH trained local staff using handheld tablets to collect and upload data to a centralized database. Data were exported and analyzed using STATA and principal component analysis.

Results: A total of 1822 (45%) of 4086 facilities across all laboratory tiers, Levels 2-6 were mapped. Level 2, 537 (20%); level 3, 890 (90%); level 4, 325 (95%); level 5, 18 (100%) and level 6, 52 (100%). Sixty-five percent of the laboratory workforce is government supported and 35% donor supported. Results of 1822 facilities on testing services, facilities and equipment status and other characteristics of the laboratory system by location were captured in various formats including maps, tables and graph. Detailed survey result will be presented at the ASLM conference.

Conclusion: Current data of the laboratory situation provides information to guide effective management and assure timely, quality laboratory services to detect and respond to disease threats.
Assessing the Impact of the National Integrated Specimen Referral Network (NISRN) on Viral Load Scale Up in Nigeria

Background: In Nigeria, following an intensive laboratory network optimization initiative with country stakeholders, the national integrated specimen referral network (NISRN) was created to increase access to diagnosis and treatment services. GHSC-PSM conducted a study to measure the impact of NISRN on quality of viral load (VL) samples collected for diagnostic tests and treatment monitoring in addition to identifying causes of specimen rejection within the network.

Methods: This descriptive study involved the monitoring of specimen logs (CD4, VL, EID and sputum) to determine the rate of specimen rejection and reason(s) for rejection.

Results: GHSC-PSM compared 158,695 specimens (sputum, DBS, VL, CD4) transported in the NISRN over four months (March – June 2018) to 26 PCR laboratories with 25,194 specimens that were not over a similar four month period (+530%). Number of health facility coverage also increased from 1,700 in March to 2,969 in June (+75%) due NISRN implementation. Out of the 158,695 referred specimens, 515 (0.3%) were rejected; 8% rejection occurred in the hubs, while 92% occurred at testing laboratories). Reasons for rejection were: inadequately filled requisition form (70%), incomplete patient identifiers (1%), inappropriate container (5%), insufficient specimen (11%), clotted, hemolyzed, lipemic specimen (12%) and specimen too old for testing (1%). Although specimen volumes increased by 1,010% from March – June 2018, rejection rates were reduced from 36% in March to 8% in June due to mentoring through relevant implementing partners.

Conclusion: NISRN implementation is critical to providing increased access to disease diagnosis and is a means for achieving UNAIDS 90:90:90 goals in Nigeria. NISRN has positively impacted the national specimen rejection rate and ensured quality of sample collection and testing. Cost benefits of NISRN will be evaluated in future.

Implementing an Electronic Laboratory Management Information System in Liberia Post Ebola Outbreak

Background: The Ministry of Health (MOH) has a paper-based laboratory information system (LIS) with limitations that were exacerbated during the Ebola outbreak, in terms of documentation and data aggregation: sample collection, transport, reception, and processing, as well as timely reporting of results. The centralized molecular testing for Ebola virus in Liberia magnified these challenges. Consequently, the MOH decided to pilot test an electronic LIS (eLIS).

Methods: Initial steps included: requirements gathering; selection of an open source software platform (BIKA.Health, now Senaite); an international visit to observe their full implementation, and determination of hardware and installation requirements. Minor renovations were completed at the selected regional laboratory to allow for cabling and equipment installation, followed by custom software development and configuration. Hands-on training and mentoring to laboratory users and information technology staff was provided onsite, with embedded mentorship, as well as remotely, via telephone and online. After successful piloting and validation of the eLIS at the Tappita Regional Laboratory (TRL), the system was deployed at the national public health reference laboratory.

Results: Forty laboratory and information technology staff underwent training, 31 at the two intervention facilities, and nine from the central level at the MOH. The e-LIS system is currently live, functioning within a local area network system with backup servers. The system includes remote access, as well as synchronization at the national repository when internet connectivity allows. Turnaround times have improved significantly over time, e.g., from 6.8 to 1.5 hours in malaria at TRL.

Conclusion: An open source eLIS is easily adoptable with appropriate training, regardless of the level of computer literacy. Creating a capable, local team who can deploy, support and improve eLIS is key. Collaborating with other implementers of similar systems will facilitate a successful deployment that is sustainable and results in improved access to data integrity and confidentiality.
Application of Multiplex PCR for Direct Detection of Campylobacter Spps. and Salmonella Serovars in Children (0 - 5 years old) Diarrhoeic Stool

**Background:** Large proportion of diarrhoeal illnesses in children in developing countries is ascribed to an unknown aetiology because the commonly available methods of diagnosis, such as microscopy and culture, have been associated with low sensitivity. Conventional culture methods remain the norm for the isolation of bacterial enteric pathogens in clinical laboratories in Nigeria. Diarrhoeal diseases due to known bacterial pathogens require rapid diagnosis of the causative pathogenic bacteria.

**Methods:** This study was conducted in Sokoto State, North western Nigeria from April, 2015 to September, 2016. A total of four hundred and twenty diarrhoeic children of zero to five years old from the three geo-political zone of Sokoto State, Nigeria were screened for the presence of enteropathogenic Campylobacter and Salmonella species. The stool samples were analyzed by conventional, biochemical methods and standard multiplex PCR using the agarose gel electrophoresis Seeplex Diarrhoea-B1 ACE. Fecal DNA MiniPrep (Zymo research (ZR) California, USA) was use for DNA extraction and was performed in accordance with the manufacturer’s instructions.

**Results:** The conventional culture techniques indicated that, 140 (33.33%) of all childhood diarrhoea in the study area are attributable to entero-pathogenic bacteria (namely Escherichia coli (18.8%), Campylobacter species (3.3%), Salmonella enterica (7%) and Shigella species (4%). The PCR based analysis of stool specimen detected (8.1%) hip and asp genes of Campylobacter jejuni and Campylobacter coli respectively, (2.6%) vif, ipaH genes of Shigella and (8.3%) sopB gene of Salmonella. This indicated that the PCR assay detected an additional 8.8% of infections for Campylobacter, Salmonella, and Shigella, in the clinical specimens beyond what was ascertained by conventional culture means.

**Conclusion:** Enteropathogenic bacteria were detected directly from the stool sample by PCR and pathogen detection was greater using PCR compared to routine culture methods. The findings highlight the value of using a combination of traditional and molecular techniques in the diagnosis of diarrhoeal disease in this population.
Optimizing Dried Tube Specimens for Xpert MTB/RIF Performance Evaluation Panels

**Background:** CDC’s Xpert MTB/RIF Performance Evaluation Program (XMPEP) has enrolled 902 TB testing sites in 23 countries. XMPEP panels use the dried tube specimen (DTS) technique. Panel performance and stability was questioned when a 2015 panel produced a higher-than-expected proportion of false-negative results from participating testing sites. The purpose of this study is to improve DTS concentration and stability and optimize DTS preparation.

**Methods:** M. tuberculosis quality control strain H37Rv was cultured using the BACTEC MGIT 960 and incubated 4–6 days past instrument positivity. Culture inactivation using Xpert MTB/RIF Sample Reagent (SR) for 2 hours was compared to heat inactivation at 80°C–85°C for 1 hour. Post-inactivation viability was tested using MGIT for 84 days at 35°C–37°C. To improve DTS stability, we compared different diluents (saline, TE buffer, and water) and drying conditions (open surface or desiccator within a class II biosafety cabinet for 10 days). Dry DTS were capped; incubated at 4°C, 20°C, 37°C, and 45°C; and tested in triplicate with Xpert MTB/RIF cartridges at weeks 0, 1, 2, 4, 8, 12, 16, and 20. Each DTS was suspended in SR (2.5 mL) and tested according to the package insert. GeneXpert results and cycle threshold (Ct) values were compared between conditions over time using Excel.

**Results:** MGIT viability testing demonstrated no growth for both inactivation methods. Heat inactivation yielded higher DTS concentrations than SR inactivation (<2–3 Ct), and the lengthy DTS drying time resulted in consistent DTS stability across 20 weeks. There was no difference in DTS stability or concentration between diluents, drying conditions, and storage temperatures.

**Conclusion:** Heat inactivation not only is easier and less expensive but also yields higher-concentration DTS than SR inactivation. Sufficient DTS drying time is needed to maximize stability of XMPEP panels over time.

Investigating Serum Leptin and Ghrelin Levels as Metabolic Syndrome Biomarkers in Adult African Zambians with Type 2 Diabetes Mellitus at the University Teaching Hospital, Lusaka, Zambia

**Background:** Metabolic syndrome is defined as the clustering of at least three of the following five medical conditions: elevated blood pressure, central obesity, high fasting serum triglycerides, elevated fasting plasma glucose and low high-density lipoprotein levels. The biomarkers of metabolic syndrome included Leptin and Ghrelin levels. Leptin is a hormone produced primarily in white adipose tissue. Ghrelin increases appetite, thereby stimulating food intake. The levels of these biomarkers in indigenous Zambians with T2DM are unknown.

**Methods:** An analytical cross sectional study was performed on routinely collected data from 511 confirmed type 2 diabetic patients (18+years) at the University Teaching Hospital adult medical clinic 5. Demography, anthropometry and body mass index (BMI) data were collected. Consent was obtained. Biochemical Laboratory Analysis were performed such as glycated haemoglobin (HbA1c), Cholesterol, Triglycerides and microalbuminuria. ELISA assay was performed to determine the level of leptin using R&D® Systems, a Bio-Technne brand Elisa kits, and ghrelin using Abnova® Corporation Elisa kits. Data was analysed with Stata® Version 13 (Stata Corporation, College Station, Texas, USA). Ethical approval was obtained from UNZABREC : ethics approval reference number 006-01-17.

**Results:** The prevalence of MetS in patients with T2DM was 47.95% (N=511). BMI, Blood pressure (BP), Triglycerides, HDL-Cholesterol were significantly increased in MetS group compared to those without MetS (p<0.001) with significant difference between controlled and uncontrolled diabetic groups. There was a significant decrease in the level of HDL cholesterol in uncontrolled groups (P<0.001) compared to MetS group. There was a positive correlation between MetS and serum leptin levels (p<0.0001, r=1%). Ghrelin levels were significantly decreased in MetS group compared to control group (p<0.0001, r=-0.8%).

**Conclusion:** Zambian adult metabolic syndrome patients are at a greater risk of developing cardiovascular disorders. Interventions/management should be put in place to help those patients avoid/delay onset of cardiovascular complications anticipated upon accumulations of predisposing factors that are components of Metabolic Syndrome. Key words: Metabolic Syndrome, Diabetes Mellitus, Leptin, Ghrelin
Use of Pre-ART Laboratory Screening to Identify Renal, Hepatic, and Hematological Abnormalities in Côte d’Ivoire – Past, Present, and Future

Background: High demand for HIV-services forces health systems in low resource settings to dedicate resources to service delivery at the expense of other priorities. Simplifying services may alleviate some of the demand and pre-ART laboratory screening, which is used to identify patients at risk for ART toxicities, is among the services under consideration for simplification.

Methods: We assessed the frequencies of conditions linked to ART toxicities among 34,994 adult, ART-naïve patients with specimens referred to the RETRO-CI laboratory in Abidjan, Côte d’Ivoire between 1998 and 2017. Screening included tests for serum creatinine, alanine aminotransferase (ALT), and hemoglobin (Hb) to identify renal dysfunction (eGFR <50 mL/min), hepatic abnormalities (ALT >5x normal), and severe anemia (Hb <6.5 g/dL), respectively. We considered screening results across 4 eras roughly defined by updates to the World Health Organization’s (WHO) guidelines for treating and preventing HIV infections and utilized logistic regression to identify factors associated with the conditions in question.

Results: Frequencies of renal dysfunction, hepatic abnormalities and severe anemia were largely unchanged over the years and just 8.4% of patients had any of the three conditions. Key factors associated with renal dysfunction and severe anemia were age >50 years (adjusted odds ratio (aOR): 2.53; 95% confidence interval (CI): 2.19-2.92; p<0.001) and CD4 <100 cells/µl (aOR: 2.57; 95% CI: 2.30-2.88; p<0.001), respectively.

Conclusion: While any patients at risk for ART toxicities are a concern, the relative infrequency of conditions linked to toxicity in Côte d’Ivoire supports the notion that simplification of pre-ART laboratory screening may be undertaken with limited negative impacts on patient outcomes. Targeted screening may be a feasible strategy to balance detection of conditions linked to toxicities with the need to simplify services.

e-PT Application is a Vital Data Management Tool in the Dried Tube Specimen Proficiency Testing (DTS PT) Program

Background: In 2015, Ghana Health Service (GHS) introduced a proficiency testing (PT) program for HIV rapid testing using Dried Tube Specimen (DTS) technology to improve the quality of HIV rapid testing. A Microsoft Excel database was used to manage the program data. This manual process resulted in high error rates in result analysis, prolonged turnaround time in report generation and creation of corrective action plans for participating laboratories. A web-based, open-source, PT data management application (e-PT) was introduced to improve program efficiency. We outline the process and successes achieved with the use of this application.

Methods: The e-PT application, funded by PEPFAR, was first piloted in April 2015. In-country capacity of GHS staff was developed through in-country and online trainings by CDC and its partner using a train the trainer model. The trained staff in-turn provided training to PT participants on results reporting and reviewing of performance. Five rounds of the DTS PT program have been completed and efficiencies monitored using the Excel database and e-PT application. Performance indicators such as error rates, report generation and reporting times were compared for system verification. Excel backups for all rounds were archived for future analysis.

Results: The e-PT application has been used to report PT results, generate performance analysis and corrective action reports for the five rounds of the DTS PT programme. Error rates on program reports have reduced from 20% to 1%. Turnaround time for report generation has reduced from 10 days to one hour. Data analysis improved from 20 days to 3 days per round. An average of 363 feedback reports have been generated (Round 1-5: 200, 262, 351, 462 and 542 reports respectively).

Conclusion: The implementation of the e-PT application for data management in Ghana has improved data analysis, report generation and turnaround time for participating testing sites.
ORAL SESSION **OA-2.2**

**IMPROVING DIAGNOSTICS TO ACHIEVE UNIVERSAL HEALTH COVERAGE AND INTERNATIONAL HEALTH REGULATIONS**

**DATE:** Wednesday, 12 December  
**TIME:** 11:00 – 12:30  
**ROOM:** Niger/Enugu  
**CO-CHAIRS:** Nicaise Ndembi, Institute of Human Virology Nigeria  
Timothy Amukele, Johns Hopkins University

**OA-2.2-007  TIME: 11:00**

**C. O. Odhiambo**


**Improved Adherence to Early Infant Diagnosis Algorithm for HIV-exposed Infants during Implementation of a Point-of-Care Early Infant Diagnosis Project in Kenya**

**Background:** Early infant diagnosis of HIV (EID) is vital to ensure HIV-infected infants begin lifesaving treatment as soon as possible. A testing algorithm is employed to ensure reliable final diagnosis. In Kenya, all HIV-exposed infants (HEIs) with an initial HIV DNA PCR positive result should be initiated on ART the day they receive their results, and a new sample collected for a confirmatory PCR and a baseline viral load test. We determine the level of adherence to the confirmatory testing algorithm for HEIs with an initial positive result during implementation of the Unitaid-funded point-of-care (POC) EID project which began in August 2017.

**Methods:** Retrospective conventional EID data were collected from HEI registers at seven high-volume health facilities in Homabay and Turkana counties in 2017 prior to implementation of POC EID. Prospective POC EID data were collected from the same facilities from August 2017 to June 2018. We tabulated the total number of HIV-infected infants, number of HIV-infected infants who underwent a confirmatory EID test, and the number of HIV-infected infants who received a baseline viral load test during both time periods at each facility.

**Results:** Retrospective chart abstraction yielded 59 infants with an initial HIV-positive result. Only 23 (40.0%) had a sample collected for a confirmatory test and 16 (27.1%) had a sample collected for a baseline viral load test. Thirteen infants (22.0%) with an initial positive EID test died or were lost to follow-up. Prospective POC EID data collection yielded 51 infants with 49 (96.1%) having a confirmatory EID test and 45 (88.2%) with a baseline viral load test. One infant had a baseline viral load test conducted without a confirmatory test while one infant (2.0%) was lost to follow-up.

**Conclusion:** POC EID testing improved adherence to the EID algorithm and has potential to reduce loss to follow up/death.

**Integration of ChemBioTM DPP Syphilis Screen and Confirm Assay with Existing Technologies to Improve Clinical Diagnostics**

**Background:** Syphilis is a sexually transmitted disease (STD) caused by Treponema pallidum. Apart from direct morbidity, the increased risk of HIV infection can cause lasting effect in children born to mothers who are infected with syphilis. To date, accurate diagnosis of syphilis in patients remains a challenge to clinicians. There is need to integrate serological tests to the existing methods for quick and accurate diagnosis.

**Methods:** This study sought to evaluate the diagnostic performance of ChemBio DPP™ Syphilis Screen & Confirm assay using whole blood, serum and plasma as sample types. A total of 202 specimens (whole blood, plasma and serum) were tested using rapid plasma regain (RPR) and Treponema pallidum Hemagglutination (TPHA) assays. All specimens and controls were further tested by Next Generation DPP Syphilis Screen & Confirm Assay.

**Results:** The sensitivity of ChemBio DPP™ Syphilis was found to be 96.1%. The Negative predictive value (NPV) was 96.2% while 100% for the positive predictive value (PPV). Triplicates of the same samples analyzed daily over a period of five days, recorded precision of 100% (kappa = 0.960). Whole blood and plasma of the same donors (n=38), recorded sensitivity, specificity, NPV and PPV of 81.3%, 100%, 88% and 100% respectively (kappa = 0.834) when compared. Of the evaluated sample types, whole blood showing better concordance with the results from the algorithm.

**Conclusion:** Our findings demonstrated that the sensitivity and specificity of ChemBio rapid test for syphilis was high compared to the gold standard (RPR and TPHA). Therefore, ChemBio DPP™ Syphilis Screen & Confirm assay can be adopted for patient management in developing countries to complement the existing technologies used in syphilis testing.
A Cross-sectional Study for Increased Detection of HPV (16, 18) Among Cervical Cancer At-risk Population in a High HIV Prevalence Setting

**Background:** Cervical cancer patients in developing countries have poor treatment outcomes and high mortality rates. Limited resources have impeded efforts for early detection and successful treatment of cervical cancer. The aim of this study was to analyze the increased detection of risk factor of cervical cancer, HPV (types 16, 18) using Hologic HPV mRNA test in a high burden developing country, Eswatini.

**Methods:** A cross-sectional pilot study was conducted from April to July 2018 using data from 5 facilities accessing HPV mRNA, Visual Inspection Acetic Acid (VIA) and Liquid Based Cytology screening (LBC). Women who tested positive for VIA or HPV mRNA were further evaluated with LBC for atypical squamous cells of undetermined significance (ASCUS) and low-grade squamous intraepithelial lesion (LSIL). Pre-cervical cancer lesion proportions were used to compare and describe the distribution of HPV between VIA and HPV mRNA methods. The diagnostic outcomes that prompted detection of cervical squamous cell change were analyzed in Stata 14.

**Results:** All participants (n=231) had HPV mRNA screening and HPV 16, 18 genotypes were reported in 40% (92/231). Out of all participants, 43 women underwent both VIA and HPV mRNA testing and HPV mRNA was detected in 23% (10/43) of those who had HPV mRNA positive and VIA negative. Of the HPV mRNA positive, 30% (3/10) had LSIL and 10% (1/10) had ASCUS. In LBC examinations, abnormal changes in cervical squamous cells were found in 21 % (9/43) with HPV mRNA positive and 7% (3/43) with VIA positive.

**Conclusion:** HPV mRNA detected additional high risk patients, therefore introducing in cervical cancer algorithms may be important for early detection of low to mild changes to the cervical squamous cells compared to VIA. Without the HPV mRNA, cervical squamous cell change may fail to be timely detected due to limited sensitivity and exclusion criteria in the current diagnostic methods.


**Background:** Despite the progress made towards HIV epidemic control, a gap in HIV testing remains a public health concern in Ethiopia. To curb the epidemic, global targets on HIV prevention and control emphasize the importance of scaling up screening for HIV by adopting new strategies such as HIV self-testing. Objective: To evaluate the diagnostic performance of non-invasive HIV self-testing (HIVST) kit using oral fluid for HIV diagnosis.

**Methods:** Between December 2017 and February 2018, we assessed a diagnostic accuracy of Oral fluid-based HIVST kit (OraQuick®) in 15 public health facilities in Addis Ababa, Ethiopia. Participants were underwent a blood-based rapid HIV antibody test as per the current national algorithm. The sensitivity, specificity, positive predictive value (PPV), Negative predictive value (NPV) and inter-rater agreement of the test were computed.

**Results:** A total of 400 study participants were tested for HIV using OraQuick® HIV self-test kit as well as blood test by the national algorithm. Out of 200 participants who tested positive on the national algorithm testing, oral fluid-based self-testing was positive in 199 (99.5%), false negative in 1 (0.5%). Of 200 participants who tested negative on the national algorithm testing, self-testing was negative in 200 (100%). There were no false positive and invalid tests. The sensitivity and specificity of the OraQuick® HIVST were 99.5% (95%CI: 97.26-99.99) and 100% (95%CI: 98.18-100.0), respectively. The overall agreement between the two tests was high ( Cramer’s V = 0.995). The PPV and NPV of OraQuick® test were 100% and 99.5% (95%CI: 96.59-99.93). There was no significant problem (P>0.5) in interpretation of HIVST results among the study participants.

**Conclusion:** This study showed a high diagnostic performance of OraQuick® HIV self-test and suggests that OraQuick® HIVST kit has a potential to be used for HIV testing in Ethiopia along with the national algorithm.
Evaluation d’un Test de Dépistage Rapide Combiné le TRIPLEX (BIOSYNEX) pour l’Amélioration du Diagnostic du VIH et des Hépatites Virales au Sénégal

**Background:** Les tests de diagnostic rapide (TDR) par leur simplicité contribue grandement à un accès universel du diagnostic du VIH et des hépatites virales surtout dans les pays à ressources limitées. L’objectif de cette étude était d’évaluer les performances du TRIPLEX HIV/HCV/HBsAg® (Biosynex) qui est un test de dépistage combinant VIH et virus des hépatites B et C.

**Methods:** L’étude a porté sur un panel de 200 plasma constitué de 92 VIH-1, 1 VIH-1/2, 65 VHB positif dont 15 VIH-1/VHB, 1 VHC positif et 41 plasma négatifs testés en première intention par l’automate Architect (Abbott Diagnostics) avant confirmation avec un algorithme à 3 tests. Tous les échantillons ont été testés par le test TRIPLEX. Pour le VIH, le VHC et le VHB, les résultats du TDR ont été comparés respectivement à celui de Architect HIVAg/Ab Combo®, Architect anti HCV® et Architect HBs Qualitative II® puis avec le résultat définitif obtenu après confirmation. L’analyse des performances a été faite par le calcul de la sensibilité (Se), de la spécificité (Sp), de la valeur prédictive positive (VPP) et de la valeur prédictive négative (VPN).

**Results:** Pour le VHB, le Triplex a donné respectivement 100%, 98.5%, 97% et 100% de Se, Sp, VPP et VPN. Pour le VIH et le VHC, Triplex a donné des valeurs de Se, Sp, VPP et VPN respectivement supérieures ou égales à 100%, 85%, 87% et 95%. Après confirmation, ces valeurs étaient de 100 %, 86.9%, 87,7 % et 100% pour le VIH alors qu’il existait une parfaite concordance pour le VHC.

**Conclusion:** Ces résultats préliminaires montrent de bonnes performances du Triplex dans la détection du VHB, VIH et VHC. Ces résultats doivent cependant être confirmés sur un échantillonnage beaucoup plus large incluant tous les sous types du VIH-1 et le VIH-2.
**Strengthening Laboratory Systems Through Mentorship & Institution of QMS in Guinea**

**Background:** In Guinea laboratory services are structured according to the pyramidal structure of the Health Services system. There are at least 39 laboratories in need of strengthening and testing capacity improvement in Guinea following the recent Ebola outbreak. A central National Reference Laboratory (LNSP) is at the apex of the system. The specialized laboratories, 3 teaching hospitals and 7 regional Hospital laboratories are in the referral system. We present a work-in-progress to institute a Quality Management System (QMS) that APHL and Ministry of Health (MOH) are implementing to improve testing capacity and strengthen the laboratory system.

**Methods:** In implementing the National Laboratory Strategic Plan, 2 regional and one National Hospital laboratory were identified as targets of a networking and testing capacity building sites along the National Reference Laboratory (INSP), APHL performed an evaluation using the WHO SLIPTA format and established a baseline performance the laboratories. A mentorship was set up which includes the 12 essentials of QMS with special emphasis on the diagnostic capability for epidemic prone diseases and antimicrobial resistance testing (AMR). Two weeks on site QMS teaching is followed by 4 weeks of reinforcement implementation. An evaluation is conducted at the end of the first round of mentorship, followed by corrective actions in the next 3 rounds. Write training plan for QMS and Basic Bacteriology and AMR testing for the peripheral-regional laboratories Implement a training plan at LNSP, the national Hospital laboratory (CHU) and 2 Regional Hospital laboratories. Perform laboratory evaluation quarterly using the SLIPTA tool.

**Results:** This approach would lead to an improved testing capacity. Laboratory performance will be measured monitoring quality indicators in microbiology.

**Conclusion:** It is planned that LNSP will use this as the basis for a SLMTA training that will be extended to the 7 regional hospital laboratories.
Strengthening Laboratory Management Toward Accreditation (SLMTA) in 23 Sub-Saharan African Countries: Progress and Lessons Learned

**Background:** Strengthening Laboratory Management Toward Accreditation (SLMTA), a large-scale global program to improve the quality of laboratories in resource-limited countries, was launched in 2009. Close to 1000 laboratories in 23 sub-Saharan African countries have participated in the SLMTA program. This study evaluated SLMTA implementation outcomes in these countries.

**Methods:** The SLMTA program consists of a series of trainings followed by implementation of improvement projects in the laboratories. Each laboratory is audited periodically using the Stepwise Laboratory Quality Improvement Process Toward Accreditation (SLIPTA) checklist and is assigned percentage scores for several aspects and create a connection with GLASS (AMR data framework). This new version will reinforce epidemiological report with a link to DHIS2 and WHONET. It also provides a full interface for Quality Management. The feedbacks from the field are constantly collected and were used to create validation of the results, the printing of scorecards, data archiving, information, the seizure of the results, technical and biological registration and billing analysis, the collection of clinical information, the seizure of the results, technical and biological validation of the results, the printing of scorecards, data archiving, epidemiological report with a link to DHIS2 and WHONET. It also provides a full interface for Quality Management. The feedbacks from the field are constantly collected and were used to create the specification of LabBook 3.0. This new version will reinforce several aspects and create a connection with GLASS (AMR data management system).

**Results:** Of the 648 laboratories, 4% achieved accreditation, 21% received 3–5 stars, 43% received 1–2 stars, and 32% received zero stars. The total number of laboratories accredited increased from three in 2013 to 28 in 2016. Managers from several SLMTA laboratories that have achieved accreditation completed a survey about key lessons learned. Their responses were analyzed to identify common themes.

**Conclusion:** SLMTA continues to improve laboratories across sub-Saharan Africa. The number of accredited laboratories has grown exponentially since SLMTA was launched - as of 2017, 52 SLMTA laboratories had attained accreditation. Program implementers should heed the lessons learned from the survey to help improve their laboratories, particularly those rated below 3 stars.

LabBook, a Free LIS to Computerize Clinical Laboratories of Developing Countries

**Background:** The West African Network of clinical Laboratories (RESAOLAB) is the first regional program in West Africa to respond to the public health challenge of laboratories capacities strengthening with a cross-cutting and regional approach. RESAOLAB was launched in 2009 by the Mérieux Foundation, in partnership with the Ministry of Health of Burkina Faso, Mali and Senegal. Four additional countries joined the network in 2013: Benin, Guinea, Niger and Togo. RESAOLAB aims to improve the quality of laboratory services in these seven countries. One of the objective of this network is to establish a Laboratory Information System (LIS). The objective was to create a tool to guide laboratories moving from the paper-based laboratory workbooks to a software solution easy to use and maintain.

**Methods:** The LIS development started in 2010 under the name of LabBook with the focus to computerize laboratories from developing countries. Epiconcept was selected to develop it according to the technical specifications and features of the software defined by a RESAOLAB working group. VoozanooTM framework have been used allowing to create a secure and open source information system. This technology is based on Zend Framework (using Linux/Apache/MySQL/PHP). Three releases of the software have been created: LabBook 1.0, LabBook 2.0 and LabBook 2.5.

**Results:** LabBook is available on the website: http://labbook.globe-network.org/ Training courses have been conducted for the 7 RESAOLAB countries’ pilot users but also in Madagascar. The Laboratories Direction in Senegal decided to scale up the deployment of LabBook (equipment and trainings) from 14 pilot sites to 50 laboratories in 2018.

**Conclusion:** RESAOLAB achieves its goal of creating an LIS. LabBook offers a free and adapted solution for clinical laboratories in developing countries. It allows, in real time for all users, the registration and billing analysis, the collection of clinical information, the seizure of the results, technical and biological validation of the results, the printing of scorecards, data archiving, epidemiological report with a link to DHIS2 and WHONET. It also provides a full interface for Quality Management. The feedbacks from the field are constantly collected and were used to create the specification of LabBook 3.0. This new version will reinforce several aspects and create a connection with GLASS (AMR data management system).
New Approaches to Procurement and Supply Chain Management for Scaling Up Viral Load Testing in Resource Limited Countries

Background: Despite progress in recent years to improve laboratory services in resource limited settings (RLS), major challenges persist in procurement and availability of laboratory commodities, functionality of laboratory equipment, and timely return of results to inform patient care. GHSC-PSM implemented procurement and supply process improvements to address these challenges, particularly in support of HIV VL scale up efforts in RLS with positive results.

Methods: GHSC-PSM conducted a desk review of historical commodity procurement, forecast volume, equipment footprints, and survey data from PEPFAR-supported countries to identify root causes of these challenges and opportunities for improvement.

Results: Commodity procurement and projection data analysis from 12 countries (representing 95% of GHSC-PSM molecular/CD4 spend) revealed a rapidly growing trend in spending, with a projected 53% increase to over $130 million from 2017 to 2018. To address VL reagent pricing variations between countries for the same shipping terms (reaching 66% difference for one manufacturer), GHSC-PSM established basic ordering agreements (BOAs) to streamline the procurement cycle and achieved lower stabilized pricing. Engagement of major donors to pool forecasted national testing volumes aided in negotiations to reduce prices. In 2017, GHSC-PSM achieved $1.7 million savings from price negotiations in five countries. Equipment footprint and capacity analysis from 22 countries showed that the majority of countries (>60%) rely on a single manufacturer for 80% of their VL national testing needs. Of a subset of 15 countries, four had adequate equipment capacity, four had insufficient, and six had excess capacity compared to national targets. Ongoing vendor negotiations to improve service level agreements with key performance indicators are leading to improved equipment performance.

Conclusion: Adoption of all-inclusive and reagent rental models leads to greater manufacturer engagement and shared responsibilities for equipment procurement and performance. This ensures consistent testing performance, optimal equipment placement, functionality, usage, and timely result availability for patient care and treatment monitoring.

Implementing External Quality Assessment for Biochemistry in Low Resource Settings; the MSF Experience

Background: Since 2015, MSF has enrolled in the EQA program provided by the joint collaboration of Biolabo, a manufacturer of medical reagents and ASQUALAB (Assurance Qualite des Laboratoire des Biologie Medicale), a quality control provider both of whom offer their services free. All MSF laboratories performing lab-based biochemistry are enrolled in the EQA program at the point of equipment installation.

Methods: EQA material is received from Biolabo and distributed to the field locations through the MSF logistics chain. The laboratories analyse two vials and enter the results online by the 30th of every month. ASQUALAB then analyses these results and issues reports within 6 weeks. The performance is reported as good, questionable or unsatisfactory based on results within ±2, between 2 to 3 or >3 Z scores respectively. The MSF quality control focal point then reviews these results with each laboratory offering support laboratories with unsatisfactory results either online or via on-site visits.

Results: 59 laboratories in 23 low and middle-income countries have been enrolled in the EQA program to date. 73% of all results expected within this period from across the portfolio were received. The main reasons for not submitting results were late reception of the EQA material and equipment breakdown. Reporting improved from 60% in 2015 to 87% in 2018 (January to August). 62%, 27% and 11% of the lab recorded good, questionable and unsatisfactory Z scores respectively. The main reasons for poor pipetting techniques and wrongful reconstitution of EQA material. 92% of the laboratories recording good results in 2018 compared to only 70% in 2015.

Conclusion: EQA is an important aspect in guaranteeing the quality of patient results. Access to affordable EQA material is a significant factor in ability to implement EQA programs. Implementation of EQA programs should be accompanied by proper equipment maintenance including pipette calibration.
Continuing Professional Development Training Needs of Medical Laboratory Personnel in KEMRI-Wellcome Trust Research Laboratories, Kilifi, Kenya

Background: Laboratory professionals are expected to maintain their knowledge on the most recent advances in laboratory testing and continuing professional development (CPD) programs can address this expectation. In developing countries, accessing CPD programs is a major challenge for laboratory personnel, partly due to their limited availability. An assessment was conducted among the laboratory technologists working in KEMRI-Wellcome Trust Research Laboratories to identify and prioritize CPD training needs as well as preferred modes of CPD delivery.

Methods: A self-administered questionnaire was disseminated to all the medical laboratory technologists registered with the Kenya Medical Laboratory Technologists and Technicians Board (KMLTTB) working in KEMRI-Wellcome Trust Research Laboratories. Questions were organized into domains of competency related to: quality management systems; technical competence; laboratory management and leadership; and data interpretation and research. Participants were asked to rank their self-perceived training needs using a 3-point scale in order of importance (most, moderate, and least) as well as selecting any three preferences for delivery formats for the CPD.

Results: Out of 80 questionnaires that were distributed, 65 were completed and returned giving an overall response rate of 81%. The most frequently selected topics for training in rank order according to key themes were (mean, range): quality management systems, most important (79%, 74–84%); data interpretation and research (68%, 52–78%); technical competence (65%, 44–73%); and laboratory management & leadership (60%, 37–77%). The top three topics selected by the participants were (i) quality systems essentials for medical laboratory, (ii) implementing a quality management system, and (iii) techniques to identify and control sources of error in laboratory procedures. The top three preferred CPD delivery modes, in rank order, were training workshops, hands-on workshops, and internet-based learning. Journal clubs at the workplace was the least preferred method of delivery of CPD credits.

Conclusion: CPD programs to be developed should focus on topics that address quality management systems, case studies, competence assessment, and customer care. The findings from this survey can also inform medical laboratory pre-service education curriculum.
An Unsuspected Case of Yellow Fever in a Tertiary Health Facility in Nigeria: A Gap in Healthcare Workers’ Knowledge of Yellow Fever Surveillance

Background: Yellow fever (YF) has re-emerged in Nigeria. Immediate notification and response to its outbreak is hinged on healthcare workers’ (HCWs) knowledge of YF surveillance.

Methods: We defined a suspected case of YF as any person with acute onset of fever with jaundice appearing within 14 days of onset of the first symptoms; while a probable case was defined as a suspected case with positive post-mortem liver histopathology. We reviewed hospital records in ABUTH to describe the case and assessed HCWs knowledge of YF surveillance in ABUTH.

Results: The case was a 10-year-old schoolgirl with features of a suspected case of YF. However, she was managed for septicemia without compromising the proficiency of testing.

Conclusion: There was a probable case of YF in ABUTH which was unsuspected possibly due to HCWs poor knowledge of YF surveillance. We sensitized HCWs on YF surveillance and recommended regular training of HCWs on YF surveillance in ABUTH.

Proficiency of Laboratory and Non-laboratory Personnel to Perform Point-of-Care Early Infant Diagnosis. Lessons from Eight sub-Saharan Countries

Background: Point-of-care (POC) diagnostic technologies allow for decentralization of laboratory services. The ease of use of most instrument-based POC assays enable non-laboratory staff to perform these assays. Based on nationally-coordinated POC instrument placement strategies for early infant diagnosis (EID), we adopted a combination of laboratory-based and non-laboratory based POC EID testing. EGPAF compared the proficiency of laboratory and non-laboratory personnel in performing POC EID using end-user related internal quality control (IQC) failure rates in eight sub-Saharan countries.

Methods: We used routine POC EID data (39,576 assay runs) across all 206 project facilities (79 lab-based; 127 non-lab based facilities) performing POC EID testing (Xpert HIV-1 qual or Alere q HIV-1/2 Detect) from mid-September 2017 to June 2018 across Cameroon, Côte d’Ivoire, Kenya, Lesotho, Mozambique, Rwanda, eSwatini, and Zimbabwe. End-user related IQC failures, identified using instrument error codes, were aggregated per facility and categorized per end-user cadre. We assessed differences between laboratory and non-laboratory personnel bi-weekly IQC failure rates between laboratory and non-laboratory personnel using the Wilcoxon rank-sum test on summary statistics (median, interquartile range intervals, proportions), and over the entire period using 2-test (proportions) from aggregated facility outcomes.

Results: No significant differences were observed in the overall end-user related IQC failure rates between laboratory and non-laboratory personnel over the entire period (0.026 vs 0.025; p=0.5474). There were also no significant differences in the median rates of end-user related IQC failures reported bi-weekly between laboratory (0.024; IQR 0.022-0.034) and non-laboratory (0.021; IQR 0.022-0.030) personnel. Both cadres routinely achieved an end-user related IQC failure rate below 2.5%.

Conclusion: Instrument-based POC EID assays performed by non-laboratory personnel showed no significant differences in the overall end-user related IQC failures, compared to laboratory personnel. For both cadres, bi-weekly IQC failure rates were below 2.5%, showing adequate and similar POC EID testing proficiency. Thus, POC EID testing can be performed in non-laboratory facilities without compromising the proficiency of testing.
Assessment of Knowledge, Practices Regarding Biomedical Waste Management in Health Care Workers in Hospitals in Eastern Uganda

Background: Waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for disease transmission and injury that also results in environmental degradation. The aim of the study was to determine the awareness regarding waste management and to conduct a survey in the health facilities to observe current practices of health care workers towards biomedical waste management.

Methods: Methods A cross-sectional study with a pretested structured questioner was administered among 420 respondents in twelve national hospitals in eastern Uganda. The questionnaire was formulated to capture; knowledge on biomedical waste management policies and guidelines, attitudes and practices and an observational checklist was used to observe current practices of health care workers and non clinical staff towards biomedical waste management.

Results: The results obtained pointed towards lack of knowledge and awareness towards legislations on bio-medical waste management. The assessment of knowledge of health care providers regarding bio-medical waste management revealed that (45%) had an overall average level of knowledge, while (24%) respondents had a good knowledge and (31%) had poor knowledge. The assessment of practice of health care providers regarding BMWM revealed that (33%) had an overall average level of practice, while (25%) respondents had a good practice and (42%) had poor practice. The practice of recapping used needles was at (33%) while none reporting of injuries was at (80%) on disposal of hospital waste, out of the 12 hospitals visited (58%) used locally built brick incinerators to dispose biomedical waste; (25%) disposed off by municipal landfills and (19%) was burning waste in open air. Only (25%) hospitals had well documented guidelines for waste management and a proper waste management team.

Conclusion: In most cases, the main reasons of the mismanagement of biomedical waste were the lack of appropriate legislation, lack of awareness, no effective controls, inadequate funding to implement waste management programs. There is the need to develop and implement a training programme for BMW and to put in place protocols, provide PPE, regular supervision and other resources for better compliance of BMW rules.

Improved Laboratory Compliance to Quality Standards in Cambodian Laboratories Through On-site Trainings

Background: I-TECH has supported laboratory quality strengthening in Cambodia since 2014. In 2017 at the onset of the 2nd phase of our project after a year lapse in implementation, we assessed all our 12 target laboratories. These audits revealed gaps in non-compliance to laboratory quality management system (QMS) including in equipment maintenance. Lack of staff engagement to improve QMS was noticeable. Although standard operating procedures (SOPs) were written, laboratory staff had not honed SOP implementation at the bench.

Methods: I-TECH mentored 12 laboratories with the aim to improve staff knowledge in QMS with emphasis in areas that showed the least staff engagement during audits. We organized and conducted on-site daylong trainings at three laboratory sites. The 12 laboratories were divided into 3 regional groups, each with 8 trainees including Laboratory Managers and Quality Officers. Trainings consisted of walking through the laboratory to check for non-conformities and a hands-on practicum on correct pipetting skills, with lectures on reagent grade water quality and distiller equipment maintenance. Training participation was documented and attendees evaluated trainings.

Results: Non-conformities documented at the three training laboratories included the following: all three laboratories did not perform pipettes accuracy check; they all had inadequately maintained distillers; at all sites distilled water container label was not standardized according to the globally harmonized system. One month after trainings, an assessment showed that all three laboratories have completed all their pipettes checks. Two laboratories have purchased the opaque containers for storing the distilled water. One laboratory has engaged a vendor to help with distiller maintenance. Training evaluation indicated that all participants agreed on the relevance of training content to their work, they all learned new skills, and they would recommend this training to other colleagues.

Conclusion: The on-site training methodology showed positive learning and improvement of the laboratory processes.
Improving Laboratory Information Management for a Stronger Clinical–Laboratory Interface: Successful Implementation of TBLIS® in Tuberculosis Laboratories in Africa

**Background:** Timely and quality laboratory reporting of Tuberculosis (TB) results is a necessity for prompt initiation of appropriate medical therapy for TB patients and rapid public health response. However, TB patients in resource-poor settings experience large delays in starting appropriate treatment and may not be monitored appropriately due to delays in communication of test results and lack of confidence in the reliability of test results. Challengingly, most TB diagnostic laboratories in Africa implement paper-based information management systems while others implement electronic systems that do not meet the unique needs of a TB laboratory. Hence, they struggle with limitations in sample tracking, results reporting, monitoring of quality indicators and patient treatment outcomes.

**Methods:** With technical support from Landsat ICT Solutions since 2013, Uganda TB Supranational Reference Laboratory (SRL) implemented TBLIS® - an electronic laboratory information management system customised for tuberculosis laboratories to improve the quality of TB laboratory data, timeliness of results reporting; improve monitoring of laboratory quality indicators, patient treatment outcomes and effective patient care.

**Results:** Implementation of TBLIS® facilitated real-time monitoring of laboratory processes; supported monitoring of laboratory quality indicators and timely delivery of test results to clinicians; met information management requirements including the ISO 15189 standard; and was very useful in managing laboratory data for the Uganda TB Prevalence Survey 2014/15. TBLIS® has been scaled up for implementation in other TB laboratories in Uganda, Somalia, Tanzania, South Sudan, Nigeria and Malawi. These laboratories have achieved tremendous improvements in information management operations and have greatly reduced issues related to results communication to clinicians.

**Conclusion:** The major product and service of a laboratory to clinicians is information (in form of laboratory results). Laboratories need right tools and systems to manage and communicate laboratory information to clinicians satisfyingly. We propose TBLIS® as a tested approach for information management in tuberculosis laboratories.
OA-2.5-027  TIME: 11:20

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**Improved Viral Load Results Utilization for Non-suppressed Patient Management: A Uganda CQI Experience**

**Background:** HIV treatment adherence and outcomes among PLHIV are better monitored using viral load (VL) testing for early identification of drug resistance or poor adherence. Considerable gains have been made in terms of coverage and access to viral load testing (80%), although utilization of results remains poor. The Uganda LARC team implemented a quality improvement project at Kyanamukaka, Bukulula and Kiyumba Health Center IVs, aimed at increasing VL results utilization. Project objectives were; to improve the proportion of patients with non-suppressed viral load results contacted within 1 week from 27% to 90% and those initiated on first Intensive Adherence Counseling within 1 month after results receipt from 6% to 90% from Nov 2016 to June 2017.

**Methods:** CQI methodologies such as process-mapping, fish-bone analysis and chart reviews were used. VL quality improvement teams were constituted, and these received monthly mentorships by the LARC team. The VL-results flow chart was revised to start from sorting and results-stamping, flagging of files for non-suppression clients using reminder-stickers, updating of tracking logs, contacting non-suppressed patients on phone or home visits within one week and intensified adherence counseling within one month of receiving results.

**Results:** Overall, there was an increase from 27% to 92% of non-suppressed patients contacted within one week and from 6% to 91% of those initiated onto Intensive adherence counseling within one month of receipt of results. In Kiyumba, Kyanamukaka and Bukulula, 100%, 80% and 75% of clients were contacted in one week respectively. Also, 100%, 80% and 75% of patients in Kiyumba, Kyanamukaka and Bukulula were provided first intensive adherence counseling within one month.

**Conclusion:** The formation of multi-cadre facility based quality improvement teams sustainably improves VL result utilization in ART patient management.

OA-2.5-028  TIME: 11:45

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**Enhancing the Laboratory-Clinical Interface to Identify Reporting and Program Gaps to Achieve the Third “90” in Kenya**

**Background:** To achieve the third UNAIDS “90” target (viral suppression), the Kenya HIV program progressively developed a national viral load (VL) laboratory network and database since 2012. Kenya guidelines recommend confirmation of non-suppressed VL (>1,000 copies/ml) after 3 months of enhanced adherence counselling (EAC). As part of quality assurance, a laboratory-clinical interface team reviewed VL data to identify strategies for better patient management.

**Methods:** Viral load data from 15 CDC implementing partners’ (IPs) sites, disaggregated by suppression status and confirmatory testing were reviewed from October 2016 to September 2017. This showed low confirmatory testing and was shared with the IPs to identify gaps and immediately implement targeted interventions. They identified the following reasons for this: suboptimal data quality; outdated, incorrect or incomplete laboratory requisition forms (LRF); misclassification of “confirmatory” VL as “routine”; patient loss-to-follow-up while some were still undergoing EAC. Interventions implemented included data quality review; laboratory and clinical staff training/mentorship on use of updated LRFs; use of remote log-in and intensified follow-up of patients with unsuppressed VL. Adherence to clinical guidelines was reinforced. Follow-up data were collected from October 2017 to April 2018.

**Results:** Of the 318,187 VL tests conducted in the initial phase, 271,327 (85%) were suppressed. Of the 46,860 unsuppressed results, only 5,979 (13%) VL were subjected to confirmatory testing of which 2,822 (47%) had re-suppressed. Of the 201,758 VL tests conducted in the follow-up phase, 175,809 (87%) were suppressed. Of the 25,949 unsuppressed VL results, 7,004 (27%) were confirmed within the period of which 3,902 (56%) had re-suppressed.

**Conclusion:** Review of laboratory VL data identified key gaps in the use of VL results in patient management. Interventions led to improvement in confirmation of non-suppressed VL results that are vital for improved patient management. Continued collaborative laboratory-clinical reviews are needed to ensure adherence to VL testing guidelines.
Utility of GeneXpert MTB/RIF-diagnosed Rifampicin Resistant Tuberculosis Alerts for Linkage to Care in Gauteng, South Africa, 2017

Background: Closing the gap between diagnosis and linkage to care is key to efforts towards tuberculosis (TB) control. To facilitate timely tracing and linkage to care of rifampicin resistant TB (RR-TB) cases diagnosed by GeneXpert MTB/RIF (GXP) assay, the National Institute for Communicable Diseases maximized the benefit of a single laboratory information system in the public laboratories to initiate distribution of weekly line lists of RR-TB cases to TB managers at provincial and district levels in South Africa. This study describes linkage to care of newly diagnosed RR-TB patients in Gauteng.

Methods: Cross sectional study including all newly GXP-diagnosed RR-TB cases across the five districts in Gauteng, 2017. Weekly line lists were routinely checked against clinical records and data from district offices to assess patient demographics, clinical characteristics and gaps in treatment cascade following diagnosis.

Results: A total of 1,411 RR-TB cases were diagnosed, most of whom were between 25-44 years (53.9%), males (56%), HIV positive (59%) and not previously treated for TB (56%). The HIV status and TB treatment history were unknown for 25% and 23% of the cases respectively. Drug resistance confirmation was recorded for 82% (1,164) of the cases. Of the diagnosed cases, 83% (1,178) were initiated on treatment, ranging from 78-86% across the districts. Of the 233 who did not initiate treatment, 83% (1,178) were initiated on treatment, ranging from 78-86%.

Conclusion: Death prior to treatment initiation and initial loss to follow up largely contributed to the treatment gap among the study cohort. Utilizing GXP-diagnosed RR-TB line lists assists in identifying gaps in treatment cascade, to achieve the 90-90-90 targets. More than half of the cases recorded no previous history of TB treatment, substantiating the use of GXP as first line test for TB in South Africa.

LARC Quality Improvement Collaborative in Eswatini Yields Improved Tracking and Follow-up for HIV Patients with High Viral Load

Background: In a peri-urban HIV clinic in Eswatini, systemic quality gaps in the viral load cascade were identified. Patients with high viral load (HVL) laboratory results were neither being identified nor being provided timely clinical follow-up. At baseline measurement, only 12% of the clients with a HVL were being recalled to the clinic for a follow-up appointment.

Methods: A multidisciplinary laboratory-clinic team joined the Laboratory African Regional Collaborative (LARC) initiative, a 6-site multicounty quality improvement collaborative pilot focused on the viral load cascade. The Define-Measure-Analyze-Improve-Control (DMAIC) Framework provided the approach to the identified gaps. Multiple quality improvement tools, including process mapping, impact-effort grid, fishbone diagram, and the Plan-Do-Study-Act (PDSA) cycle were sequentially introduced and assigned over three didactic learning sessions. At these sessions, the country teams, comprised of national laboratory and clinical leaders and site leadership and front-line staff, shared their progress and learned through collaboration. During the intervening action periods, in-county leadership visited the site to insure progress and remove barriers.

Results: Viral load results not being tracked was identified as a root cause. After testing and fine-tuning a HVL-result-tracking (hand-off) log through iterative PDSA cycles, 80% of the patients (n=27) were successfully identified, called within two days, and scheduled for a follow-up clinic appointment. Multiple other opportunities for improvement were identified and addressed. In addition, the cohort was further tracked through adherence counseling sessions, repeat viral load testing (17) and suppression (5).

Conclusion: Through participation in the LARC improvement collaborative, the team was able to meet their primary goal of timely follow-up for patients with HVL. The knowledge and skill required to implement the quality improvement approach / tools was firmly embedded at the site and national level to ensure continuous, sustainable quality improvement. The team approach yielded benefits to both national leaders and site leadership/staff in terms of engagement and advocacy.
Thursday, 13 December

ORAL SESSION OA-3.1
THE ONE HEALTH APPROACH

DATE: Thursday, 13 December
TIME: 11:00 – 12:30
ROOM: Congress Hall
CO-CHAIRS: Tom Chiller, CDC
Cristian DeBattisti, FAO

F. Sidibe
1. Diagnostic et Recherche Biomédicaux, INRSP Mali, Bamako, Mali.

Contribution du Laboratoire de Référence de l’Institut National de Recherche en Santé Publique dans la Détection des Pathogènes zoonotiques Associés à des Maladies Fébriles Aiguës au Mali

Background: L’avènement d’une ère marquée par l’apparition de maladies émergentes et ré-émergentes et leurs conséquences potentiellement graves pour la santé publique constituent des enjeux majeurs de recherche. Ainsi pour étudier les pathogènes potentiels causant des fièvres d’origine inconnue, l’INRSP et le NIH (USA) ont mené une étude rétrospective en 2014, sur les échantillons de sérum de la surveillance épidémiologique de la fièvre jaune du Mali Objectif : Vérifier la circulation d’autres agents pathogènes associés à des maladies fébriles aiguës au Mali, pour prévenir d’éventuelle épidémie.

Methods: 376 sera non réactifs au test de fièvre jaune ont été éprouvés vis-à-vis des anticorps de 08 pathogènes zoonotiques au Rocky Mountain Laboratories (NIH). Ces prélèvements ont été effectués chez les patients dans un contexte de fièvre + icterie et/ou hémorragie au cours de la surveillance de routine de la fièvre jaune sur toute l’étendue du territoire de 2009 à 2013. Les tests utilisés étaient : Gen-way Biotech (immuno-enzymatiques) pour le Chikungunya, la Dengue, le West Nile, la Leptospirese et les tests Elisa pour le Lassa, la Fièvre Hémorragique Crimée –Congo (CCHFV) l’Ebola.

Results: 39,9% des échantillons étaient positifs pour les zoonoses suivantes : 14,4% pour la Leptospirose ; 7,7% pour la Dengue ; 7,2% pour le Hantavirus ; 5,3% pour le Chikungunya ; 0,27% pour le Lassa et le West Nile ; 4,8 pour la CCHFV. L’Ebola n’a été retrouvé dans aucun sérum.

Conclusion: Cette étude a démontré la preuve sérologique d’une circulation chez l’homme de : Leptospirose, Dengue, Chikungunya, Hantavirus dans tout le pays. Depuis des sites sentinelles ont été mis en place pour surveiller ces pathogènes. Le poids de ces zoonoses sur la population doit être évalué pour renforcer les capacités des laboratoires et développer des stratégies d’intervention pérenne afin de prévenir d’éventuelles épidémies. Mots Clés : Surveillance Épidémiologique Diagnostic, Maladies Zoonotiques, Mali

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Seroprevalence and Determinants of Echinococcus Granulosus Infection in Owned Dogs in Ibadan, Oyo State, Nigeria

Background: Echinococcosis is a parasitic zoonosis of worldwide distribution that has been recently termed emerging/re-emerging and has dog as a definitive host. It constitutes severe financial burden derived from human health costs and livestock production losses. The factors associated with Echinococcus granulosus (EG) seropositivity in dogs in Nigeria is relatively unknown. This study, therefore, aimed at determining EG seropositivity and its determinants in owned dogs in Ibadan.

Methods: Sera from 185 dog blood samples (5mls) obtained via the cephalic vein were analysed for the presence of EG antibodies using the direct ELISA technique. Structured interviewer-administered questionnaire was used to obtain data on demography, management and environmental factors from participating dog owners. Data were analysed using descriptive statistics, univariate analysis and logistic regression at 0.05.

Results: The mean age of the respondents was 35.7 ± 11.3 years; while median age of the dogs was 20 months (range 2 – 96). The seroprevalence of EG infection was 33.51%. Factors: low educational level of dog owners (OR: 2.8; 95% CI: 1.3, 5.8); local breed of dog (OR: 3.3; 95% CI: 1.7, 6.3); confinement (OR: 0.4; 95% CI: 0.2, 0.8); interaction with other dogs (OR: 3.2; 95% CI: 1.4, 7.3) and self-deworming of dogs (OR: 2.8; 95% CI: 1.3, 6.4) were associated with exposure to EG. On logistic regression, being a local breed of dog (AOR: 2.5; 95% CI: 1.2, 5.1) and self-deworming of dogs (OR: 2.8; 95% CI: 1.1, 6.9) remained predictors of EG seropositivity.

Conclusion: Exposure to EG is high among owned dogs in the study areas showing considerable risk of human infection. Owners who self-medicate their dogs against worms were more likely to have dogs with EG infection compared to those who seek veterinary services. Dog owners are advised to seek veterinary service in treating their dogs against tapeworm infection.
Re-emergence of Rift Valley Fever Virus in Uganda After 50 Years: Evidence from a country-wide Serological Study in Cattle

Background: Uganda had not reported outbreaks of Rift Valley Fever (RVF) in humans for 50 years since 1968. In March 2016 the Uganda Ministry of Health reported three cases of RVF in the South Western Uganda district of Kabale. Subsequent investigations in Kabale district showed seroprevalence in cattle and humans at 27% and 12%, respectively. The Viral Haemorrhagic Fever Surveillance (VHFS) program of the Uganda Virus Research Institute (UVRI) designed a nationwide study to establish seroprevalence of RVF virus in livestock.

Methods: Blood samples and relevant data were collected from 1746 cattle in 27 districts across all regions of Uganda as part of an RVF longitudinal study, beginning in February 2017. Samples were tested using a CDC in-house ELISA targeting IgG antibodies against RVF virus. Data were analyzed using binary logistic regression for risk factors of RVF in livestock.

Results: The overall seroprevalence was 9.7% (167/1746, 95% CI=8.4%-11.2%). RVF herd prevalence was at 40%. Female adult cattle were more at risk of being seropositive at 13.5% (OR=2.7, 95% CI=1.6-4.4). Risk factors identified include cattle grazing in low lands (OR=1.9, 1.4-2.7), tethering and paddocking production systems (OR=3.1, 2.6-4.5), animal with history of abortions (OR=1.5, 1.2-3.1), and cattle from larger herd size of more than 50 (OR=2.3, 1.6-3.4). The prevalence was higher in the Central districts around Lake Victoria and the River Nile (OR=4.5, 2.5-8.3) indicating that this could be an emergence followed by enzootic transmission by mosquitoes rather than a new introduction from neighboring countries.

Conclusion: RVF is re-emerging in the Southern and Central districts Uganda, spreading to Northern districts of the country. Further studies and prospective analysis should be completed in order to determine the risk factors for emergence and transmission dynamics. Appropriate control and prevention measures need to be instituted by health authorities accompanied by targeted health education messages.

A One Health Approach to Addressing Gaps in Laboratory Leadership Training

Background: Laboratories play a critical role in the detection, diagnosis and control of diseases and are a cornerstone of health systems; however, reliable laboratory services are limited in many low- and middle-income countries. Weak laboratory systems impede disease detection, control and prevention efforts as exemplified by a number of well-documented events, including some at the convergence of human, animal, and environmental health. It is also recognized that laboratory leaders in resource limited settings have little training in the leadership and management skills needed to build strong, sustainable laboratory systems.

Methods: To address this training gap six leading organizations have joined to develop a Global Laboratory Leadership Programme (GLLP) targeting leaders working in human, animal and environmental health laboratories. Partners include the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE), the European Centre for Disease Prevention and Control (ECDC), the U.S. Centers for Disease Control and Prevention (CDC), and the Association of Public Health Laboratories (APHL). Together these organizations are committed to developing a Laboratory Leadership Competency Framework outlining the essential competencies needed for laboratory leaders to build sustainable national laboratory systems capable of improving disease detection, control and prevention efforts.

Results: The Framework takes a multisectoral One Health approach addressing the entire National Health Laboratory System, defined as networks of human, animal, environmental, agricultural, food, and chemical laboratories supporting health systems. The Framework will also provide a foundation for the GLLP and a training package including core course materials and a guidance program planning, implementation and evaluation.

Conclusion: By developing strong laboratory professionals to lead their laboratory systems to the next level, this international partnership, encompassing One Health disciplines, is committed to support countries’ laboratory systems as they strive to meet critical Global Health Security demands.
Prevalence of ESBL Producing Salmonella Typhimurium among Commercial Poultry and Poultry handlers in Keffi, Nasarawa State, Nigeria

Background: Salmonella enterica is a zoonotic pathogen which can pass from animal to man through consumption of contaminated food. The contamination of poultry and poultry products with extended spectrum betalactamase (ESBL) producing Non-Typhoidal (NT) Salmonella has significant public health and economic implications. Antibiotic resistance is a growing concern worldwide and has continually affected important class of antibiotics, such as the beta-lactams, which are among the most significant bactericidal antibiotics used to treat bacterial infections in humans.

Methods: The study was conducted using standard bacteriological methods. Antibiotic susceptibility and determination of ESBL phenotypes were carried out according to the methods described by the clinical laboratory standards institute (CLSI) guidelines. The polymerase chain reaction (PCR) was used for molecular detection of the ESBL genes using specific primers.

Results: Salmonella Typhimurium and the ESBL producing phenotypes recorded a prevalence of 59 (11.8%) and 25 (42.4%) respectively. The ESBL (bla TEM and bla SHV) genes had prevalence values of 10 (40.0%) and 4 (16.0%) respectively. Co-carriage of these ESBL genes in this study was also observed.

Conclusion: Monitoring of antibiotics usage in veterinary and human medicine is important in order to limit the development and spread of resistant Pathogens.

Is Housing (Roofing) Quality Associated with Malaria Incidence? The Findings in Nchelenge, Luapula Province.

Background: The malaria vectors predominantly enter houses via open eaves. There is an unprecedented opportunity to design homes that keep malaria vectors out, ultimately reducing individuals’ exposure to malaria parasites thereby mitigating disease. We conducted a study in Nchelenge, Zambia to assess the association of locally used roofing materials, namely corrugated roofing sheets and straw-thatch, on malaria incidence.

Methods: Individuals seeking medical care were screened at point of care facilities where those suspected of malaria and consented were recruited. A total of 282 participants were tested for malaria and responded to a questionnaire capturing social demographic data which included IRS records in last six months, ITN ownership, and type of wall, roofing and floor material. A multiple regression was applied on IRS record, ITN ownership, sex and type of roofing material in order to determine the relation between 3 predictor values and the outcome.

Results: Sixty-four percent of participants slept under straw-thatched houses while 34.8% under roof made of Corrugated Iron Sheets. Malaria positivity for the latter and straw thatched roofs were 55.1% and 68.1% respectively. Of all the variables that were analyzed, there was a statistically significant association between roofing material and malaria positivity (R²=4.49, p=0.034). Individuals sleeping in corrugated roofing sheets were less likely to have malaria than those that slept under a straw thatched roof (OR=0.579, 95% CI: 0.349-0.960).

Conclusion: Malaria control and elimination in sub-Saharan Africa is currently focused on Indoor Residual Spraying, use of ITNs and case treatment as they present. Unfortunately, not much attention has been given to environmental strategies. The association of malaria cases with straw thatched houses underscores an urgent need for further studies on housing structures and redesigning of houses particularly, in zones of high transmission to reduce vector densities as part of environmental control towards malaria elimination.
Strengthening Regional Capacity for Diagnostics through Laboratory System Strengthening using the WHO/AFRO Strengthening Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) Program

Background: The laboratory is increasingly playing a critical role in diagnosis, patient management, disease surveillance, outbreak investigation and policy. The Southern-Africa TB Health Systems Strengthening (SATBHSS) Project is implementing laboratory system strengthening in targeted national, regional and district laboratories across the four project countries of Lesotho, Malawi, Mozambique and Zimbabwe.

Methods: Thirteen Laboratories were enrolled from Malawi (4), Lesotho (3), Mozambique (3) and Zambia (3) where several quality improvement initiatives were implemented including mentoring, training in Strengthening Laboratory Management Towards Accreditation (SLMTA), Quality Management System (QMS) and biosafety. Twenty-six mentors and 22 auditors were trained in collaboration with the Africa Society for Laboratory Medicine (ASLM). A peer-to-peer audit process using the trained auditors was used to assess the change in implementation of QMS using SLIPTA checklist—which measures laboratory performance from 0 to 5 stars. We compare overall median scores from baseline (2017) and follow-up (2018) using Wilcoxon signed rank test.

Results: Twelve and 11 laboratories were audited in 2017 and 2018 respectively. In 2017, no laboratory attained 5 stars, 1 got 4 stars, 3 received 3 stars, 2 received 2 stars, 1 attained 1 star and 5 zero stars. In 2018, 1 achieved 5 stars, 1 attained 4 stars, 3 attained 3 stars, 2 attained 2 stars, 1 attained one 1 star and 5 received 0 stars. Of the 4 laboratories recommended in 2017, 1 (Zambia) attained international ISO 15189 accreditation. In both years, performance in management reviews, internal audits and identification and management of non-conformities was on average below 50%. There was an overall statistically significant increase in SLIPTA audit percent scores from 2017 to 2018 (p=0.02).

Conclusion: There is progressive improvement in laboratory quality management system in the target laboratories as a result of multi-pronged approach that includes mentorship, training, capacity building and an audit process.
Assuring Quality and Building Trust: Providing High Quality, Low Cost EQAS at Both Laboratory and Community Settings

Background: An important component in the delivery of quality health care is participation in External Quality Assessment Schemes (EQAS). Challenges to participate in EQAS for laboratories in resource-limited settings include specialised sample handling requirements and the subscription and shipping costs. These challenges are magnified when diagnostic testing is moved to the community level. NRL validated and implemented a comprehensive range of high quality, low cost EQAS to meet the growing challenge at both the laboratory and community testing sites.

Methods: Dry tube sample (DTS) schemes were optimised by NRL for HIV, including EID; HBV & HCV viral load. Swab-based panels for sexually-transmitted qualitative molecular detection were developed as was a multimarker serology scheme for serology rapid tests, mimicking whole blood. Accelerated stability was performed on all EQAS programmes at four temperatures which inferred shipping and storage options. Since 2018, the schemes were distributed to 15 countries. Results were submitted to NRL using an internet-based application (OASYS, Oneworld Accuracy, Canada) and analysed by comparing results submitted for the same assay platforms.

Results: All schemes were stable for at least a year. Results from 103 participants from 15 countries (seven from the African continent) were received. Sixty-five participants were laboratory-based and 38 from community testing sites. Four participants subscribed to more than one type of scheme. The scheme with the greatest participant numbers was the multimarker serology scheme for rapid tests (n=63), with 38 from community testing sites and 25 from laboratories. Forty sites performed molecular testing, all of which were from laboratories.

Conclusion: Stability of novel sample types such as DTS and dried swabs overcome many barriers to the delivery of well-characterised EQAS to resource-limited settings. Optimisation, validation and implementation of these EQAS formats has provided access to ISO 17043 accredited programmes to point of care testing facilities globally.

Regional Collaborations for Laboratory Systems Improvement towards accreditation: Lessons From East Africa Public Health Laboratory Network

Background: While laboratory is a back-bone to clinical care, a number of public health facilities have reported limited utilization of laboratory services due to perceived poor quality of results. The East Africa Public Health Laboratory Network established a program for regional peer support for laboratory quality improvement and annual audits of selected networked laboratories in five countries in East Africa (Burundi, Kenya, Rwanda, Tanzania and Uganda) since 2011.

Methods: In order to facilitate improvements in laboratory quality systems the project set a cycle of joint regional planning with clear improvement projects included in national plans, implementation of the improvement project was enhanced by Strengthening Laboratory Management Towards Accreditation (SLMTA) training, focused onsite mentorship, internal audits and provision of facility improvement seed funds to address critical gaps. Performance was measured through an innovative regional peer audit program that involved ASLM trained laboratory auditors using the WHO-AFRO SLIPTA checklist with a set target of two stars. The regional peer audits ensured objectivity and transparency in the audits while allowing peer to peer learning.

Results: The performance varied from country to country but overall improvements were recorded in performance of the laboratories over time. All the laboratories in Burundi, Kenya, Rwanda and Tanzania attained 2 stars and above. The peer assessment conducted in 2017, found that more than 96% of project-supported facilities attained at least 2 stars, compared to 23% at baseline (2011), a 73-percentage point's improvement in performance. Four laboratories in the network received accreditation using ISO 15189 standard. Improved performance was recorded due to improved laboratory infrastructure, good working relationship with the top management, commitment to quality by laboratory staff members and mentorship.

Conclusion: Impressive gains were recorded SLIPTA, institutionalizing Laboratory Quality Management Systems (LQMS) translating into a culture of continuous quality improvements that set the facilities on a path towards accreditation.
**OA-3.2-011** **TIME: 11:55**

E. L. Nyakarungu
1. Laboratory, Ifakara Health Institute, Malabo, MALABO, Equatorial Guinea.

**Strengthening Clinical Laboratory Services for Malaria Vaccine Trial Initiative in Bioko Island of Equatorial Guinea**

**Background:** The quest for reliable malaria vaccine in sub-Saharan Africa has intensified and this calls for high quality standard clinical laboratories to meet the rigorous protocols requirements in clinical research. In 2015, Equatorial Guinean government in partnership with private sectors, including Marathon Oil, AMPCO and Noble Energy, funded a small scale clinical trial of whole malaria sporozoite vaccines developed by Sanaria. The aim was to evaluate the safety, tolerability, immunogenicity and the protective efficacy of the vaccines in Bioko Island. Presence of a clinical laboratory that meets Good Clinical Laboratory Practices (GCPL) was a critical requirement.

**Methods:** Clinical research experts from Sanaria, Ifakara health institute and Swiss tropical public health institute teamed-up with local staff from La Paz medical centre in Bioko Island to improve the laboratory standards to comply with international quality standards for clinical trial laboratory. The laboratory infrastructure was redesigned with a well-defined management structure. Laboratory manuals and standard operation procedures were developed and laboratory personnel trained. High quality lab equipment and supplies were procured. Internal quality control and external quality assurance were put in place.

**Results:** Two trials have successfully been carried out: First, a phase I, randomized, double-blind, placebo-controlled trial to evaluate the safety and immunogenicity of direct venous inoculation of a radiation-attenuated Plasmodium falciparum sporozoite vaccine (PfSPZ Vaccine) tolerability; this involved 35 adults. Second, a phase II study on the safety, tolerability and immunogenicity of a radiation-attenuated Plasmodium falciparum sporozoite vaccine (PfSPZ Vaccine); and comparison with non-attenuated Pf sporozoites (PfSPZ Challenge) administered under chloroquine prophylaxis (PfSPZ-CVac approach) for efficacy against controlled human malaria infection. This involved 135 Equatoguinean adults, children and infants.

**Conclusion:** This abstract shares the experiences and, challenges from transforming a simple laboratory to high quality international standard for PfSPZ malaria vaccine trials.

**OA-3.2-012** **TIME: 12:05**

R. Njouom1, O. Njoya2, C. Bilong3, A. Boers4, R. Coutinho5, R. Nsalimb6, M. Biwole Sika4, F. Essomba3, P. Ondoa3
1. Centre Pasteur de Yaoundé, Yaoundé, Cameroon.
2. Faculté de médecine de Yaoundé, Yaoundé, Cameroon.
3. PharmAccess, Amsterdam, Netherlands.
5. ASLM, Addis Ababa, Ethiopia.
6. Joep Lange Institute, Amsterdam, Netherlands.

**Addressing the Challenges of Laboratory Monitoring of Hepatitis C Treatment in Cameroon**

**Background:** Untreated Hepatitis C can lead to chronic liver disease and death. In addition to the high treatment cost of Directly Acting Antivirals (DAA) and the centralized organization of care, insufficient diagnostic capacity for the screening, confirmation and treatment monitoring further complicate the control of hepatitis C in Cameroon. We set up to enroll a cohort of 150 patients through 6 specialized clinics of Yaoundé to demonstrate the feasibility of the DAA-treatment of Hepatitis C, using simplified treatment and diagnostic algorithms geared towards achieving high cure rates, while reducing the overall treatment costs.

**Methods:** Branded Sofosbuvir combined to Ledipasvir or Ribavirin was used, according to the viral genotype and stage of liver disease. Treatment monitoring included HCV genotyping, one HCV viral loads at enrolment and one to confirm viral suppression at 12 weeks post treatment, a fibrotest, and other hematology and biochemistry investigations (~320 USD/patients). Treatment and diagnostic costs were supported by the project. Testing was done in a reference laboratory setting.

**Results:** Between September 2017 and June 2018, 131 HCV patients were pre-enrolled and 111 started treatment. Ninety-two percent were older than 45 and 50% were unemployed. The turnaround time for VL testing and fibrotest was >30 days delaying treatment initiation. Co-morbidities associated with older age were frequent (15% with diabetes and 40% with high blood pressure). Three patients with deteriorated clinical condition at study entry, died after treatment initiation. A cure rate of 95% was achieved in the first 38 patients reaching the end of the program.

**Conclusion:** Delivering effective DAA treatment using 2 HCV VL is possible in ‘real life’ clinical settings of Cameroon. Options to decentralize and reduce the cost of virology testing but also biochemistry investigation are needed to ensure optimal clinical and public health outcomes.
ORAL SESSION OA-3.3

SCIENCE AND EDUCATION TO PREVENT THE NEXT PANDEMIC

DATE: Thursday, 13 December
TIME: 11:00 – 12:30
ROOM: Benue/Plateau
CO-CHAIRS: Iruka Okeke, University of Ibadan
Coumba Toure Kané, IRESSEF

Community Health Screening and Education Through Laboratory Science: Clinical Laboratory Science Student Service-Learning and Study Abroad Collaboration Opportunities

Background: Public health outreach initiatives frequently overlook laboratory medicine students and professionals. This is a missed opportunity to engage lab science students in the health screening and education of their local communities as well as in partnerships with lab science students from other countries. This presentation will demonstrate a model bilingual community health screening and education (CHS & E) through laboratory science service-learning (SL) study abroad (SA) program that could be utilized to combat pandemic threats. In collaboration with The Foundation for International Medical Relief of Children (FIMRC), Clinical Laboratory Science (CLS), Texas State University, San Marcos, TX, United States.

Methods: While I will present the cross-sectional prevalence study results, the majority of the proposed presentation will focus on the active learning activities presented in the CHS & E through laboratory science service-learning (SL) study abroad (SA) program that could be utilized to combat pandemic threats. In collaboration with The Foundation for International Medical Relief of Children (FIMRC), Clinical Laboratory Science (CLS), Texas State University, San Marcos, TX, United States.

Results: We conducted hemoglobin, urinalysis, glucose, cholesterol, and sexually transmitted infection screenings on 157 people. Parents and children learned more about their conditions through fun and interesting laboratory science activities and tests. I will present a video of all the interactive stations.

Conclusion: Collaboration between lab medicine programs at universities in the United States and Africa to build more CHS & E through lab science programs can expand awareness of our profession, build international relationships, and help prevent pandemics.

Development of a Clinical Trials Laboratory During an Epidemic

Background: During the 2014-2016 West Africa Ebola epidemic, the EBOVAC-Salone clinical trial of a heterologous prime-boost vaccine against Ebola was setup in a resource-poor setting in the Kambia District of Sierra Leone. To support the trial, it was necessary to establish a Good Clinical Practice (GCP)-based research laboratory capable of conducting key safety and other assays.

Methods: The laboratory was established during the Ebola outbreak between January and September 2015. Challenges included identifying a site and research partners, recruiting staff, establishing a power supply and equipping the laboratory. The research laboratory was being developed, laboratory work for the trial began in a tented laboratory within an Ebola Treatment Centre one hour’s drive from the clinical trial site at Port Loko. After 5 weeks, laboratory operations were moved closer to the trial site and into two prefabricated containers with a generator-based power supply. Laboratory staff was recruited over nine months and were assisted by technical support from the University of Oxford and LSHTM. Equipment and consumables were imported specifically for the clinical trial, and this process was facilitated by an importation waiver put in place during the epidemic. There was a step-wise implementation of laboratory services, including haematology, biochemistry, malaria diagnostics, ELISA and PCR assays, as well as a quality management system.

Results: The laboratory was able to support the clinical trial during the epidemic at both the temporary and longer-term laboratory sites. Ongoing challenges include sourcing biomedical engineers to service equipment and the need to transport and store fuel in large quantities on site for the generators.

Conclusion: It is possible to establish a trial-related research laboratory, following GCLP principles, in a rural setting with no electricity during an epidemic if there is flexibility in initiating laboratory activities and pre-fabricated units are used to save on laboratory construction time.
OA-3.3-015 | TIME: 11:20

O. J. Kehinde1, E. Ofuche1, E. A. Ojo1, A. Ani1, F. Owolagba1, D. Ogbuagu1, R. Fayomade1, D. Adeniyi1, J. O. Samuels1

1. Laboratory Services, APIN Public Health Initiatives, Ibadan, Oyo State, Nigeria.

Assessment of the Competency Assessment of HIV Rapid Testers and Functionality of Testing Points in some HIV Testing Points supported by APIN Public Health Initiative in Nigeria

**Background:** Diagnosis of HIV has shifted overtime from the complex laboratory methods like ELISA to the use of simple HIV Rapid Testing kit (RTK). Many concerns have been raised however on reliability of test results provided by Non Laboratory personnel using RTKs. This study assessed the competency of testers and performance of TPs implementing HIV Rapid Testing Continuous Quality Improvement (RT CQI) in Lagos State.

**Methods:** One Hundred and Thirty Six (136) Testing Points (TPs) were identified and assessed at baseline and the number reduced to 123 TPs during follow up audit. Two Hundred and Eighty Personnel (testers) offering HTS were also identified. Competency Assessment tool was developed while site audit checklist (SPI –RT) was adopted from the National HIV RTCQI standardized tools. Competency assessment of testers was conducted after training and periodic site visit by trained program staff and QA officers from SMOH after site level training. Site audit using SPI –RT audit checklist was done at baseline and after targeted interventions in the various TPs.

**Results:** Ninety Nine percent (277 out of 280) of the testers passed the competency Assessment. The baseline site audit revealed that 22 (16%) Testing points were on Level 4, 34 (25%) on Level 3, 68 (50%) on Level 2, 8 (6%) on Level 1 and 4 (3%) on Level 0 and the average performance of all site was 49.3%. The follow up assessment after intervention showed an improved performance from overall average of 49.3 % to 92%; 109(89%) Testing points were on Level 4, 8(7%) on Level 3, 3 (2%) on Level 2 and Level 1 each and none (0%) on Level 0.

**Conclusion:** With focus on the second pillar of HIV RT CQI – Training and competency Assessment of Testers is a way of ensuring reliability of HIV Testing results especially among lay counsellor testers.

OA-3.3-016 | TIME: 11:45

S. Ouattara1

1. bureau Guinée, Fondation Mérieux, Conakry, Guinea.

Renforcement des Capacites des Agents de Laboratoire en Guinee dans le Cadre du Projet Labnet

**Background:** De mars 2014 à aout 2016, la Guinée a fait face à une épidémie de la maladie à virus Ebola. Cette crise sanitaire a révélé la faible capacité de diagnostic des laboratoires de ce pays. Un projet dénommé LABNET, financé par le Ministère français des affaires étrangères a été mis en place. Ce projet a pour mission de renforcer les capacités des agents de laboratoire en Guinée.

**Methods:** Le projet LAB-NET, débuté en 2015, a commencé par des missions d’évaluation par des équipes d’experts nationaux et internationaux pour les laboratoires d’analyses médicales, en collaboration avec le ministère de la Santé. Cette évaluation sert à faire l’état des lieux des laboratoires. L’évaluation est effectuée à l’aide d’une grille qui permet une récolte objectivée des données. Les résultats ont été restitués aux acteurs clés de la santé.

**Results:** 105 laboratoires publics et privés ont été évalués, une analyse quantitative des données a été effectuée, ainsi que des recommandations d’actions. Basé sur l’évaluation des laboratoires, des formations du personnel des laboratoires ont été dispensées. De mars 2017 à avril 2018, des formation touchant 430 personnes ont été organisées. Les thématiques abordées étaient : biosécurité et référencement des échantillons (357 bénéficiaires en 17 sessions), transport des matières infectieuses (formations certifiantes IATA, 52 bénéficiaires en 3 sessions), évaluation externe de la qualité (21 bénéficiaires en 1 session). Les participants étaient venus de 96 Structures sanitaires publiques et privées.

**Conclusion:** Les enjeux principaux du renforcement de capacité par l’intermédiaire du projet LABNET sont le travail sur le transport d’échantillon avec l’élaboration d’un circuit officiel d’envoi des échantillons biologiques au centre de référence, et le management de la qualité avec la mise en place de contrôle de la qualité. Ce projet révèle la nécessité de la poursuite des actions de formation à l’intention des agents des laboratoires en y ajoutant de nouvelles thématiques.
Implementation of the Competence-Based Curriculum for Mid-Level Laboratory Technicians in Health Training Institutions

**Background:** The Mozambique Ministry of Health is responsible for the training of mid-level health technicians. Since 2008, the National Directorate of Training of Health Professionals has been developing competency-based curricula to respond to the profile of professionals required in the market and professional technical education. The competency-based Laboratory Technicians curriculum approved in 2016 was implemented in six institutions during the first half of 2017 under the supervision of a central level team. The objective of this study is to analyze the results of the implementation of the curriculum by competences of Laboratory Technicians.

**Methods:** The research has a descriptive approach based on direct observation, interviews, and document evaluation through the application of monitoring instruments in the first quarter of 2018 and first academic semester. Eight areas were evaluated: a) Adequacy of facilities, resources and teaching materials, b) Prevention of risks and safety in the laboratory, c) Preparation of analytical plans, d) Monitoring of analytical plans, e) Assessment of teaching, f) Evaluation of students, g) Orientation of students, and h) Evaluation of student attendance control. The degree of compliance with standards and areas was calculated.

**Results:** The results showed that the institutions have basic conditions for curriculum implementation including multidisciplinary laboratories for practical classes, but the lack of a risk and safety prevention plan was found in 4 institutions and insufficient equipment and reagents in three. The teachers fulfilled the planned hours, but lacked diversification of the methodologies of teaching and evaluation of the students. In three institutions, there was no follow-up of the analytical plans of the academic semester. The results were discussed with the teachers who developed an action plan.

**Conclusion:** The curriculum responds to the requirements; however, there is a need to identify areas to be improved in the implementation to ensure the quality of training.

Developing Competencies for Different Levels of Laboratory Workers in Low and Middle Income Countries: A Stepwise and Multi-Sectoral Approach

**Background:** Review of national laboratory policies in seven countries revealed that until recently scarce attention is being paid to pre-service education and continuous development of laboratory staff even though a specialized health laboratory workforce is the most important asset of the laboratory. In order to provide accurate and adequate clinical and public health laboratory services in a rapidly changing and technologically complex environment, the health laboratory workforce needs to be well trained. During the Strengths, Weaknesses, Opportunities and Threat analyses review, questions were raised regarding the pre-service training of laboratory workers, and therefore curriculum reviews were initiated.

**Methods:** We used a 2-step approach: (1) a situational analysis through a survey with the goal to create a 360 degree insight into the current education and training for national laboratory personnel. (2) The results of the survey were then discussed with all stakeholders at workshops in the different countries during which competencies were formulated.

**Results:** The review of the national education system for health laboratory workers helped to identify strong and weak points of the system. In the workshop the competencies of different categories of laboratory workers using the different roles of health workers as defined by Canmed were developed. For the laboratory manager the competencies were developed based on the roles of a manager as defined by WHO. In Sudan sub-competencies based on the competencies were also developed.

**Conclusion:** Using a multi-sectoral approach working with all stakeholders has been fundamental to develop competencies which are both realistic, context-specific, and aligned with the needs in practice as well as acceptable to the different stakeholders concerned. Based on the situational analysis, and a comparison of the competencies with the curriculum, action points can be drawn up for improvement of the training curricula for the health laboratory workforce.
Suromounting Barriers to the 3rd ‘90’: How Inter-cadre Collaboration Improved Uptake of HIV Viral Load Results at Homabay County Referral Hospital, Kenya

Background: Homabay County Referral Hospital (HBCRH), a high volume antiretroviral therapy (ART) facility in western Kenya identified that despite a short turnaround time for HIV viral load (VL) test results, these results did not end up in patients’ files, compromising the benefit of VL monitoring. We describe results of a continuous quality improvement (CQI) initiative that increased timely utilization of VL results from 4% to 80% in seven months at HBCRH.

Methods: From 2016−2017, we piloted CQI study to identify barriers and facility systems weaknesses related to documentation of VL results in patients files at HBCRH. We reviewed the following facility-level systems: inter-cadre communication, collaboration, health systems competence between laboratory technologists/technicians and clinicians. Every month, we reviewed patient files to gauge the extent to which VL results are entered into patients’ files, compromising the benefit of VL monitoring. We describe results of a continuous quality improvement (CQI) initiative that increased timely utilization of VL results from 4% to 80% in seven months at HBCRH.

Results: At baseline, only 4% of patients’ files at HBCRH had VL test results. However, after 7 months of CQI mentorship, this had increased to 80%. The following QI concepts and skills were improved and embedded in the facility: inter-departmental communication, documentation management, client-centered approach to patient management and a culture of continuous improvement. A registrar and VL data champion were deployed to the lab and tasked with receiving and filing VL results in patient files.

Conclusion: Application of CQI interventions in support of inter-cadre collaboration significantly improved the uptake of VL tests at clinic level. As functional health systems are a key component for timely HIV VL diagnosis and linkage to treatment, implementing CQI approaches focused on the lab-clinic interface may be critical in reaching the UNAIDS 90/90/90 targets.
Bridging the Gap Between Stakeholders at Strategic and Operational Level Between Implementing Partners to Improve Efficiency in VL and EID Commodity Quantification and Management in Cameroon

Background: Meeting HIV viral load (VL) targets demands national HIV/AIDS programs know the scope of VL technologies, test capacities and reference laboratory constraints and, that laboratories understand the overarching strategies of the national program. Prior to 2017, Cameroon experienced challenges in adequately forecasting commodities to meet testing targets due to poor reporting of consumption and testing data and limited coordination between stakeholders.

Methods: With support from USAID through the GHSC-PSM, the National AIDS Control Committee (NACC) and the Departments of Pharmacy, Medicine and Laboratories organized the first-ever national supply chain workshop, bringing together VL and early infant diagnosis (EID) laboratories to discuss test expectations, equipment needs, commodity specifications, reporting requirements, and the laboratory network.

Results: Participants adopted a standard list of VL and EID commodities and a harmonized reporting format for commodity logistics data. This resulted in a 98% reporting rate increase over 15 months (from zero). For the first time, collective indicators (test interruption due to stockouts; equipment down time; product loss; reporting rates and timeliness) were agreed upon for all test sites. A standardized communication network was established between laboratories where, over 15 months, 50 commodity redeployments took place. HIV VL and EID point-of-care commodities and test output data points were incorporated into the reporting mechanism developed for sites with conventional test platforms to permit complete monthly data visibility by NACC. This led to 11.5% reduction in VL testing stockouts and a 36.21% decrease in EID commodity expiration wastage rate.

Conclusion: Under the leadership of the Government of Cameroon, a coordinated multi-stakeholder approach to develop a standardized list of essential commodities, coupled with creation of a framework for systematic collection of key indicators resulted in greater data visibility and an established laboratory network. This improved forecasting, quantification, and distribution of commodities, and thus, the testing capacity of the national reference laboratories.

Integrated TB–HIV Testing on GeneXpert is Feasible, Enables Increased Device Utilization and Does Not Negatively Impact TB Services: Implementation Experience in Malawi and Zimbabwe

Background: Point-of-care (POC) technologies enable testing outside centralized laboratories, within facilities where patients receive care. POC testing has been shown to improve rates and timeliness of clinical action for people living with HIV, including ART initiation for adults and infants. Multidisease platforms perform multiple test types, such as HIV viral load (VL), early infant diagnosis (EID) of HIV, and tuberculosis (TB). Multidisease testing may enable cost-sharing, increased device utilization, more efficient resource-use and expanded access to POC technologies. To determine if excess capacity on near-POC GeneXpert devices used by TB programs could be leveraged for HIV testing without compromising TB services, two integration pilots were conducted in 10 facilities in Malawi and 4 in Zimbabwe. Sites were selected to ensure sufficient capacity on existing devices to accommodate the projected additional tests.

Methods: Descriptive analysis of in laboratory turn-around time, testing volumes, and error rates before and after integration was performed. Rates and timeliness of TB treatment initiation were also analyzed. Cost-savings of integrated testing was calculated.

Results: TB testing volumes were maintained or increased during the pilot in both countries. EID and VL tests accounted for 35% and 23% of total GeneXpert volumes in Malawi and Zimbabwe, respectively. Device utilization increased from 41% to 55% in Zimbabwe and from 22% to 47% in Malawi. Average error rates were maintained at 10% in Malawi; in Zimbabwe, the error rate was 4% at baseline and 5% during the pilot. Same-day TB test results continued to be available; in Zimbabwe, ~30% of individuals were diagnosed and initiated TB treatment on the same day and 94% within 1 week; in Malawi, 80% of patients diagnosed with TB initiated treatment within 1 week and the median time from sample collection to treatment initiation decreased post-integration, from 4 days (IQR: 6) to 3 days (IQR: 4.5).

Conclusion: With appropriate planning, multidisease testing on near-POC devices is feasible. Integration did not negatively impact TB services and was estimated to generate cost-savings. These findings will be used to inform national scale up plans to offer near-POC testing services at an increased number of facilities to maximize patient impact.
Cost per HIV-infected Infant Initiated on HIV Treatment: Conventional vs. Point-of-Care Early Infant Diagnosis (POC EID) Testing

**Background:** Implementation pilots of POC EID testing in Malawi and Mozambique have demonstrated clear patient benefit from providing same-day test results, compared to conventional testing. However, POC EID testing currently requires the purchase of devices costing $17,500-$25,000 and the per-test cost varies depending on testing volume for a particular device, ranging from $35.87 to $1.22. Laboratory-based EID testing uses a referral-based system to aggregate tests from multiple health facilities, enabling optimization for a high utilization rate that is not dependent on the number of EID specimens submitted per site. With the decentralization of prevention of PMTCT services there are many sites testing only a few infants per year and it is important to design EID testing networks that are affordable, but can also maximize positive patient outcomes.

**Methods:** To determine sites suitable for POC EID testing based on the cost per HIV-infected infant initiated on treatment, a model was developed using site-level expected EID testing volumes. The fixed cost and annual service contract for POC devices were amortized across the expected testing volumes over the life of the device, five to seven years, as well as the cost of conventional testing included greater rates of lost/repeated EID tests (41.03% vs. 1.13%).

**Results:** The model shows that the cost per HIV-positive infant initiated on treatment using conventional EID testing is $867-$1,176, while the cost using POC EID varies from $631 to ≥$10,000. An analysis of data across four countries shows that up to 3% of EID testing sites, which run >0.85 EID tests per day, could be served by POC EID testing at a lower cost per HIV-infected infant initiated on treatment. Due to the concentration of expected EID testing volumes at high-volume sites, these 3% of sites account for ≥37% of expected EID testing volumes.

**Conclusion:** While device-based POC technologies may require significant up-front investment, this may be offset by improvements in patient outcomes and reduced wastage, however due to the fixed cost to access POC testing, it is important to consider site-specific volumes to estimate appropriate applications of these technologies. Other factors, including integration with other testing services using POC devices may make testing cost-competitive at additional sites, however, this is outside the scope of this analysis.

Evaluation of the Real Cost Of Waste Disposal Generated by Viral Load Tests in Burundi

**Background:** With HIV viral load testing (VLT) scaling-up in resources-limited-countries (RLCs), biomedical laboratories are generating important additional quantities of waste, both in the form of plastics and chemicals. Even though the real cost associated with waste disposal (WD) is essential from an economic point of view, data from RLCs are scarce. The objective of this study is to evaluate the VLT WD cost in Burundi.

**Methods:** The cost analysis was based on the “micro-costing” method and conducted from March 2013 to July 2016 at ANSS (testing facility) and CHUK (incineration facility) in Burundi. Six costs categories were defined in the WD process: human resources, training, consumables, equipment, maintenance, operations and infrastructure. The total cost of WD was calculated by adding the cost categories. All waste generate for a VLT were weighed in order to use the weigh as a weighting factor. The mean cost/VLT was obtained by dividing the total cost by the total number of VLT.

**Results:** A total of 11,986 VLT were performed. The total cost of WD was 4,165.97 corresponding to 1.8 tons of waste. The three main costs categories were: operation (65.6%), consumable (20.9%) and equipment (7.6%). The infrastructures and human resources costs represented only 3.6% and 2.2% of the total cost, respectively. The mean cost/VLT (0.35) was not expensive (1.3% of a total VLT cost (26.4)) in the non-optimal current conditions of WD.

**Conclusion:** With the improvement of waste disposal conditions, its associated costs are expected to increase in a context where it is not yet know who support this additional cost (ie. suppliers, health structures). There is an urgent need to conduct similar studies for other VLT platforms in Burundi and others RLCs to provide greater visibility of the WD costs linked to the global HIV VLT scaling-up that would inform decision makers for their investment strategies.
IMPLEMENTING AND HARMONIZING POLICIES

DATE: Thursday, 13 December
TIME: 11:00 – 12:30
ROOM: Kano
CO-CHAIRS: Fatima Cham Jallow, WHO, Regional Office for Africa
Benjamin Djoudalbaye, Africa CDC

OA-3.5-025  TIME: 11:00


1. Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, United Kingdom.
2. New York University School of Medicine, New York, NY, United States.
4. Clinical Research, London School of Hygiene & Tropical Medicine, London, United Kingdom.
6. Liverpool School of Tropical Medicine, Liverpool, United Kingdom.
7. Malawi-Liverpool-Wellcome Trust, Blantyre, Malawi.

An Increase in the Number of Countries Permitting Lay Provider HIV Testing and Counselling Between 2015 and 2018: An Updated Policy Review of 48 Countries

Background: Approximately 75% of people with HIV are diagnosed, an increase from 67% in 2015. Despite this progress, further efforts to reach people with undiagnosed HIV are still needed to meet the United Nations’ “90-90-90” testing and treatment targets. To address this, many countries have expanded the tasks of “lay providers” (i.e., any person delivering health services without formal tertiary education) to encompass HIV testing services (HTS). This includes conducting rapid HIV tests, as well as delivering pre-test information and post-test counselling.

Since 2015, WHO has recommended that lay providers conduct HTS in communities. Here, we examine national policy changes related to lay provider testing since these recommendations.

Methods: In 2015, WHO conducted a policy review of 48 countries with national HTS policies identified using electronic databases, WHO country intelligence databases, national programme websites, and by contacting country representatives. In June and July 2018, the most recent HTS policies from these countries were re-examined to identify changes related to lay provider testing and counselling.

Results: As of July 2018, twenty-seven (56%) of 48 countries reviewed permit lay providers to perform blood-based HIV rapid diagnostic tests (RDTs), marking a 33% increase from 20 countries in 2015. While 34 (71%) of reviewed countries now permit lay providers to conduct pre-test information and post-test counselling, only 28 (58%) did so in 2015. As in 2015, 65% of reviewed countries do not specify if lay providers can perform oral HIV RDTs. In total, eleven countries updated their guidelines to allow lay provider testing and/or counselling, with most in Sub-Saharan Africa and the Eastern Mediterranean.

Conclusion: Though several countries have incorporated lay provider testing into HTS policies following WHO guidelines, many still have not yet implemented this approach. Efforts to introduce lay provider HIV testing services are still needed.

OA-3.5-026  TIME: 11:10

E. K. Ruttoh1, J. Tome1, J. Y. Carter2

Taking the Pulse of Policy: Laboratory Policy Availability and Implementation in Kenya

Background: Accurate and timely laboratory tests are central to effective patient management, and reliable laboratory diagnostic information is essential for the prevention and control of infectious and non-communicable diseases. For laboratory services to deliver their mandate, availability, adoption and implementation of national policies and guidelines are fundamental to ensure minimum standards of quality, promote access to laboratory services, and reduce inconsistencies across service providers and regions. Understanding the barriers to policy implementation is essential to guide improvements in service delivery.

Methods: This was a cross-sectional study where laboratory managers and laboratory technical personnel were interviewed using a structured questionnaire. The assessment was conducted between January and April 2017 in 30 health facilities in seven project counties in Kenya: Mombasa, Kwale, Kilifi, Machakos, Makueni Kitui and Taita Taveta. Physical presence of policies and guidelines was checked; adoption and implementation was evaluated through development and use of manuals, standard operating procedures and testing algorithms.

Results: No facility had all the 22 current policy guidelines and documents. Of the 22 listed policies and guidelines, the highest availability was 64% and the lowest 18%; 87% of the facilities had <50% of the documents. Between 3 to 13% of policies and guidelines had been disseminated to laboratory staff through training courses and workshops but were not available in the facilities. An average of 57% of general laboratory staff was aware of the available policies and guidelines. Despite the low rate of dissemination, there was a moderate indication of adoption and implementation in more than 50% of health facilities.

Conclusion: These findings suggest that the policies and guidelines developed are not adequately disseminated and distributed to health facilities. This demonstrates the need for active follow-up from national and county level to ensure adoption and implementation.
**Country Implementation of WHO Recommendations on HIV Testing Strategies and Testing Algorithms**

**Background:** In 2014 WHO conducted a review of 48 national policies to inform HIV testing services (HTS) guidelines, which indicated that only 17% of testing strategies aligned with WHO recommendations. In preparation for WHO’s 2019 guidelines, this review was updated to assess policy change and adoption of new HIV testing guidance.

**Methods:** We conducted a global search of HIV testing policy documents obtained from existing WHO databases, regional contacts, and testing program websites. There were no geographic or language restrictions, although documents in languages other than English had limited data extracted. Data were extracted using standardized data collection forms. Results were analyzed descriptively.

**Results:** Policies from 144 countries were identified and 72 (50%) contained sufficient information to determine compliance. Overall 15/72 (20%) followed WHO recommendations. Primary reasons for non-compliance included strategies involving only two assays (n=45), failure to repeat assays upon initial discordance (n=18), and using tie-breakers to rule in HIV infection (n=11). Only 31/72 (43%) policies included algorithm specifics (e.g., test type and brand names) and reports of validation occurred infrequently. Of policies with information available, 17/54 (31%) required retesting prior to ART initiation, most of which were published since 2015. Of 22 PrEP-related policies, almost all followed recommendations related to testing frequency, although several did not specify use of national HTS strategies.

**Conclusion:** Compliance rates with WHO HIV testing recommendations are similar to results from the 2014 review and remain low globally. Incorporating and correctly using a third assay for many countries would improve compliance. More guidance on how to validate testing algorithm is needed. Potential ways to improve WHO guidelines include providing clarity about the rationale for recommended strategies and providing an order of severity to non-compliance issues. For recently published policies (2016-2018), we found overall compliance with updates to WHO recommendations, including retesting prior to ART initiation and PrEP testing recommendations.

**Exploring the Adoption of Lean Principles in Medical Laboratory Industry**

**Background:** As the demand for efficiency and quality in the healthcare industry has increased over the past few years, adoption of Lean principles and tools in the medical laboratory industry has become increasingly crucial. This study explores the level of adoption, barriers, and enablers of Lean principles and tools in the Namibian medical laboratory industry.

**Methods:** A descriptive cross-sectional study was carried out to examine the level of usage, barriers, and enablers, and impact of Lean tools, and to suggest appropriate strategies for adopting Lean in the Namibian medical laboratory services.

**Results:** Research findings reveal that Lean tools are moderately implemented in most of the laboratories. Standard operating procedures, root cause analysis, overall equipment effectiveness, and visual management are the important Lean tools used in the industry. Results of the survey also show that Lean tools had a positive impact on operational performance, employee motivation, turnaround time, and cost reduction. Furthermore, top management involvement, adequate training and proper planning emerged as major barriers to the adoption of Lean principles in the Namibian medical laboratory industry.

**Conclusion:** This study showed that lean is implemented and mostly used in Namibian medical laboratory industry as a quality improvement approach rather than as a turnaround time improvement approach. Standard operating procedure (SOP) is the most adopted tool in Namibian laboratories, opposing many studies which show that value stream mapping is the most frequently tool used in healthcare. Management support plays a huge role in the success of Lean principles implementation while lack of support from the management, financial constraint, and staff resistant to change are major barriers to the adoption of Lean principles in the Namibian medical laboratory industry.
A Successful Implementation of a National Laboratory Equipment Maintenance Program Through the Global Health Security Agenda (GHSA) Program: Experience of Senegal

Background: Well-maintained biomedical equipment is critical to having accurate and reliable laboratory results for prevention, care and surveillance needs. However, maintaining a properly working laboratory equipment is usually a challenge in most resource poor settings such as Senegal. To address the above-mentioned issues, we have implemented, through the Global Health Security Agenda (GHSA), a laboratory equipment maintenance program in Senegal to improve the quality of Laboratory services in country.

Methods: Between November 2017 and March 2018, 24 champion laboratories selected by the Ministry of Health Division of Laboratories were enrolled in the program. Each laboratory was visited by our biomedical engineers and technicians for equipment inspection, registration, and preventive or curative maintenance support activities. A final satisfaction survey was also conducted.

Results: Out of a total of 24 champion labs, 14 were located in Dakar, the Senegalese capital city. In total, 762 laboratory equipment were inspected and registered. Most of the equipment were composed of centrifuges (80), microscopes (93), agitators (75), cold enclosures such as fridges and freezers (164), spectrophotometers (31), Biosafety cabinets (15). Overall, 602 (79%) of the medical equipment registered received preventive maintenance. The remaining 160 (21%) were too damaged to benefit from preventive or curative maintenance activities. For curative maintenance, closed to half (13 out of 29; 45%) of non-functional equipment’s seen during our visits were repaired. The remaining required specific engineering actions which could not completed during our 2-3 days visit period. A final satisfaction survey showed that 96% of the lab Directors were very satisfied/satisfied with the support receive

Conclusion: Laboratory equipment maintenance is essential for quality and reliable results to support prevention, patient care and surveillance activities. This program showed that it is possible to implement a successful national laboratory maintenance program in Africa to help improve the quality of laboratory services.


Background: To improve rates of HIV case detection and treatment, the World Health Organization introduced the Test and Start strategy in 2015, which was adopted across Nigeria in April, 2016. Given the integration of the tuberculosis (TB) and HIV programs and evolving policies, it is imperative to evaluate the effect of this strategy on the TB program. We analyzed specific TB-HIV diagnosis and treatment indicators before and after implementation of Test and Start

Methods: Routinely collected de-identified program data from 27 Nigerian military hospitals (but who serve a 95%-civilian population) were analyzed. Bivariate analyses using Wilcoxon signed-ranked test compared data from the 12 months before and after implementation of Test and Start. Ten and three out of fourteen of the GeneXpert machines serving this population were installed prior to and during the 12 month period before Test and Start implementation, respectively, and additional one following Test and Start implementation.

Results: Comparative data analyses showed improvements pre- and post- Test and Start implementation as follows: clients receiving anti-retroviral treatment (ART) screened for TB improved from 14,530 to 29,467 patients (p<0.001); diagnosis of TB presumptive cases from 803 to 1,800 (p<0.001); ART clients bacteriologically tested for TB from 746 to 1,717 (p<0.001); and ART clients treated for TB from 152 to 282 (p<0.001). Newly registered or relapsed TB cases improved from 436 to 906 patients (p<0.001), TB cases with known HIV status from 437 to 837 (p<0.001), TB cases identified with HIV-positive status from 182 to 301(p=0.0058), and TB-HIV co-infected patients started on ART from 101 to 176 (p=0.0032).

Conclusion: Although we could not determine a causal association given the evaluation design, the initiation of Test and Start may have contributed significantly to improved TB diagnosis and treatment indicators among TB/HIV programs. Healthcare providers should consider leveraging innovative approaches and lessons learned from the Test and Start strategy for wider application to other TB and TB/HIV programs.
**Tuesday, 11 December**

**ORAL POSTER SESSION**

**OP-1.1**: Assessing the Burden of HIV, Tuberculosis and Malaria

**OP-1.1-001**

**TIME: 12:30**

**H. Diop-Ndiaye**\(^1\)\(^,\)\(^4\), A. S. Ndiaye\(^3\)\(^,\)\(^4\), A. Diop\(^2\), S. Gueye\(^4\), G. Lo\(^5\)\(^,\)\(^3\), M. Diakhaby\(^4\), R. C. Tine\(^1\), C. Toure Kane\(^1\)\(^,\)\(^3\), C. Ndour\(^1\)\(^,\)\(^2\), C. B. Boye\(^1\)\(^,\)\(^4\)

1. University Cheikh Anta Diop, Dakar, Senegal.
2. Division de Lutte Contre le SIDA et les IST, Dakar, Senegal.
3. Institut de Recherche en Santé, de Surveillance Epidémiologique et de Formations, Dakar, Senegal.
4. Laboratoire Bactériologie Virologie CHNU Aristide le Dantec, Dakar, Senegal.
5. Laboratoire, Centre Médical Inter Armées, DAKAR, Senegal.

**Prévalence du VIH et des IST chez les MSM au Sénégal: Résultats de l’Enquête de Surveillance Combinée de 2017**

**Background:** La connaissance du statut sérologique à grande échelle chez les populations clés telles que les Hommes ayant des rapports sexuels avec d’autres Hommes (HSH) fait partie des domaines d’intervention prioritaires pour le contrôle de l’infection à VIH. Ce travail avait pour objectif de documenter les résultats de la dernière surveillance combinée menée chez les HSH pour déterminer la prévalence du VIH et des IST au Sénégal.

**Methods:** Il s’agit d’une étude prospective réalisée entre Novembre 2017 et Février 2018 qui a permis d’inclure les HSH dans 12 régions du Sénégal. Un prélèvement sanguin et d’urine ont été effectués et les tests biologiques réalisés au laboratoire de Bactériologie Virologie du CHNU Aristide le Dantec (Dakar, Sénégal). La sérologie du VIH, VHB, VHC et syphilitique a été effectuée sur l’automate architect i1000sr (Abbott Diagnostic) et celle de HSV-2 avec le test rapide SIMPLY HSV-2 RAPID TEST®. Le diagnostic moléculaire des infections à Chlamydia trachomatis (CT) et à Neisseria gonorrhoeae(NG) a été faite à partir des urinespar le système Cobas 4800 (Roche Diagnostic). Tous les échantillons réactifs au VIH ont été confirmés selon un algorithme à 3 tests et ceux positifs au VHC par un second test rapide.

**Results:** Un total de 1147 HSH ont été inclus avec un âge moyen de 24,5 ± 6,1 ans. La prévalence du VIH était de 27,6% (317/1147) et était significativement plus élevée à Dakar (49,3% vs 17,8% ; p<0,01). Celles du VHC, VHB, syphilitique et HSV-2 étaient respectivement de 0,08% (n=1),15,8% (n=182),4,4% (n=51) et15,1% (n=173). La prévalence de CT et NG étaient respectivement de 4,9% (53/1089)et 2,3% (25/1089).

**Conclusion:** Cette étude montre des taux très élevé de l’infection à VIH et des IST chez les HSH particulièrement dans la région de Dakar d’où l’intérêt de renforcer la prévention combinée chez cette population clé.

**Descriptive Analysis of 2017 Lassa Fever Cases in Nigeria**

**Background:** Lassa fever is an acute viral infectious haemorrhagic illness caused by Lassa virus. It is associated with high morbidity and mortality. The disease is endemic in West Africa countries with 300,000 – 500,000 cases and 5000 deaths occurring annually. Nigeria experiences annual recurrent bouts of outbreaks in different states. We aimed to descriptively analyze all cases that were reported in 2017.

**Methods:** Lassa fever surveillance data of 2017 was extracted from the Viral Haemorrhagic Fever platform. Descriptive analysis of all reported cases was carried out using Microsoft Excel 2016 and Epi info 7.

**Results:** There were 317 cases reported during the study period. Of these, 234 were confirmed, data was complete for 229 (97.9%). Case fatality rate was 31.9%. Males were 129 (56.3%). The median age was 32 years (IQR: 22- 43), the most affected age group was 21-30 with 61 (26.6%) cases. Seventeen states recorded at least one confirmed case, Edo 87(37.99%), Ondo 55(24%), and Kano 16 (6.99%) had the highest number of cases. There was an all year-round transmission with seasonal peaks 161 (70.3%) occurring in the first quarter of the year (January – April).

**Conclusion:** There was an all year-round transmission in the 2017 Lassa fever outbreak, a deviation from previous years seasonal transmission. We recommended enhanced surveillance, high index of suspicion, intensified risk communication and improved environmental sanitation for early detection and control.
Mass Campaigns for HIV, HBV (HBsAg) and HCV Screening by Multiplex Rapid Diagnostic Test in Sub-Saharan Africa Using Mobile Units

Background: HIV, HBV and HCV testing is fundamental for both prevention and treatment services, in order to reach an effective response to these three chronic viral infections. We herein report our experience using mobile units in combination with multiplex rapid diagnostic test (RDT) for simultaneous detection of HIV, and HCV-specific antibodies (Ab) (IgG and IgM), and HBV surface antigen (HBsAg) during several free screening campaigns in Cameroon.

Methods: From February to April 2018, 1206 volunteers (665 men, 541 females; mean age 31.9 years and range, 18-91) were enrolled. Blood samples were collected after informed consent and submitted to parallel screening by multiplex HIV/HCV/HBsAg (Triplex, Biosynex, France) and CE-labeled ELISAs for HIV, HBV (HBsAg) and HCV (Human Diagnostics, Germany), as reference assays. Volunteers were screened and their results given back to them.

Results: Out of these 1206 volunteers screened, 104 (8.6%) were positive for HBsAg, 25 (2.1 %) for HIV and 27 (2.2%) for HCV. All samples positive and negative by multiplex RDT were further confirmed by reference HIV, HBV and HCV ELISAs, demonstrating 100% sensitivity and specificity, as well as excellent concordance between multiplex RDT and ELISAs (Cohen’s k =1). Only one blood sample was positive for both HIV and HBsAg. All volunteers who were seropositive by multiplex RDT for HIV, HBV or HCV were referred to counselling and treatment centers. There was in our series no lost to follow-up in the transition to reference health care centers.

Conclusion: In populations at high-risk of chronic viral infections such as people living in sub-Saharan Africa, the simultaneous use of low cost multiplex HIV, HBV and HCV RDT in combination with mobile units may clearly improve the “cascade of screening”, the prevention strategies and the linkage-to-care with reduced cost and also contribute to achieve the United Nations 90-90-90 targets.

An Ongoing Rift Valley Fever Outbreak in Two Refugee Settlement Camp in Isingiro District, Western Uganda, July 2018

Background: Rift Valley Fever (RVF) is a viral zoonosis with significant morbidity and mortality. Uganda is currently experiencing an outbreak of RVF in the Southwestern District of Isingiro involving two refugee camps, Oruchinga and Nakivale. The Viral Hemorrhagic Fever (VHF) Surveillance program at the Uganda Virus Research Institute (UVRI), Entebbe, is at the forefront of responding to VHF outbreaks, conducting laboratory diagnostics and providing epidemiological support.

Methods: Human blood samples drawn from suspected cases of RVF were collected with accompanying epidemiological information at Mbarara Regional Referral Hospital where cases are currently managed. Samples were transported by the national sample transport system to the VHF laboratory at UVRI, Entebbe. Samples were tested by both real-time PCR and ELISA to detect IgM and IgG antibodies against RVF virus. Additionally, cattle blood samples were collected from the herds around the refugee camps for IgG ELISA testing.

Results: Out of 62 human samples tested to date, 11 (17.7%) have been confirmed as acute RVF virus infections. The mean age for the infected individuals was 33 (SD=12.7) with a range of 15-55. The overwhelming majority of cases [90.9% (10/11)] are male whose occupation are either butcher men or herdsmen. Only two confirmed cases have died. Investigations have revealed that during the months of April and May 2018 there was flooding in Isingiro district in and around the refugee camps; this unusually heavy amount of rain may have made conditions permissive for increased RVF emergence in the district and surrounding areas. Of 50 cattle samples tested, 46% (23/50) had IgG antibodies against RVF virus.

Conclusion: There is an on-going outbreak of RVF in Isingiro district in both animals and humans. Additional investigations and assessments should be carried out to determine the source and cause of the outbreak.
**OP-1.3: Laboratory for Understanding, Treating and Preventing Disease**

**OP-1.3-005**  
**TIME: 12:50**

D. G. Debebe¹

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**Latest Trick About H1N1 influenza Vaccine Induced Autoimmunity and its association with HLA-DQB1*0602 Genotype**

**Background:** Narcolepsy is a rare, disabling disorder caused by H1N1 pandemrix vaccine or its natural infection and is characterized by excessive daytime sleepiness, cataplexy, hypnagogic hallucinations and sleep paralysis. Several studies demonstrated its association with HLA-DQB1*0602 in various ethnic groups. Our study aimed to determine the prevalence of HLA-DQB1*0602 allele in Iranian patients with narcolepsy and assess its predictive parameters for diagnosing narcolepsy. In addition, car accidents and job problems were assessed among narcoleptic patients.

**Methods:** We studied 44 narcoleptic patients, 30 patients with other types of excessive daytime sleepiness (EDS) and 50 healthy age and sex matched individuals from January 2015 to February 2016 in this case-control study. Patients and controls filled out a questionnaire including items about car accidents due to sleepiness and job problems. International classification of sleep disorders-2 criteria was used as the gold standard for diagnosis of narcolepsy. The DNAs isolated from whole blood samples were collected from the patients and controls to assess the presence of HLA-DQB1*0602.

**Results:** The results showed that HLA DQB1*0602 was present in 4 (8%) individual of controls and 20 (45.5%) patients with higher prevalence in patients with cataplexy (78.9%) than patients without cataplexy (p<0.001). The sensitivities of the DQB1*0602 for diagnosing narcolepsy with cataplexy and narcolepsy without cataplexy were 78.9 and 20; specificities were 88 and 72.4, respectively. 18.2% of patients had car accidents due to sleepiness and 68.2% suffered from job problems.

**Conclusion:** Our study shows that evaluation of DQB1*0602 in patients suspected to narcolepsy could be helpful especially in complex cases with atypical cataplexy and indistinguishable multiple sleep latency test MSLT results. Moreover, high rates of car accidents and job problems are found among narcoleptic patients.

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**OP-1.4: Combatting Antimicrobial Resistance**

**OP-1.4-006**  
**TIME: 12:55**

L. Atieno¹, P. Totha², O. Tholley², I. Mustapha³, N. Bell², D. Harding⁴, P. Koroma⁵, V. Matt-Lebby¹, L. Maryogo-Robinson⁴, I. Wurie¹

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**Sierra Leone Road to AMR Surveillance – Antibiotic Sensitivity Trend**

**Background:** Antimicrobial Resistance (AMR) patterns in West Africa is largely unknown. To date there are no empirical data for Sierra Leone. During the Ebola outbreak, the majority of patients were routinely given third generation cephalosporins to cover bacterial gut translocation. This exacerbated concerns regarding the widespread prescription of these (and fluoroquinolones) as routine hospital and community-based treatment. There is clear evidence of high levels of self and non-clinician prescription resulting in inappropriate use. It is recognised that surveillance of resistance in identified clinical isolates is the key to the control of existing antibiotic resistance in a given population and the development of an antimicrobial stewardship program. In view of this a bacteriology unit at the main children and maternal referral hospital laboratory was activated for full bacteriology analysis - culture and antibiotic sensitivity testing.

**Methods:** Urine samples from 24 patients were analysed. Quantitative cultures using CLED media and the Kirby-Bauer Antibiotic Susceptibility Testing technique were used to study resistance patterns for five antibiotics per the national treatment protocol. Following incubation, the zones of inhibition were measured and interpreted using The CSLI 100 - Performance Standards for Antimicrobial Susceptibility Testing (AST) and reported as Sensitive, Intermediate or Resistant.

**Results:** Patient age range was 3 months – 65 years. A total of 24 isolate results were analysed, of which Coliform group of bacteria (14 (58.3%), Staphylococcus spp. (4 (16.7%), Pseudomonas aeruginosa (3 (12.5%), and Others (6 (20.8%). Of the five antibiotics tested, highest resistance was seen with trimethoprim/ sulfamethoxazole (82.6%) and the least with Chloramphenicol (38.9%).

**Conclusion:** The results indicate significant resistance to first line antibiotics recommended for treatment in Sierra Leone; raising concerns on the current treatment protocol and warrants continued review of broad spectrum antibiotics and also testing of selected second line antibiotics in the quest to establish empirical therapy protocols.

Background: Surveillance of HIV drug resistance (HIVDR) in newly-HIV-diagnosed infants is important in low-income countries. We conducted a survey to determine the frequency and patterns of HIVDR among children <18 months old, born to HIV-1-infected mothers, and having available dried blood spots (DBS) specimens collected for early infant diagnosis of HIV (EID).

Methods: Between January 1, 2013 and December 31, 2014, HIV-positive remnant DBS specimens collected from children <18 months old in all 10 departments of Haiti for EID at the National Public Health Laboratory were used for HIVDR testing with a broadly sensitive genotyping assay. HIVDR mutations were identified using Stanford Drug Resistance HIVdb program and those mutations associated with low-, intermediate- or high-level resistance were defined as resistance mutations and included in drug susceptibility analyses.

Results: Of the 3,555 DBS collected for EID, 360 (10.1%) tested positive for HIV and 355 were available for HIVDR genotyping. Of the 355 specimens, 304 (85.6%) were successfully genotyped and 240 (78.9%) had > one HIVDR mutations. Among the 240 DBS with HIVDR, mutations against nucleoside reverse transcriptase inhibitors (NRTIs) and non-NRTIs (NNRTIs) comprised of 54.2% (130) and 90.4% (217) of the DBS, and mutations to both NRTIs and NNRTIs were identified in 126 (52.5%) of the samples. The common mutations were K103N/S (45.1%), M184V (37.5%), G190A/S/E/Q/R (15.1%), and Y181C/G/V (13.8%). Drug susceptibility analyses revealed that resistance to nevirapine/efavirenz and abacavir/emtricitabine was in 93.9% and 38.8% of the samples, respectively.

Conclusion: These results suggest that in the era of option B+, a majority of children who acquired HIV infection through mother-to-child transmission carry resistant HIV. These results have led the Haiti National HIV Program to revise the pediatric treatment guidelines to include protease inhibitors in the first-line regimens for all HIV-positive newborns regardless of the mother’s antiretroviral therapy regimen.

Dispersin (aap), Transcriptional Activator (aggR) and aat Genes Are Not Restricted to Enterogaggregative Escherichia coli

Background: Enteroaggregative Escherichia coli (EAEC) are increasingly implicated in diarrhea, particularly in children less than 5 years of age. EAEC are defined by their stacked-brick adherence to cultured HEp-2 cells. In a subset of EAEC, this property is associated with the presence of a partially conserved plasmid, pAA. We hypothesized that pAA genes are associated with diarrhea.

Methods: We used a triplex PCR protocol to identify aat, aggR and aap, in enteric isolates from an on-going case-control study. Bacterial species were identified by biochemical profiling and, where required, 16S rRNA gene sequencing was done.

Results: A total of 1377 E. coli isolates from 306 children enrolled in the study were screened for the pAA targets aat, aggR and aap and other diarrhoeagenic E. coli (DEC) genes. 366 E. coli strains positive for 1-3 of these loci were recovered from 31 cases (41%, 95 isolates) and 100 controls (43%, 271 isolates) in all showing no association with disease. Of the 366 strains positive for at least one pAA target, 96 (26%) carried genes for other DEC categories. These included strains that are hybrids of EAEC and enterotoxigenic E. coli (59), Shiga toxin-producing E. coli (25), enteroinvasive E. coli and Shigella (4) and attaching-and-effacing E. coli (12). Interestingly there were also twenty-five strains that were either not of the species coli (including Escherichia fergusonii) or of the genus Escherichia (including Klebsiella pneumoniae), but which were positive for these three EAEC loci.

Conclusion: Hybrid diarrhoeagenic E. coli are common in our setting and genes associated with so-called ‘typical’ EAEC may be found in non-E. coli, presumably because of their association with an extrachromosomal element. On-going work is characterizing the chromosomal background of bacteria carrying pAA through whole genome sequencing and determining whether there is a role for non-E. coli strains that carry pAA in disease.
Prevalence of Mutations of the PFDHFR / PFDHPS Genes in Isolates Collected in Senegal, Tanzania and Comoros

Background: Plasmodium falciparum causes the majority of morbidity and mortality associated with malaria. Resistant to different antimalarials used to date against malaria is a big challenge. Indeed, the increase in resistance of P. falciparum to chloroquine (CQ) led Tanzania and the Comoros to change the CQ to sulfadoxine-pyrimethamine (SP) in 2001 and 2004 respectively. Senegal changed the CQ to SP-amodiaquine in 2003. Resistance to this molecule, used in intermittent preventive treatments (IPTs), is progressing rapidly. The aim of this study was to determine the prevalence of mutations of the Pfhdfr and Pfhdps genes in three countries (Senegal, Tanzania and Comoros) with different levels of endemicity.

Methods: We collected 251 samples: 77 in Senegal, 50 in Tanzania and 124 in Comoros. DNA was extracted from the filter paper or RDTs using the kit Qiagen method. Mutations of the Pfhdfr and Pfhdps genes were analyzed by HRM. The msp1 and msp2 genes were amplified by nested PCR to determine the multiplicity of infections (MOI) between the three countries.

Results: A high prevalence of resistance mutations was observed at codons N51I [63%-90%], C59R [48%-90%] and S108N [70%-96%] of the Pfhdfr gene in the three countries. For the Pfhdps gene, allele mutant G437 was found between 30% to 54%. No mutations were observed at the K540E and A581G codons. In addition, new mutations (Pfhdps S436Y/437A) were detected by HRM and confirmed by sequencing. The MOI was 1.57 in Senegal, 1.47 in Comoros and 2.06 in Tanzania.

Conclusion: In summary, a high prevalence of mutations have been observed. However, the quintuple mutation (Pfhdfr N51I/C59R/S108N and Pfhdps A437G/K540E) which is strongly associated with in vivo and in vitro resistance to SP was not observed in our study; this molecule can continue to be used for IPT in pregnant women and children.

OP-1.5: Laboratory Networks and Systems for Outbreak Response

Networking a Laboratory Information System at Each Level of the Health System to Improve Quality, Timeliness and Real-Time Evaluation of Test Services. The Mozambique Model for Viral Load Testing Scale-up

Background: APHL Mozambique implemented an electronic remote test order entry (RTOE) system at district and health center levels, connected to HIV viral load (VL) referral laboratories, and in turn a national repository. This enables bar coding and tracking of specimens, electronic test ordering and result reporting and analysis of national viral load laboratory data.

Methods: Following a competitive process in 2015, the Mozambique Ministry of Health (MoH), with technical assistance from APHL and CDC, implemented a proprietary Laboratory Information System (LIS) at 12 high volume laboratories and VL testing at ten linked to district health centers by a networked RTOE system to enable specimen/patient accession, test requests, and test results to flow electronically between health centers and testing laboratories. A national repository was developed to retain a record of testing services and instruments, patient demographics, specimen tracking and test results.

Results: LIS at ten viral load referral laboratories are linked to RTOE at 120 district health centers. From July 2017 to May 2018, the average testing turnaround time decreased incrementally from 70 days per specimen to 17 days, correlating with the expansion of the RTOE in the LIS network. A dashboard to visualize viral load test indicator data was developed to provide continual near real-time monitoring of viral load testing efforts. Controlled access to the data repository provides MOH and care and treatment partners, using approved protocols, the capability to evaluate and measure key factors of testing services.

Conclusion: LIS and RTOE systems can reduce test result turnaround time and facilitate robust quality control and quality assurance of diagnostic testing. A national laboratory repository can support near real-time indicator monitoring via dashboard and provide capability for measurement and evaluation to support the continual improvement of the quality, timeliness and effectiveness of patient testing services and ultimately, patient care and treatment.
Implementation of Laboratory-based Surveillance for Antimicrobial Resistance in Burkina Faso

**Background:** In 2017 the Burkina Faso Ministry of Health developed a national action plan to tackle antimicrobial resistance (AMR). One of its priorities was the implementation of laboratory-based surveillance for AMR that was not yet in place. As part of the Global Health Security Agenda, the African Society for Laboratory Medicine (ASLM) through a cooperative agreement with the US-Centers for Disease Control and Prevention (CDC) provided technical and financial support to the Ministry of Health to establish the surveillance system.

**Methods:** The overarching goal of the system was to provide validated data on the prevalence and trends of AMR in bacteria of interest to the country and to support the global action plan on AMR through Global Antimicrobial Resistance Surveillance System (GLASS). The objectives were (1) to build national capacity on antimicrobial susceptibility testing (AST) of bacterial pathogens, (2) establish a standardized recording and reporting protocol of AMR data, and (3) to ensure timely analysis and dissemination of information to guide decisions.

**Results:** A national guideline for laboratory-based surveillance of AMR and a standardized national AST manual were developed and endorsed by the Ministry of Health. The guideline established a sentinel surveillance (15 sites and 10 priority bacterial pathogens), based on routine AST on bacterial isolates from diagnostic specimens. A national reference laboratory for AMR has been designated. Laboratory personnel from the sentinel sites received practical training on AST and on the use of WHONET for data management. Reporting using WHONET software started in May 2018.

**Conclusion:** Burkina Faso took critical steps to implement AMR surveillance with the endorsement of national guidelines for laboratory-based surveillance and a standardized AST manual. Following the surveillance system initiation and capacity-building efforts, ASLM will continue to work with national and international stakeholders to help the country enroll in GLASS in 2019.
Potential for Data Mining From Networked LIMS for Disease Surveillance

Background: Cross sectional data was collected between January to June 2018, from 10 public health hospitals in 10 different counties, which are part of 38 facilities currently implementing integrated LIMS. 5 facilities had the Hospital Information System(HIS) integrated with LIMS. The LIMS systems are connected to the central datamart at NPHLS via a secure private Network over the internet. The data structure was uniformly tabulated at the LIMS servers in the 10 facilities, and centrally frequency analysis performed by test profile, Health facility, gender and sex.

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Results: 29% of all the patient information was from HIS via integration. The number of repeat patients in a facility, that had tests done, over more than a day, were between 2.3-20%. There was a weak positive correlation of 3.7 between the number of repeat patient IDs and the number fetched from HIS. Malaria blood smear, Full Haemogram and Urinalysis accounted for 31% of the total workload. 59% of each of these three common tests were from female, and 66% under the age of 35. Malaria blood smear & Full Haemogram was the most common test combination on a patient. Gaps in the data included lack of uniform patient IDs from female, and 66% under the age of 35. Malaria blood smear was a weak positive correlation of 3.7, between the number of tests done, over more than a day, were between 2.3-20%. There

Conclusion: Laboratory data mining is a useful and more cost effective and a faster tool in augmenting specific disease surveillance measures. More validation and trial is required in the context of specific disease program requirements.
OP-2.2: Improving Diagnostics to Achieve Universal Health Coverage and International Health Regulations

Performance and Usability of a Blood-based Rapid HIV Self Test in a Low HIV Prevalent Population With No Previous Self Testing Experience

Background: HIV self testing is an acceptable and effective method to reach the undiagnosed in sub-Saharan Africa, however there is very little data on performance and usability of blood-based self tests in low prevalence populations with no prior self testing experience particularly in West-Central Africa.

Methods: In April 2018, The Clinique de la Fondation Marie-Madeleine Gombes, in partnership with the University of Ottawa, Canada, completed a study of the blood-based INSTI HIV Self Test (bioLytical Laboratories, Canada) in a low prevalent (3.1%, UNAIDS 2016), inexperienced self-testing population in the Republic of Congo. A total of 500 subjects were enrolled from Pointe Noire, Brazzaville and surrounding locations. All subjects participated in the performance study, comparing INSTI results to 4th generation EIA from matching venous blood, with portions completing usability and readability elements to assess ease of use, result interpretation and acceptability.

Results: A total of 478/500 self-test subjects obtained valid results (95.6%). The positive and negative percent agreement between INSTI and the Vironostika HIV uniform II Ag/Ab EIA test was 100% for the 478 subjects (11 positive, 469 negative). 11 previously undiagnosed HIV positive subjects (7 male, 4 female) were identified and linked to care through the study. From the 500 subjects (392 male, 108 female) in the usability study, >96.4% correctly interpreted all positive, negative and invalid results. Possible causes of the false reactivity will be discussed.

Conclusion: This field study of a fingerstick blood-based self test in a low prevalence population with no prior HIV self testing experience provides strong evidence that the INSTI HIV Self Test is accurate, acceptable and easy to use by self testers with diverse backgrounds.

OP-2.2-004 TIME: 12:45

Serological False Reactivity – Implications for HIV Testing Algorithms

Background: World Health Organization (WHO), in collaboration with the Institute of Tropical Medicine, Belgium, conducts independent performance evaluations of in vitro diagnostics (IVDs) as part of WHO prequalification assessment to determine eligibility for procurement. When more than one assay is used to detect a pathogen, the accuracy of the final result is dependent not only on assay specificity but also the probability that a specimen that is false-reactive on the first assay will not also be false-reactive on the second assay. This is especially important for multi-assay testing strategies used to diagnose HIV infection and for surveillance. A single clinical specimen panel has been used so that patterns of false reactivity can be documented. This comparative data set is useful for determining testing algorithms for HIV diagnosis and surveillance.

Methods: A panel of serum/plasma specimens collected worldwide; HIV-positive (n=462) and HIV-negative (n=658) specimens were characterized by 3rd generation anti-HIV-1/2 enzyme immunoassay, 4th generation anti-HIV-1/2 and p24 enzyme immunoassay, anti-HIV-1/2 line immunobssay and HIV-1 p24 antigen EIA. Between 2011 and 2016, a total of 27 rapid diagnostic tests and 7 enzyme immunoassays were evaluated on the same panel. Common false reactive specimens were tabulated.

Results: Of the 658 HIV-negative specimens tested, 15 specimens showed false reactive results for at least two of 34 IVDs tested. For populations with high HIV prevalence (above 5%), a minimum of two HIV assays are recommended for diagnosis. In addition of sensitivity and specificity of specific assays, documenting and therefore avoiding use of assays giving concordant false reactive results is critical when determining a national testing algorithm in order to prevent misdiagnosis of HIV infection. This underscores the usefulness of one clinical specimen panel for a comparative data analysis.

Conclusion: For populations with high HIV prevalence (above 5%), a minimum of two HIV assays are recommended for diagnosis. In addition of sensitivity and specificity of specific assays, documenting and therefore avoiding use of assays giving concordant false reactive results is critical when determining a national testing algorithm in order to prevent misdiagnosis of HIV infection. This underscores the usefulness of one clinical specimen panel for a comparative data analysis.
**Evaluation of the Cost-effectiveness of Viral Load Testing Approach over CD4 Testing for Antiretroviral Therapy Monitoring in Uganda: Service Providers’ Perspective**

**Background:** An estimated 1.5 million people live with HIV in Uganda, 60% of whom are on treatment and there is 90% viral load suppression rate among those accessing viral load testing. Scale up in ART and its requisite services requires; sustainable financing, efficient use of limited resources, infrastructure improvement, community involvement, efficient regulatory mechanisms and training health workers on advances in HIV monitoring and progression. Following WHO recommendation, in 2014 Uganda switched from CD4 testing to viral load testing as the preferred approach for ART monitoring. Regardless of the benefits, there is an increasing demand for the value of tests done in regard to unit cost per test in order to eliminate overutilization of laboratory tests coupled with an interest towards developing effective, efficient and sustainable health initiatives.

**Methods:** Costs were determined based on the service providers’ perspective. Retrospective cost analysis was done using step down accounting methodology, to estimate the costs of providing CD4 and viral load testing services at Kiswa HCIV and CPHL respectively for financial year 2015/2016. Primary outcomes were expected costs and the incremental cost-effectiveness ratio for viral load testing over CD4 testing.

**Results:** The total number of CD4 and viral load tests done was 7,784 and 512,217 respectively. The average cost for CD4 was $10.28 while that for viral load testing was $11.99 for the financial year 2015/2016. The cost of viral load testing dropped by 52% when compared to previous findings. The biggest cost driver for both testing approaches was expenditure on laboratory supplies. The ICER for viral load testing was $12 when compared to CD4 testing.

**Conclusion:** Viral load testing is a very cost-effective method for antiretroviral treatment monitoring for Uganda.

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**Implementation of a Sustainable National Biosafety Cabinet Certification Program in Kenya**

**Background:** Biosafety cabinets (BSC) and Ventilated Workstations (VWS) used for TB Smear Microscopy are the primary means of containment for air-borne pathogens in laboratories. BSC and VWS should be certified prior to initial use and annually thereafter. Access to BSC certification in years past was uncommon due to absence of competent local certifiers and prohibitive cost of outsourced expertise. In 2011, Kenya Ministry of Health (MOH), in collaboration with CDC-Kenya, initiated a national BSC certification program.

**Methods:** Local biomedical engineers were trained by Eagleson Institute, USA, including in-country proficiency mentorship and procurement of certification equipment, in 2011 (4 engineers) and 2015 (2 engineers). A Laboratory Information System (LIS) was set up to inventory the country’s BSC and VWS, track annual certification activities and user training. In 2017, MOH and CDC in collaboration with Eagleson Institute started in-country training. Data capture was done using Excel and LIS portal.

**Results:** National BSC, VWS and PCR Clean Work Bench (CWB) service has increased over time. By the end of 2017, 697 of the 3 equipment types (BSC, VWS, and CWB) were recorded. The 697 include, 400 (57%) BSC class II Type A2, 179 (26%) VWS, 108 (15%) BSC Class 1, and 10 (1%) PCR CWB. By February 2018, 697 BSC, VWS and CWBs were assessed. Data on performance after calibration was available for 682 out of 697(98%) cabinets. Of these 682, 94% passed the smoke test assessment. On BSC air flow tests performance, 90% (615) passed while 10% were rated unsuitable for use, with recommendation for air filter replacement. Onsite training for 2038 BSC users was delivered. Four more engineers are being trained locally with the aim of increasing in-country capacity.

**Conclusion:** The BSC certification program has increased access to certification services, improved laboratory quality systems, ensured protection of laboratory workers from TB and other air-borne pathogens.
Site Improvement Through Monitoring (SIMS) HIV Proficiency Testing (PT) Scores Improved Following Implementation of the HIV–Rapid Test Continuous Quality Improvement (RTCQI) in Facilities Supported by the President Emergency Plan for AIDS Relief (PEPFAR) in South Africa

Background: SIMS assessments help monitor implementation of HIV rapid test proficiency testing at PEPFAR-supported sites and use a 4-color scale: red requires urgent remediation; yellow requires remediation; light or dark green meets or exceeds standards. SIMS assessments conducted starting in October 2015 uncovered challenges with uptake and implementation of the PT program at assessed sites. As an important component of the HIV–Rapid Test Continuous Quality Improvement (RTCQI) package, it is strengthening PT in testing sites, we explored the potential effect of the RTCQI program on SIMS PT scores over time.

Methods: RTCQI was implemented in 1627 PEPFAR supported facilities in South Africa from September 2015 onwards. A convenience sample of 283 facilities that had a SIMS assessment from October 2015 to May 2018 was used for the analysis. SIMS PT scores were calculated from key informant interviews, document reviews, and recent PT panel results. For PT SIMS scores, red indicates the facility was either not currently enrolled in a PT program or had received less than 50% satisfactory score in the last 12 months. Yellow indicates unsatisfactory PT scores with no corrective actions taken. Light and dark green indicate corrective actions taken for unsatisfactory results and exceeding expectations, respectively.

Results: Trend analysis of SIMS PT assessment data collected from October 2015 to May 2018 indicated a marked increase in light and dark green scores. Of note, dark green (exceeding standards) scores improved from 29% (2016) to 54% (2017) to 79% (2018, preliminary data) while red scores for PT decreased from 43% (2016) to 31% (2017) to 14% (2018).

Conclusion: Although inconsistencies in implementation of PT panels still exist, the improvement in SIMS scores and the PT program at these facilities may be reflective of the strong emphasis put on PT quality improvement activities during RTCQI implementation.

Effectiveness of Using a Mixed Approach of On-site Mentoring and Tele-mentoring for Improving Laboratory Quality Management Systems: Lessons From Cambodia

Background: Strengthening laboratory services is critical to ensure quality diagnostic services and strong healthcare systems. Implementing a Quality Management System (QMS) helps to ensure accurate, timely and reliable laboratory test results. In 2017, results from I-TECH’s quality assessment of 12 national hospital laboratories in Cambodia revealed considerable gaps in their QM. Inadequate laboratory staff competency was recognized as a critical barrier to delivering quality diagnostic services in the country. In March 2018, I-TECH piloted a multi-faceted approach to mentoring and training to address key QMS knowledge gaps.

Methods: To support implementation of laboratory QMS and strengthen capacity, 2 local mentors working alongside international technical experts to coach the laboratory staff, deliver face-to-face training and provide remote training using teleconferencing by Zoom technology. Training sessions focused on internal quality control, SOP writing, documentation procedures and occurrence management as determined by gaps identified from assessments using the WHO SLIPTA checklist. Each mentor was assigned 6 laboratories, a virtual network was established for weekly technical assistance (TA) Zoom™ calls, and face-to-face practical regional training provided to laboratory staff. Mentors also met with staff to address their unique challenges. QI engagement and training effectiveness was assessed by tracking participant attendance and by monitoring completion of action plans.

Results: All laboratories attended all 20 of the weekly TA Zoom™ calls, with 18 – 40 individuals participating per session. Laboratory staff showed a significant increase in understanding of QMS principles and implementation. Overall management SOP writing completion increased from 46% to 84% across laboratories with 100% of laboratories documenting non-conformities and internal quality control within 4 months.

Conclusion: When paired with onsite mentoring, remote training and TA provide a system that builds professional capacity of lab staff while continuously monitoring QMS implementation in the laboratory.
Survey on Challenges Facing Transporters Submitting Samples to the National HIV Reference Laboratory (NHRL), Nairobi, Kenya for Testing

Background: Effective sample management plays a pivotal role in ensuring that once a specimen has been obtained from a client, it is transported, tested and results released in a timely manner to help in decision making. However, despite the increased access to testing, clinical sample management in Kenya is marked with challenges that ought to be addressed to attain the UNAIDS 90-90-90 targets.

Methods: In this survey, we sought to profile the systemic and health issues associated with sample transport by facility-contracted riders (n=34) who dispatch samples from various facilities in Kenya to the national HIV reference laboratory (NHRL) for testing. A structured survey questionnaire administered by trained personnel at NHRL between March 2017 and April 2018 was used to obtain data which was analyzed using STATA (v14).

Results: In this survey, we found that 31% (n=11) of the transporters use government vehicles while 8% (n=3) use private cars to dispatch samples to NHRL. The rest (61%) were motorcyclists. Only 25% (n=9) of the transporters had been trained on biosafety and were the only vaccinated on hepatitis B. Interestingly, 43% (n=15) of the transporters had not received any training on sample handling thus contributing to 26% (n=9) of the double packaging received at NHRL. Of the surveyed transporters, 23% (n=8) neither wore gloves while handling samples nor did they wash their hands after dispatch.

Conclusion: Our survey findings add insights into the challenges associated with sample management prior to testing for the HIV virus. Findings in this survey also highlight the health risks transporters are exposed to and therefore there is a need to bridge the gaps.

Factors Affecting Training Effectiveness of African Centre for Integrated Laboratory Training (ACILT)

Background: Training effectiveness is the extent to which trainees transfer and use their newly gained knowledge, skills and behaviors in their workplace and organizations. We assessed training effectiveness of courses offered between 2008-2014 at African Center for Integrated Laboratory Training (ACILT), Johannesburg, South Africa to improve quality and access to laboratory services.

Methods: To assess extent of training effectiveness and relevant enabling and obstructive factors six months before and after attending training - we distributed electronic surveys to 867 participants in 43 countries attending 10 courses. Responses to three laboratory diagnostic (Viral Load/Early Infant Diagnosis (VL/EID), HIV Drug Resistance and Incidence) and four system strengthening courses (National Laboratory Strategic Planning (NLSP), Biosafety, Laboratory Information System (LIS) and Supply Chain Management (SCM)) were analyzed.

Results: Fifty-four of 267 trained in diagnostics responded from 20 countries. Six months post-training they trained 502 personnel, increased total testing volume by 113,000 specimens, decreased average VL turnaround time from 12 to 9 days and reduced mean testing-error rates from 12% to 5%. Resource constraint (48%) and staff’s resistance to change (40%) were key obstructions while support from team and management (75%) were enablers for training effectiveness. 161/600 responded to system strengthening survey; 45 respondents from 21 countries contributed to developing first national NLSP, SCM and LIS plans. Lack of funding (43%) and management’s support (25%) were common obstructions; 61% (Biosafety) and 64% (SCM) were enabled by availability of resources, and partner support was enabler for 94% (NLSP) for training effectiveness. Study limitations were low responses rate of 25% (215/867) leading to small sample size and inherent recall bias in self-report surveys.
**Conclusion:** Despite limitations, training offered at ACILT was effective in building ownership for improved quality and access for laboratory systems and services. However, for continued workforce development, subsequent trainings will need to address the identified key challenges.

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### OP-2.4-011 TIME: 13:20

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**Give Us This Day Our Daily Mentors:**
**The Experience of Onsite Quality Management Mentorship Towards Accreditation at the University Teaching Hospital, Lusaka, Zambia**

**Background:** Over 90% of accredited medical laboratories in Sub-Saharan Africa are in South Africa. However, a lot of laboratories across the continent still struggle to implement sustainable ISO 15189-based quality management systems (QMS). One of the most common approaches is training workshops. This method, without follow up mentorship, has frequently proved to be ineffective for many laboratories in Zambia and beyond. Our laboratory went through similar challenges before working with onsite mentors. We present our experience of the mentorship approach in our haematology section.

**Methods:** Between 2017 and 2018, the laboratory received mentors from the African Society for Laboratory Medicine (ASLM) who were embedded in the operations of the laboratory while coaching staff in QMS. Mentors conducted a total of 7 visits of two to three weeks each during this period. During this period, the mentors assessed the haematology section six (6) times using the WHO-AFRO SLIPTA checklist version 2015. After each assessment, the mentors assisted the laboratory to develop corrective action plans with assigned responsibilities and clear timelines for each task. When mentors were away from the laboratory, they followed up on completion of action items and provided remote assistance by email and phone.

**Results:** At baseline assessment, the haematology section scored 65%. The laboratory then scored 75.2%, 75%, 83%, 76%, and finally 84% at the follow-up assessments. The laboratory improved from a baseline of 65% (2 stars) to 84% (3 stars) in the final assessment. The laboratory was included in the application for accreditation by the Southern African Development Community Accreditation Services (SADCAS) and was subsequently recommended for accreditation of full blood count following an initial assessment in June 2018.

**Conclusion:** Onsite mentorship is an effective approach to assisting laboratories in the implementation of QMS towards accreditation.
OP-2.5: Strengthening the Laboratory–Clinic Interface

OP-2.5-012 TIME: 13:25

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Integration of the HIV-Rapid Test Continuous Quality Improvement program Into the Clinic-Lab Interface Programs in Healthcare Facilities Supported by the United Nations Secretary General’s Emergency Plan for AIDS Relief (PEPFAR) in South Africa

Background: In 2015, the Secretary General’s Emergency Plan for AIDS Relief (PEPFAR) introduced the HIV-Rapid Test Continuous Quality Improvement (RTCQI) program in South Africa. However, baseline audits indicated the need to improve RTCQI specific processes, and combine the program with the clinic-Lab-Interface (CLI) program.

Methods: In September 2017, 1,842 sites enrolled in the RTCQI program were audited using the Stepwise Process for Improving the Quality of HIV Rapid Testing (SPI-RT) checklist, which rated and ranked facilities from level 0 to 4, based on the score received, with each level indicating how close the facility is in meeting site certification requirements. The baseline audit results led to various interventions including integrating the CLI and the RTCQI programs, by monitoring and strengthening the provision of consumables, sample collection and transportation, and results turnaround time and uptake; decentralizing technical support, and moving the program under the leadership of the NDOH. Follow-up SPI-RT audits were conducted in March 2018, and data compared with baseline findings.

Results: Baseline audits data showed <40% of the facilities were at level 4, which is the level where a site is recommended for certification. After the interventions, interim results from one district showed level 0 (lacking all quality measures) sites decreased from 34% to 0%, and level 2 ([achieving 60–79% on the SPI-RT checklist], site is partially eligible for certification) sites decreased from 60% to 5%, indicating strong improvement in quality measures. The majority of the sites were at Levels 3 (>80–89% score on the SPI-RT checklist), close to national site certification and 4 (>90% score on the SPI-RT checklist), eligible for national site certification.

Conclusion: This interim data suggest a significant improvement in quality measures, likely because of the combined interventions. Interventions are being scaled up, and further audits are expected to document quality improvement.

OP-2.5-013 TIME: 13:30

S. Osawe1, 2, 1. Mammman1, 2, 1. Obishakin1, 2, 1. Peters1, 2, 2. Wilson-Dindam1, 2, 1. Kwar1, 2, 3. Peters1, 2, 1. Abimiku1, 2
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Establishing a System for HIV High Viral Load Result Flagging and Monitoring HIV Suppression Rates

Background: With the 90-90-90 targets and HIV Viral Load (VL) scale up, there was a need to increase the testing and monitor of unsuppressed results. Nigeria has the second largest number of HIV infected adults and children with a recorded 81% viral suppression.

Methods: We developed a Microsoft Excel database on our Laboratory Information Management System (LIMS) to capture all HVL results >1,000 copies/ml and track un-suppressed VL results. In order to flag high VL results, we also inserted a command in the LIMS to insert thumbs down symbols to help pictorially interpret results to patients and encourage them to improve in their adherence. Before dispatch, all report forms are arranged, separating the flagged HVL from the suppressed as priority result dispatch.

Results: A total of 47,574 patient samples were tested from a total of 185 facilities from October 2016-May 2018. There were a total of 9,669 (20.3%) flagged HVL results with a suppression rate of 79.7%. A large number of samples were received with improperly filled request forms. The ages ranged from 1-80 years old (34±11.17) with a total of 3,980 females and 1,450 males (p<0.0001). HVL ranged from 1,000-9,947,570 copies/ml (Log10 3.00-7.00). Healthcare workers reported ease in interpreting results when shown to patients.

Conclusion: Tracking the unsuppressed patients is critical for the implementation and monitoring in a HIV care and treatment program. Our flagging of HVL helped physicians and nurses to quickly identify non-suppressed results. The graphical representation made it easier for patients to understand their results. There are challenges with poor filling of the request forms; this is an area that needs improvement at the facility level.
OP-3.1: The One Health Approach for Effective Medical Laboratory Services In Africa

R. T. Isah

The Need to Synergize Partnerships Toward One Health Approach for Effective Medical Laboratory Services In Africa

Background: More than 70% of clinical decision making relied on laboratory test results. Despite this recognition, there are still gaps in the strengthening of effective laboratory services in most of the African countries. The situation has prone Africans to be worst hit during pandemic outbreaks with consequent death of thousands human lives as seen during outbreaks of ebola and influenza. Many stakeholders are involved in assisting and strengthening healthcare services in Africa but still there is no overall improvement in this sector most especially in the rural areas. This research was conducted to identify the current realities of laboratory services and proper measures to synergize partnerships towards effective laboratory services in Africa.

Methods: This research work reviewed already forty (40) literatures to identify problems affecting laboratory services and proper ways on how synergy in partnership can help in having a one way directional approach to have effective laboratory services in Africa.

Results: Problems hindering access to adequate laboratory services in Africa include lack of necessary regulatory frameworks, inadequate budgetary allocation to health sector, poor training and re-training of laboratory personnel, lack of enough testing equipment and reagents, poor monitoring and evaluation policies. Although we have existing different partnerships between African countries and various stakeholders in health sector for many years ago, the level of various partnership achievements has not been fully realized probably due to differences in methods used by various stakeholders to deal with poor healthcare services experience in Africa. Therefore, the need for various African governments, World Health Organization and other international partners to come together to proposed one way approach in achieving effective laboratory services all over Africa. This will enhance African health system’s ability to detect pandemic risk factors, identify causal pathogen, characterize emerging diseases and monitor their evolutions with minimal wastage of scarce funds.

Conclusion: Synergizing partnerships toward one way approach in improving laboratory services in Africa will ensure tackling problems dwindling effective services and prepare the healthcare system better in responding to emerging pandemics with improvement in healthy living.

A Sero-epidemiological Survey of Crimean-Congo Hemorrhagic Fever in Cattle, Uganda, 2017

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Background: Crimean-Congo Hemorrhagic Fever (CCHF) is a severe tick-borne viral disease that affects both animals and humans in many parts of Africa, Eastern Europe and Asia. Over the last 5 years, Uganda has been affected by 10 independent outbreaks of human CCHF, mainly in the Central Region. Due to the increasing public health threat of CCHF around the world, the use of animal surveillance data as an indicator of local virus circulation and risk assessment is highly recommended. This study investigated the seroprevalence and predisposing risk factors for CCHF disease in cattle obtained from all agro-ecological zones of Uganda.

Methods: This was a cross-sectional survey study. Blood samples were obtained from randomly selected cattle across many purposively selected districts of Uganda, and processed for anti-CCHF IgG serology using established ELISA protocols at Uganda Virus Research Institute, Entebbe, Uganda. Epidemiological data for every sampled animal was also obtained using a structured questionnaire.

Results: A total of 1,729 animals from 121 herds of cattle in 27 districts of Uganda were sampled. Overall seroprevalence for CCHF was 17.4% (95% CI: 15.6-19.2). Districts in Northern Uganda and the “cattle corridor” showed the highest seroprevalence. Animal seropositivity for CCHF was significantly associated with adult age (OR = 2.62; 95% CI: 1.6-4.0), being of a local breed (OR = 18.35; 95% CI: 2.53-132.94), tethering (OR = 2.28; 95% CI: 1.24-4.18) and a history of stillbirths (OR = 1.73; 95% CI: 1.09-2.75) and herd movement (OR = 2.0; 95% CI: 1.3-3.1).

Conclusion: This study provides evidence of widespread circulation of CCHF virus in many parts of Uganda, including areas where human outbreaks have not been reported. This data can be used in advocacy for enhanced CCHF control and prevention efforts such as effective tick control methods and enhanced surveillance for suspect human cases.
OP-3.2: Partnerships and Collaborations for Universal Health Coverage and International Health Regulations

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Strengthening Cross-Border Diseases Surveillance Through Cross-Border Zoning

Background: The weak disease surveillance systems between countries require establishment of harmonized consensus-based collaborations and implementation of cross-border surveillance approaches. The Southern-Africa TB health Systems Strengthening (SATBHSS) Project established cross-border surveillance zones led by cross-border committees.

Methods: 25 Cross-Border Zones made up of 1 or more districts from either side of the border for each project countries of Lesotho, Malawi, Mozambique, Zambia and neighbors of Democratic Republic of Congo, South Africa, Tanzania and Zimbabwe were identified. Zoning was based on length of the border, burden of the diseases, human and animal activities, presence of a health facility with laboratory and human population size. A Cross-border Committee was established for each zone representative of the One-Health Approach whose roles include; conducting risk assessment, annual planning, resource mobilization and allocation, managing laboratory commodities, oversight of surveillance and response, and capacity building.

Results: Between November 2017 and July 2018, 25 Cross-Border Zones were identified and 5 operationalized and Committees established between Malawi-Zambia (1), Malawi-Mozambique (1), Lesotho-South Africa (2) and Zambia-DRC (1). Three quarterly meetings were conducted between Malawi-Zambia (1) and Lesotho-South Africa zones (2). Four Tabletop simulation exercises conducted to test epidemic preparedness. One plan developed and three updated. Malawi-Zambia; Malawi-Zambia zones active during the 2017 choler outbreak and an Ebola simulation exercise conducted in the Zambia-DRC zone. Three informal communication (whatsapp) and 6 formal communication (email) platforms established between the 5 cross border zones. List of priority disease for joint response agreed for each zone. Three trainings conducted in Threats, Hazard Identification and Risk Assessment (1 – Lesotho); Laboratory based Surveillance trainings (2-Malawi).

Conclusion: Cross-Border zoning led by cross-border committees is one way of building a platform for collaboration, building capacities for public health preparedness and implementation of harmonized cross border diseases surveillance, joint outbreak investigation and response.

OP-3.2-004 TIME: 12:45

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Connected Diagnostics: Using Point-of-Care Tests Linked to Mobile Health Wallets to Reduce Overtreatment of Malaria in Kisumu, Kenya

Background: Fever is one of the most common reasons that people visit health facilities in most resource restricted areas in Africa. In malaria-endemic zones such as Kisumu, Kenya, malaria is often suspected as the cause of fever. Where proper diagnostic tools are lacking, combined with low laboratory capacity and skills, it has been determined that clinicians often prescribe antimalarial therapy without proper diagnostics. This leads to overtreatment rates as high as 60%, risk of possible toxicity, increased drug resistance, and waste of resources.

Methods: Connected Diagnostics links payment for malaria treatment to accurate malaria rapid diagnostic testing to improve the accuracy of malaria diagnosis and ensure that payment for malaria treatment is linked directly to a positive diagnosis. Over a period of 9 months in 7 clinics in Kisumu County, patients presenting with fever symptoms were tested for malaria at point-of-care using rapid diagnostic tests (RDT). These tests were interpreted by a portable RDT reader (Deki Reader) linked to a cloud database. Positive diagnosis for malaria allowed users to use their mobile health wallet, known as M-TIBA, to pay for antimalarial drugs prescribed by the clinician, thus linking distribution of malaria drugs directly to positive malaria diagnosis.

Results: As of June 2018, 5,179 persons have been tested for malaria with overall test positivity rate of 14.19%. Positive malaria diagnosis decreased from 51.1% in 2017 (presumptive diagnosis) to 11.3% in 2018 in the same facility over a corresponding 4-month period. Hotspots of malaria were detected amongst poorest population segments. Over a 2 months period in 5 facilities 62% of patients had a malaria test done, 20% tested positive and an overall 44% over prescription was recorded (pharmacy records versus lab records).

Conclusion: This campaign demonstrates that digital technologies can improve the performance of malaria diagnosis and treatment in a Kenyan context by recording over prescription and thus reduce unnecessary expenditures while improving quality of care.
**Background:** Key to international efforts to improve global health security is increased alignment with the International Health Regulations (IHR) 2005, with each country being able to diagnose adequately and report infectious disease threats within their borders, including emergencies of public health concern.

**Methods:** To strengthen IHR capacity in Nigeria, Public Health England (PHE) and the Nigeria Centre for Disease Control (NCDC) have agreed to jointly collaborate through provision of epidemiological and microbiological technical support. This has involved a bilateral pairing of their respective national reference laboratories to exchange skills, experience, expertise, and best practice, with ongoing engagement to help implement lessons learned.

**Results:** Within the first year of the link, active collaboration on a wide range of diagnostic areas has been established with participation of PHE specialists in guideline development on antimicrobial resistance and Lassa Fever diagnostics, organising a joint national workshop on enteric bacteria to harmonise practice across NCDC-collaborating laboratories, and providing broad-based support to improve overall laboratory governance and quality assurance. NCDC, in turn, has assisted PHE with collaborative planning for Lassa fever research, and is helping frame activity around novel diagnostics and febrile illness panels for travellers returning from West Africa to the United Kingdom. Discussions are ongoing regarding how best to share microbial strains between countries and best learn from each other’s strengths.

**Conclusion:** Bilateral twinning of two country’s national reference laboratories has showcased potential for mutual growth. While expertise on the diagnosis of endemic infections such as Lassa fever, cholera and monkeypox, is centred in and delivered by NCDC, broader issues surrounding laboratory development and antimicrobial sensitivity testing, can be shared by PHE. A planned workshop on biosafety and biosecurity will exemplify knowledge sharing. Ongoing successful collaboration, with bilateral exchanges, research collaborations, and training activities, will be of great benefit to all parties.

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**Newborn Screening Initiatives for Sickle Cell Disease in Africa**

**Background:** There is recognition of the importance of newborn screening (NBS) as a public health program in the US and worldwide. Each year thousands of newborns with severe genetic and congenital conditions are identified in the US from state NBS programs. With about 97% of the world’s newborns born outside the US and Canada, there is a lot to be learned from interactions between NBS systems around the globe. Sickle cell disease (SCD) affects about 100 million people worldwide, and 5% of the world’s population are carriers. Over 250,000 infants are born yearly with SCD in Africa of which 60% will die as infants according to World Health Organization. Africa has the highest prevalence of sickle trait in the world with prevalence in Ghana and Nigeria estimated between 15-40%. Through NBS, newborns with SCD can be identified and treated early thus leading to better quality of life and a reduction in morbidity and mortality.

**Methods:** The Association of Public Health Laboratories is currently working with Ministries of Health in several African countries to expand NBS programs and maximize the coverage of screened worldwide. Some African countries have expressed a desire to utilize NBS to improve the delivery of genetic health services. We have also provided technical assistance, trainings and worked with partners to assist newborn screening initiatives around Africa and the world.

**Results:** Early detection of newborns with sickle cell disease in several African countries have shown that newborn screening can make a positive difference in the health outcome of kids with sickle cell disease. There is need building and maintaining other vital infrastructures, including follow up, medical treatment facilities and the medical home in conjunction with the specialists (in this case, pediatricians and hematologists). Newborn screening is not just the test but a system.

**Conclusion:** This presentation will highlight current and future NBS initiatives in several African counties. The goal of these NBS initiatives is to reduce morbidity and mortality related to NBS conditions, using sickle cell disease as a model. At the end of the presentation, participants will be able to describe newborn screening initiatives in African countries.
Supporting a Regional and Cross-Country Approach to the Strengthening of the Epidemiological Surveillance System in Four Countries in West Africa

Background: The 2014-2016 Ebola Virus Disease (EVD) outbreak in West Africa underlined the urgent need for an integrated regional response to epidemic diseases and cross-country collaboration. During the outbreak, challenges and needs within the regional epidemiological surveillance system were identified. With support from the KfW German Development Bank and in coordination with the Regional Centre for Surveillance and Disease Control, the West African Health Organization (WAHO) is responding to these needs. Accordingly, WAHO has prioritized capacity building in the areas of disease surveillance and prevention as well as epidemiology and emergency response within ECOWAS, in line with the International Health Regulations and the Integrated Disease Surveillance and Response frameworks.

Methods: At the national level, the project will contribute to a transversal upgrading of laboratory infrastructure by way of sustainable procurement of priority equipment and reagents as well as develop laboratory personnel capacity in order to prepare laboratories towards ISO15189 accreditation. At the regional level, the project will reinforce collaboration by preparing frameworks in cross-cutting issues and implementing laboratory coordination mechanisms.

Results: At the end of this 3-year project, it is expected that: 1) laboratory infrastructure in the selected laboratories has been upgraded towards ISO15189; 2) laboratory personnel capacity and laboratory standard operating procedures have been developed in compliance with international regulations; and 4) regional frameworks and laboratory coordination have been developed and are implemented.

Conclusion: A regional coordinated approach with clear leadership from regional stakeholders will strengthen the epidemiological surveillance system in West Africa and thus ensure a timely as well as efficient outbreak response in the future.
Leveraging Regional Resources to Support Viral Load Monitoring for Patients with Human Immunodeficiency Virus on Antiretroviral Therapy in South Sudan

Background: Viral load (VL) monitoring is the gold standard for managing patients on antiretroviral therapy (ART) for human immunodeficiency virus (HIV). VL monitoring is severely restricted in resource-limited settings due to high costs, complex specimen collection and transport requirements, and need for trained personnel and a well-established laboratory infrastructure. The World Health Organization HIV treatment guidelines have previously focused on clinical and immunologic criteria for monitoring treatment in these settings. In South Sudan, health systems are currently in development. HIV prevalence is high in the southern part of the country (average 4.3%; country average 2.6%). In 2016, the Ministry of Health sought to leverage resources in Kenya to expand access to routine VL testing for ART monitoring.

Methods: A stakeholders meeting was held in Nairobi in 2016 to develop SOPs, reporting tools and training materials. A courier company was identified to ship samples weekly to the Kenya National HIV Reference Laboratory for testing. Results were returned to the Public Health Laboratory (PHL) in Juba by email and remitted to health facilities by email or hard copy. Laboratory staff from PHL were attached to the NHRL for 2 weeks for training on all aspects of VL testing. Multi-disciplinary comprehensive health worker training was conducted followed by individual facility mentorship.

Results: Between April 2017 and March 2018, 6124 patients in 16 targeted high volume facilities were enrolled in the VL monitoring programme. By March 2018, overall VL suppression rate was 78%; with 83% suppression in the 20–24 years age group, and 84% and 79% in breastfeeding and pregnant women respectively. VL suppression remained poor in the >18 age group.

Conclusion: Regional resources can be effectively utilised to establish essential technical services in countries with evolving health systems.

Using Expert Patients to Scale Up HIV Viral Load Testing in Resource Limited Settings in United Republic of Tanzania

Background: Plasma samples remain the gold standard for monitoring HIV Viral Load (HVL) among patients on antiretroviral treatment. Paucity of testing laboratories, human resource shortage and specimen transportation challenges impede access of HVL monitoring in Tanzania. The country scaled up HVL testing capacity to 17 (from six) laboratories serving 1,490 health facilities (HFs). Hub and spoke system facilitates specimen referral and testing countrywide. Tanzania Health Promotion Support (THPS) engaged people living with HIV (PLHIV) to facilitate HVL sample transportation in Kigoma and Pwani regions with no testing laboratories and 90 % of supported HFs in remote locations.

Methods: Selection and training of 363 expert clients (EC) was done. Training included practical on HVL sample management and biosafety. The EC were introduced to spokes, hubs and testing laboratories for transporting samples and results using public transport. Average distance was 40 km, with maximum travel time of eight hours. Triple packaged samples with temperature monitors in cooler containers were used. Data on samples collected, transported, tested, rejection rate, results turnaround time (TAT) was recorded.

Results: 66,523 HVL samples were collected and transported to three HVL testing laboratories between July 2016 and June 2018 in 114 HFs. Coverage of eligible PLHIV with HLV monitoring increased from 24% in 2016 to 83% in 2018 with average TAT of 26 days (standard is 14 days). By June 2018, 86% of clients tested had HVL suppression. Sample rejection rate was 1.4%, these were communicated to HFs for re-collection and testing; 98 % of the samples were resubmitted.

Conclusion: Expert PLHIV can serve as reliable transport agents in remote areas; allowing health providers to dedicate time on clinical care services. Adopting this practice in resource limited settings contributes towards reaching the UNAIDS global 3rd 90 target.
OP-3.5: Implementing and Harmonizing Policies

**OP-3.5-011 TIME: 13:20**

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**Stratégie de Lutte Contre la Résistance Anti-Microbienne – Madagascar**

**Background:** La résistance aux antimicrobiens est un problème majeur de santé publique et une menace croissante pour le contrôle des maladies infectieuses. Paradoxalement très peu de laboratoires de biologie médicale dans les PED sont capables d’effectuer l’antibiogramme, examens de base et de référence pour documenter la résistance. Dans ce contexte une première unité de bactériologie a pu être mise en place dans un des CHU de Tanarive. Fort de ce succès, une approche en réseau a été mise en œuvre sous tutelle du ministère de la santé afin de soutenir et renforcer les capacités d’autres laboratoires hospitaliers de Madagascar. Cette approche a permis aux laboratoires de mutualiser leurs moyens, d’harmo niser leurs pratiques et d’homogénéiser la qualité de leurs résultats.

**Methods:** Données rétrospectives recueillies sur 3 ans pour quatre des laboratoires de RESAMAD : Antananarivo (CHU Mère enfant Tsaralalana / CHU Joseph Raseta Befelatanana), Antsirabé (CHRR Antsirabe), Majunga (CHU PZAGA Androva), Tamatave (CHU Morafeno). Prélèvements dits « prioritaires » (Hémocultures, ECBU, Coproculture), combinaison Entérobactéries (E.Coli, K.Pneumoniae, Salmonella sp, Shigella sp) / Antibiotiques (Beta lactamines, quinolones, SXT), selon les critères définis par le système de surveillance GLASS (OMS)

**Results:** Parmi 1143 hémocultures, 17% étaient positives. Pour E.coli et K.pneumoniae la proportion de résistance à la Ceftriaxone, était de 62 et 68%, essentiellement par production de BLSE. La résistance aux quinolones était de 57 et 68% et la résistance au SXT de 79 et 68%. Parmi les 1451 ECBU, 17% étaient positifs. Pour E.coli et K.pneumoniae la proportion de résistance à la Ceftriaxone, était de 34 et 58%, là aussi essentiellement par production de BLSE. La résistance aux quinolones était de 39 et 55% et la résistance au SXT de 70 et 69%. Pas de résistance a l’imipénème détectée dans ces échantillons.

**Conclusion:** La mise en réseau des laboratoires et le renforcement des capacités de bactériologie montre qu’il est possible de mettre en place de la bactériologie dans des laboratoires de biologie de PED en capitale et en province avec des moyens modestes. L’apport de ces laboratoires est important à la fois pour une prise en charge de proximité des patients, et pour documenter les taux de résistances. Le suivi permet de pouvoir juger de l’impact des mesures mises en œuvre dans le cadre de la lutte contre la résistance aux antimicrobiens.

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**OP-3.5-012 TIME: 13:25**

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**A Baseline Study of Hospital Policies for Hepatitis B Vaccination of Healthcare Workers in Botswana**

**Background:** Unvaccinated healthcare workers (HCWs) performing high risk procedures are at risk of occupational exposure (OE) to hepatitis B virus (HBV). The Botswana Ministry of Health (BMoH) issued hepatitis B (HB) vaccination guidelines in 2011, recommending free HB vaccination, post-vaccination testing, post-exposure prophylaxis (PEP) against HBV for unprotected HCWs, and keeping vaccination and OE records for all HCWs. This study aimed to investigate hospital policies for HB vaccination of HCWs in Botswana.

**Methods:** This descriptive survey was conducted in March-May 2012, in all 17 hospitals in Botswana where high risk procedures were performed. The relevant hospital administrator (HA) at each hospital was identified and requested to (a) complete a questionnaire on hospital policy, and (b) make HCW HB vaccination records available for review. Also, in order to establish if policies were being implemented, a stratified (by hospital and profession) sample of 459 HCWs were requested to complete a questionnaire on awareness of a hospital HB vaccination policy; HB vaccination status; OE history and receipt of PEP for HBV following OEs.

**Results:** The response rates were 76.5% (13/17) and 79.5% (365/459) for (hospital administrators) HAs and HCWs respectively. Of all hospitals, 61.5% (8/13) had a HB vaccination policy, with 50% (4/8) implementing their policies. Only 38.5% (5/13) had a PEP policy. Of all HCWs, 65.2% (238/365) had received at least one dose of HB vaccine, while only 34.8% (127/365) were fully vaccinated. Only 23.1% (3/13) of hospitals had HB vaccination records for their HCWs.

**Conclusion:** Although over 60% of hospitals had adopted the BMoH HB vaccination guidelines in 2012, the year following their introduction, the majority were not yet fully implementing these guidelines. Our study indicates that there is a strong need for full implementation and follow up.
ASSESSING THE BURDEN OF HIV, TUBERCULOSIS AND MALARIA

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Seroprevalence of the Coinfection HIV, HBV, HCV Among Clinic Attender at Laquintinie Hospital, Douala, Cameroon

Background: In Cameroon, the new national AIDS control strategy “test and treat” apart from lymphocytes TCD4 rate to achieve 90-90-90 target impose a systematic screening and the early management of HIV. However, HIV, HBV, and HBC share the same routes of transmissions increasing the risk of co-infection and of severe damage. This study was undertaken to evaluate the prevalence of the co-infection HIV HBV/HCV among subjects aged from 15-75 years at Laquintinie Hospital, Douala, Cameroon.

Methods: A cross-sectional, prospective study was held from October, 2017 to March 2018 at Laquintinie Hospital. HIV, HBV and HCV immunochromatographic test were performed to each ignorant participants and HIV positives cases were confirmed by oral Quick. Data’s analysis were performed using Epi info 7.0. P value <0.05 was considered as statistically significant.

Results: Out of 247 patients enrolled, there were 51.52% of women and the mean age among participants was 42.3± 1.98 years [min : 15; max : 75]. The seroprevalence of HIV was 10.12% (25/247), HBV 7.69 % (13/247), and HCV 4.04 % (10/247). The co-infection HIV/HBV was 1.21% (3/247), HIV/HCV (2.02%) and HBV/HCV (1.61%). Women seemed to be most affected by HIV co-infection HBV/HVC (2,5%) whereas male subjects by HCV (5,0% vs. 3,1% women, p=0,65), HBV (10,0%vs. 5,4%, p=0,89) and the co-infection HBV/HVC (2,5% Vs. 0,8%, p=0,56). Subjects aged (45; 60) were more likely to be positives either by HIV 23,6%(9/38), HBV 12,1%(5/38), HCV 7,8% (3/38) or by co-infection HIV/HBV 7,8% (3/38), HIV/HCV 7,8% (3/38).

Conclusion: We should keep intensifying sensitization on prevention measures against HIV, HBV, HCV in the town of Douala-Cameroon.

Characterization of HIV Drug Resistance Mutations in Patients with Detectable Viral Load Whilst on Combination Antiretroviral Therapy in Botswana

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Background: The transmission of antiretroviral therapy resistant HIV strains is a significant challenge for the success of HIV treatment programs. Patients on combination antiretroviral therapy (cART) with detectable viral loads that harbour ART resistant strains contribute to the transmission of drug resistant HIV strains. We here sought to determine the prevalence of patients on cART in Botswana with detectable HIV viral loads that have developed HIV drug resistant strains within a selected sample group.

Methods: Over a period of 3 months, we monitored the rate of samples with detectable HIV viral load presenting to the Botswana Harvard HIV Reference laboratory (BHHRL). A portion of the plasma samples with detectable viral loads had their RNA extracted, PCR amplified and genotyped to determine the frequency of HIV drug resistant strains in these patients. The sequences were analyzed for HIV drug resistance mutations as per the USA-IAS 2017 list.

Results: Over the 3 months period, 20143 samples were received for HIV viral load testing of which 1139(5.7%) had detectable viral loads of >400 copies/µL. 124 of the samples with detectable viral load were randomly selected for HIV drug resistance genotyping. Sequencing was successful for 50 of the 124(40.3%). Of the successfully genotyped samples, 27 (54%) had resistance mutations. The most prevalent mutations were: M184V(19(43.2%), followed by V106M 9 (13.6%), K103N and K101E both 6 (9.1%) and lastly K65R 5(11.4%). Most of the resistance mutations were to NNRTIs(56.9%), followed by mutations conferring resistance to NRTIs(37.9%) and to PI (5.2%).

Conclusion: These frequencies reflect most used drug classes in Botswana HIV treatment program. The findings underscores a significant proportion of patients on cART in Botswana with detectable viral loads have drug resistance mutations. There is need to identify patients on cARTwith virologic failure as soon as possible to avert the spread of drug resistant HIV.
Evaluation de la Résistance Précoce et Tardive du VIH1 Chez des Patients Sous Traitement Antirétroviral au Sénégal

**Background:** L’émergence de la résistance du VIH sous traitement ARV (TAR) est une préoccupation majeure surtout dans les pays à ressources limitées. La surveillance de la résistance selon les recommandations de l’OMS est donc essentielle pour identifier les schémas thérapeutiques optimaux garants de succès thérapeutiques. Ce travail avait pour objectif d’évaluer l’échec thérapeutique et la prévalence de la résistance précoce et tardive aux ARV des souches de VIH-1 chez des patients sous TAR au Sénégal.

**Methods:** Il s’agit d’une étude prospective conduite entre Janvier et Juillet 2018 qui a inclut après consentement des patients sous TAR depuis 12 mois +/-3 (M12) et 48 mois +/-3 (M48) dans 35 sites au Sénégal selon les recommandations de l’OMS pour la surveillance de la résistance. Des spots de sang sèches ont été confectionnés puis acheminés au laboratoire de Bactériologie-virologie du CHNU Aristide Ledantec, Dakar, Sénégal. La charge virale, Biocentric, Bandol, France. CILM reste aujourd’hui le seul platform running HIV VL en la pays. Ce travail de surveillance de la résistance chez les patients traités a été effectué pour tous les patients présentant une CV ≥ 3 log copies/ml. La correction de la séquence a été faite avec le logiciel DNA Star. L’analyse des mutations de résistances de la RT a été faite en utilisant l’algorithme de Stanford Version 8.6.

**Results:** Un total de 552 PVVIH ont été inclus dont 247 à M12 (44,7%) et 305 (55,3%) à M48. Le taux d’échec virologique global était respectivement de 17,8% (44/247) et de 16,7% à M12 et M48 avec une médiane de CV de 4,2 log/copies/ml. L’analyse des séquences a montré que 73% des souches présentaient une résistance à au moins 1 classe d’ARV et 50% aux 2 classes d’inhibiteurs nucléosidiques de la Transcriptase inverse (INTI) et d’inhibiteurs non nucléosidiques de la Transcriptase inverse (INNTI). Les mutations les plus fréquentes étaient pour les INTI la M184V suivi des thymidine analogue mutations et pour les INNTI, K103N, Y181C et Y188L.

**Conclusion:** Ce travail de surveillance de la résistance chez les patients traités fait état d’un taux d’échec virologique et de résistance parmi les patients en échec au Sénégal avec la nécessité de changer de ligne de traitement. Il est donc important de renforcer l’observance des patients avec une bonne éducation thérapeutique pour assurer une efficacité à long terme des premières lignes de TAR.
PS-1.1-005
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Prévalence du VIH et des IST Chez les Détenus du Sénégal en 2010 et 2015

**Background:** Au Sénégal, l’épidémie du VIH est concentrée avec une prévalence de 0,5% dans la population générale et élevée chez les groupes vulnérables. En milieu carcéral, la promiscuité augmente le risque d’infection d’où la nécessité d’interventions ciblées comme leur inclusion dans les enquêtes combinées. L’objectif de ce travail est de documenter la prévalence du VIH et des IST chez les détenus.


**Conclusion:** Cette étude confirme le caractère vulnérable des détenus face au VIH et aux IST avec une prévalence pour le VIH en 2015 quatre fois plus élevée que la moyenne nationale et une prévalence pour la syphilis en 2015 deux fois plus élevée par rapport à la moyenne retrouvée chez les femmes enceintes ; d’où la nécessité de mener des actions efficaces de prévention et de prise en charge en milieu carcéral.

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PS-1.2-006
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4. CRCF Fann, Dakar, Sénégal.

Infection à VHB Chez des Enfants Infectés par le VIH au Sénégal : Prévalence et Caractérisation Moléculaire

**Background:** Dans les pays à forte endémicité du VHB, la co-infection VIH/VHB varie de 1 à 49% chez les patients VIH adultes. Cette situation soulève une préoccupation, particulièrement chez les enfants car pouvant conduire à un risque plus élevé d’évolution vers la cirrhose et le carcinome hépatocellulaire. De plus, les enfants sous première ligne de TARV incluant la lamivudine risquent de développer des mutations de résistance au VHB. Ainsi, ce travail a été entrepris avec pour objectif de documenter la co-infection VIH/VHB et les génotypes du VHB impliqués.

**Methods:** Il s’agit d’une étude rétrospective réalisée sur des échantillons collectés entre février et juin 2015 au laboratoire de Bactériologie-Virologie. Elle portait sur les prélèvements de 612 enfants infectés par le VIH recrutés dans le cadre du Projet EnPrise. Les prélèvements ont été réalisés sur DBS et les éluats ont été utilisés pour rechercher l’AgHBs avec le TDR Determine® AgHBs (Alere) et la plateforme Architect<sup>®</sup>i1000SR (Abbott). L’AgHBe a également été recherché chez les enfants positifs pour l’AgHBs. L’ADN viral du VHB a été quantifié et la région S du génome a été génotypée, respectivement par PCR en temps réel en utilisant la plateforme Amplicx<sup>®</sup> (Biosynex) et PCR nichée suivi de séquençage sur l’analyseur génétique ABI 3130 (Applied Biosystems).

**Results:** L’âge moyen des enfants était de 8,58 ans avec un sexe ratio de 1,04. La prévalence de la co-infection VIH/VHB était de 4,1% (n=25) et 18 enfants étaient positifs à l’AgHBe. La charge virale médiane était de 6,20 log UI/ml. Les tests de génotypage étaient positifs pour 11 échantillons et les analyses phylogénétiques sont en cours.

**Conclusion:** L’étude a montré que la co-infection VIH/VHB pédiatrique demeure un problème de santé. Des stratégies innovantes sont nécessaires pour une couverture vaccinale complète et des recherches moléculaires de prédiction de l’évolution de l’infection.
PS-1.2-007

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Presence of Transfusion-transmissible Viral Infections Among Blood Donors Screened Using Rapid Diagnostic Kits: A Public Health Concern

**Background:** Transfusion-transmissible infectious (TTIs) agents such as hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C virus (HCV) and syphilis are among the greatest threats to blood safety and pose a serious public health problem. Rapid diagnostic test kits are mostly used in resource-limited settings for transfusion-related diagnosis. However, inability of the kits to detect the diseases in the window phase increases the chance of being infected through transfusion. Therefore, we determine the prevalence of TTIs among blood donated at the Blood Bank Unit (BBU), University College Hospital (UCH), Ibadan.

**Methods:** This was a retrospective cohort study and 562 records of blood donors were obtained from their register at BBU, UCH, Ibadan, January to August, 2010. All potential blood donors were routinely screened for HIV, HBV, HCV and syphilis with rapid diagnostic test kits prior to blood donation. Enzyme linked immunosorbent assay (ELISA) was used to test donated blood (that had screened negative) before transfusion. We calculated means and proportions.

**Results:** Donors were aged between 18 and 58 years, with a mean of 30.5 ± 11.6 years. There were 455 males (81.0%), and 275 (48.9%) were within the age group 18-27, 79 (14.1%), 50 (8.9%) and 50 (8.9%) were within the age group 28-37, 38-47 and 48-57 age group respectively. The overall prevalence of TTIs using ELISA techniques was 7.7%. Hepatitis B was the most common infection detected with a prevalence of 3.7% (21), followed by HIV (1.8%), HCV (1.8%) and syphilis (0.4%) respectively.

**Conclusion:** Blood transfusion is a potential route of transmission of TTIs. Prevalence of 7.7% TTIs among screened blood indicates that rapid diagnostic kits should not be used alone for screening of blood donors. However, there is need to develop a safe blood donor strategy to limit the risk of TTIs.

PS-1.2-008

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Trends of Rotavirus Infection in Children Under 12 Months Pre and Post Introduction of Rotarix Vaccine in the Kingdom of Eswatini (Swaziland), 2013-2017

**Background:** In the Kingdom of Eswatini, Rotavirus surveillance was established in 2013 after findings from a study which informed decision making in establishing the sentinel surveillance. There are currently two sentinel sites for this surveillance; Mbabane Government Hospital and Raleigh Fitkin Memorial Hospital. In 2014 the country experienced a diarrheal outbreak which fast tracked the introduction of Rotarix in May 2015. The aim of this retrospective analysis was to see if trends of Rotavirus infection were comparable pre and post introduction of Rotarix.

**Methods:** A retrospective assessment was done for children under 5 that were hospitalized due to gastroenteritis between 2013 and 2017.

**Results:** Between 2013-2017, 763 samples were collected and tested using the WHO standardized Prospect Enzyme Immunoassay test kit. Rotavirus positivity reduced from 55% (208/379) in 2013-2014 pre-vaccine period to 21% (43/206) in 2017 post-vaccine introduction. The peak season for all diarrhea including rotavirus-specific hospitalizations among children under five years of age was July to August in all years with blunting of the peak season in the post-vaccine introduction phase. Rotavirus positivity among children 0 – 12 months reduced from 38% in 2013-2014 (145/236) to 15% (31/206) in 2017.

**Conclusion:** There has been a rapid reduction of rotavirus related hospitalizations in the Kingdom of Eswatini particularly in young children (0-12 months) after the introduction of Rotarix. Therefore there is need for continuous monitoring of the sentinel surveillance to maintain herd immunity (high vaccine coverage) so as to prevent future outbreaks.
**Prevalence of Intestinal Parasitic Infections and Associated Risk Factors Among Pregnant Women Attending Antenatal Clinic at the Volta Regional Hospital in Ho, Ghana.**

**Background:** Intestinal parasitic infections (IPIs) are common among pregnant women globally and about 10 million pregnant women are affected with about 100,000 cases in Africa annually. This could lead to negative maternal and foetal consequences. In the Ho Municipality, there is paucity of data on the prevalence and risk factors for IPIs among pregnant women.

**Methods:** 175 pregnant women were conveniently sampled with their stool samples collected and examined for the presence IPIs using direct wet mount by normal saline, formol-ether concentration and modified ZN techniques. Semi structured questionnaire was employed to assess the knowledge of pregnant women about IPIs.

**Results:** Overall prevalence was 18 (10.29%). Amoebiasis was the most prevalent, 5 (27.78%), Cryptosporidiosis, 3 (16.67%), Giardiasis and Hookworm infection each, 2 (11.11%), Ascariasis and Trichuriasis each, 1 (5.56%). Non-pathogenic Entamoeba coli accounted for 4 (22.22%). Hookworm and E. histolytica/dispar were the most prevalent helminth and protozoa identified respectively. Consumption of unwashed fruits was significantly associated with infection by intestinal parasites [p = 0.041]. Pregnant women who practiced geophagy were at a higher risk of infection [OR=1.62, 95% CI=0.42-6.29] compared to those who do not consume clay. 9 (5.14%) were excellent in knowledge about IPIs, 11 (6.29%) were good whereas majority were poorly informed on IPIs 155 (88.57%). There was a significant association between the knowledge of pregnant women and infection [p = 0.009]. Those with excellent knowledge, (33.33%), had the highest chance of IPIs compared to those who had good, (18.18%) and poor, (6.45%) knowledge about IPIs.

**Conclusion:** IPIs are prevalent among pregnant women with predisposing factors which could be associated. The study recommends periodic health education delivery to pregnant women who visit the Antenatal Clinics to expand their knowledge on IPIs and help them improve their sanitary conditions to avoid infection.

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**The Prevalence and Phenotypic Characterization of Enterococcus Species Isolated from Clinical Samples of Pediatric Patients in Jimma University Specialized Hospital, South west Ethiopia**

**Background:** Drug resistant enterococci have emerged as nosocomial pathogens over the last decade all over the world. Now they can also be significant pathogens, causing community and hospital acquired infections. To our knowledge there is no available data related to prevalence, resistance pattern and virulence factors of Enterococci in pediatric patients in Ethiopia.

**Methods:** A cross-sectional study was conducted on 403 pediatric patients under fifteen years of age recruited by consecutive sampling, from April 1 to September 30/2016 at Jimma University Specialized Hospital. Different clinical samples were obtained and questionnaire-based face to face interviews were conducted with guardian of the children. Entercoccal isolation, identification, and antimicrobial susceptibility tests were done using standard bacteriological procedures. The isolates were characterized phenotypically for possession of some virulence factor. Data was analyzed by using SPSS software version 16.0.

**Results:** The overall prevalence of Enterococci was 5.5% (22/403) of which 5 (22.7%) were vancomycin resistant Enterococcus. Haemolysin and gelatinase production was seen among 45.5% and 68.2% isolates respectively, while 77.3% isolates formed biofilm. The overall rate of resistance was 21 (95.5%). High resistance was observed to norfloxacin (87.5%), streptomycin (86.4%), gentamicin and tetracycline (77.3%) and low resistance (36.5%) was observed to ciprofloxacin. Eighteen (80.8%) of the isolates were multi-drug resistant.

**Conclusion:** This study revealed high prevalence of Enterococci and vancomycin resistant strains as well as their virulence factor. Length of current hospitalization was associated with vancomycin resistant Enterococcus infection. Therefore, timely monitoring and early detection of vancomycin resistant Enterococcus, knowing virulent strains, rational use of antibiotics and adherence to infection control practice will help in preventing the establishment and spread of multiresistant Enterococcus species among the communities.
PS-1.2-011

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Prevalence of Specific Types of the Human Papillomavirus Infection Among Unscreened Women In Accra And Kumasi – Ghana

Background: The Human Papillomavirus (HPV) infection is the most common sexually transmitted disease in women and the main etiological factor for pre-invasive and invasive cervical cancer. Approximately 35 HPV types are known to infect the female genital mucosa. The aim of the study was to investigate the type specific prevalence of HPV and their associated risk factors among previously unscreened women in Ghana.

Methods: A cross-sectional descriptive study, to establish the prevalence of the genital 18 HPV genotypes involving 317 women aged between 21 and 76 years, was conducted in Accra and Kumasi-Ghana, from October 2014 to March 2015. HPV-DNA detection and identification of 18 genotypes was carried out by a nested multiplex PCR assay that combines degenerate E6/E7 consensus primers and type-specific primers for the detection and typing of HPV genotypes 6/11, 16, 18, 31, 33, 35, 39, 42, 43, 44, 45, 51, 52, 56, 58, 59, 66 and 68.

Results: The mean age of study participants was 39.96 years (SD ±10.80). Among women positive for HPV, 43.5% were infected with a single HPV infection, and 56.5% with multiple HPV infections. The prevalence of high-risk (HR) HPV was higher (35.0%), compared to probably-high risk (PHR) HPV (12.9%), and low-risk (LR) HPV (17.0%). The most prevalent among HR-HPV were types 52 (18.3%) and 58 (8.8%). Among the PHR-HPV were types 66 (7.9%) and 68 (6.6%), and among the LR-HPV was type 42 (9.5%). HPV positivity was associated with educational background (p=0.000), age at coitarche (p=0.016) and age at first pregnancy (p=0.028).

Conclusion: Our study revealed that the most prevalent HPV genotypes among previously unscreened women in Accra and Kumasi, Ghana are 52, 42, 58, 66 and 68. Although the proportions of specific genotypes differ, the most common genotypes detected in this study are equally prominent across other African countries.

PS-1.2-012

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Enterotoxigenic Escherichia Coli toxins and Colonisation Factors in Zambian Children Presenting With Moderate to Severe Diarrhoea to Health Facilities

Background: Enterotoxigenic Escherichia Coli (ETEC) is recognised as an important contributor to diarrhoeal morbidity globally and vaccine development efforts are underway. For efficient eventual filed evaluation of vaccines, it is critical to generate epidemiological data on the distribution of types of ETEC and associated virulence factors. This is the first report on ETEC toxin and colonisation factors (CFs) found in children with ETEC diarrhoea in Zambia.

Methods: We analysed DNA from stool samples from children under 5 years of age presenting to clinics with moderate or severe diarrhoea in a study originally set up to assess rotavirus vaccine effectiveness. We used conventional PCR from purified DNA and quantitative PCR to screen for both toxins and CFs.

Results: We analysed 106 samples, of which 49 (46.2%) were positive for at least one of the toxins (LT/STh/STp). Among the ETEC positive samples, the most common toxin was ST in 18 (38%) of the samples positive with at least one toxin, followed by LT 16(33%). The most frequent CF detected was CS6 with 6 (12.2%), followed by CS2, CS3 and CS7 at 2 (4.1%) each. CS6 was common across all toxin combinations (LT only, STh only and a combination of LT/STh while CS2, CS3 and CS7 were identified in LT only and LT/STh strains respectively. The mean age of children with detected toxin or CFs was 15.4months 95% CI: 12.2, 18.7).

Conclusion: Our results offer the first glimpse into relevant CFs that a vaccine against ETEC may need to target to control ETEC associated diarrhoea in the Zambian children. Further studies are required to assess the relative importance of these CFs in terms of disease severity as well as track their sero-epidemiology over time.
**PS-1.2-013**

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**Seroprévalence de la Polyarthrite Rhumatoïde Chez les Patients Souffrant Darthrose : Cas de l’Hôpital de District Dolembé (Yaoundé-Cameroun)**

**Background:** La polyarthrite rhumatoïde (PR) est une maladie dégénérative inflammatoire chronique de l’articulation. Il sagit d’un problème majeur de santé publique à l’échelle mondial, dont les données épidémiologiques sont rares. Cette étude visait à évaluer la séroprévalence de la polyarthrite rhumatoïde chez tout patient se plaignant de douleurs articulaires dans la communauté d’Olembe.

**Methods:** Une étude transversale a été menée de janvier à juillet 2018 à l’hôpital de district d’Olembe ciblant tout patient souffrant darthroses après obtention de l’autorisation du directeur de l’hôpital. La recherche des facteurs rhumatoïde (FR) était effectuée chez chaque participant après consentement éclairé. Un test de X² a été effectué pour les associations entre variables et pour tout p<0,05 la différence observée était statistiquement significative.

**Results:** Sur 105 participants enrôlés, la moyenne d’âge était de 47,5(±1,9 ans [min : 15 ans et max : 81 ans]. La tranche d’âge la plus représentée de la population générale était celle de 47-62 ans, 29,5%(31/105). La séroprévalence de la PR dans cette étude était de 18,09%(19/105). Les sujets de sexe masculin semblent être les plus touchés 20,5%(8/39) vs. 16,7%(11/66), p=0,6. Une association a été trouvée entre l’âge et la polyarthrite rhumatoïde (p=0,003), les patients >63ans étant les plus affectés 43,5%(10/23); aucune association n’a été trouvée avec le niveau d’étude (p=0,98), le statut matrimonial (p=0,84), la connaissance de la maladie (p=0,81), la prédisposition génétique (p=0,14).

**Conclusion:** Cette étude montre que l’âge est un facteur associé à la polyarthrite rhumatoïde. Ainsi, une recherche systématique du facteur rhumatoïde simpose chez tout patient souffrant de douleurs articulaires de plus de la soixantaine.

**PS-1.2-014**

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**Facteurs de Risques Associés au Taux de Portage de L’acHcv de L’Hépatite C Chez Les Incarcérés Vivant Avec le VIH à la Prison Centrale de Nkondengui, Yaoundé**

**Background:** Au Cameroun, le MINSANTE a fait de la lutte contre les hépatites virales son cheval de bataille en lançant récemment un vaste programme de traitement des dits hépatites désormais accessible à tous et à moindre cout. Toutefois, ce traitement est de plus en plus efficace tant que le dépistage est précoce. En zone carcérale, le taux de portage de l’AcHCV semble plus élevé chez les détenus vivant avec le VIH. Cette étude visait dévaluer les facteurs de risque associés au portage de l’AcHCV chez prisonniers VIH+ de Nkondengui-Yaoundé.

**Methods:** Une étude transversale, a été menée de Mai à Août 2018 à la prison centrale de NKONDENGUI ciblant les détenus vivant avec le VIH, après obtention de l’autorisation du Régisseur de la prison centrale. La détermination de la sérologie de l’AcHCV par immunochromatographie était effectuée chez chaque détenu séropositif au VIH. Un test de X² a été effectué pour les associations entre variables et pour tout p<0,05 la différence observée était statistiquement significative.

**Results:** Sur 92 détenus VIH+ dont 89, 13 % (n=82) d’hommes enrôlés (sexe ratio F/H=1/8), l’âge moyen était de 36,3(±1,9 ans (min 25, max 65). La séroprévalence de la co-infection AcHCV/VIH chez ces détenus était de 3,26%(3/92) avec les femmes incarcérées semblant plus co-infectées que les hommes [10%(1/10) vs 2,43%(2/82), p=0,74]. Aussi, les jeunes détenus célibataires (2,4%(2/81) vs 10% (1/10) des mariés, p=0,02) et ceux de durée d’incarcération variant entre 3-7ans semblait plus touchés 7,6%(2/26). Par ailleurs, paraissaient également plus affectés les détenus VIH+ ayant des antécédents transfusionnels (11,7%(2/17) oui vs. 1,3%(1/75) non, p=0,05), les dogués (5%(5/20) oui et 12,98%(2/72) non, p=0,82).

**Conclusion:** Le dépistage systématique de l’AcHCV chez tout détenus nouvellement dépisté VIH+ savère crucial notamment chez les jeunes prisonniers et les drogués a la prison Nkondengui. Toutefois, une confirmation de l’HCV par recherche de l’ARN viral plastique serait salutaire pour les prochaines études.
Studies on Clinical and Environmental Isolates of Cryptococcus neoformans in Calabar, Nigeria

**Background:** Cryptococcus neoformans is an opportunistic fungal pathogen which may cause cryptococcosis, a life-threatening infection that usually manifest as meningoencephalitis mainly in immunocompromised patients. The present study investigated the prevalence of clinical isolates and presence of environmental C. neoformans isolates in Calabar, Nigeria.

**Methods:** Two hundred (200) sputum samples were collected from immunocompromised subjects with CD4 count of less than 200 cells/µl, visiting two tertiary hospitals while a total of three hundred (300) environmental samples, hundred each were collected from pigeon droppings, poultry droppings and eucalyptus trees spp, in Calabar metropolis. Each clinical sample was cultured in Sabouraud’s dextrose agar incorporated with chloramphenicol while each of the environmental samples was suspended in a 1:10 dilution of sterile saline solution prior to culture. Identification of C. neoformans isolates were based on demonstration of melanin synthesis on bird seed agar (BSA) and rice straw agar (RSA), capsule on India ink preparation, and urease production.

**Results:** Of the two hundred (200) clinical samples, 18(9.0%) were positive for C. neoformans. Among the three hundred (300) environmental samples, the highest frequency was observed in pigeon droppings 28(9.3%), followed by Eucalyptus trees spp 11(3.7%) and poultry droppings 9(3.0%).

**Conclusion:** The study confirmed the presence of C. neoformans in clinical samples while demonstrating its presence in environmental sources in the area for the first time. It’s presence in poultry droppings has implications for its transmissibility to humans considering the importance of poultry in the nation’s food chain. The contribution of the study to the existing scanty data on ecology, biology and epidemiology of C. neoformans in Calabar metropolis is discussed.

Comparative Assessment of Human Papilloma Virus Seropositivity Among HIV-I Infected and Non Infected Women at the Nnamdi Azikiwe University Teaching Hospital Nnewi Nigeria

**Background:** Human papilloma viruses (HPV) are DNA viruses that infect the cutaneous and mucosal epithelia. This study determined the potentials of HIV-I infection in increasing the burden of HPV infection in Nnewi Nigeria. It compared the seroprevalence of HPV among HIV-I infected and non infected women.

**Methods:** In this cross sectional study, 163 women made up of 93 HIV-I infected and 70 non infected women were randomly recruited. Ethical approval and informed consent were obtained and questionnaires administered. HPV seropositivity was detected using an IgG enzyme-linked immunosorbent assay from Melsin Biotech China. CD4 count was performed using partec cyflow system and full blood count was done using symsex auto analyser. Cervical smears were stained using Papanicolaou technique and data was analysed using SPSS version 20

**Results:** The seroprevalence of HPV in this study was 22 (23.7%) for the HIV-I infected women and 2(2.9%) for the non infected women. For non HIV infected subjects, 4(5.7%) tested positive by the Papanicolaou technique. For the HIV-I infected and non infected women, those aged 26–35 years had the highest HPV Seroprevalence. Decreasing CD4 T-cell count associated strongly with increasing seroprevalence of HPV. The mean CD4 count of those with CD4 less than 200 cells/mm3 was (149.4±44.41 cells/mm3, p=0.000), those with CD4 count of (200-350 cells/mm3) had mean values of (316.00±134.86 cells/mm3, p = 0.823) and those with CD4 counts >350 cells/mm3 had mean values of (644.65±248.92 cells/mm3, p =0.274). The total lymphocyte count values of HPV seropositive subjects for both HIV-I infected and non infected subjects were 2.41±0.87 and 2.89± 0.10 cells/mm3.

**Conclusion:** HPV spread is enhanced by low CD4 counts and age bracket of 26-35 years among HIV infected individuals. A greater implementation of the test and treat strategy is necessary and HPV vaccination to curtail the burden of HPV infection.
PS-1.2-017

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Determination of Tetanus Antibody Levels in School-age Children in Calabar, Nigeria

Background: Tetanus is a vaccine-preventable disease. Immunization with the Diphtheria-Pertussis-Tetanus (DPT) vaccine followed by periodic booster doses remains the best way to reduce its risk in individuals. This study determined the level of tetanus antibodies in children in Calabar and the presence of Clostridium tetani in the children’s school playgrounds.

Methods: A total of 352 children were recruited for the study from some public schools in Calabar. A structured questionnaire was used to obtain socio-demographic, vaccination and anthropometric data of participants. Tetanus toxoid IgG antibody ELISA Test Kit was used to determine tetanus antibody levels of subjects. Soil samples from the playground of each school enrolled in the study were screened for the presence of Clostridium tetani by anaerobic culture procedures. Descriptive statistics, chi-square and correlation analyses were done with level of significance set at p<0.05.

Results: About 38% of participants had protective immunity to tetanus. Children between three and five years old who received the DPT vaccine at infancy had the highest (74.1%) seroprotective tetanus immunity; children between nine and eleven years old had the lowest concentrations. The level of tetanus immunity in the study population had no association with gender, location of residence or occupation/educational level of parents (p>0.05). Soil samples from four out of the five schools enrolled for the study yielded Clostridium tetani. There was a strong association between recent tetanus toxoid (TT) booster vaccination and high concentration of tetanus antibodies in participants’ sera.

Conclusion: Children with non-protective levels of tetanus immunity are at high risk of tetanus infection on their playground and other places of exposure. Booster doses of tetanus vaccines are recommended for school-age children at periodic intervals.

PS-1.2-018

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Prevalence of Diarrhoea of Rotavirus Aetiology in Exclusively Breast-fed and Bottle (Formula) Fed Children in Calabar, Nigeria

Background: Diarrhoea is a deadly disease, especially in children under five years of age. Rotavirus is one of the most important agents implicated in this killer disease. This study sought to determine the prevalence of diarrhoea of rotavirus aetiology (DORA) in exclusively breast-fed and bottle (formula) fed children in Calabar, Nigeria. It also evaluated the relationship between the feeding categories of children with DORA.

Methods: Stool samples were collected from 115 children (5 years and below). Some were collected in universal containers, while rectal swabs were also collected from other participants. Rotavirus Assay was performed using Prospect Rotavirus microplate Assay method. Descriptive statistics and chi-square analyses were carried out with the level of significance set at p<0.05.

Results: Of the 115 diarrhoea stool samples examined, 51 (44.3%) were positive for rotavirus. Among the 51 children who were diagnosed with DORA, 19 (37.3%) and 17 (33.3%) were from the age groups 0-12 months and 13-24 months respectively, and 5 (9.8%) each from the age groups 25-36 months, 37-48 months and 49-60 months. However, there was no significant difference in the prevalence of DORA among the various age groups (p>0.05). Among 115 children presenting with diarrhoea, 15 were exclusively breast fed, among which only 2 (13.3%) were diagnosed with DORA. Among the 31 bottle (formula) fed children with diarrhoea, 25 (80.6%) had DORA. Among the 69 children with diarrhoea fed with adult food, 24 (34.8%) had DORA. Children who were exclusively breast fed and those who were fed with adult food had a significantly lower rate of DORA compared to children who were bottle (formula) fed (p<0.05).

Conclusion: This study clearly demonstrates the importance of rotavirus in diarrhoea aetiology among children in Calabar and the strong relationship the disease has with bottle (formula) feeding in children.
Bacteraemia Among Patients Attending Selected Health Facilities in Ibadan

Background: Bacterial infections are important cause of morbidity and mortality particularly in Africa. Estimating the burden from invasive bacterial infections in Nigeria and many other African countries is hampered by diagnostic limitations.

Methods: This study screened paediatric and adult out-patients attending four health centres in Ibadan, South West Nigeria for blood-borne bacteria and malaria parasites. Febrile patients with objective fever or/and history of fever or/and clinically suspected typhoid fever underwent clinical diagnosis, malaria parasite testing and blood culture. Bacterial isolates were identified to the species level and subjected to disc diffusion antimicrobial susceptibility testing.

Results: A total of 682 patients were recruited between 16 June and 15 October, 2017; a majority, 467 (68.5%), were less than 18 years of age. Blood cultures from 123 (18.0%) patients yielded bacterial pathogens; Staphylococcus aureus 71 (57.7%) and Salmonella enterica serovar 30 (24.4%) being the most common bacteria isolated. A broad range of resistance patterns was seen among bacterial isolates with most being multidrug-resistant. Among the 618 patients for whom blood culture and malaria parasite testing were performed, malaria parasites were detected in 171 (27.6%), including 34 (19.8%) from whom a bacterial isolate was cultured. Pathogen recovery and characteristics were similar among patients from municipal and outlying metropolitan locations.

Conclusion: The study demonstrates that bacteria, particularly S. enterica were commonly recovered from febrile patients with and without malaria. Focused and extended disease burden investigations are needed for typhoid conjugate vaccine introduction that may potentially generate significant impact on prevention of severe community-acquired bacterial infections in our locality.
Isolation and Characterisation of Atypical Pathogens in Childhood Diarrhoea in Ile-Ife, Southwestern Nigeria

**Background:** Diarrhoeal illnesses exert a great health burden and responsible for 2.6 million deaths annually mostly among African children below the age of five years. Within the background of traditionally recognized pathogens, there are increasing reports of new agents including Providencia, Serratia, Yersinia, and Escherichia fergusonii as possible agents of diarrhoea. We sought to investigate the role of emerging pathogens in the aetiology of childhood diarrhoea in Ile-Ife, southwestern Nigeria.

**Methods:** The protocol for this case-control study was approved by the Research and Ethics Committee of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria. Stool samples from 167 children with diarrhoea (cases) and 334 healthy children (controls) under the age of five years old were collected between October 2016 and October 2017. Specimens were cultured for isolation of atypical non-lactose fermenting Gram-negative bacilli. The isolates were identified by conventional biochemical tests and Microbact™ 24E identification kit. All isolates were tested for known determinants for diarrhoea (LT, ST, ipaH, bfp+, bfp-, CVD432, stx1 and stx2) by polymerase chain reaction-based protocols. Data were analyzed using Epi Info™ 7.

**Results:** 14.4% (24/167) cases and 13.2% (43/334) controls had at least one of the pathogens sought. Providencia spp., Acinetobacter baumannii, Yersinia a Aldovae and Salmonella Subsp2 were significantly isolated more in cases than controls (X²=13.921, p=0.001; X²=8.438, p=0.004; X²=11.081, p=0.001 and X²=5.456, p=0.020 respectively). Virulent genes among the diarrhoeal cases are distributed as LT (6/28), ST (8/28), LT&ST (4/28), ipaH (6/28) and bfp+ (4/28). Resistance was higher among the diarrhoeal cases are distributed as LT (6/28), ST (8/28), and bfp+ (4/28). Resistance was higher among diarrhoeal children in Ile-Ife, southwestern Nigeria.

**Conclusion:** This study shows that non-conventional pathogens are important diarrhoeal agents. They have constituted high resistance burden which may impact negatively on treatment of cases of diarrhoea.

Role of Diarrhoeagenic Escherichia coli in Acute Childhood Diarrhoea in Ile-Ife, Southwestern Nigeria

**Background:** Diarrhoea is a major public health concern in developing countries usually due to poor sanitation. 6.3 million children under the age of five years died yearly globally, 578,000 of them are caused by Diarrhoeagenic Escherichia coli (DEC). We determine the prevalent pathotypes of DEC as well as their antibiotics susceptibility patterns which is necessary to design interventional protocol in this environment.

**Methods:** This case-control study was approved by Ethics and Research Committee of Obafemi Awolowo Teaching Hospital Complex, Ile-Ife and carried out between October 2016 and October 2017. Stool samples from 167 cases and 334 controls under the age of 5 years were cultured. Isolates were identified by conventional biochemical tests and confirmed with Microbact 24E identification kit. Antimicrobial susceptibility by modified Kirby-Bauer disc diffusion method was carried out in accordance with guidelines of the Clinical and Laboratory Standards Institute. DEC pathotypes was determined by polymerase chain reaction-based protocol. Data analysis was done using Epi Info™ 7.

**Results:** Diarrhoeagenic Escherichia coli were more prevalent among isolates in cases (120/183) than controls (136/435) (X²=62.489, p=0.001). Enterotoxigenic Escherichia coli, Enteroinvasive Escherichia coli, Enteropathogenic Escherichia coli and Shiga-toxin producing Escherichia coli were more in cases than controls (X²=2.725, p=0.001; X²=2.761, p=0.003; X²=2.761, p=0.032 and X²=30.456, p=0.001 respectively). The number of DEC strains obtained from diarrhoea cases during the wet season (118; 98%) was significantly higher than the number obtained in the dry season (2; 1.67%) (X²=224.267, p=0.001). This study revealed high resistance among DEC from diarrhoea cases to Sulphonamide (63.7%), Ampicillin (45.7%), Trimethoprim (42.2%) and Tetracycline (39.5%). However, resistance was not higher among cases than controls.

**Conclusion:** DEC pathotypes are more in cases of diarrhoea in our study, and they show considerable resistance to the first line antimicrobials. This underscores that DEC is still a pathogen of great concern among diarrhoeal children in South-western Nigeria.
Prevalence and Recurrence of Rectal Gonorrhoea and Chlamydia Infections Among Men Who Have Sex with Men at the Kenyan Coast

**Background:** Men who have sex with men (MSM) experience a high burden of Chlamydia trachomatis (CT) and Neisseria gonorrhoea (NG) infections which remain largely undiagnosed in the context of syndromic and presumptive treatment. We assessed prevalence and recurrence of rectal CT and NG among MSM in Coastal Kenya.

**Methods:** At two-time points, six months apart, rectal swabs were collected from MSM who reported receptive anal intercourse. Samples were analyzed for CT and NG using GeneXpert DNA assay, Gram stain smears for polymorphonuclear neutrophils (PMN) and culture and antibiotic sensitivity for NG. All NG and CT positive were treated using ceftriaxone or cefixime and azithromycin respectively. Factors associated with CT or NG infection were analysed by multivariable logistic regression.

**Results:** Of 104 MSM assessed at baseline, 21% had CT or NG, 11.5% had CT only, 7.7% had NG only and 1.9% had both CT and NG. Of these 20% were asymptomatic and had <10 PMN cells (p=0.0039, 95% CI 0.02, 0.015). Of 82 (79%) MSM assessed at 6 months follow-up contributed 39.1 person-years (PY) with a median follow-up time of 5.7 (IQR: 5.4-6.2). High rate of CT/NG infection at 53.7 (95% CI, 35.0–82.4) per 100 person-years (PY) were obtained. Four had CT and one had NG at baseline and follow-up. Of a total 22 samples positive for NG, 5 were successfully cultured; all were sensitive to ceftriaxone and cefixime, but resistant to ciprofloxacin. Asymptomatic CT or NG infection was associated with being paid for sex (adjusted odds ratio, aOR, 4.2, p=0.11).

**Conclusion:** One fifth of asymptomatic MSM had CT or NG at baseline and a third had CT or NG at 6 months follow up, suggesting that more frequent screening or presumptive treatment may be required to adequately control these infections in this population. While we were able to identify one factor associated with asymptomatic CT or NG infection, further research is required to understand the high rate of recurrence.

**Prevalence and Determinant Factors of Intestinal Parasites among Yekolo temari Children Attending Traditional Education in the Ethiopian Orthodox Churches in Northern Ethiopia**

**Background:** Yekolo temari are children who are studying traditional education in the Ethiopian Orthodox Churches. These children are characterized by migration, begging and hardship. Objective: To determine the prevalence of intestinal parasites and determinant factors among Yekolo temari children of the Ethiopian Orthodox Churches in Northern Ethiopia.

**Methods:** A cross sectional study design was employed to assess the prevalence and factors associated with parasitic infection among Yekolo temari children in 2015. Wet mount and kato-katz techniques were used to detect S.mansoni and other intestinal parasites. Intensity of infection was estimated from the number of eggs per gram of faeces. SPSS version 20 was used to analyze data.

**Results:** 361 children participated in the study of which 183 (50.7%) children were positive for at least one parasite. E.histolytica and S.mansoni were predominant parasites which were detected in 108(29.9%) and 60(16.6%) of participants, respectively. Of the participants, 139(38.5%) and 37(10.2%) harbored single and dual infections, respectively. The mean intensity of S.mansoni infection was found to be 118 eggs per gram (epg) of stool. Majority (82.5%) used to defecate on open fields and 253(70.1%) did not wash their hands after defecation; 308(85.3%) of children get their food by begging and 58.4% trimmed their fingers. Association was observed between parasitic infection and environmental/behavioral factors. The likelihood of washing hand after defecation was found to be protective against parasitic infection by 31.8 % (OR=0.68, 95% CI (1.249, 3.132). Children who used to wear shoes were less likely to be infected by hookworm by 3.7 times (OR=3.649, 95%CI (0.005, 0.147). The presence of dirty materials on finger nails was found to be a risk factor for infection by 53% (AOR=0.47, 95%CI (1.043, 2.45).

**Conclusion:** Intestinal parasites are predominant among this group of children. Therefore, appropriate intervention should be implemented to reduce the burden of parasitic infections.
**PS-1.2-025**

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The Burden of AdeNO 40/41 Among Children Less Than 5 Years With Moderate-severe Diarrhea (MSD) In Western Kenya.

**Background:** The adenoviruses are common pathogens of humans and animals. Moreover, several strains have been the subject of intensive research and are used as tools in mammalian molecular biology. More than 100 serologically distinct types of adenovirus have been identified. The family Adenoviridae is divided into two Genera, the mammalian and the avian. The adenoviruses are named after the human adenoids. The 40/41 adenovirus plays an important role as the productive agent of gastroenteritis at a pediatric age according to recent studies.

**Methods:** The laboratory received 2447 stool samples from children <5 years with MSD. In the study, children presenting with diarrhea, coupled with specific symptoms were enrolled. Fresh stool samples were collected between July, 2015 to Jul, 2017. ProSpecT Adenovirus testing kit, a direct qualitative enzyme immunoassay technique was used to for the detection adenovirus. Meridian Adenovirus 40/41 an enzyme immunoassay technique with specific monoclonal antibodies was used for detection the 40/41 adenovirus.

**Results:** Out of 2447 tested for Adenovirus 155 (6.33%) were positive. Of the 155 adenovirus positive samples 38 (24.5%) were positive for 40/41 which is 1.55% of the total number of samples tested during the study period. An upward trend in the number of 40/41 adenovirus positives was observed as follows: 2015 Jul to Aug = 5(3.23%) POS, 2016 Jan to Dec = 13 (8.39%) POS, 2017 Jan to Jul = 20 (12.9%) POS.

**Conclusion:** At 24% of all the positive adenovirus results, the data from this study has provided a valuable evidence that adenovirus 40/41, despite standing at 1.55% occurrence, is gaining a strong ground, taking an upward surge, and could be the next major cause of severe/acute paediatric diarrhoea episodes.

**PS-1.2-026**

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Distribution of Catheter Associated Urinary Bacterial Pathogens; Their Biofilm Formation and Antimicrobial Susceptibility Patterns Among Inpatients of Jimma University Specialized Hospital, Southwest Ethiopia

**Background:** Urinary tract is the most common site of nosocomial infections, accounting up to 40% of all the hospital-acquired infections (HAI). Among nosocomial urinary tract infections, approximately 80% are usually associated with instrumentation of urinary tract. High prevalence of catheterization leads to a large cumulative health care cost from catheter associated urinary tract infections (CA-UTI) mainly associated to biofilm forming pathogen. Resistance to antimicrobial agents is emerging globally, particularly in pathogens causing CA-UTI.

**Methods:** A prospective cross sectional study was conducted among urinary catheterized inpatients at JUSH; from February - August, 2015. A total of 143 study participants were enrolled in this study. Urine sample was collected and processed by standard bacteriological procedure for isolation, biofilm formation and antimicrobial susceptibility testing of the isolated bacterial pathogens. Data was cleaned, coded and entered in to SPSS version 20 for analysis. Bivariat and multivariate logistic regression was used to assess associated factors for catheter associated bacteriuria (CAB). All statistical tests values of p<0.05 was considered as statistically significant.

**Results:** The overall prevalence of catheter associated bacteriuria was 39.8%. The predominant bacterial isolates were gram negative and 79.7% of bacterial isolates were biofilm producers and majority of isolated bacteria had greater than 50% antimicrobial resistance to commonly prescribed antimicrobial agents. Age of ≥58 years, gender being female, catheterization ≥7 days and hospital stay ≥10 days were identified as independent risk factors.

**Conclusion:** Majority of uropathogen bacterial isolates were gram negative, biofilm producers and resistance to commonly prescribed antimicrobial agents. Catheter associated bacteriuria was mainly associated with gender being female, elderly age, increase in duration of catheterization and hospital stay.
Bacteriological Profile of Blood Pathogens Among Donors and Febrile Patients in Sokoto, Nigeria

Background: Bacterial pathogens cause significant number of deadly diseases and wide spread epidemics in man. The mortality associated with these diseases is higher in developing countries where the impact is difficult to estimate as symptoms are similar to other non-bacterial febrile illnesses. Bacteria are transmitted through blood transfusion, deep unclean wounds, minor skin breaks or bruises, eyes, oral fecal route, respiratory tract, bites from arthropods and urinary tract.

Methods: The objective of this study was to determine the Bacteriological profile and resistance pattern of blood pathogens among blood donors and febrile patients in Sokoto. A total of 100 patients were recruited 50 were febrile patients and 50 were asymptomatic blood donors. Their ages and gender were recorded after obtaining their consent. Laboratory analysis was done to identify and characterize bacteria pathogens by conventional methods using microbial culture on various culture medium and standard biochemical tests.

Results: The prevalence of bacteria was found to be 28%. Of the total pathogens isolated S. aureus accounts for 10%, P. mirabilis 9%, Streptococcus pneumonia and Salmonella typhi 3% each, Shigella dysenteriae 2%, and Klebsiella pneumonia 1% respectively. High rate of infection occurs between ages 21-40 years old (25%). The male subjects were most commonly infected than the females (19% and 9% respectively). The isolates were highly resistant to Erythromycin, cefalexin, Amoxycillin clavulanic acid, Cloxacin, Clindamycin, Tetracycline and highly susceptible to Ceftriaxone, Oflexacins, Netillin, ciprofloxacin and gentamicin.

Conclusion: This study provided data on specific causative and prevalent bacterial species among asymptomatic blood donors and symptomatic febrile patients and provides guidelines on antibiotics use in the management of bacteraemia in Sokoto.

Burden and Genotype Distribution of High Risk Human Papillomavirus and Cervical Cytology Abnormalities at Selected Obstetrics and Gynecology Clinics in Addis Ababa, Ethiopia

Background: Cervical cancer is a preventable disease affecting an estimated 530,000 women each year & leading to nearly 275,000 deaths. Human papillomavirus (HPV) has been recognized as an important cause of cervical cancer & it is implicated in 99.7% of cervical squamous cell cancer cases worldwide. In Ethiopia, every year 7095 women diagnosed with cervical cancer and 4732 die from the disease. Very low screening practice & inadequate screening coverage in Ethiopia makes cervical cancer as one of the major public health concern. This study was aimed to assess the burden & genotype distribution of High Risk Human Papilloma Virus (HR HPV) & Cervical Cytology abnormalities at selected Obstetrics & Gynecology clinics in Addis Ababa, Ethiopia.

Methods: Institutional based cross sectional study design was used from June to October 2015. Cervical samples were collected using Abbott cervi-cyt collection material for HR HPV DNA & cyto-brush for Pap smear screening. A total of 366 participants were enrolled based on the set inclusion criteria. HR HPV DNA was analyzed using Abbott Real Time PCR & cervical cytology screening was made using conventional Pap smear techniques. Data entry & analysis was made using Epi-data ver 3.1 & STATA ver 11.0 respectively.

Results: The overall HR HPV prevalence was 13.7% (50 /366), with 76 % (38 /50) of other HR HPV genotypes. Abnormal cytology was observed in 13.1% (48/366) with 81.3 %, 12.5 %, and 6.3 %, are LSIL, ASCUS and HSIL respectively. In this study, Non-16/18 genotypes contributed the largest proportion of the overall HR HPV. The highest frequency of HR HPV positives was women without cervical cytology abnormality. The overall percent agreement between HR HPV DNA PCR and conventional Pap smear cytology was 78% (kappa=0.12).

Conclusion: “Other High-Risk Human Papilloma virus” genotypes contributed the largest proportion of the HR HPV positive study population. The age range of 31-60 years has the highest proportion of HR HPV positivity. Address, occupation, and HIV sero-status were found to be potential risk factors for the prevalence of HR HPV, and age, age at first marriage, and education were significantly associated with cervical cytology abnormalities.
Acute Diarrhea and Associated Risk Factors Among Under-five Children in the Refugee Camps and Host Communities in Gambella Region, Ethiopia: A Comparative Cross Sectional Study

Background: Diarrhea is one of the most common causes of child morbidity and mortality in refugee camps, aggravated by inadequate WASH services and nutritional deficiencies, particularly in developing countries. The study aimed to assess acute diarrhea and associated risk factors among under-five children in the refugee camps and host communities in Gambella Region, Ethiopia.

Methods: Methodology: A comparative cross-sectional study was conducted from September to December 2016 using a structured questionnaire and the Potatatest+ water quality testing kit. Data was entered to Epi-data Version 13 and exported to STATA Version 14 for cleaning and analysis. Bi-variate and multi-variable models and the Mann-Whitney U test were used. P-values < 0.05 with 95% confidence interval [CI] were considered statistically significant.

Results: Result: Prevalence of childhood diarrhea was 38 % in the refugee camps and 33% in the host communities. Child age and maternal education were the common predictors of childhood diarrhea in both communities. Households of children in which the water containers were not covered, consumed less than 15 liters of water per capita per day and lacked hand washing setups were specific predictors of diarrhea in refugee camps. In the host communities, children of households which did not have a latrine and consumed surface water had significantly a higher risk of diarrhea than their corresponding households. Households with heads without formal education, surface water source, water shortages and unavailability free residual chlorine were determinants of fecal coliform contamination of stored water. Coliform counts exceeded the moderate risk were associated with acute childhood diarrhea [P = 0.002].

Conclusion: Diarrhea burden was significantly higher among children in the refugee camps than in the host communities. Hygiene related factors and facility problems were the main predictors of diarrhea in the refugee camps and host community, respectively. Therefore, further collaborations between government and non-government organizations are required to identify persisting factors of diarrhea transmission and draw relevant resolutions in the region.

Serological Screening of Dengue Virus Antibodies And Non Structural Antigen-1 (NS-1) Among Pregnant Women Attending Antenatal Clinic of Specialist Hospital Sokoto

Background: Dengue, a mosquito-borne viral disease, has been reported to be endemic in Nigeria. The disease is under-recognized, underreported and diagnosis is neglected due to lack of awareness by some health workers and it is not priority of health care authority. Dengue infections may be asymptomatic. Early diagnosis of dengue virus antibodies through screening among the pregnant women is crucial to the ongoing effort and campaign on the reduction of maternal and child mortality in Nigeria. Indeed there is paucity of literature on studies conducted on dengue around the study area. This study provide the current status of pregnant women against dengue infection.

Methods: In this cross-sectional study, Serological screening of dengue virus antibodies and NS1 antigen was conducted among pregnant women attending antenatal care in a Specialist Hospital, Sokoto. Blood samples were collected from 100 consenting subjects. Serological screening of dengue-specific antibodies and NS1 antigen was conducted using the Aria Duo Dengue Ag-IgG/IgM Rapid test. A structured questionnaire was administered to obtain demographic data.

Results: Overall IgM, IgG, and NS1 prevalence was 8%, 21%, and 6% respectively. None of the pregnant women in 2nd trimester was positive for IgM and NS1. However, 14.3% of them had IgG. There is a significant relationship between parity and NS1 (p<0.05). There is also significant relationship between NS1 and IgG among the pregnant women (p<0.05). There is no relationship between age group, body temperature, fever and NS1, IgM, IgG (p>0.05).

Conclusion: This finding establishes low seroprevalence of dengue infection antibodies and NS1 antigen among pregnant women attending specialist hospital Sokoto. Dengue screening should be included in the routine antenatal test; febrile patients should also be screened for dengue to initiate appropriate treatment regimen.
Suspected Measles Outbreak in Plateau State, Nigeria, 2012-2015: A Retrospective Data Analysis

**Background:** Measles has remained a major cause of death among under five children despite the availability of a safe and affordable vaccine. In 2014, there were 114,900 measles deaths globally. The case fatality rate of measles in developing countries ranges from 3–5%. Despite efforts to vaccinate eligible children, measles outbreaks continue to occur in Nigeria. We conducted a four-year retrospective review of measles outbreaks data in Plateau State, Nigeria to determine spatial distribution and factors associated with measles outbreak.

**Methods:** A four-year retrospective review of line listed measles data for 17 Local Government Areas (LGA) in Plateau State was conducted. Data was cleaned and analyzed for socio-demographic characteristics, immunization history and outcome of measles infection using Microsoft Office Excel version 2007. Association between exposure variables and outcome of measles infection was determined.

**Results:** Of 773 (65%) suspected measles cases, males constituted 54% (415) and 446 (58%) under-five, most affected age-group being 13 - 24 months. Oldest case was 51 years. Overall case fatality rate (CFR) was 1.9% (under-five CFR 1.4%) while Attack rate was 0.056% among under five. Wase LGA recorded highest number of cases while Jos East recorded least. Jos North recorded the highest number of mortality. Vaccinated proportion among under five was 42.2% (>15 years was 19.1%). Cases reached a peak between February and May annually and occurred year round. Sex (OR: 0.8, 95% CI: 0.3 - 2.1) and vaccination status (OR: 0.26, 95% CI: 0.08-0.81) were associated with outcome of illness.

**Conclusion:** Between 2012 and 2015 a propagated suspected measles outbreak occurred in Plateau State involving all 17 LGAs that affected mostly under five populations. Vaccination was found to improve the outcome of illness.

Undiagnosed Diabetes, Impaired Fasting Glucose and Associated Risk Factors in the population of Koladiba Town of Dembia District, Northwest Ethiopia

**Background:** According to 2013 International Diabetes Federation Atlas, there are 1.9 million diabetes cases of 20-79 years age and 34,262 diabetes related deaths in Ethiopia. Of which 1.2 million of them are in the rural setting. More than 1 million of these people are living with undiagnosed diabetes mellitus. The number of people with diabetes is increasing in every region of Ethiopia. The main objective is to assess the prevalence of undiagnosed diabetes mellitus, impaired fasting glucose and associated risk factors in the population of Koladiba town of Dembia, Northwest Ethiopia

**Methods:** Methodology: A community based cross-sectional survey was performed using a multistage cluster random sampling strategy on 392 adults aged 20 years and above from February 2015 to April 2015. After getting informed written consent, each participant was questioned for socio-demographic characteristics and associated risk factors. The levels of glucose, total cholesterol and triglycerides were measured using enzymatic colorimetric assay using Mindray BS-200 chemistry analyzer. Data was entered and analyzed using SPSS version 16. Possible risk factors were assessed using logistic regression. P-value <0.05 was considered as statistically significant.

**Results:** A total of 392 (173 males and 219 females) individuals were participated in this study. The prevalence of undiagnosed DM, using the ADA fasting criteria, was 2.3% (4.62% in males and 0.46%, in females). The prevalence of impaired fasting glucose was 12% (13.29% in males and 10.95% in females). BMI (overweight (AOR = 4.817, 95% CI = 1.463-15.857, obesity (AOR = 5.825, 95% CI = (1.239-27.385)), high TG level (AOR = 2.75, 95% CI = 1.407-5.379) and systolic blood pressure (AOR = 3.634, 95% CI = 1.513-8.727) were significantly associated with impaired fasting glucose.

**Conclusion:** The prevalence of impaired fasting glucose (12%) and newly diagnosed DM (2.3%) in Koladiba town of Dembia district was high. This result indicates a need for greater emphasis on the early detection (screening) and timely intervention in order to effectively control the diabetes epidemics.
A clinico-epidemiological Study of Hospitalised Patients with Crimean Congo Hemorrhagic Fever in Uganda After 5 Years of Enhanced Surveillance

**Background:** Crimean-Congo Hemorrhagic Fever (CCHF) is the most widely distributed tick-borne viral zoonosis, yet its epidemiology in sub-Saharan Africa is less defined. To gain an improved understanding of its occurrence, we reviewed case reports of hospitalized patients that have been identified in Uganda since the initiation of enhanced surveillance.

**Methods:** Uganda operationalized a national surveillance system for viral hemorrhagic fevers in 2011. The working surveillance case definition for suspected cases is any individual presenting with acute onset of fever ($\geq 38.0^\circ C$), with no alternative diagnosis, and presenting with additional signs and symptoms such as intense fatigue, chills, abdominal pain, headache, anorexia, arthralgia, myalgia, vomiting, diarrhea, jaundice and unexplained hemorrhage. During episodes, demographic, clinical and epidemiological data of identified patients is collected using a standardized case report form. This data is stored in an Epi Info software at Uganda Virus Research Institute, Entebbe, Uganda. We performed a descriptive analysis of this dataset.

**Results:** From May 2013 to July 2018, a total of 10 CCHF outbreaks were detected, involving 12 patient hospitalizations (9 males, 3 females) with 3 deaths (CFR = 30.0%). Patients were aged between 9-68yrs. Most cases were detected during July to December of each outbreak year with the most affected districts located in central Uganda and within the “cattle corridor”. Fever was the commonest presenting symptom (83.3%), followed by muscle pains, fatigue, headache and hemorrhage (all at 72.0%). Other than for two cases in whom person to person transmission was potentially the source of infection, and one case whose risk of exposure could not be established, most cases were potentially infected through tick bites and/or exposure to infected animal tissues.

**Conclusion:** These data, although limited, help describe the most-at-risk populations, time periods of the year and geographic regions of Uganda where targeted surveillance and control interventions could be focused.

**Epidemiological Profile of the Suspected Cases of Measles, 2014-2017**

**Background:** Measles is a notifiable infectious disease, historically the largest cause of infant deaths. Manifestations include fever, rash, cough and conjunctivitis; complications such as pneumonia, diarrhea, and encephalitis may occur, and severe cases may develop into deafness and blindness. Currently, the disease has been eliminated from the Americas, while in other continents, including Africa, there is a target for elimination by 2020. In Mozambique, measles is part of the vaccination schedule, with vaccines at 9 and 15 months, and surveillance is underway throughout the country. This study aims to describe and analyze the epidemiological profile of suspected cases of measles between 2014 and 2017.

**Methods:** This was a retrospective study, using data from 2014-2017, in the field of Measles Epidemiological Surveillance. Suspected cases had their samples collected and sent to the Serology Laboratory of the National Health Institute. EPI-Info version 3.5.1 was used for data analysis.

**Results:** During the study period, 6439 suspected cases were reported, and the highest number was 1758 (27.3%) and 1751 (27.2%), in 2017 and 2015 respectively. The suspected cases were predominantly male (53.1%), and the predominant ages were 0-5 years old with a 66.6% rate, which may be explained by the fragility of the immune system or by incomplete vaccination. The provinces of Maputo, Zambezia and Niassa had the highest number of cases, with 15.7%, 15.5% and 11.6% respectively. Among the suspected cases, only 1.81% (98/5400) were confirmed positive, which confirms the circulation of the virus, even though in a reduced form.

**Conclusion:** Suspected cases of measles are equally distributed, between gender and provenance, but in relation to age, it mainly occurs in children under 5 years of age. Despite the low occurrence of confirmed cases in the country, these should be monitored to identify susceptible sites or groups, so that measures can be taken to control and subsequently eliminate the disease in the country.
**Frequency of Bacteriuria and Candiduria in Children Attending Primary Schools in Amassoma, Niger Delta Region, Nigeria**

**Background:** Candida co-infections with bacteria have become a public health interest. Can this occur in Children? This study was conducted to determine the frequency of Bacteriuria and Candiduria of apparently healthy children of different age group and sex attending primary schools in Amassoma, Bayelsa State, Nigeria.

**Methods:** A total of 142 primary school children Mid Stream Urine (MSU) were collected in sterile bottles and analyzed using standard Microbiology methods.

**Results:** The findings showed asymptomatic bacteriuria and Candiduria in 91 (64.1%) and 97 (68.3%) samples respectively; the subjects who had Staphylococcus co-infection with Candidiasis were 75 cases (52.8%) with female (ages 5 to 9) preponderance over males. Two hundred and seventy-eight (278) organisms isolated include Staphylococcus aureus (58, 20.8%), Candida glabrata (39, 14%), Staphylococcus epidermidis (37, 13.3%), Candida albicans (19, 6.8%), Candida tropicalis (14, 5%) Bacillus species (12, 4.3%), Candida parapsilosis (9, 3.2%), Klebsiella sp. (4, 1.4%), other Staphylococcus sp. was (27, 9.7%) and unidentified Candida sp. (53, 18.9%). The bacteria isolated were susceptible to Levofloxacin (97.4%), Gentamycin (93.2%), Ciprofloxacin (93.1%), Streptomycin (92.6%), Rifampicin (71.2%); Erythromycin (58.9%), but resistant to Chloramphenicol (14.6%). Candida isolates were susceptible to Fluconazole (87.9%); Nystatin (71%); Ketoconazole (68%) but resistant to Itraconazole (8.1%). There is no significant difference between the male and female infected at p = 0.05.

**Conclusion:** This study has shown that co-infection of Staphylococcal and Candida is prevalent in Amassoma Community primary schools, Bayelsa State.
Helicobacter Pylori Among Patients Attending a Military Hospital in Lagos State, South-Western, Nigeria, August 2018

Background: Helicobacter pylori (H. pylori) is a Gram-negative bacterium that grows in the digestive tract and infects about 50% of the world population. It is the most common cause of gastric ulcers and gastritis. The bacterium is found more commonly in under-developed and developing nations. In areas with improved socioeconomic conditions and better sanitation, there is lower rate of infection among the populace. Person-to-person transmission via saliva and fecal contamination of food and water are leading routes of transmission. This study was done to determine the prevalence of H. pylori and associated risk factors among patients attending Naval Medical Centre, Lagos.

Methods: This was a retrospective cross-sectional review of patients screened for H. pylori using one step lateral flow immunochromatographic assay at Naval Medical Centre, Victoria Island, Lagos State, Nigeria. Study period was from January to July, 2018. Data analysis was done using Epi-Info software, version 7.2.

Results: Of the 140 subjects, 84(60%) were males. Age range was from 13 - 48 years with a mean of 30.1 ± 7.3 years. Sixty seven (47.9%) were from Igbo ethnic nationality and 92, (55.7%) had no direct relationship with military personnel. Fourty eight (35.5%) were positive for serum H. pylori. Gender, (OR = 0.47; CI = 0.22 - 0.98) and tribe, (OR = 0.31; CI = 0.15 - 0.62) were significantly associated with positive H. pylori. Age and direct military affiliations were however not significantly associated with positive H. pylori result. Logistic regression showed females were about two times less likely to have H. pylori when compared with males (aOR = 0.46; CI = 0.22 - 0.98).

Conclusion: There was high prevalence of Helicobacter pylori among the population studied and males were more affected. We recommend improved personal hygiene and regular hand washing before eating, particularly among males.
**Gonadal Hormone Profile Among Chronic Khat, Marijuana and Heroin Abuses; Case Control Study, Addis Ababa, Ethiopia**

**Background:** Drugs of abuse can be disrupting the hypothalamic-pituitary-gonadal axis, causing impaired functions of the glands and the associated functions of target organs. Due to their negative effect on mental health and libido, it has been implicated as a causal factor for criminal behavior and family instability. Data regarding gonadal hormone profiles of drug abusers are limited—as use of these drugs being illegal. Investigating hormone profile is crucial to early avert the health-related complications among substance users.

**Methods:** Method: A cross-sectional case control study design was applied to collect serum samples from a total of 171 male consented study participants (148 drug abusers and 23 controls). Serum level of Luteinizing (LH), Follicle stimulating (FSH) and Testosterone (T) hormone was assayed using Electrochemiluminescence immunoassay principle (Cobas® e411, Roche Diagnostics Corporation, USA) at the Ethiopian Public Health Institute (EPHI). Demographic data and type of drug was collected using questionnaire and structured interview. Non parametric statistical tools (Mann-Whitney test and median) were used to compare groups. In all cases, $p < 0.05$ were considered as statistically significant.

**Results:** Result: Median age for the drug abusers and control groups were 27. The median level of E2 among chronic Khat chewers (39.4 pg/ml), Marijuana (44 pg/ml), and heroin users (40.2 pg/ml) were significantly higher than the control groups (23 pg/ml), $p < 0.003$. The median level of LH among chronic Khat chewers (5 IU/L), Marijuana (5 IU/L), and heroin users (5.6 IU/L) were significantly less than the control groups (6.2 IU/L), $p < 0.02$. The median level of Testosterone among chronic Khat chewers (6.1 ng/ml), Marijuana (6.3 ng/ml), and heroin users (6.6 ng/ml) were significantly less than the control groups (8.0 ng/ml), $p < 0.003$. Only the median level of FSH among heroin users (2.3 IU/L) were significantly less than the control groups (3.2 IU/L), $p < 0.003$. In contrary to the controls groups, heroin and marijuana users had unusual positive correlation between FSH and LH.

**Conclusion:** Conclusion & Recommendation: Drug abuse (khat, marijuana and heroin) has shown to affect the gonadal hormones in an unusual physiological phenomenon. This warrants for further studies and cautious management of patients at substance abuse rehabilitation centers.

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**Interleukin-2 Level Among Rheumatoid Arthritis Patients Attending Rheumatology Clinic of Aminu Kano Teaching Hospital, Kano**

**Background:** Rheumatoid Arthritis is an autoimmune disease that is associated with progressive disability, systemic complications, early death and socioeconomic costs. Interleukin-2, a Th-1 lymphocyte derived cytokine, which is thought to play an important role in the pathogenesis of Rheumatoid Arthritis, could serve as a predictive index for the onset of Rheumatoid Arthritis.

**Methods:** A total of 45 serum samples from patients attending Rheumatology clinic were assayed for the presence of Rheumatoid Factor and Interleukin-2 using AVITEX RF Kit and Boster ELISA Kit respectively.

**Results:** Forty (40) were Rheumatoid Factor positive and 5 were negative giving an overall prevalence of 88.9%. The 61-70 year age range has the highest positive cases 26 (57.8%) and age range of 0-30 and 51-60 years were all negative with significant statistical association ($p=0.0001$). Elevation of Interleukin-2 level in the patients was noticed in comparison with healthy control individuals, with no statistical significance ($p = 0.519$). The tendency of developing Rheumatoid Arthritis was significantly seen to be higher in females (88.9%) compared to males (11.1 %) and the likelihood of developing Rheumatoid Arthritis in patients with family history of the disease was found to be higher (64%) compared to those with no family history (35.6%), though it was not statistically significant ($p=0.826$). There is depression in the level of Interleukin-2 in Rheumatoid Factor negative females (376.0 pg/ml) as opposed to male negatives (645.0 pg/ml) which was not statistically significant ($p=0.287$).

**Conclusion:** The study establishes the elevation of inter-2 level in patients with rheumatoid arthritis in comparison with healthy control individuals.
Probable Résistance au VIH Chez les Partenaires SérénoGâtis des Couples Sérodiscordants Induite par les Protéines CD107a en Présence d’une Charge Virale Élevée et en L’absence de L’utilisation de Préservatifs

**Background:** Certains individus demeurent sérénoGâtis malgré de nombreuses expositions au VIH (Exposés SérénoGâtis ou ESN) et en l’absence d’utilisation de préservatifs lors des rapports sexuels avec des partenaires VIH séropositifs. Différents mécanismes participent à la résistance à l’infection du VIH. Dans la réponse spécifique au VIH les CTL jouent un rôle primordial.

**Methods:** Trente patients des couples sérodiscordants au VIH-1 (10 individus non infectés des couples sérodiscordants et 20 individus infectés par le VIH-1 des couples sérodiscordants) et 10 individus sérénoGâtis servant de contrôles ont été enrôlés dans l’étude pendant une durée de 5 ans et les prélèvements ont été faits au CHNU de Fann à Dakar au Sénégal. L’activité des CD107a+IFN-γ+ des CD8+ a été mesurée par cytométrie en flux multparamétrique en présence ou en absence d’une stimulation avec le SEB. Au cours de leurs visites semestrielles, les patients ont bénéficié de préservatifs et de conseils sur les comportements sexuels à risque. Nous avons évalué le risque de contamination du partenaire sérénoGâtis en rapport avec la fréquence d’utilisation du préservatif et la charge virale du partenaire séropositif.

**Results:** Une fréquence très faible d’utilisation du préservatif chez les couples séréGâtis combinée à une forte expression des marqueurs CD107a+ des LT CD8+ a été retrouvée, comparées aux patients non infectés non infectés (2,9% vs 11,6% ; P = 0,016). Chez ESN, les fréquences de non utilisation du préservatif étaient de 83,33 et 90,62 chez les partenaires séropositifs. Des conclusions similaires ont été retrouvées s’agissant de l’expression des CD107a+IFN-γ+. Fait intéressant, les ESN au VIH-1 exprimaient très fortement les marqueurs CD107a et l’IFN-γ comparées aux contrôles sérénoGâtis (11,6% vs 1,3% ; P = 0,018) malgré une moyenne de charge virale de 2,42 chez les partenaires séropositifs des couples sérodiscordants.

**Conclusion:** Globalement, nos résultats suggèrent que la résistance au VIH-1 chez les partenaires ESN dans les couples sérodiscordants pourrait être associée à des réponses CTL spécifiques du VIH en l’absence d’utilisation de préservatifs et ceci malgré l’existence de comportements à risque.

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**Molecular Characterization of Diarrhoeagenic Escherichia coli Isolated from Paediatric Stool Samples in Northern Ibadan, Nigeria**

**Background:** Diarrhoeagenic Escherichia coli (DEC) are important intestinal pathogens causing a wide variety of gastrointestinal diseases including diarrhoea, particularly among children in developing countries. This study hypothesized that enteroaggregative E. coli (EAEC), an adherent category, and potentially other DEC, are associated with infantile diarrhoea in northern Ibadan, Oyo State, Nigeria.

**Methods:** We performed a case control study among children under 5 years of age. Stool specimens were collected from 75 children with diarrhoea and 230 controls attending primary health clinics in Lagelu and Egbera local government areas of Ibadan between November 2015 and June 2018. E. coli was isolated and identified using standard laboratory protocols and strains belonging to diarrhoeagenic E. coli pathotypes enteroaggregative (EAEC), enterotoxigenic E. coli (ETEC), enteropathogenic E. coli, Shiga toxin-producing E. coli and enterohaemorrhagic E. coli (EHEC), enteroinvasive E. coli and Shigella were identified by multiplex PCR.

**Results:** All pathotypes except EHEC were recovered in the study. EAEC, the study’s main focus, were isolated from 17 (22%) cases and 44 (19%) controls. Overall, they were not associated with disease, but did show an association with diarrhoea in children above seven months old (p=0.02). ETEC strains carrying both heat-labile and heat-stable enterotoxin-encoding genes were recovered from 10(13%) and 12(5%) cases and controls respectively and associated with diarrhoea (p=0.002). There was clustering of ETEC recovery in the March 2016 and again in August to September 2016. IS3 PCR banding profiles of ETEC isolates within these clusters point to possible ETEC outbreaks.

**Conclusion:** Our data/study suggests that EAEC and ETEC may be important causes of diarrhoea in weaned children and overall respectively. The study further reveals that outbreaks caused by DEC could be commonplace but beyond routine detection. Interventions that target these two pathotypes may have the potential to reduce the morbidity from infantile diarrhoea in Ibadan.
**Prevalence and Factors Associated with Hepatitis B Virus Infection Among Adults in Bench Maji Zone, Southwest Ethiopia: Community Based Cross Sectional Study**

**Background:** Hepatitis B virus (HBV) infection is one of the leading causes of liver diseases causing serious public health problem worldwide. Ethiopia is grouped among countries with highly endemic viral hepatitis regions. In Ethiopia, community based studies on HBV are limited. The aim of this study was to estimate the sero-prevalence and associated factors of HBV infection in South West Ethiopia.

**Methods:** A community based cross-sectional study was conducted in Bench Maji Zone, from November 1st, 2016 to January 30, 2017. A total of 612 individuals were included in the study using multistage sampling technique. Structured questionnaire was used to collect data. Whole blood sample was aseptically collected using blood lancet and tested for hepatitis B surface antigen (HBsAg) using commercially available rapid serological test kit. Bivariate and multivariate logistic regression was employed and odds ratio with 95% confidence interval was used to assess the degree of association between variables. P value of less than 0.05 was considered as statistically significant.

**Results:** A total of 612 eligible participants were included in this study. The mean age of the respondents were 32.5 [SD ±7.521] years. About 310 (50.7%) of the respondants were within the age range of 25–34 years. Sero-prevalence of HBsAg among the total respondents was 55(9.0%). Tattooing of gums, tattooing on body, contact with jaundiced person, dental extraction at home, alcohol drinking or drugs/substances utilization, sharing personal items with non-household members were found to be significantly associated with sero-prevalence of HBV.

**Conclusion:** The sero-prevalence of HBV infection in this community was highly endemic. Modifiable risk factors such as tattooing of gums, tattooing on body, contact with jaundiced person, tooth extraction at home, alcohol drinking or drugs/substances utilization, and sharing personal items may account for the HBV infection. Hence, behavioral education and communication programs designed to reduce HBV infection need to address these modifiable risk factors.

**Hormonal Profile and Clinical Correlation of Women with Dysmenorrhea at Calabar, Nigeria**

**Background:** Several studies have reported hormonal imbalances during dysmenorrhea. Considering the frequency of dysmenorrhea in our contemporary society and its potential to induce secondary infertility, testing for serum hormonal levels are crucial for clinical utilities. This study sought to investigate the serum hormonal levels of women in Calabar experiencing dysmenorrhea in order to ascertain their inter-relations. This was a case-control study.

**Methods:** Sixty-seven (67) dysmenorrhea subjects and twenty-two (22) control subjects (Nigerian females, age-matched between 14 – 30 years) were recruited for this study. The levels of estradiol, progesterone, prolactin (PRL), luteinizing hormone (LH), follicle stimulating hormone (FSH) were determined using enzyme linked immunosorbent assay (ELISA).

**Results:** The mean serum levels of FSH (p=0.0031), FSH/PRL (p=0.0041), progesterone (p=0.0022) and estradiol (p=0.018) in dysmenorrhea subjects were significantly higher when compared with their control counterparts (p<0.05). The mean serum prolactin level in dysmenorrhea subjects (p=0.0033) without the use of contraceptives was significantly higher when compared with their control counterparts (p<0.05). The mean serum prolactin level in dysmenorrhea subjects (p=0.0033) with moderate pain was significantly lower when compared with those in severe pain (p>0.05). Serum prolactin level correlated positively and significantly with serum follicle stimulating hormone level in dysmenorrhea subjects (r=2.163, p=0.024).

**Conclusion:** Findings from this study revealed that dysmenorrheic women had significant increase in serum levels of FSH, FSH/PRL ratio, progesterone and estradiol.
**Rh2 as a Potential Risk Factor for HIV Infection Among Africans**

**Background:** Sub-Saharan Africa carries a disproportionate burden of the HIV pandemic. In addition, the Caribbean Islands, consisting of individuals of African origin are also reported to be the worst-hit country outside Africa, suggesting a common genetic susceptibility.

**Methods:** 540 samples (344 HIV-negative and 196 HIV-positive) were phenotyped for Rh2 to compare proportions of Rh2 frequency against categories of HIV status. In a follow-up study, 102 blood samples from treatment-naïve HIV-infected individuals were phenotyped for the Rh2 antigen. Samples were also analysed for viral load, CD4 and CD8 T-cell populations using routine diagnostic methods.

**Results:** The Rh2 phenotype was associated with a 40% odds reduction for HIV-1 infection in Botswana (p=0.006). Furthermore, the Rh2 phenotype was associated with enhanced cytotoxic T-cell proportions (p=0.002) which are critical for immunity against HIV. In C-positive individuals, the proportion of CD8+ cells correlated with viral load compared to C-negatives (r²=0.054, p<0.001 versus r²=0.148, p<0.001, respectively). We did not perform CD8 functional assays to confirm enhanced immunological response of the CD8 T-cells in Rh2-positive versus Rh2-negative individuals. A review of literature however, suggests that the frequency of Rh2 is low among African and Caribbean countries and consistently higher in countries with a lower HIV prevalence (Pearson 2=−20.0, p<0.0001).

**Conclusion:** We propose that Rh2 may be an important factor, among others, determining susceptibility to HIV infection, and may have influenced the pandemic in Africa.

**Prevalence of Metabolic Abnormalities for People Living with HIV on First Line Art Regimen: Case Study of Harare**

**Background:** Even though HIV infection can now be treated effectively with combination of antiretroviral based drugs such as protease inhibitors (PIs) which has led to decline of immunodeficiency-related events, including causes of death from HIV/AIDS, there have been an increase in metabolic abnormalities which present new challenges for the management of PLWHA using these drugs.

**Methods:** Utilising the logistic regression analysis, the study examined the prevalence of metabolic abnormalities for 200 people living with HIV on first line art regimen in Harare. Components of lipid profiles and glucose profiles were used as independent variables. Lipid profile comprise of TG, HDL-C and LDL-C while glucose components include FBS. The dichotomous dependent variable was whether the administration of ART resulted in alterations of the metabolic processes or not.

**Results:** Significant correlation was observed with TG (p =0.000) and LDL-C (p =0.000). The positive value for the coefficients for TG (odds=76.03677) [95%CI: 16.21; 356.64] implies that administering of the ART results in elevating TG in patients. The positive value for LDL-C (odds=83.58862) [95%CI: 20.13544; 347.0029] imply that administering ART results in elevating LDL-C in patients. No significant correlation was observed with HDL-C (p =0.141). This implies that ART had less impact on HDL-C owing to the insignificant alpha value. There was also a significant correlation with FBS (odds=138) [CI: 48.14634; 395.5441] (p=0.000). The positive value for the coefficient for FBS implies that administering of the ART results in elevating FBS in patients.

**Conclusion:** The prevalence of both lipid and glucose metabolic abnormalities was higher in people who were already enrolled and coming for return visits compared to starters. However, to ascertain on causality, it will be beneficial to conduct an in-vivo experimental longitudinal study.

Background: Cancer is a leading cause of morbidity and mortality globally with annual incidence estimated at 10 million. In Kenya, cancer is the third leading cause of death and accounts for 7% of all deaths. Malnutrition is an important component of adverse outcomes in cancer patients. We sought to establish the prevalence and factors associated with acute malnutrition among cancer patients enrolled for nutritional supportive management at a Referral Hospital in Western Kenya.

Methods: We conducted a retrospective review and analysis of records on socio-demographic, clinical, nutritional support and outcome of care information for cancer patients enrolled on nutritional support management. Descriptive statistics were calculated for both categorical and continuous variables. We performed bivariate followed by multivariable logistic regression to determine factors associated with acute malnutrition.

Results: During the period under review, 1,528 patients were enrolled at the hospital oncology unit, 60% (910) were female and the mean age was 49 years (±17 years). Overall, leading cancers were breast cancer 29% (391) and Kaposi’s sarcoma 22% (330). The leading cancer among males was Kaposi’s sarcoma (39%); n=240) while breast cancer was the leading among females (43%; n=391). A total of 45% (687) received nutritional support; 20% (151) had moderate or severe acute malnutrition and anaemic 1.7 (130) had moderate or severe acute malnutrition and anaemic 1.7 (1-2.6). Factors associated with acute malnutrition included being male (OR=1.6; 95% CI, 1.1-2.2) and experiencing food insecurity (1.2-2.6). Factors associated with acute malnutrition included being male (OR=1.6; 95% CI, 1.1-2.2) and experiencing food insecurity (1.2-2.6). Factors associated with acute malnutrition included being male (OR=1.6; 95% CI, 1.1-2.2) and experiencing food insecurity (1.2-2.6). Factors associated with acute malnutrition included being male (OR=1.6; 95% CI, 1.1-2.2) and experiencing food insecurity (1.2-2.6).

Conclusion: Nearly half of patients in the oncology unit had some form of nutritional support and one fifth had acute malnutrition. We recommend more screening of cancers at primary care sites to allow earlier diagnosis and increase nutritional support to all cases especially males aimed at preventing malnutrition.

Analysis Of Hla Genotypes and Viral Vif Sequences in HIV-1-Infected Ghanaians

Background: Hla-Restricted Ctl Responses Play A Central Role In The Control Of Hiv-1 Replication. Hla-Associated Viral Genome Mutations Resulting In Viral Escape From Ctl Recognition Accumulate Under Ctl Selective Pressure In Hiv-1-Infected Individuals, And Viruses Carrying Such Mutations Can Be Transmitted In Populations. These Mutations Can Substantially Reduce Viral Replication Capacity. It has been Reported That Cts Targeting Conserved Regions Of Hiv-1 Antigens Have Relatively Larger Impact On Viral Control. The Role Of Cts And Hla In Control Of Hiv Infection Has Been Extensively Evaluated Among Hiv-1 Subtype B/C Populations. Nonetheless, It Remains To Be Evaluated The Role Of These Host Genetic Factors In A Subtype Ag Population.

Methods: Hla Genotyping Using Cellular Dnas Extracted From Pbcns Was Performed By Ngs (Genodive Pharma). Viral Genome Cdnas Were Amplified By Rt-Pcr From Plasma-Derived Viral Rnas And Subjected Sequence Analysis.

Results: We Investigated The Association Between Hla Alleles With Hiv-1 Infection In A Treatment Naive Ghanaian Population Infected With Subtype Cvf2_o2 Ag Virus. We have Obtained Hla Class 1 Genotypes With 27 Hla-A, 38 Hla-B As Well As 29 Distinct Hla-C Alleles. Hla-B4201-Hla-C1701 Were Found To Have Strong Linkage Disequilibrium Resulting In Lower Viral Loads. Additionally, Individuals Possessing Hla-B4201-Hla-C1701-Hla-A3001 Display Lower Viral Loads. Viral Genome Analysis Revealed That About 80% Of Our Cohort Are Of Subtype Cvf2_o2 Ag Origin. Several Vif Mutations Were Identified To Have Significantly Occurred In Our Cohort By R Analysis And Were Observed As Strong Binders On Some Ctl Epitopes Restricted By Hla-A0301, Hla-A3001, Hla-A3002, Hla-B4201, Hla-B4403, Hla-B1510, Hla-C1701, Hla-C0304, Hla-C0210 (P<0.05, Q<0.2).

Conclusion: This Is A Novel Study In The Field In West Africa. We Successfully Obtained Data On Hla Genotypes And Viral Vif Sequences In Hiv-1-Infected Ghanaians. Accumulation Of These Data Would Contribute To The Development Of T Cell-Based Intervention Strategy For Hiv-1 Control In West Africa.
Hepatitis B Infection Risk Factors Among Pregnant Women Attending Antenatal Care in Kunene Region, Namibia

**Background:** Hepatitis B is a viral infection caused by Hepatitis B virus (HBV) which is a double stranded DNA virus, a member of the Hepadnaviridae family of viruses. WHO estimates that about 257 million people are living with Hepatitis B virus infection. Namibia has a high prevalence of Hepatitis B infection (9%) among pregnant women and Kunene region prevalence of 8%.

**Methods:** The team conducted an un-matched 2:1 case-control study to determine the risk factors for Hepatitis B infection among pregnant women in Kunene region. Cases were study subjects with reactive results for HBsAg or HBeAg and controls were study subjects with negative for both HBV markers. A total of 115 cases and 230 controls were interviewed.

**Results:** Mean age among the cases was 29 years range 16 – 45 (SD = 6.6), controls the mean was 26 years range 13 – 45 years (SD = 6.8). Bi-variate analysis was conducted to determine the odds ratios at 95% confidence level. Significant risk factors at p-value less than 0.05 were retained in multiple logistic regression models to determine significant associations. The multivariate analysis found that polygamous marriages (AO: 3.45; CI: 1.25 – 9.57; p= 0.02), Body piercing and scarification (AOR: 2.30 – 8.17; p= 0.00), history tooth extraction or any dental procedures (AOR: 2.03; 95% CI: 1.09 - 7.99; p = 0.03), history of abortion (AOR: 2.91; CI: 1.38 – 6.16; p= 0.00), STI’s (AOR: 3.34; 95%CI: 1.92 – 5.80; p= 0.00) and previous history tooth extraction or any dental procedures (AOR: 2.03; 95% CI: 1.17 – 3.54; p = 0.01) was significantly associated with Hepatitis B infection. Gravidity, parity, HIV positive status and history of blood transfusion were not associated risk factor in multivariate model (p = >0.05).

**Conclusion:** The Ministry of Health in Kunene region should implement preventative strategies such as Hepatitis B screening, treatment, health education, infection control and hepatitis B vaccination for the general population.

Chlamydia Trachomatis and Biomarkers of Oxidative Stress Among Women with Spontaneous Abortion in Sokoto, North West, Nigeria

**Background:** Spontaneous abortion or miscarriages are a major public health problem affecting all regions of the globe. Chlamydia trachomatis is the most common bacterial Sexually Transmitted Infection (STI) in the world. Women carry the major burden of the disease. Immune response to C. trachomatis involves generation of free radicals which have deleterious effect on the developing embryo which may lead to spontaneous abortion.

**Methods:** A case control study was undertaken to determine the role of C. trachomatis, biomarkers of oxidative stress among women with miscarriages in Sokoto Metropolis. Forty five (45) women with miscarriages as cases and forty five (45) women without any history of miscarriage served as controls. Antibodies to C. trachomatis (IgG) was determined using enzyme link immunosorbent assay (ELISA) while Malondialdehyde (MDA) and total antioxidant capacity (TAC) were quantified by chemical methods.

**Results:** The overall seroprevalence of C. trachomatis was 7.7%; with 11.1% (5/45) and 4.4% (2/45) in the cases and the control groups, respectively (2=0.6196, df=1, OR=2.688 (95% CI: 0.4930 to 14.65); p= 0.4312). The mean (± SD) of MDA among the controls with and without antibodies to Chlamydia trachomatis were 3.4 ± 1.2 nmol/mL and 2.1 ± 0.3 nmol/mL, respectively; The mean (± SD) of MDA among the controls with and without antibodies to Chlamydia trachomatis were 2.7 ± 2.1 nmol/mL and 1.6 ±0.2 nmol/mL respectively. The mean (± SD) concentration of the TAC in the cases with and without antibodies to Chlamydia trachomatis were 1684±619, 1574±197 (µmol/L) respectively. 1550±1070 and 2451± 260 (µmol/L) were the mean (±SD) of TAC among the controls with positive and negative antibodies to Chlamydia trachomatis, respectively.

**Conclusion:** Findings from this study suggest that all women experiencing miscarriages should be screened for C. trachomatis infection and, if positive, adequately treated to prevent recurrent miscarriages. Public awareness of the possible risk of C. trachomatis infection to future pregnancies is advisable.
Efficacy and Safety of Artesunate-Amodiaquine for the Treatment of Uncomplicated Plasmodium Falciparum Malaria in Kigobe Health Center, in Bujumbura Nord District in Burundi

**Background:** The first and second-line treatment for P. falciparum in Burundi are respectively Artesunate-Amodiaquine and Quinine + Clindamycin. The latest study conducted in 2006, ACPR was 94.8% for artesunate-Amodiaquine. This study is to evaluate the efficacy and safety of artesunate-Amodiaquine after 10 years of its use.

**Methods:** A therapeutic efficacy study was conducted to evaluate the efficacy and safety of artesunate-amodiaquine among patients with uncomplicated falciparum malaria in Kigobe health center, in Bujumbura Nord district. Clinical and parasitological parameters were assessed over a 28-day follow-up period. PCR analysis using msp1, mps2 and glurp was conducted to distinguish recrudescence from re-infection. Mutations associated with antimalarial drug resistance in K13 gene (artemisinin resistance), in dhfr/dhps gene (pyrimethamine/sulfadoxine resistance), copy number variation in Pfplasmepsin 2 (Pfpm2) gene and Pfmdr1 (piperaquine and mefloquine resistance) were investigated using PCR analysis and sequencing.

**Results:** A total of 58 patients were enrolled between November 2015 and June 2016. Mean age (SD; range) was 6.3 years (1.8; 2.3-9) and mean weight 19.1 kg (5.4; 10-34). Mean temperature at admission was 38.8°C (1.1; 36.1-40.3) and parasitaemia geometric mean (range) at day 0 was 33 947/ul (2 930-199 800). Among the 58 patients, 5 were lost to follow-up or withdrawn. Day 3 positivity rate was 0%. ACPR PCR corrected using per protocol analysis was 92.3% (81.5-97.9), LPF 1.9% (0.0-10.3) and LCF 5.8% (1.2-15.9%). No ETF were reported. ACPR PCR corrected using Kaplan Meir analysis was 92.5% (81.3-97.19). Artesunate-amodiaquine was well tolerated. There were no serious adverse reported. Among the 58 isolates analyzed day 0, all isolates were wild type for K13. All parasites were carrying a single copy of Pfplasmepsin 2 gene, but 10.3% of the parasites were carrying multiple copy of pfmdr1. The prevalence of quintuple mutants (dhfrN51I+C59R+S108N and dhpsK540E+A581G) was 34.5%

**Conclusion:** Artesunate-amodiaquine remains efficacious and was well tolerated. There is no evidence of artemisinin resistance and by level of sulfadoxine-pyrimethamine which need to be taken into account for the IPTp policy implementation.

**Evaluation of Angiopoetins 1 and 2 in Relation to Malaria Severity in Infested Children**

**Background:** Malaria could affect people of all sexes and ages most especially young children. Improper or wrong diagnosis could lead to severe complications and death. The study aimed to assess the levels of serum angiopoietin-1 (Ang-1) and angiopoietin-2 (Ang-2) which are critical regulators of endothelial activation and integrity and establish their relationships with selected hematological parameters.

**Methods:** A total of 92 blood samples from children between the ages of 6 months to 15 years were analyzed. The samples consisted of 30 cases of severe malaria, 40 cases of uncomplicated malaria and 22 apparently healthy subjects which served as control. Serum Ang-1 and 2 were determined using Enzyme-linked Immunosorbent Assay (ELISA). The selected haematological parameters were determined using WHO standard.

**Results:** There was significant decrease in serum Ang-1 of uncomplicated malaria and severe malaria compared with the control while significant increase was observed in Ang-2 and similarly Ang-2 / Ang-1 ratio in uncomplicated malaria and severe malaria compared with control. Total Wbc showed significant increase while Rbc and platelet showed significant decrease in severe malaria compared with uncomplicated malaria and control. Significant increase in malaria parasite density was seen in severe malaria compared with uncomplicated malaria. In uncomplicated malaria, a significant negative correlation was observed between Ang-1 levels and Ang-2/Ang-1 ratio while a significant positive correlation was seen between Ang-2 and Ang-2/Ang-1 ratio. However, a significant positive correlation was seen between Ang-1 levels and Ang-2 but a significant negative correlation was observed between Ang 1 and Ang-2/Ang-1 ratio in severe malaria.

**Conclusion:** Ang-1 and Ang-2 may be used to determine the severity of malaria infection since the levels of the angiopoetins differ significantly in malaria subjects compared with control.
**The Value Procalcitonin and C-Reactive Protein as Early Markers of Bacteraemia Among Patients with Haematological Malignancies receiving Chemotherapy: A Cross-sectional Study**

**Background:** The immune system of patients with hematological malignancies is suppressed during chemotherapy. This renders them vulnerable to frequent infections especially of the bacterial type. Timely diagnosis of these infections is difficult, because a severe infection may be asymptomatic or manifest only in the form of fever or malaise. There is need for laboratory markers that can detect an infectious process at an early stage. This study was aimed at determining the value of using Procalcitonin (PCT) and C reactive protein (CRP), for early diagnosis of infection in patients with hematological malignancies receiving chemotherapy.

**Methods:** This was a cross-sectional study consisting of sixty eight (68) patients with hematological malignancies. Data from each participant including sex, age, clinical and laboratory data were collected after obtaining informed consent. Blood specimens were then collected for measurement of PCT, CRP and bacteriological analysis. Patients were divided into two groups; those with a culture positive and negative result. PCT and CRP concentrations were compared between groups using t-test and non-parametric statistical tests respectively. The area under ROC curve, sensitivity, specificity, likelihood ratio, and Spearman’s correlation coefficient were also calculated.

**Results:** A total of 14 (20.6%) microorganisms were isolated, of which 10 were gram-positive bacteria and 4 were gram-negative bacilli. The mean values of PCT which were 6.1ng/mL in the bacteraemia group and 5.1ng/mL in the non-bacteraemia group, p=0.023 and median CRP values were 23.5 (6.03-75.44) in the bacteraemia and 23.5 (6.03-75.44) in the non-bacteraemia group, p=0.832. The area under curves was 0.52 (95% CI=0.57-0.84) for CRP and 0.70 (95% CI=0.35-0.69) for PCT. PCT value of greater than 4.7 ng/mL is diagnostic for infections (sensitivity 86%, specificity 54%) while that of CRP was 21mg/mL with the sensitivity and specificity of 64% and 44% respectively. Elevated levels of PCT as well as fever were significantly associated with bacteremia.

**Conclusion:** PCT was a more reliable and sensitive marker of bacteremia among patients with hematological malignancies receiving chemotherapy than CRP.

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**Microalbuminuria and Traditional Serum Renal Markers of Nephropathy in Diabetic Patients at Mbarara Regional Referral Hospital in South Western Uganda**

**Background:** Diabetic Nephropathy (DN) is a common finding in Diabetic patients. Microalbuminuria is the earliest clinical evidence of DN. Early detection of microalbuminuria is very important; it allows timely interventions to prevent progression to macroalbuminuria and later end stage renal disease. There is paucity of data on correlation of urine microalbumin levels and traditional renal markers in diabetic nephropathy in Uganda.

**Methods:** This was a cross-sectional study that involved 140 participants with diabetes mellitus attending the diabetic clinic of Mbarara Regional Referral Hospital. Data collected included: age, sex, level of education, smoking history, alcohol consumption, hypertension, body mass index, family history and duration of diabetes mellitus. Morning spot urine samples were collected from each participant and blood drawn for the analysis of the traditional serum renal markers. Commercially available kits that use spectrophotometric methods were used to determine microalbuminuria, serum creatinine, uric acid and glucose levels. A P > 0.05 was statistically significant in our study.

**Results:** Overall prevalence of microalbuminuria was 22.9%. Simple and multiple linear regression revealed serum creatinine (β=0.01, 95%CI [0.005, 0.014], P=0.0001) and glucose (β=0.03, 95%CI [0.011, 0.048], P=0.0017) levels to have significant correlation with microalbuminuria. After adjusting for linearity, only a family history of diabetes mellitus (β=0.275, 95%CI [0.043, 0.508], P=0.002) was found to have significant correlation with microalbuminuria as an associated risk factor. Microalbuminuria had a non significant association with eGFR (OR = 1.2, 95%CI [0.24, 5.96], P=0.824).

**Conclusion:** The high proportion of diabetic patients with microalbuminuria in the study raises implications for health policy. Microalbuminuria is significantly related with serum creatinine levels which are used as a marker of nephropathy. A family history of diabetes mellitus is an associated risk factor for microalbuminuria.
Immunosuppressive Effects of Calcitriol on TBET, TNF-α, and INF-γ Expression in the PBMC of Patients with Inflammatory Bowel Diseases

**Background:** Ulcerative colitis (UC) and Crohn’s disease (CD) constitute chronic idiopathic inflammatory bowel diseases (IBD). The key underlying pathogenic mechanisms for both diseases is a dysregulated host immune response to commensal intestinal flora in genetically susceptible individuals. The high rate of hospitalisation, which is accompanied with the high economic burden experienced by the IBD patients, calls for more tailored research efforts to design an effective treatment option that will specifically address the problems associated with these diseases. Calcitriol inadequacy is commonly associated with the development of IBD, in that, most of the patients diagnosed with IBD have a deficiency of calcitriol.

**Methods:** This research was designed to test the efficacy of calcitriol and assess its therapeutic potentials in the treatment of IBD. Peripheral blood was aseptically collected from 24 IBD patients and 24 healthy controls. Peripheral blood mononuclear cells (PBMC) were isolated using ficoll-paque centrifugation method and stimulated with 1µg/ml of LPS in cell culture plate and incubated for 4 hours. The cells were later treated with 10-8 and 10-10 M of calcitriol and incubated at 37°C under 5% CO2 and 100% humidity. RNA extractions, cDNA synthesis, and Quantitative real-time PCR were performed. The concentration of cytokine in the supernatant was assessed by ELISA.

**Results:** Result: The result showed a significant down-regulation in the expression of T-bet, IFN-γ and TNF-α.

**Conclusion:** This result indicates that calcitriol has both immunoregulatory and immunosuppressive effects, on this transcription factor and cytokines that play important roles in the pathogenesis of IBD, and thus could be of major benefit in the treatment and management of IBD patients.
**A Cross Sectional Study to Identify Microbial Contaminants and Quantify The Microbial Contamination Levels of Four Operating Theatres at Mbale Regional Referral Hospital, Uganda**

**Background:** Nosocomial infections are one of the greatest problems in public health. Several studies underscore the role played by the hospital environment as a source of transmission of nosocomial pathogens and thus increase in prevalence of nosocomial infections. In this study, we aimed to identify microbial contaminants and quantify the microbial contamination levels of four operating theatres in Mbale Regional Referral Hospital Laboratory in 2017.

**Methods:** This was a cross-sectional study conducted between August 2016 and January 2017. We used pre-moistened sterile swabs were used for surface sampling and settle plates for air sampling. The study included surfaces considered in immediate contact with patients (i.e. tables, taps and hand wash sinks, door handles) and locations considered having little air movement and dead spaces. Sampling was performed in the “at rest” operating theatre after disinfection. Colony counts for the settle plates were done and reported as cfu/dm2/h. Colonial characteristics, Gram staining and conventional biochemical tests were used for identification. Data was analyzed using Stata 13 and Microsoft Excel 2013.

**Results:** A total of 109 (31 air samples and 78 surface swabs) samples were collected and analysed. The average colony counts in the air of the four operating theatres exceeded the acceptable limit of 9 cfu/dm2/h. Air contamination was high in Gynaecology theatre (mean colony counts, 261 cfu/dm2/h/) and least in Ophthalmology theatre after disinfection. Colony counts for the settle plates were 9 cfu/dm2/h. Results: Approximately 98% (120/123) of the processed samples were positive on culture for 24-48 hours; the isolated pathogens were: Staphylococcus aureus, 30% (36/120), Pseudomonas spp, 19% (16/120), Klebsiella species 15% (18/120) and Proteus species 1% (1/100), other contaminants not associated with puerperal sepsis were: Bacillus species, 29% (35/120) and Micrococcus species 18% (22/120). The pathogenic bacteria: Staphylococcus aureus, 30% (36/120), Pseudomonas spp., 19% (16/120), Klebsiella species 15% (18/120) and Proteus species 1% (1/100), other contaminants not associated with puerperal sepsis were: Bacillus species, 29% (35/120) and Micrococcus species 18% (22/120). The pathogenic bacteria; Staphylococcus aureus, Klebsiella and Pseudomonas species, were susceptible to chloramphenicol, gentamycin and amikacin antibiotics, resistance was to ceftazidime and oxacillin.

**Conclusion:** The study findings indicate hospital surface contamination and its possible role in infection transmission to not only the patients but also health workers and caretakers. It is recommendable that regular hospital assessment be performed by laboratory personnel and fumigation, to reduce on the incidence of nosocomial infections.

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**The Role of Hospital Surfaces in Transmission of Puerperal Sepsis Related Pathogens in the Maternity Unit at Mbarara Regional Referral Hospital**

**Background:** Puerperal sepsis is the leading cause of maternal mortality in Mbarara Regional Referral Hospital (MRRH) with a maternal mortality rate of 30.9%. Studies have been done to identify the bacteria associated with puerperal sepsis but less effort in determining the source of these pathogens. No study had been conducted in MRRH to assess the role of hospital surfaces in transmission of puerperal sepsis pathogens in the maternity unit. This study was conducted, to determine the prevalent bacterial isolates and their antibiotic sensitivity patterns within the maternity unit at this hospital.

**Methods:** A cross-sectional study was conducted from March to June 2017. 123 Samples were collected from hospital surfaces and the air within the maternity unit during morning hours. The samples were labeled with identification codes and then cultured. The isolates were gram stained, identified using biochemical tests. Culture and sensitivity testing using selected antibiotic discs. Percentage scores were used to identify the most prevalent bacterial isolates.

**Results:** Approximately 98% (120/123) of the processed samples were positive on culture for 24-48 hours; the isolated pathogens were: Staphylococcus aureus, 30% (36/120), Pseudomonas spp, 19% (16/120), Klebsiella species 15% (18/120) and Proteus species 1% (1/100), other contaminants not associated with puerperal sepsis were: Bacillus species, 29% (35/120) and Micrococcus species 18% (22/120). The pathogenic bacteria; Staphylococcus aureus, Klebsiella and Pseudomonas species, were susceptible to chloramphenicol, gentamycin and amikacin antibiotics, resistance was to ceftazidime and oxacillin.

**Conclusion:** The study findings indicate hospital surface contamination and its possible role in infection transmission to not only the patients but also health workers and caretakers. It is recommendable that regular hospital assessment be performed by laboratory personnel and fumigation, to reduce on the incidence of nosocomial infections.
**The Clinical Utility of the Reticulocyte Hemoglobin Content for Screening Pregnant Women for Iron Deficiency**

**Background:** Iron deficiency (ID) is a major cause of morbidity and mortality in pregnancy and the neonatal period. The reticulocyte hemoglobin content (Ret-He) is a simple and cost-effective alternative to traditional iron studies. The Ret-He has not been evaluated as a diagnostic tool for subclinical ID in pregnant patients.

**Methods:** The study aim was to verify the clinical usefulness of the Ret-He on the Sysmex hematology analyzer as a predictor of ID in pregnant patients. A prospective study was performed in 102 pregnant patients presenting to the Johannesburg Academic Hospital antenatal clinic for routine screening for ID. There were 50 (49.02%) patients with ID as defined according to iron studies (serum iron of <9umol/l, transferrin saturation of <20% and/or ferritin of <30ug/l). The independent t test and receiver operating characteristic (ROC) analysis were applied.

**Results:** Ret-He levels in the ID and non-ID groups were 30.37±3.31 and 33.36±2.22 pg respectively (P <0.001). The Ret-He at a cut-off of <31.2 pg reliably distinguished ID and non-ID pregnant patients with a sensitivity and specificity of 62.50% and 86.44% respectively. The AUC for the Ret-He (0.81, 95% CI 0.71-0.88) indicates that the Ret-He is the best discriminator of ID in this population (P <0.0001).

**Conclusion:** The Ret-He is a rapid and accurate test which can be determined from the sample used for FBC analysis for the diagnosis of ID in pregnant patients.

**Prevalence of Salmonella and Shigella Species Among Under-five Children and Antibiotic Resistance Patterns at Jimma University Medical Center and Serbo Health Center, Southwest Ethiopia**

**Background:** Salmonella and Shigella species are common causes of bacterial diarrhea in under-five children. Worldwide, an estimated 21 million cases of gastroenteritis are due to Salmonella, resulting in 200,000 deaths each year where 80% of deaths occur among children under-five years of age. Shigella species is the leading pathogen among the top six attributable pathogens causing childhood diarrhoea.

**Methods:** Cross-sectional study design was used to collect data. The stool samples were inoculated on MacConkey agar, xylose lysine dextrose agar and incubated aerobically at 37oC for 18 to 24 hrs. The same samples were plated onto Selenite F broth for enrichment of Salmonella species. All positive stool cultures were identified and characterized on the basis of morphology, cultural characters and biochemical tests. The antibiotic susceptibility testing against commonly used antibiotics was done on Mueller Hinton agar. The results of the susceptibility tests reported as susceptible, intermediate or resistant according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) guideline.

**Results:** From 348 stool samples screened, 39 samples were positive for bacterial growth. The overall prevalence of Salmonella and Shigella species was 5.2 % and 6.0% respectively. Frequently isolated Salmonella species was Salmonella typhi (44.5%) while presumptive identification of Shigella species showed 57.1% was Shigella flexneri. About 76.2% of Shigella species and 66.7% of Salmonella isolates were multidrug resistant. Shigella and Salmonella species showed highest frequency of drug resistance against ampicillin (100%, 88.9%), cefuroxime (85.7%, 72.2%) respectively.

**Conclusion:** Salmonella and Shigella species remain significant causes of bacterial diarrhea. Higher level of drug resistance observed in the present study. Fluoroquinolones and ceftriaxone are still treatment of option for Salmonella and Shigella species.
**PS-1.3-061**

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**Seroprevalence and Associated Risk Factors of Yellow Fever Virus Among Febrile Patients in Selected Health Facilities in Borena District, Southern Ethiopia**

**Background:** Yellow fever virus causes a hemorrhagic fever leading to fatal disease in 20-50% infected cases. An estimated annual incidence of 200,000 cases of yellow fever and causing 30,000 deaths which the majority is from Africa. The aim of this study was to assess the seroprevalence and associated risk factors yellow fever virus among febrile patients in Borena District, Southern Ethiopia.

**Methods:** An institution based cross-sectional study was conducted from May to August, 2016. A total of 519 consecutive febrile patients attending health facilities were enrolled. Data on socio-demographic, environmental risk factors and blood samples were collected from all participants and screened for yellow fever virus immunoglobulin G using indirect immunofluorescent assay.

**Results:** The overall seroprevalence of yellow fever virus immunoglobulin G among febrile patients was 12.5%. The rate of exposure to yellow fever virus was 15.7% among males, 20% in those older than 65 years, and 14.5% among urban residents. However, yellow fever virus sero-status was influenced only by gender, where males had significantly higher rate of exposure (AOR=1.72; 95%CI 1.01-2.94). Of the assessed risk factors, a recent mosquito bite was found to be associated with YFV exposure (AOR=2.98; 95%CI 1.51-5.89). Patients with Black vomit (AOR=8.91; 95%CI 1.94-40.86), and fatigue (AOR = 5.37; 95%CI 1.51-5.89) had higher rate of yellow fever virus exposure.

**Conclusion:** This study showed yellow fever virus has public health significance in the study area. The need to provide diagnostic services that help rule out yellow fever virus infection among febrile patients in the study area is essential to minimize the prescription of antibiotics for non-malaria patients. Interventions measures that help control mosquito and enhance awareness should be emphasized to reduce the transmission of virus.

**PS-1.3-062**

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**Variation in Lineage 2 Strain of Lassa Fever Virus in Nigeria**

**Background:** Nigeria harbours three of the four established lineages (strains) of LF in West Africa. Lineages 2 and 3 occur dominantly in the southern and Northern regions of the country respectively. In the southern region, the South central (S.C) and South east (S.E) axes are the most endemic for LF. The increased disparity in nosocomial transmission and mortality from LF among healthcare workers (HCWs) in the SE raised the question; Are there any variations in the LF strains in the SC and SE axes that may suggest a difference in virulence?

**Methods:** Following the 2014 epidemic with fifteen positive cases among (HCWs) in the SE axes, genomic studies elucidating their nucleic acid sequences were conducted in NUITM. A ten year study of nucleic acid sequences of lineage 2 strains of LF from Nigeria covering the period 2004-2014 gleaned from the GENBANK pool was conducted. Included were the fifteen positive samples of 2014, totalling 79 LF glycoprotein precursor (GPC) gene sequences. Using MEGA 6 software, phylogenetic and BLAST analysis of the homologous identity of all the 79 strains were conducted.

**Results:** Fifty of the 79 LF lineage two strains were of SC origin while 29 were of SE. Three distinct clades of the SE strain were observed and clustered around Nig 05-SE40, Nig 08-04 and Nig 11-186 strains. Diversity among the clades of the SE strains ranged between 18 – 21 %. The SC strains were essentially of one clade and exhibited good homologous identity of 97-100%. This suggests less diversity among the SC strains than SE strains. Between the SC and SE strains diversity was up to 20%.

**Conclusion:** In addition to questionable IPC practices, the difference in clades may contribute to the increased nosocomial transmission among LF cases in SC axes. There is need for evaluation for mutation among clades of SE origin.
Endemicity, Homeopathic Management and Public Health Threat of Plague Associated with Yersinia pestis in Abakaliki District, South-Eastern, Nigeria

**Background:** Cases of plague-like illness have been observed for over 5 decades in Abakaliki district, especially among rural dwellers. However, affected individuals usually avoid hospital management for the fear of death. This study focused on the epidemiology, awareness level of health professionals and homeopathic management of plague associated with Yersinia pestis.

**Methods:** A total of 460 blood samples were collected from volunteers in 5 communities by venipuncture of 360 suspected cases of plague as diagnosed by herbalists and 100 apparently negative individuals. Blood samples collected were transferred into EDTA containers and centrifuged at 1500 x g for 10 minutes to obtain plasma. Y. pestis F1-antigen strip was dipped into the plasma and the result was read after 30 minutes. The herbalists’ methods of diagnosis were evaluated by administration of questionnaires and analyzed in comparison with conventional clinical criteria. The awareness of health professionals for the occurrence and management of plague associated with Y. pestis was assessed using questionnaires.

**Results:** Out of 360 subjects diagnosed homeopathically of plague, 70/360 (19.4%) were confirmed F1-antigen positive for Y. pestis, whereas the 100 samples from non-plague cases were negative. The data also showed that Y. pestis infections occur predominantly among farmers and artisans in rural, 30/60 subjects (50%) and sub-urban, 40/210 subjects (19%) areas. Of the 15 herbalists evaluated, 9/15(60%) had 25% diagnostic criteria conformation with conventional clinical criteria and 38% of the cases identified by those herbalists were positive for Y. pestis. The interview of health professionals revealed that there is relatively poor awareness of the occurrence/endemicity of plague among physicians (60% awareness), Nurses (15%), pharmacist (20%) and Clinical Laboratory Scientists (30%).

**Conclusion:** This study revealed Y. pestis infections in Abakaliki region and further buttresses the need for education of health workers on plague management and molecular typing of the Y. pestis strain associated with the disease.

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Definitive Management of Patients on ART Who After Retesting, Present a Negative Result in Kenya

**Background:** The current ART guidelines in Kenya recommend that HIV Exposed Infants (HEIs) less than 18 months of age be diagnosed by a PCR test using the harmonized EID algorithm. On the other hand, adults are diagnosed by rapid diagnostic kits using the in-country HIV testing guidelines. Once the patients are confirmed positive, they are linked to ART care with periodic viral suppression monitoring. In this regard, it is not recommended to perform HIV-1 testing for patients who are already on ART due to them being virally and antibody suppressed hence can be diagnosed as ‘false negative’. However, some patients self-refer for HIV testing and do not disclose that they are known HIV positives and on ART and as a result, are sometimes diagnosed as negative. In Kenya, these cases leads to deferring of appropriate management and also triggers confusion to the clinicians, patients, the caregivers and laboratory staff who perform the testing. To curb this, we sought to develop definitive recommendations on managing patients on ART who present with a new negative antibody test and a new PCR negative for adults and HEIs respectively.

**Methods:** Held meetings and workshop with all the relevant stakeholders constituting of laboratorians, clinicians and PLHIV and developed guidelines on how to manage patients who upon retesting, get a negative HIV test while on ART. The content was developed based on the National HIV Clinical TWG meeting in 2017 and the WHO 2015 HTS guidelines.

**Results:** Successful development of a comprehensive algorithm on ‘management of retested patients on ART care’ in Kenya that gives a clear approach on how to manage this increasing category of PLHIV.

**Conclusion:** The newly developed algorithm is a promising government tool that will better treatment outcomes to PLWHAs in Kenya as the country races towards attaining the KASF 90-90-90 targets by 2020.
**PS-1.3-065**

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**Frequenc des Lesions Mammaries Chez les Patientes Recues au Laboratoire D’anatomie et de Cytopathologie De l’hôpital Laquintinie de Douala**

**Background:** Les lesiones mammaries malignes sont des affections qui constituent un problem de santé publique.

**Methods:** Une étude descriptive rétrospective de 3ans (janvier 2015-décembre 2017) fut menée pendant un mois de collecte au Laboratoire d’anatomo-cytopathologie de l’hôpital Laquintinie de Douala (HLD) après obtention d’une autorisation de la délégation régionale de la santé-publique et celle du directeur de l’HLD. La coloration de Papanicolaou était effectuée sur chaque échantillon.

**Results:** sur 300 prélèvements de biopsies mammaries suspectes enregistrés, 64 cas en 2015, 101 en 2016, 135 en 2017, l’âge moyen des participantes était 38ans (min : 15ans max : 100ans). L’examen cytologique était plus pratiqué que l’examen histologique (61,33%vs. 38,66%).

**Conclusion:** La fréquence des lésions mammaires semblait assez constante au fil des 3 années, semble précoce et évolue avec l’âge des participantes.

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**PS-1.3-066**

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**Intérêt du Suivi Pharmaco-virologique des Femmes Allaitantes Séropositives HIV-1 au CHU Gabriel Toure**

**Background:** La transmission mère-enfant (TME) durant l’allaitement est empêchée par les antirétroviraux maternels démarrés pendant la grossesse et pursuivis jusqu’à la fin de l’allaitement (option B+). Le but de cette étude était d’évaluer l’intérêt du suivi pharmaco-virologique des femmes allaitantes sous ARV et leurs enfants à Bamako.

**Methods:** Les patients (mère-enfant) ont été suivis dans le service de pédiatrie du CHU Gabriel Toure. Les charges virales plasmatis ont été réalisées au laboratoire de l’INRSP de Bamako. Le dosage pharmacologique réalisé au laboratoire de Pharmacocinetique et de toxicologie de Toulouse avec un système LC-MS/MS. La Charge virale a ete effectuee sur un appareil M2000 avec limite de quantification 40copies/ML. Les patientes ont été recrutées du 1er septembre 2015 au 30 septembre 2016 avec un consentement éclairé. Les données ont été saisies et analysées sur le logiciel SPSS version 20.

**Results:** L’âge moyen des mères était de 29 ans±75 [19-41 ans []. Les mères étaient non scolarisées dans 16,67% des cas et sans activités professionnelles dans 60% des cas. La majorité de nos patientes était sous EFV avec 86,67% et 13,33% sous LPV/r. A l’inclusion J0, une seule de nos patientes avait une charge virale détectable sous 3,33% (6610 copies/ml) et 73,91% des mères avaient un taux de CD4 supérieur à 350 cellules/mm3. Apres 6 mois de suivi, nous avions trouvé 3 mères qui avaient une charge virale plasmatis déetectable (200 copies/mL ; 72copies/mL et 477copies/mL) et 86,36% des mères avaient un taux de CD4 supérieur à 350 cellules/mm3.

**Conclusion:** La mesure des paramètres biologiques (Virologique et pharmacologique) constitue un mailion essentiel dans la prise en charge des femmes allaitantes infectées par le VIH au Mali.
Pulmonary Tuberculosis and its Proinflammatory Correlates in a Nigerian Hospital

**Background:** Tuberculosis (TB) is a serious public health problem in Nigeria. It is a disease that affects the immune system resulting in a debilitating effect on the individuals. Cell mediated immune response are required for containment of the organisms. The immune status of the individual plays an important role during these processes. This aim of the current study was to evaluate some proinflammatory parameters in pulmonary tuberculosis patients.

**Methods:** The study was a prospective on One hundred and forty-six (146) consecutive TB patients (within the age range of 8-75years) and thirty-eight (38) apparently healthy subjects as control were recruited after informed consent from patients attending Chest Clinic of Central Hospital, Agbor. The study was approved by the Delta State Ministry of Health. The spuata were examined for Mycobacterium tuberculosis using GeneXpert. Five millilitres (5 mL) of blood was collected from each subject. Tumour necrosis factor (TNF)-α, interleukin (IL)-1 and -6 were measured using human ELISA kits.

**Results:** There was statistically significance in the mean serum concentrations of cytokines among the genders ($p < 0.05$). Female TB subjects recorded the higher mean concentration of TNF-α and IL-6, while the male TB subjects had higher mean levels of IL-1. The mean serum concentration for cytokines were high for IL-1, IL-6, TNF-α in tuberculosis subjects were 95.77 ± 6.68 pg/mL; 107.54 ± 14.76 pg/mL and 122.09 ± 16.55 pg/mL respectively in comparison with control subjects. There was very strong correlation between mean values of IL-6 and TNF-α ($r=0.72315$, $p < 0.05$). Tumour necrosis factor- α recorded the highest value for mean serum concentration value in pg/mL.

**Conclusion:** The study revealed that IL-1, IL-6, TNF-α were higher in TB patients compared to controls and can be used as biological markers for response to tuberculosis treatment.

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**Evaluation of Test and Start Model in Viral Suppression Among PLHIV in North Central Nigeria**

**Background:** The Test and Start Model (TSM) of Care was adopted in the Nigeria’s 2016 National Guideline. The significance of the evaluation of the effectiveness of this model cannot be overemphasized. Early detection and viral suppression and subsequent reduction in the rate of population transmission of HIV can be attained through a successful TSM. This Study is to evaluate the implementation of the TSM of Care in North Central Nigeria.

**Methods:** The Institute of Human Virology Nigeria (IHVN) carried out a cross sectional retrospective analysis to evaluate the impact of Test and Start Model among ART patients who were at least 6 months on first line (Adult and Pediatric) regimen, attending Federal Medical Center Keffi between October 2016 and October 2017 under different Antiretroviral combinations. Statistical analysis of single proportion was done using Medicalc.

**Results:** Before TSM, in 2015 and 2016; 166 (77%) out of 217 (CI=72.04% to 81.46%; $p<0.0001$) and 199 (72%) out of 276 (CI=66.33% to 77.22%; $p<0.0001$) attained viral suppression respectively. After the initiation of TSM, zidovudine-Lamivudine-Efavirenz/ Nevirapine regimen demonstrated highest viral suppression of 88% (CI=73.82%to 96.1%; $p<0.0001$) among age group 14-39 years while an overall (highest) suppression of 86% (CI=76.38% to 98%; $p<0.0001$) was observed in the 40 years and above group. Tenofovir/ Abacavir -Lamivudine-Efavirenz/ Nevirapine group recorded a highest suppression rate of 84% (70.73% to 92.9%) among age group 40 years and above while the least of 67% (9.57% to 99.2%) suppression was observed among age group 1-13 years. Among the entire 1st line regimen, female patients exhibited higher level of viral suppression of 77% (CI= 71.256% to 83.295%; $p<0.001$) compared to their male counterpart 74% (CI= 63.06% to 83.12%; $p<0.0001$).

**Conclusion:** TSM has shown success in achieving viral suppression among all the groups irrespective of the 1st line regimen, age or sex. This will in turn reduce population transmission rate in the community. We recommend a further study to enable the evaluation of transmission prevention resulting from the success of TSM in the same communities.
Anaemic Profile and Associated Risk Factors Among Children Aged 0 to 15 Years at Bafoussam Regional Hospital

**Background:** Pediatric anaemia remains a public health problem worldwide. In Cameroon, many studies have been already conducted in many metropolises. But epidemiologic data on pediatric anaemia are scarce as far as the town of Bafoussam concerns. This study was to evaluate anaemic profile and associated risk factors among children aged 0 to 15 years admitted at Bafoussam regional hospital.

**Methods:** A cross-sectional, prospective study took place from January 1st to February 28th, 2018 on admitted children aged from 0 to 15 years suffering from anaemia at Bafoussam regional Hospital. To diagnose anaemia, an automatic Full blood and differential count (Human, 11 parameters) was performed on each participant. Comparison of categorical variables were performed by Epi info 7.0 using a X2 test and for p<0,05, the difference was considered as statistically significant.

**Results:** Out of 54 symptomatic anemia children enrolled, mean age 5.3±0.7 years, male subjects were predominant 62.96% (n=34). We observed 48.15% (26/54) of mild anaemia (9

**Conclusion:** Mother should be well sensitized on anaemia, its consequences and how to provide balanced diet to their children.

Renal and Hepatitis Function of Illicit Drugs Users in Yaounde-Cameroon

**Background:** The consumption rate of illicit drugs in low and middle income Countries is permanently increasing. In Cameroon for example this worrying phenomenon touches more and more the young generation, with consequences such as early damages of body’s function. While liver is considered as the excellent metabolic center, the kidney seems to be the perfect filter clearing away the blood from toxic waste. This study was to evaluate the impact of illicit drugs use on renal and hepatic function.

**Methods:** A cross sectional, prospective and descriptive study took place at LAMA laboratory-Yaounde-Cameroon from March to June 2017. The Rapid detection of Illicit drugs(Immunochrommatography), HBsAg, HCVAc, high blood sugar (one touch glucometer), the kinetic titration of ALAT/ASAT, Ure/creatinine and an estimation of Glomerular filtration rate eGFR (MDRD study equation) were simultaneously done to each participant. Significant threshold 5%.

**Results:** Out of Sixty positives illicit drugs users were enrolled, Mean age: 27.47 ± 0.99 years [min :15 ; max :65], Men 80% (48/60) and young aged [15 ; 25] were predominant. Cannabis 23.33% (14/60), Benzodiazépine, and mixture of 2 and more than 2 illicit drugs were the most consumed. The number of consumers and drugs consumption’s rate decreased with the age of participants. The frequency of hepatic failure (concomitant ALAT and ASAT abnormal) was 20% with more consuming illicit drugs mixtures. Hepatic failure seemed increasing with the age (p=0,66). Moreover, 18.33 % (11/60) showed kidneys failure (eGFR< 90) with 10 patients of mild renal impairment (60

**Conclusion:** Drugs consumption rate has a negative impact on hepatic and renal function. We therefore recommend to avoid illicit drugs consumption especially drugs mixtures. Renal and hepatic function of drugs addicted should be frequently controlled.
Les Hommes Ayant des Rapports Sexuels Avec d’autres Hommes (HSH), Moteur de L’épidémie du VIH au Sénégal

Background: Au Sénégal, les HSH constituent un groupe hautement vulnérable à l’infection à VIH et autres IST. Malgré une diminution notable de la prévalence au niveau des Professionnelles du Sexe (PS) et de la Population Générale (PG), elle reste à des niveaux inacceptables dans le groupe des HSH. Pour documenter la dynamique de l’épidémie et de renforcer la prise en charge de cette population clé dans notre pays, des enquêtes ont été menées régulièrement depuis 2004 auprès de cette cible. L’objectif était d’évaluer l’évolution épidémiologique de l’infection à VIH et autres IST chez les HSH, par rapport à la PG et au groupe des PS au Sénégal.


Conclusion: Ces résultats ont montré des prévalences toujours élevées du VIH chez les HSH, par rapport à la population générale (0,5%) et dans le groupe des PS (6,6%), du VHB et de l’Herpès au Sénégal. Il existe aussi des co-infections prouvant la vulnérabilité du VIH face aux autres IST. Cette étude a également montré la réalité bisexuelle chez certains HSH constituant un « pont » avec la population générale.
**PS-1.3-073**

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**Le défaut de production d’IFN-γ par les cellules T au cours de la TB active est associé à une diminution de l’expression de CD40L**

**Background:** La réponse immunitaire contre le Mycobacterium tuberculosis est principalement assurée par l’IFN-γ produite par les cellules T. Cependant, cette réponse peut être influencée par d’autres facteurs tels que le défaut de signalisation des lymphocytes, en partie assurée par l’interaction entre CD40 et CD40 ligand (CD40L), ou encore l’inhibition de la réponse lymphocytaire par certaines molécules dont le Tim3 (T-cell immunoglobulin and mucin-domain containing-3). C’est ainsi que nous nous sommes proposés d’évaluer la production d’IFN-γ par les cellules T ainsi que les niveaux d’expression de CD40L et de Tim3 par ces cellules au cours de la tuberculose active.

**Methods:** À partir de 19 sujets composés de patients atteints de tuberculose active (n = 10) et témoins sains (n = 9), les cellules mononucléées du sang périphérique ont été isolées par gradient de Ficoll. Les cellules ont ensuite été stimulées pendant 6 heures avec du PMA/mononoycline en présence de Brefeldine A pour la détermination des cellules T productrices d’IFN-γ ainsi que des marqueurs CD40L et Tim3 par cytométrie en flux.

**Results:** Nos résultats ont montré que la proportion des cellules T CD4+ produisant l’IFN-γ était significativement plus faible chez les patients tuberculeux par rapport aux contrôles (p = 0,002). Le même profil a été observé les cellules T CD8+ productrices d’IFN-γ (p = 0,008). L’expression de CD40L par les cellules T CD4+ et T CD8+ quant à elle était significativement plus faible chez les tuberculeux par rapport aux contrôles (p = 0,002 et p = 0,005 respectivement) alors que celle de Tim3 ne montrait aucune différence significative entre les groupes.

**Conclusion:** Nos résultats montrent ainsi qu’au cours de la tuberculose active, le défaut d’expression d’IFN-γ est associé à une diminution de l’expression de CD40L. L’investigation de facteurs pouvant rétablir le CD40L sur les cellules T contribuerait significative à la prise en charge de la tuberculose.

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**PS-1.3-074**

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**Polymorphisms in the Heme Oxygenase-1 and Bone Morphogenetic Protein Receptor Type 1B Genes and Estimated Glomerular Filtration Rate in Brazilian Sickle Cell Anemia Patients**

**Background:** Sickle cell anemia (SCA) is a chronic and severe hemolytic anemia dysfunction. One of the most important clinical complications in SCA is kidney disease, responsible for 15-18% of the mortality rate in adult patients. Genetic variants of genes related to oxidative and signalling pathways, as in the Heme Oxygenase-1 (HMOX1) and Bone Morphogenetic Protein Receptor Type 1B (BMPR1B) genes, respectively. HMOX1 is the rate limiting enzyme that degrades heme. HMOX1 gene has two promoter variants a -413 A>T single nucleotide polymorphism (SNP) (rs2071746) and a (GT)n microsatellite polymorphism. Short repeats (n=25 or n<27, according to the cut off of different studies) have been associated with higher gene expression levels than the long (GT)n repeats (n=25 or n>27). BMPR1B gene encodes a member of the bone morphogenetic protein (BMP) receptor family of transmembrane serine/threonine kinases. The ligands of this receptor are BMPs, which are members of the TGF-beta superfamily.

Our results showed that the SNP BMPR1B are significantly associated with the estimated GFR (eGFR). In Brazil the prevalence of the s allele is high, from 12% to 10.9%. Thus we compared the allelic and genotypic frequencies of the SNP rs2071746 and (GT)n repeats in the HMOX1 gene and the SNPs in the BMPR1B gene between Brazilian adult SCA patients and healthy controls and investigate whether these polymorphisms may influence the eGFR of these patients.

**Methods:** The SNPs were genotyped by TaqMan® SNP Genotyping Assay. The (GT)n repeats were identified by capillary electrophoresis. The eGFR was determined in the SCA patients by MDRD (Modification Diet in Renal Disease): Statistical Analysis System (SAS) for Windows version 9.4 (SAS Institute Inc., Cary, U.S.A.).

**Results:** Regarding rs2071746, eGFR median was higher in patients with the TT genotype (p=0.019), inclusive when TT was compared with AT+AA (p=0.009). HMOX1 (GT)n repeats, the eGFR the genotypes (SS, SL and LL) significantly differed (p=0.009); when LL was compared with LS+SS, the LL eGFR median was significantly higher (p=0.005).

**Conclusion:** Our results showed that the homozygous TT for rs2071746 and homozygous LL for (GT)n repeats of HMOX1 were associated with significantly higher eGFR medians, providing additional support for the role of HMOX1 in renal complication in SCA patients.
Angiogenic and Angiostatic Factors in the Saliva of Malaria Patients

Background: The mortality due to malaria remains high even after appropriate treatment with effective anti-malaria drugs. Malaria mortality is associated with exaggerated host responses to inflammatory factors such as C-X-C motif chemokine 10 (CXCL10) and host biomarkers such as angiopoietin 1 (Ang-1) and angiopoietin 2 (Ang-2). Current diagnosis of malaria relies on microscopic detection of the parasites in blood film. This approach is invasive, increases accidental infections and uncomfortable for the patients. The aim of this study was to determine saliva levels of CXCL10, Ang-1 and Ang-2 and compare with plasma levels with regard to their potential as biomarkers in malaria which may be useful for further development of highly efficient non-invasive malaria detection methods.

Methods: This was a case control study involving a total of 213 (119 malaria subjects and 94 non malaria subjects) aged 1 -16 years for children. Haematological determination was done using Haematology Analyzer. Plasma and saliva levels of CXCL10, Ang-1 and Ang-2 were measured among the study participants using Quantikine Elisa kit. The data was analyzed at 450 nm wavelength using a Spectra Max 190 fluorescence micro plate reader. Data was presented as mean ± standard error or median and interquartile range (IQR). A p-value < 0.001 was considered statistically significant.

Results: There was decreased plasma levels of Ang-1 and increased plasma levels of CXCL10 and Ang-2 in individuals with malaria compared to those without malaria (Ang-1, p<0.009; Ang-2, p<0.001; CXCL10 p<0.001). Biomarker levels in both plasma and saliva with malaria and non-malaria subjects were correlated and found a significant relationship between Ang -2 and CXCL10 which could be used to predict malaria (p=0.001 for Ang-2 and p<0.01 for CXCL10). Low Ang-1 and high Ang-2 in both plasma and saliva were significantly associated with increased risk of malaria severity: Ang-1, 2741.04 (1785.85-3582.68), p<0.009; Ang-2, 3508.82 (2139.61-5091.633.9), p<0.001 and Ang-1, 720.27 (439.82-1086.74); 16.98 (10.08-33.26), (p<0.001 for all). Finally, Ang-2 was informative when combined with CXCL10 to predict malaria severity.

Conclusion: These results provide insight into the use of saliva as a non-invasive diagnostic method and demonstrate that Ang-2 combined with CXCL10 is a promising predictive biomarker in malaria severity.

Uptake of Isoniazid Preventive Therapy (IPT) Among Adult HIV Seropositive Patients in Western Nigeria

Background: Isoniazid Preventive Therapy (IPT) is an effective intervention for prevention of tuberculosis among people living with HIV (PLHIV) and its use is recommended by the World Health Organization (WHO). The risk of developing tuberculosis can be reduced by nearly 60% with the administration of 6 month IPT course. This study thus aimed at determining the uptake of IPT and factors impacting its completion among PLHIVs in Western Nigeria.

Methods: A total of 710 consenting adult PLHIVs were randomly recruited into this prospective cohort study from January 2015 to September 2017 and evaluated for IPT commencement and completion. Written consent was obtained from every participant and ethical clearance was obtained from the Ethical Review Committee of the Federal Teaching Hospital Ido Ekiti, Nigeria. Data was analysed using SPSS software, with significance fixed at P<0.05.

Results: The mean age is 40.40 ± 9.25 years. 156 (22.0%) of them are males while 554 (78.0%) are females. Seven hundred and three patients (99.0%) are categorized as WHO clinical stage 1. Seven hundred and six (99.4%) are currently on first line regimen while seven hundred and two (98.9%) of them have excellent antiretroviral therapy (ART) adherence. Seven hundred (98.6%) patients completed the IPT course. The main factors found to significantly impact IPT completion were ART adherence (Chi square value = 173.48, df = 1, P = 0.001) and WHO clinical staging (Chi square value = 10.99, df = 1, P = 0.001). WHO clinical staging has higher association with IPT completion (OR: 1.16, 95% CI: 0.85 – 1.56).

Conclusion: IPT administration and completion among PLHIVs hinge largely on excellent antiretroviral therapy (ART) adherence, lesser drug side effect experience and asymptomatic condition as in the WHO clinical stage 1, with intensive drug adherence counseling key to all.
**PS-1.3-077**

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**Anti-Müllerian Hormone: Establishing the Ovarian Reserve Range with Age in Rivers State Women, Niger Delta Region of Nigeria**

**Background:** The measurement of circulating anti-Müllerian hormone (AMH) in the plasma of adult women has been used as a tool in the assessment of ovarian reserve. This is based on its ability to reflect the number of growing follicles in the ovaries and knowing the level of AMH in a woman's blood is generally a good indicator of her ovarian reserve and this can be achieved by making reference to a decision values. The purpose of this study was to measure the level of this hormone in normal, apparently healthy subjects in Rivers State, Nigeria with respect to age. The essence was to establish a reference range for the hormone because of its clinical application in women fertility.

**Methods:** Materials/method: A total of four hundred and fifty-five women divided into four age groups were recruited for this study; this comprised of 120 each in age group of 20 to 30, and 31-40; 110 in age group 41-50 and 105 in 51-60 years from May 2014 to June 2017. The Enzyme linked Immunoassay method was used in the measurement of the AMH.

**Results:** Results: The result from the measurement of plasma AMH levels showed a mean + SD value of 2.89 ± 0.94, 1.55 ± 0.69, 0.43 ± 0.27 and 0.13 ± 0.08 ng/ml respectively for the 1st, 2nd, 3rd and 4th age groups respectively. The mean value for the AMH decreases with increasing age and was statistically significant at the different age group levels (P<0.05).

**Conclusion:** The reference, established range for the AMH (that is, 95% prediction interval) with respect to age in Rivers State women of Niger Delta region, Nigeria is as follows: 1.95-3.83; 0.86-2.24; 0.16-0.70 and 0.05-0.21 respectively for the age groups. This study summarizes the findings concerning AMH and its role as a marker for the quantitative aspect of ovarian reserve, ovarian aging, as well as ovarian dysfunction in this region of the country.

**PS-1.3-078**

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**A Rare Prothrombin Gene Mutation C20209T in a South African Woman with Life-threatening Venous Thrombosis in Pregnancy**

**Background:** Mutations in the untranslated region of the prothrombin gene have been reported to be associated with thrombotic events and pregnancy loss. The most common of these mutations, G20210A, is typically found in Caucasians. The other variants, including C20209T are rare, and have been reported in patients with various ethnic origins. We report on a 28-year-old black South African female who was admitted to Charlotte Maxeke Johannesburg Academic Hospital after experiencing shortness of breath and chest pain at 35-weeks gestation. Ventilation perfusion scan on admission revealed a massive pulmonary embolism, without obvious evidence of deep vein thrombosis in the legs. She was treated with Clexane® and delivered a healthy 3.5kg baby girl by caesarean section.

**Methods:** Real-time polymerase chain reaction with melting curve analysis was performed for the G20210A Prothrombin gene mutation on the LightCycler® 480 (Roche) using hybridization probes. Typically, the mutant allele for the G20210A prothrombin mutation shows a melting peak at ~54oC and the wild type allele melts at ~60oC.

**Results:** In this patient a product with a melting temperature of ~50oC was documented and the gene was sequenced (3730 DNA Sequencer, Applied Biosystems) which identified a C20209C/T mutation in the prothrombin gene.

**Conclusion:** To the best of our knowledge, this is the first report of the rare C20209T mutation in South Africa, although it has been described in individuals of African origin. The thrombotic risk with this mutation remains unknown, however, our results concur with the few reported cases in showing an association with pregnancy complications and pulmonary embolism. Analysis and reporting of further cases will assist in this regard. It is also worth noting that real-time PCR with melting curve analysis may be a useful diagnostic tool to detect rare genetic variants in the untranslated region of the prothrombin gene.
A Primal Incrimination of Cedecea Davisae with Post-prostatectomy Urinary Tract Infection in Nigeria

**Background:** Cedecea species are recent members of the family Enterobacteriaceae. A patient with protracted urinary tract infection, post-prostatectomy, was referred to Lahor Research Laboratories in Nigeria and his mid-stream urine samples were processed for culture and susceptibility testing.

**Methods:** Four mid-stream urine specimens were collected from the patient and inoculated onto standard culture media and incubated at 37 °C aerobically for 24hrs. Microscopic and biochemical characterization were carried out on the isolates employing standard methods to identify the uropathogen. Antimicrobial susceptibility testing of isolates were carried out using the Kirby-Bauer disc diffusion method, employing ten frequently used antibiotics in Nigeria. Genomic and plasmid DNA were extracted using the Zymo Research kit (Irvine, CA). Plasmid curing was carried out to identify the possible genetic basis of the multiple drug resistance exhibited by the isolate. Molecular detection of antibiotic resistant genes gyrA, TEM, SHV and aac(3)-II were carried using polymerase chain reaction technique. DNA sequencing was carried out using 16S rRNA to identify the nomenclature of the isolate.

**Results:** The isolates were characteristically mucoid, lactose fermenting, non hemolytic Gram negative, motile rod-shaped bacteria, which were lipase positive but oxidase, gelatinase, deoxyribonuclease, indole and urease negative. The isolates were highly susceptible to Imipenem and moderately sensitive to Nitrofurantoin but resistant to the other antibiotics investigated. It possessed plasmid at 48.5 kb and harboured SHV, TEM and gyrA antibiotic-resistance genes, which were either plasmid-mediated, chromosomal-mediated or both. Analysis of DNA sequence data using Geneious package (version 9.0.5) with Maff alignment revealed that the isolated bacterium is closely related to Cedecea davisae.

**Conclusion:** The paucity of reports on Cedecea species as aetiological agents of human infections could be as a result of the difficulty in recognizing and characterizing this recently described pathogen, coupled with the fact that Laboratorians and Physicians are yet to be fully aware of the emerging clinical significance of this “relatively new” organism.

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Microbiological Analysis of Hemodialysis Water at the Douala General Hospital, Cameroon

**Background:** Rigorous control of the microbiological quality of water in hemodialysis services is important because the immune system of patients with chronic renal failure is weakened. The objective of this study was to determine the microbiological quality of water for hemodialysis in Nephrology Unit of the Douala Général Hospital in order to improve the disinfection strategy.

**Methods:** Twelve water samples were collected each month at different sites of the hemodialysis circuits A (inlet of filters), B (Outlet of filters / inlet of Reverse Osmosis (RO) device) and C (outlet of the RO device / close to the generator) between November 2015 and February 2016 to be analyzed. The bacteria were isolated after filtration of 100 ml of water at each site through nitrocellulose membrane with 0.45 µm microporosity deposited on the surface of the Tryptone Glucose Extract Agar (TGEA) and then incubated at room temperature (20 to 22°C) for 7 days. After transplanting to different environments, pure bacterial isolates were identified by their cultural characters and marketed biochemical galleries.

**Results:** The colony count was well above the required international standards (greater than 100 CFU / ml), for the hemodialysis water with a percentage of 50% of non-compliance. Among the bacteria identified, seven (07) were Gram-negative bacilli including Pseudomonas fluorescens, and Klebsiella pneumoniae subsp ozaenae, three (03) Gram-positive bacilli all Bacillus sp and three (03) Gram-positive cocci all of coagulase-negative staphylococci. The most frequently isolated bacterial genera were Pseudomonas sp (38,5%), Staphylococcus sp (23%), Bacillus sp (23%) and Klebsiella sp (15,5%).

**Conclusion:** The high bacteriological contamination of the hemodialysis water with the detection of a variety of bacteria shows that the disinfection procedure of the distribution loop is not efficient and cannot prevent the development of a biofilm.
Clinical Correlation of Malaria with Differential CD4 T Cells Count Among HIV Positive Subjects

**Background:** The human immune response to malaria and HIV gives us reasons to assert that either infection might influence the laboratory outcome of the other. Hence, it is logical to expect a decreased in CD4 T cells count, could cause an increased malaria outcome. This is a case-control study aimed at relating CD4 count among HIV positive subjects to malaria infection.

**Methods:** Giemsa staining technique was used to stain thin and thick blood film of both HIV positive and HIV negative controlled subjects, and observed under the microscope for the presence of trophozoites and other life stages of malaria parasites. CD4 T cell analysis was done on HIV positive subjects, using the Partec cyflow machine following the standard operating procedure.

**Results:** Among the two hundred and ten (210) HIV positive subjects, 10(4.8%) were positive for malaria. Out of the one hundred (100) HIV negative control subjects, 3(3%) were positive for malaria. Malaria recorded 6(2.9%) positive in CD4 counts ≤300 cells /µl, 3(1.4%) positive in CD4 counts 301-833 cells /µl, 1(0.5%) in CD4 counts 834-1365 cells /µl, and 0(0%) in CD4 counts 1366+ cells /µl. We analyzed our findings using the SPSS version 21 and results showed that there was no significant difference between CD4 cells count and malaria infection. Nonetheless, we also observed that 6 out of the 10 malaria positive subjects were those whose CD4 counts were ≤300 cells /µl.

**Conclusion:** This may suggest that either malaria or low CD4 Counts affects the outcome of the other. We conclude that the knowledge of the interactions between malaria and HIV remains important to the management of either of the diseases.

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Magnitude of Cytopenias Among HIV-infected Children in Bahir Dar, Northwest Ethiopia: a Comparison of HAART-Naïve and HAART-Experienced Children

**Background:** AIDS, caused by HIV, is a multisystem disease that affects hematopoiesis. The aim of this study was to assess cytopenias among HIV-infected children who had a follow-up at Felege Hiwot Referral Hospital, Bahir Dar, and northwest Ethiopia.

**Methods:** An institution-based cross-sectional study was conducted between April and May 2013. Systematic random sampling method was used to select the study participants. Descriptive statistics, independent t-test as well as chi-square and logistic regression were used for analysis. A p-value <0.05 was considered as statistically significant.

**Results:** A total of 224 children (112 highly active antiretroviral therapy [HAART]-naïve and 112 HAART-experienced) participated in the study. The magnitude of anemia, thrombocytopenia, neutropenia, leukopenia and pancytopenia among HAART-naïve HIV-infected children were 30.4%, 9.8%, 8%, 4.5% and 1.8%, respectively. The overall prevalence of anemia, neutropenia, thrombocytopenia, leukopenia and pancytopenia were 29.5%, 8.9%, 8%, 4.5% and 1.4%, respectively. Cluster of differentiation-4 percentage and mean corpuscular volume were significantly different between HAART-experienced and HAART-naïve children. Being of younger age and severely immunosuppressed were risk factors of anemia.

**Conclusion:** Anemia was the most common cytopenia, followed by neutropenia. Severe immunosuppression and younger age were significantly associated with anemia. Therefore, emphasis should be given for investigation and management of cytopenias in HIV-infected children, particularly for those who are immunosuppressed and of younger age.
The Role of Hospital Surfaces in Transmission of Puerperal Sepsis Related Pathogens in Maternity Unit at Mbarara Regional Referral Hospital

Background: Puerperal sepsis is the leading cause of maternal mortality in Mbarara Regional Referral Hospital (MRRH) with a maternal mortality rate of 30.9%. Studies have been done to identify the bacteria associated with puerperal sepsis but less effort in determining the source of these pathogens. No study had been conducted in MRRH to assess the role of hospital surfaces in transmission of puerperal sepsis pathogens in the maternity unit. This study was conducted, to determine the prevalent bacterial isolates and their antibiotic sensitivity patterns within the maternity unit at this hospital.

Methods: A cross sectional study was conducted from March to June 2017. 123 Samples were collected from hospital surfaces and the air within the maternity unit during morning hours. The samples were labeled with identification codes and then cultured. The isolates were gram stained, identified using biochemical tests. Culture and sensitivity testing using selected antibiotic discs. Percentage scores where used to identify the most prevalent bacterial isolates.

Results: Approximately 98% (120/123) of the processed samples were positive on culture for 24-48hours; The isolated pathogens were: Staphylococcus aureus, 30% (36/120), Pseudomonas species, 19% (16/120), Klebsiella species 15% (18/120) and Proteus species 1% (1/100), other contaminants not associated with puerperal sepsis were: Bacillus species, 29% (35/120) and Micrococcus species 18% (22/120). The pathogenic bacteria; Staphylococcus aureus, Klebsiella and Pseudomonas species, were susceptible to chloramphenicol, gentamycin and amikacin antibiotics, resistance was to ceftazidime and oxacillin.

Conclusion: The study findings indicate hospital surface contamination and its possible role in infection transmission to not only the patients but also health workers and caretakers. It is recommendable that regular hospital assessment be performed by laboratory personnel and fumigation, to minimize on occurrence of nosocomial infections.
**PS-1.3-085**

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**Prevalence Of RH Negative Blood Type in Nakasero Blood Bank Blood Donors**

**Background:** Rh blood group system is one of the most important human blood group systems after ABO. Studies have reported variations in incidence of Rh-negative blood types amongst different ethnic groups with African populations being at 3%. In Uganda, the blood bank cannot predict the stock of Rh-negative blood type and it becomes a challenge when there is need for this blood type for transfusion purposes and yet the blood bank does not have the product in stock. The aim of the study was to determine the prevalence of Rh-negative blood type amongst the blood bank donors in Uganda.

**Methods:** Blood bank data for 52, 216 donors from April 2017 to May 2018 was retrospectively reviewed and analyzed using e-delyphyn, the blood bank information management system at Uganda Blood Transfusion Service. The results analyzed were from five (5) collection blood sites within the central region. The Rh factor was typed using microplate technology and analyzed in accordance with the respective ABO blood group, sex of the donors and collection Sites.

**Results:** The overall prevalence of Rh-negative blood type irrespective of the specific blood groups was at 3.06% (1600/52216). The prevalence for the various blood groups were 1.74% (909/52216), 0.68% (355/52216), 0.53% (279/52216), and 0.11% (57/52216) for O Rh-, A Rh-, B Rh- & AB Rh- respectively.

**Conclusion:** There is a low prevalence of Rh-negative blood type in the Central region of Uganda. The prevalence is however similar to those obtained by other studies for African Populations. We recommend a comprehensive study in other regions to determine the national prevalence of Rh-negative blood type.

**PS-1.3-086**

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**Evaluating the Effectiveness and Efficacy of Disinfectants Used at Kabale Regional Referral Hospital**

**Background:** Disinfectants are used to destroy microorganisms that are living on the objects by destroying the cell wall of or interfering with the microbe’s metabolism. At Kabale Regional Referral Hospital (KRRH), disinfectants are such as Alcohol, Hypochlorite, Chlorhexidine are to kill infectious organisms in the different departments. Limited data is however available on evaluating the efficacy and effectiveness of disinfection in Hospital settings. The aim of the study was to determine the level of disinfection and the efficacy of the disinfectants used at Kabale Regional Referral Hospital.

**Methods:** Working surfaces and Door handles from fifteen (15) units in the hospital were swabbed during the morning after disinfection. The collected samples were labeled with identification codes and then cultured. The isolates were gram stained and identified using biochemical tests. The disinfectants from these wards were collected and qualitative Suspension tests performed by suspending bacterial cultures into the disinfectants. After exposure they cultures were verified by sub culturing to find out whether the inoculums were killed or not. Results were expressed as ‘growth’ or ‘no growth’.

**Results:** Of the 15 units swabbed, 80% (12/15) showed growth for staphylococcus aureus and Escherishia Coli. 66% (10/15) of the working areas exhibited growth, 6% (1/15) of the door handles sampled also showed growth. The suspension test showed 100% clearance of the bacterial cultures with Jik, Alcohol showed no growth & 99.8% Escherishia coli suspensions. Chlorohexadin showed now growth.

**Conclusion:** Disinfectants used at Kabale regional referral Hospital are effective in killing microorganisms with Jik and Alcohol being more effective than Chlorohexadin. The Growth of microorganisms in 80% of the hospital units was attributed to inadequate cleaning.
Uncoupling of Nitric Oxide Synthase Predisposes Diabetic Rats to Cardiovascular Risk Events

**Background:** It has been established that diabetes is associated with endothelial dysfunction resulting from decrease in activities of endothelial nitric oxide synthase (eNOS) leading to reduced nitric oxide (NO) production. In current work, we hypothesized that acute hyperglycaemia may affect the vascular beds differently, leading to endothelial dysfunction and loss of cardiovascular protection in diabetes.

**Methods:** Adult male and female Sprague-Dawley rats, 9–11 weeks of age were divided into three groups: controls (5 males and 5 female), diabetics (5 males and 5 females) and diabetics supplemented with tetrahydrobiopterin, 20mg/kgbw/day for two weeks. Diabetic groups received a single i.v. injection of streptozotocin (STZ, 60 mg/ kg) while control group were injected with a similar volume of citrate buffer.

**Results:** Total cholesterol was 144.30±3.51 mg/dl, 145.66±3.78 mg/dl in controls, 165.30±3.84 mg/dl and 177.01±2.49 mg/dl in diabetics and 152.57±2.75 mg/dl, 157.70±2.02 mg/dl in diabetics supplemented respectively. HDLC was 34.40±0.42 mg/dl, 39.28±1.45 mg/dl in controls, 31.49±1.11 mg/dl, 26.59±3.12 mg/dl in diabetics and 35.05±0.73 mg/dl, 36.35±1.24 mg/dl in diabetics supplemented respectively. LDL-C was 91.87±3.48 mg/dl, 86.98±3.36 mg/dl in controls, 108.72±2.81 mg/dl 124.40±4.41 mg/dl in diabetics, 94.31±3.38 mg/dl, 97.79±2.46 mg/dl in diabetics supplemented respectively. VLDL-C was 18.08±1.10 mg/dl, 19.40±0.70 mg/dl in controls, 25.08±0.41 mg/dl, 26.00±0.82 mg/dl in diabetics, 23.04±0.83 mg/dl, 23.50±0.29 mg/dl in diabetics supplemented. TG was 123.50±5.39 mg/dl, 97.00±3.49 mg/dl in controls, 125.00±2.61 mg/dl, 130.00±4.08 mg/dl in diabetics, 115.20±4.13 mg/dl, 117.75±1.60 mg/dl in diabetics supplemented. AIX was 4.21±0.14, 3.72±0.15 in controls, 5.26±0.13, 6.98±0.92 in diabetics, 4.36±0.10, 4.37±0.15 in diabetics supplemented respectively. With exception of TG and VLDL-C, differences observed between controls, diabetics and diabetics supplemented were significant (P lessthan 0.05).

**Conclusion:** Treatment with tetrahydrobiopterin, a known cofactor of NOS, tend to reversed all anomalies to near control values. Hence, uncoupling of NOS by diabetes, may predispose these subjects to cardiovascular events that may be reversed by treatment with tetrahydrobiopterin.

Kidney Tolerance Study of Hydro-alcoholic Extract of Terminalia Mantaly H. Perrier (Combretaceae) in Rats

**Background:** Introduction: Traditional medicine, despite its strengths, faces barriers, such as doses used in the preparation and administration of drugs (N’guessan, 2009). In view of this situation WHO (2008) therefore recommended that all traditional plants used for the treatment of diseases should be the subject of toxicological studies to prove their safety. It should be noted that the kidney is one of the main routes of drug elimination (Brater, 2002). The drugs or their metabolites can thus influence the functioning of the kidney by destroying the renal tissue or by modifying its main functions. Objective: To evaluate the effect of hydro-alcoholic extract of Terminalia Mantaly on tissues and kidney biochemical markers of rats.

**Methods:** Forty (40) rats were used and randomly divided into 4 groups of 10 animals (5 males and 5 females per batch). Batches II, III, IV were given by gavage in a volume of extract of 1 ml / 100 g body weight at doses of 150 mg / kg; 300 mg / kg; 600 mg / kg body weight. Batch T received distilled water. The administration is made daily at the same time for 28 days. Blood is collected once a week to evaluate biochemical parameters and a histological study was performed.

**Results:** creatinine changes in rates have increased significantly (p <0.001). The analysis of serum electrolytes reveals significant decreases in levels of sodium, potassium (p <0.005). The kidney micrograph did not show any adverse effects in the different groups of animals treated with hydro-alcoholic extract of Terminalia Mantaly.

**Conclusion:** With regard to these results, it appears that the aqueous-alcoholic extract of Terminalia mantaly would be globally well tolerated by the body when it is used at doses ranging from 150 to 600 mg / kg of body weight in animals (rats). Keywords: Terminalia mantaly, kidney tolerance, Biochemical parameters
Genetic Relatedness of Mycoplasma and Ureaplasma From the Cervix of Students and Infertility Patients

**Background:** Evidence on genetic relatedness of Mycoplasma and Ureaplasma from the cervix among Nigerians is lacking due to non-application of suitable molecular method. As a result, the study aimed to explore the genetic diversity and relationship among Mycoplasma and Ureaplasma in the cervix of students in a tertiary institution and infertility patients.

**Methods:** A total of one hundred and thirty-one randomly selected females of which endocervical swabs were collected from both groups. Genome sequencing of the 16SrRNA gene following DNA extraction were performed directly from the endocervical swabs. Phylogenetic analysis established the genetic relatedness between the Mycoplasma and Ureaplasma isolates from both groups.

**Results:** The overall percentage harboring Mycoplasma/Ureaplasma spp. was 10.7% with students and infertility patients having 11% and 9.7% respectively. From both groups, phylogenetic analysis revealed three distinct clusters, two with already characterized M.hominis and Ureaplasma spp (28.6% of overall Mycoplasma spp.) whereas one group formed a distinct cluster matched with U.urealyticum isolated from both groups. Furthermore, M.hominis clusters from the students were found to be strongly associated with that from infertility patients contrary to U.urealyticum. All M.hominis clusters strongly matched two strains from China.

**Conclusion:** This study suggests that Mycoplasma associated with infertility might result from being colonized by this pathogen in the female genital tract undetected within a general population where only conventional diagnostic methodologies are implemented.
Frequences des Marqueurs de Linflammation Chez les Potentiels Donneurs de Sang au Centre Hospitalier et Universitaire (CHU) de Yaoundé

Background: Malgré le fait que la sécurité transfusionnelle connait de nombreuses proeuses ces dernières années, les accidents post-don subsistent. En dépit des mesures de sélection, le donneur peut être en phase de séroconversion ou à un stade chronique précoce: période où les marqueurs biologiques de la pathologie sont indétectables par les méthodes de diagnostics sérologiques, hémato-étologiques et immuno-hémato-étologiques habituelles. Doù l'intérêt de la prise de température corporelle et la recherche des marqueurs de linflammation lors du recrutement d'un donneur. Cette étude visait à rechercher certains marqueurs inflammatoires chez les potentiels donneurs de sang du CHU afin de contribuer à la sécurité transfusionnelle.

Methods: Une étude transversale, prospective a été menée 08 février au 08 avril 2016 à la banque de sang du Centre Hospitalier Universitaire (CHU) de Yaoundé. Le titrage de la CRP (réactif CRP HUMATEX) et la VS (tube de Westergreen de 300 mm de haut et 2,5 mm de diamètre) était simultanément réalisée chez chaque potentiel donneur. Les données ont été analysées à laide dun logiciel Epi info version 4.0.

Results: Sur 123 donneurs enrôlés dont 57,72% (n=71) hommes, 73,98 % (91/123) de dons familiaux et 26,02 % (n=32) de dons volontaires, la tranche de (17-27) (ans 68,29% (84/123), suivi de (28-38) ans 26,83 % (33/123) était la plus représentée. 34,15% (42/123) de participants présentaient une CRP positives avec 23,6% (29/123) ayant un titre entre [6-24] mg/l, 7,3% (9/123) à [48-96] et 3,25%(4/123) ayant un taux >96. Par ailleurs, 10,5%(13/123) présentaient une VS anormale et 17,9%(22/123) avaient le couple VS/CRP anormaux. Linflammation était à tendance féminine (26,9% contre 11,3% hommes ayant le couple VS/CRP anormal).

Conclusion: Dans cette étude comme dans la littérature, les femmes constituent les mauvais donneurs. Il est donc important de rechercher systématiquement les marqueurs de linflammation telle que le couple VS/CRP chez chaque donneur avec un accent particulier chez les sujets féminins afin de garantir une meilleure sécurité transfusionnelle.

Synergyst Bioassay: The Role of ABC Transporters in Pyrethroids Resistance in Anopheles Gambiae s.l. from Northern Nigeria

Background: ATP binding cassette transporters (ABC transporters) has been implicated in insecticides resistance in the major malaria vector Anopheles funestus and An. gambiae. Over expression of ABC transporters can protect insects against insecticides. Verapamil a p-glycoprotein inhibitor has been utilised in as inhibitor of the ABC transporters to implicate them in insecticides resistance in malaria vectors.

Methods: Protocol. Extracted DNA of seven female An. gambiae mosquitoes brought from Auyo were analysed using SINE PCR Method for species identification. Approximately 100% of the mosquitoes were An. coluzzii (formerly M form) because the PCR product of 479 bp was amplified. Insecticide susceptibility to pyrethroids, was assessed using WHO susceptibility assays with Permethrin (0,05%), with and without pre-exposure to synergists. The synergists used is an inhibitor of P-glycoprotein efflux pumps (verapamil). Pre-exposure to verapamil followed by Permethrin result in 0,12% knockdown after one hour exposure and 10,7% mortality after 24 hours, which was higher than that for permethrin alone. Also, Mortality in all control groups was consistently 0%. no knockdown was seen when the mosquitoes were exposed to Ethanol + Dow corning oil proving that the Dow corning oil and the ethanol were not toxic to the mosquitoes and any mortality should be due to presence of insecticide or verapamil plus insecticide.

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Conclusion: This bioassay result reveals that ABC transporters possibly do not contribute to the resistance.
**Asymptomatic Cryptococcal Infection in Virologically Non-suppressed Patients at Fort Portal Regional Referral Hospital: A Retrospective Cohort Study**

**Background:** Cryptococcal meningitis is a leading cause of mortality among Human Immunodeficiency Virus (HIV) infected persons with severe immune suppression. However, data is limited on level and factors associated with Asymptomatic Cryptococcal Infection (ACCI) among HIV positive persons with un-suppressed viral load after six months of anti-retroviral therapy (ART). This study investigated the prevalence of ACCI among HIV positive persons who failed to suppress viral load after six months of ART in Fort Portal Regional Referral Hospital.

**Methods:** The study used a retrospective cohort design. Data was abstracted on 384 participants from electronic medical registers using abstraction form, entered in Epi-Data and exported to STATA version 15 for statistical analysis. Univariate, bivariate, and multivariate analysis was performed. The binary logistic regression was used. Results were presented with odds ratio and 95% confidence interval in publication quality tables. Statistical significance was set at 5% at multivariate level.

**Results:** 22 (5.7%) participants had ACCI. In multivariate analysis, moderate malnutrition was statistically significantly associated with ACCI (Adjusted Odds Ratio (AOR), 3.88; 95% CI, 1.19-12.66). However, opportunistic infection (AOR, 0.35; 95% CI, 0.12-1.02), baseline CD4 count of 250-350 cells/ul (AOR, 2.30; 95% CI, 0.12-1.02) and 350 cells/ul or more (AOR, 3.43; 95% CI, 0.95-12.31), WHO clinical stages III/IV (AOR, 5.52; 95% CI, 0.40-76.35), and baseline viral load greater 1000 copies/ul (AOR, 0.92; 95% CI, 0.37-2.26) were not statistically significantly associated with ACCI.

**Conclusion:** The prevalence of ACCI in Virologically no-suppressed patients is high and is associated with malnutrition. Next steps: Virologically non-suppressed persons at 6-months of ART and Malnourished should be screened for ACCI using CrAg test for early detection and management with pre-emitive Fluconazole. Nutritional assessment, counselling and support for people living with HIV should be prioritised.

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**Invivo Anti-malarial Activity of Ethnobotanically Used Ethiopian Medicinal Plants**

**Background:** Malaria is a major public health problem in the world in general and developing countries in particular, causing for about 80% of all malaria cases and about 90% of the deaths. Plasmodium falciparum has been reported to be resistant to the available drugs. Moreover, vectors have been reported to be resistant to the available vector control methods. So there is an urgent need for the development of new drug to alleviate the burden of the disease. This study was aimed to investigate the in vivo anti-plasmodial activity of extracts of the water and methanol leaves of C. aurea, methanol extracts of L. sativum and Z. scabra traditionally used medicinal plants for malaria treatment.

**Methods:** Experimental study design was implemented. A rodent malaria parasite, Plasmodium berghei, which was maintained at Aklilu Lemma Institute of Pathobiology laboratory, was inoculated into Swiss albino mice. The mice were infected with 1x10^7 parasites intraperitoneally. The extracts were administered to the mice via gabage daily for four days starting from the day of parasite inoculation. The control groups received the same amount of solvent (vehicle) used to suspend each dose of the herbal drug. Chloroquine was used as a standard drug, and was administered through the same route.

**Results:** Except the methanolic extract of Zehneria scabra all crude extracts did not produce symptoms of toxicity at 2000 mg/kg body weight of mice. Each extract showed variable level of parasitaemia suppression in dose related manner. Methanol extract of Zehneria scabra leaf produced highest suppression of parasitaemia (48.3%) at the dose of 600mg/kg. The methanol extract of Lepidium sativum showed 28.3% of suppression of parasitaemia at the dose of 600mg/kg. Furthermore, methanol extract of Calpurnia aurea induced 15.2% suppression, whereas its water extract induce 35.03% at 600 mg/kg body weight.

**Conclusion:** Crude extracts of Z. scabra, C. aurea and Lepidium sativum had dose dependent suppression activity against P. berghei.
The Role of Heme and CXCL10 in Malaria Pathogenesis

**Background:** Plasmodium falciparum malaria remains one of the most frequently lethal diseases affecting children in sub-Saharan Africa, yet the immune mediators that regulate pathogenesis and the wide variation in clinical manifestations of malaria are poorly understood. The aim of this study was to determine whether the overproduction of CXCL10 and Heme play roles in malaria pathogenesis.

**Methods:** This was a case control study involving a total of 500 children (382 malaria subjects and 118 non-malaria subjects) aged 1-16 years. Full blood count was estimated using a Hematology Analyzer. Plasma levels of CXCL10 and Heme were measured among the study participants using Quantikine ELISA kit. Data was presented as mean ± standard error or median and interquartile range (IQR). Pearson’s rank test was used to determine if there was any association between CXCL10 and Heme levels and malaria infection.

**Results:** There was significantly lower hemoglobin levels (12.1g/dL) in the malaria patients compared with 12.5g/dL in non-malaria subjects (p<0.001). There were significant difference in white cell counts in malaria compared to non-malaria white cell counts (6.9x10^9/L and 5.8x10^9/L respectively, p<0.0001). There were significant increases in plasma concentrations of CXCL10 in malaria subjects compared to non-malaria controls. (Non-malaria 180.4 pg/mL [IQR 101.1–328.6], malaria 705.7 pg/mL [IQR 459.0–1154], p <0.0001). There was significant increase in plasma concentration of Heme in malaria compared to non-malaria controls 60.33 µM [IQR 47.67–74.34], malaria 119.57 µM [IQR 72.34–192.41], p < 0.0001. There was strong linear relationship between CXCL10 and Heme levels in malaria subjects (r =0.492, p<0.0001).

**Conclusion:** Plasma levels of heme and CXCL10 were significantly increased in malaria subjects compared with non-malaria subjects. The present study has shown that the CXCL10 and Heme are markers of susceptibility to malaria in individuals living in malaria endemic areas such as Ghana.

**HIV Viral Load Suppression Rate Among Children on ART Between October 2016 and September 2017 in Côte d’Ivoire**

**Background:** Antiretroviral therapy (ART) and access to viral load (VL) testing became available for patients with HIV in Côte d’Ivoire in 1998. As of Sept 2017, 221,990 patients, including 10,427 children were on ART. However, VL testing scale-up began only in 2015.

**Methods:** Aggregate data of plasma based VL testing for children ages 0 to 14 was obtained from the laboratory information system (OpenELIS) of all 15 VL laboratories between Oct 2016 and Sept 2017. A descriptive analysis was conducted to measure the VL suppression rate (VLS) by age group, gender, and within and outside of the capital, Abidjan.

**Results:** At least once during the study period, 73.5% (n=7666) of children ages 0 to 14 on ART received VL testing (50.2% female). Only 13.9% (n=1067) benefited from testing at least twice, as recommended by national guidelines. Overall VLS among children was low at 55.6% [95% CI: 54.9-56.2] including 54.4% for male, vs 77.4% overall for adults. Suppression rates were 62.8% [62.1-63.6] (n=70), 56.3% [55.6-56.9] (n=4531), and 54.3% [53.7-55.2] (n=3065) respectively for children <1 year, 1-9 years and 10-14 years. VLS in Abidjan was 63.0% [62.4-63.6] vs 47.6% [46.9-48.3] in the rest of the country.

**Conclusion:** VLS among children was low. However, children in Abidjan, and particularly those attending university teaching hospitals/specialized treatment centers had the highest VLS. They benefited from better access and best practices, including reinforced peer education, enhanced counseling, targeted psychologic consultations and monthly VLS data analysis. Strategies to improve VLS should consider improving access and replicating best practices, particularly outside of Abidjan.
Characterization of Rotavirus Strains Circulating in Vaccinated Infants Who Presented with Acute Diarrhea at University Teaching Hospital

**Background:** Rotavirus is the primary cause of acute gastroenteritis in children under five years of age worldwide. Rotaviruses are associated with 24 million diarrheal episodes requiring clinic visits, with an estimated 114 million rotavirus episodes requiring home care per year and 2.4 million rotavirus linked hospitalizations. In Zambia, an estimated 10 million episodes of diarrhea results into 63,000 hospitalizations and 15,000 deaths every year, making diarrhea the third leading cause of death after pneumonia and malaria. Acute Diarrhea due to rotavirus has continued to affect under five children despite the introduction of the rotavirus vaccine. This study aims to characterize the strains that are causing diarrhea in vaccinated children and determine strain specific vaccine effectiveness.

**Methods:** Surveillance samples that were collected from vaccinated under five children, aged 2 to 12 months, who presented to the hospital with acute diarrhea of > 3 episodes in 24 hours were selected and tested by ELISA. Selected samples were tested for rotavirus using Enzyme Immuno-Assay (EIA) and all positive samples were genotyped using RT-PCR.

**Results:** 424 cases met the inclusion criteria of having passed more than 3 episodes of loose stool in 24 hours and had enough sample to be tested. So 424 stool specimens were selected and tested for group A rotavirus Viral Protein (VP) 6 antigen using an ELISA kit (ProSpecTTM, Oxoid, UK) following the manufacturer’s instructions. Out of the 424 stool samples that were tested, 153 (36%, 95% CI 31.5% to 40.9%) were positive for VP6 rotavirus antigen. Of the 153 cases that were positive, 134/153 (88%) were vaccinated against rotavirus and 19/153 (12.4%) were not vaccinated. Genotypes that were responsible for causing acute diarrhea in infants aged 2-12 months were G1P[8] (31.9%), G1P[6] (3.5%), G2P[4] (6.0%), G2P[6] (36.2%), G9P[6] (3.5%) and mixed infections accounted for 19%. Results for the first 25 samples that have been tested indicate the predominance of G2P[4] and G2P[6].

**Conclusion:** Infants are still having acute rotavirus diarrhea even after vaccine introduction. It is important to confirm whether these strains causing diarrhea in vaccinated children are evading the immune system or have evolved into strains that the vaccine is not effective against.

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**Bacterial Profile and Antimicrobial Susceptibility Pattern of the Isolates from Stethoscope, Thermometer and Inanimate Surfaces of Mizan-Tepi University Teaching Hospital, Southwest Ethiopia**

**Background:** Nosocomial infections occur among patients during their stay in hospitals. The severity of infection depends on the characteristics of microorganisms with a high risk of being acquired when the environment is contaminated. Antibiotic resistant bacteria are emerging rapidly around the globe creating a serious threat. This study was undertaken aiming in determining the profile of nosocomial bacteria isolated from stethoscope, thermometer, and inanimate surfaces of Mizan-Tepi University Teaching Hospital for which the antimicrobial susceptibility test was performed.

**Methods:** An institutional based cross sectional study was conducted from December, 2016 – February, 2017 at Mizan-Tepi University Teaching Hospital, Southwest Ethiopia. Samples were collected from the equipment and hospital surfaces. The isolated bacteria were checked for susceptibility by Kirby-Bauer disc diffusion method following the standards of CLSI 2014. Health professionals and sanitary team members were included in the study which assessed the disinfection practice of objects from which samples were taken. Data was analyzed using SPSS version 20.0.

**Results:** A total of 201 swab samples were taken and most bacteria were recovered from thermometer and floor consisting of 21.6% S.aureus, 19.3% CoNS, 15.9% E.coli, 14.8% Klebsiella Species, 11.4% Pa aeruginosa, 10.2% Proteus Species, and 6.8% Serratia species. The most multidrug resistant organisms were S.aureus (79%), Klebsiella Species (53.8%), CoNS (47%), and Proteus Species (44.4%). Only 6.45% of health professionals disinfect their stethoscope consistently.

**Conclusion:** S.aureus, CoNS, and E.coli were the predominant isolates. Most isolates showed highest susceptibility to ciprofloxacin and least to ampicillin and penicillin. There is no regular sanitation and disinfection of hospital equipment and surfaces. Therefore, continuous discussion and follow up should be needed by stakeholders to develop a habit of routine sanitation and disinfection of hospital surfaces and equipment.
Antimicrobial Susceptibility Pattern and Biofilm Forming Potential of Bacteria Isolated from Suspected External Ocular Infected Patients Attending Jimma University Medical Center Eye Clinic, Southwest Ethiopia

**Background:** Ocular disease and its complications are significant health problems worldwide, particularly in developing countries. The study aimed to assess the antimicrobial susceptibility pattern and biofilm formation potential of bacteria isolated from suspected external ocular infected patients.

**Methods:** A cross-sectional study was conducted on 319 suspect patients with external ocular infections from March 2017 to June 2017 at Jimma University Medical Center, Southwest Ethiopia. External ocular specimens were collected using sterile swabs and inoculated onto Blood agar, Chocolate agar, MacConkey agar, and Mannitol salt agar. Presumptive isolates of gram positive and gram negative bacteria were further identified by a series of biochemical tests. The antimicrobial susceptibility pattern of the isolates was determined by disk diffusion method according to CLSI 2015. Biofilm formation rate of isolates was 66.1% with *P. aeruginosa*.

**Results:** Out of 319 study participants with external ocular infection, prevalence of bacterial pathogens was 46.1%. The predominant bacterial isolate were *Coagulase negative staphylococcus* (27.7%) followed by *S. aureus* (19.7%). Among gram negative, *P. aeruginosa* (6.8%) was the leading isolate. Increased antimicrobial resistance was observed in tetracycline (84%), ethromycin (66.7%) and penicillin (71.1%). Amoxicillin-clavulanic acid, ciprofloxacin and gentamicin were the most effective drugs for both gram negative and gram positive ranging from 69-100%. *S. aureus* (13.8%) was methicillin resistant.

**Conclusion:** The prevalence of bacterial isolates among external ocular infection was high. Almost all bacterial isolate were resistant to at least one or more drugs. MDR pathogens were observed increasingly biofilm formers. Therefore, antimicrobial susceptibility testing should be practiced to guide treatment of patients and control of the emergence of drug resistant bacteria and their consequences.

**Molecular Diversity of Extended Spectrum β-lactamas among Clinical Specimens in a Tertiary Health Institution, Nigeria**

**Background:** Extended Spectrum β-lactamase (ESBL) production in Gram-negative bacilli has become a global health concern leading to the use of last-resort antibiotics such as the carbapenems in managing infections caused by them. We aimed to identify the clinically important molecular ESBLs (*blaTEM, blaSHV, blaCTX-M*) among routine clinical specimens sent to the Microbiology laboratory of University of Ilorin Teaching Hospital, Nigeria (UITH).

**Methods:** Clinical specimens submitted to UITH Microbiology laboratory between November, 2017 to January, 2018 were analysed for ESBL production. Isolates from these specimens were identified by standard biochemical tests. Phenotypic screening and confirmation for ESBL were done with agar dilution using cefotaxime and ceftazidime (MIC >1 mg/L) and double-disc synergy test respectively according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines. Antibiotic susceptibility was performed with Kirby-Bauer disc diffusion method and molecular detection of ESBL genes was by Polymerase chain reaction.

**Results:** Twenty (20) non-duplicate clinical isolates were identified as ESBLs and were all positive for double-disc synergy test. *E. coli* (8) and *Klebsiella spp.* (12) were the identified isolates with wound swab (30%), being the most prevalent of the clinical specimen. Of the thirty-nine (39) ESBL genes detected, *blaTEM* was the predominant type (n=17, 43.59%) while *blaCTX-M* and *blaSHV* were 13 (33.33%) and 9 (23.08%) respectively. An average of two ESBLs were seen per clinical isolate. In addition to cephalosporins resistance, the isolates were all resistant to floroquinolones and aminoglycosides.

**Conclusion:** Extensive ESBLs has been known to be the predominant ESBL in Nigeria, the leading type of *blaTEM* in our study shows the molecular diversity of ESBLs among clinical specimens in the country.
ASLM2018 INTERNATIONAL CONFERENCE PROGRAMME

TRACK 1: PANDEMIC THREAT

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**PS-1.4-101**

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Assessment of the Antifungal Activity of Dissotis Multiflora (MELASTOMATACEAE) and Paullinia Pinnata (SAPINDACEAE) Leaves Extracts and Their Combinations on Some Candida Species

**Background:** Fungal infections remain strong recrudescences in the World despite the range of antifungals present on the market. It is therefore necessary to search for new substances as a solution to the conventional drugs. Cameroon is a country with an immense wealth of medicinal plants, used in traditional medicine without scientific bases to treat various diseases. The aim of this study was to evaluate the antifungal activity of Dissotis multiflora and Paullinia pinnata.

**Methods:** Of each plant, one ethanolic extract, one methanolic fraction and one ethyl acetate fraction were tested on the inhibition of the growth of Candida strains. The combination of the methanolic extracts of these plants were also tested. The fungal strains were isolated from vaginal swab of women at the sampling unit of the Yaounde University Teaching Hospital (CHU) from March 15th to July 30th, 2017. The identification test of the fungal strains and their susceptibility to different antifungals were performed using the cocktail method. The effect of the combination of methanolic extracts were assessed by the checkerboard method.

**Results:** Phytochemical analysis of the crude extracts of D. multiflora and P. pinnata revealed the presence of secondary metabolites such as phenols, tannins, anthraquinones, alkaloids, saponins, steroids and flavonoids in both extracts. In general, our six fungal strains were susceptible to different extracts and fractions with inhibition diameters ranging from 10.33 mm for the methanolic fraction of D. multiflora on C. parapsilosis to 19 mm for the same fraction on C. haemolinii with (p < 0.05). Both the MICs and the MFCs of the active extracts ranged from 0.78 to 12.5 mg/ml and 1.56 to 25 mg/ml, the majority being fungicidal. The fractions showed significant antifungal activity compared to those of the fractions taken individually, especially with MICs reductions of the order to 75%.

**Conclusion:** The antimicrobial activities of the molecules present in these two plants could justify their use in traditional medicine in the treatment of candidiasis.

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**PS-1.4-102**

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High Level Plasmid-mediated Quinolone Resistance in Clinical Infections at Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State

**Background:** Antibiotic resistance as a current global health issue is making infections increasingly difficult or impossible to treat. Surveillance of pattern and determinants of resistance is a key strategy in instituting effective control.

**Methods:** The study was cross-sectional and the protocol was approved by the Ethics and Research Committee of OAUTHC Ile-Ife, 390 non-repetitive Gram negative bacilli involved in bacteraemia, meningitis, urinary tract infections and wound infections were isolated and identified by standard biochemical tests and MicrobactTM GNB 24E. They were tested against a panel of antibiotics in routine use, including four quinolones, by disc diffusion method. We investigated the carriage of PMQR genes using multiplex-PCR for qnrA, B, C, D, S aac(6')-Ib-cr, qepA, and oqxAB in isolates resistant to at least one quinolone. Data analysis was with appropriate descriptive and inferential statistics.

**Results:** The organisms were distributed as Escherichia coli (n=121; 31.0%), Kibesiila species (n=112; 28.7%), Pseudomonas aeruginosa (n=59; 15.1%), Proteus species (n=43; 11.0%), Salmonella species (n=6; 1.3%), Enterobacter species (n=25; 6.4%), Citrobacter freudii (n=4; 1.0%), Acinetobacter species (n=5; 1.3%), Hafnia alvei (n=4; 1.0%), Stenotrophomonas maltophilia (n=3; 0.8%), Serratia marcesens (n=1; 0.3%), and others. The antibiotic resistance profile was nalidixic acid; n=244 (62.6%), norfloxacin; n=204 (52.3%), ofloxacin; n=203 (52.1%), ciprofloxacin; n=199 (51.0%), ampicillin; n=233 (70.4%), co-amoxiclav; n=233 (57.7%), cefotaxime; n=181 (46.4%), gentamicin; n=159 (40.8%), cefazidime; n=141 (36.2%), cefepime; n=115 (29.5%), nitrofuratoin; n=55 (27.4%), and imipenem; n=39 (10.0%). 244 isolates were found to be resistant to at least one quinolone, 180 (73.8%) of these harboured at least one PMQR gene. These are efflux pump qepA (32.8%), followed by oqxAB (30.7%), aac(6')-Ib-cr (28.7%), qnrB (19.3%), qnrS (12.7%), qnrA (8.6%), qnrD (6.6%), and qnrC (6.1%).

**Conclusion:** There is high level quinolone resistance and wide distribution of PMQR genes in clinical isolates in Nigeria, calling for a review of the continuous use of these drugs as first line antibiotics in the treatment of infections.
Prevalence of Multidrug Resistant Mycobacterium Tuberculosis in Benue State, Nigeria

Background: In recent years the problem of TB has been compounded by the emergence of multidrug resistant (MDR) strains. Ten countries accounted for 76% of the total gap between TB incidence and reported cases of which Nigeria is among the top three and the highest in Africa. Benue State has a high risk of TB burden in Nigeria, being the highest HIV/AIDS endemic State in the country. This study assesses the prevalence of MDR TB in patients attending clinic in Federal Medical Centre Makurdi and General Hospital Otukpo.

Methods: Participants between the ages of 18 – 75 years were enrolled for this study. They were majorly presumptive and newly diagnosed TB cases with less than one-month duration of TB therapy. Two sputum samples were obtained from the participants. These samples were screened for the presence of Mycobacterium tuberculosis using standard techniques: Ziehl-Neelsen (ZN) staining; Xpert MTB/RIF Assay and Culture using Petroff’s method. Drug susceptibility test was by proportion method.

Results: Total of 152 participants were enrolled. Majority of the subjects were males (98, 64.5%). Eleven (7.2%) were smear positive for AFB. Based on culture 14 (9.2%) participants were confirmed Mycobacterium tuberculosis positive cases. A high prevalence of drug resistant TB was noted, with 11 (78.6%) isolates resistant to at least one of the first line drugs. The highest level of resistance, 78.6% was noted against Streptomycin, while no resistance was observed against Ethambutol. Nine isolates (64.3%) were mono-resistant. One isolate was poly-resistant while 2 isolates (14.3%) were multi-drug resistant. In total 5 different susceptibility profiles were identified in this study.

Conclusion: The studies detection of MDR tuberculosis cases, high resistance to Streptomycin and no resistance to Ethambutol calls for continuous detection and monitoring of drug resistance by scaling up laboratory facilities at all levels. Education of the public to increase treatment compliance.

Asymptomatic Bacteriuria Due to Multi-drug Resistant Uropathogens in Sickle Cell Disease Patients in Ile-Ife, Nigeria

Background: Sickle cell disease (SCD) patients have increased susceptibility to infections. The predisposing role of asymptomatic bacteriuria (ASB) to symptomatic urinary tract infection, its potentials of renal damage leading to sickle cell nephropathy and reports of increasing resistance of uropathogens to antimicrobials are of great concern. We investigated ASB prevalence, the etiological agents and their antibiotic resistance profile in patients with SCD.

Methods: This cross sectional study of patients with haemoglobin S (HbSS and HbSC) was conducted at a tertiary hospital setting in Nigeria. Single voided aseptically collected mid-stream urine samples were obtained from 59 patients with HbS in steady state and 116 healthy controls with haemoglobin A (HbAA), for urinalysis, microscopy and culture using standard techniques. Antimicrobial susceptibility was done with Kirby-Bauer disc diffusion method. Phenotypic confirmatory test for extended spectrum beta-lactamase (ESBL) detection was performed using combination disc method. ESBL producers were screened for blaSHV, blaTEM, and blaCTX-M genes by multiplex PCR technique and gene products were sequenced.

Results: The prevalence of ASB was significantly higher among patients with SCD (8.6%) than among the healthy controls (0.9%) (p = 0.016). All cases of ASB occurred only in females in both groups. Among the isolates from the patients, coagulase negative Staphylococci was more predominant (n=2; 33.3%). Other uropathogens isolated include Stenotrophomonas maltophilia, Acinetobacter baumannii and Enterobacter cloacae. All the isolates were multi-drug resistant with Enterobacter cloacae having the highest percentage resistance (n=10/11; 90.9%). This isolate harboured blaSHV, blaTEM and blaCTX-M-15 genes. All the isolates were sensitive to meropenem but resistant to cefotaxime, ceftazidime, penicillin, ampicillin and tetracycline.

Conclusion: The prevalence of ASB is high in SCD patients at 8.6% predominantly amongst female; occurrence of multi-drug resistant isolates implicated in these patients requires guided prescriptions. We posit a strong need for female patients’ education in our cohort to reduce the magnitude of ASB.
**Detection of Quinolone Resistance Genes (Qnr) in Gram-negative Bacteria Isolated from Clinical Samples and Hospital Environment in Bayelsa State**

**Background:** Understanding the mechanisms of bacterial resistance to some drugs is a way of overcoming threat to human health. This study aimed at detecting QnrA, QnrB and QnrS quinolone resistance genes from clinical and hospital environment isolates in Yenagoa, Bayelsa.

**Methods:** 146 clinical specimens from patients were collected namely; urine, sputum, endocervical swabs, high vaginal swabs, wound swabs, urethral swabs, throat swabs and hospital environment. Microorganisms were isolated using standard bacteriological techniques. The susceptibility pattern of the isolates to commercial antibiotics was determined using discs diffusion method. Quinolone resistance genes were detected by polymerase chain reaction using an ABI9700 Applied Biosystem thermal cycler.

**Results:** A total of 55 bacterial comprising 16(29.0%) Escherichia coli, 15(27.2%) Klebsiella spp., and 10(18.1%) Proteus spp., 14(25.5%) Pseudomonas aeruginosa were identified. Escherichia coli and Pseudomonas aeruginosa exhibited a higher level of resistance to various antibiotics including the quinolones when compared to Klebsiella spp. and Proteus sp (P<0.05). Bacterial isolates from hospital environment exhibited more resistance to antibiotics when compared to isolates from the patients (P<0.05). QnrB gene was more distributed across the various isolates unlike the QnrA and QnrS (P<0.05). Of the 14 Pseudomonas aeruginosa isolates, none harboured any of the quinolone resistance markers studied.

**Conclusion:** Our findings revealed that the QnrB quinolone resistance gene is more prevalent among enteric organisms in Bayelsa state and also suggested that Pseudomonas aeruginosa resistance to quinolones may be mediated by other features apart from Qnr genes.

**Prevalence of Pfcrpt K76T and Pfmdr 1 Mutant Genes in Four South-South States of Nigeria in the Post-chloroquine Era**

**Background:** Malaria, a global health problem especially in the sub-Saharan region posed a recurrent concern due to the resistance of the parasites to available antimalarial drugs despite the preventive measures provided by WHO. This study aimed to determine the prevalence of resistance markers in four South-south states of Nigeria, a decade after the withdrawal of chloroquine.

**Methods:** Eight hundred and forty-six (846) subjects participated in the study and were as follows: 192 (22.7%) Bayelsa, 218 (25.8%) Rivers, 196 (23.2%) Edo State and 240 (28.4%) Delta State. Malaria parasite identification was carried out using standard parasitological techniques. The Pfcrpt K76T and Pfmdr 1 resistance markers were analysed by Polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP).

**Results:** Our findings revealed that the prevalence of malaria infection in the four states was 78.1%, 68.8%, 62.8%, and 58.8% respectively. Children < 5 years recorded the highest infection rates (P< 0.01). The distribution of the mutant Pfcrpt K76T and Pfmdr 1 genes across the states was 12.0% and 28.6%, 4.0% and 22.0%, 14.6% and 29.3%, and 10.6% and 25.0% respectively. However, the prevalence of Pfcrpt K76T in Rivers State was significantly lower than that in the other states (P < 0.01), while for Pfmdr 1(N86Y) was statistically insignificant (P>0.01).

**Conclusion:** The prevalences of Pfcrpt and Pfmdr 1 remained elevated in the states despite the withdrawal of chloroquine over a decade ago. Hence, Nigeria is still far from re-introduction of chloroquine and the root cause of the persistence of resistance markers needs to be investigated.
Current Treatment of Multidrug-resistant Tuberculosis in Ethiopia: An Aggregated and Individual Patients’ Data Analysis for Outcome and Effectiveness of the Current Regimens

**Background:** The programmatic management of Multidrug-resistant tuberculosis (MDR-TB) is entirely based on a WHO recommended long-term, 18-24 month lasting treatment regimen. However, growing evidence shows that low treatment success rate and high rates of adverse events are associated with this regimen. Up to date, the MDR-TB treatment outcome is not sufficiently understood in Ethiopia. Therefore, this analysis aimed to determine the pooled estimates of successful (cure, completed, or both), and poor outcomes (death, failure, and defaults).

**Methods:** A systematic search was performed to identify eligible studies reporting MDR-TB treatment outcomes in Ethiopia. Relevant studies for our analysis were retrieved from the PubMed database search, Google Scholar and institutional repository sites of Ethiopian universities up to March 15, 2018. The primary outcome was treatment success, referring to a composite of cure and treatment completion. A random effect model was used to calculate pooled estimates.

**Results:** Six studies reporting treatment outcome on the 1,993 MDR-TB patients were included in this analysis. Of the cases, the 1288 and 442 patients had a successful and poor outcome, respectively. In the pooled analysis, treatment success was observed in 59.2% (95%CI, 48.1 - 70.4) of patients, while 23.3% (95%CI, 19.7 – 27.0%) of patients had a poor outcome. In sub-group analysis, 46.1% (95%CI, 34.2 – 58.0) were cured, 12.8% (5.7 – 20.0) treatment completed, 14.3% (11.5 – 17.2) died, 7.5% (3.7 – 11.3) defaulted, and 1.6% (1.1 – 2.2%) experienced treatment failure. However, 25.0% (14.6 – 35.5) patients whose treatment outcome was not assessed (on treatment or transfer-out).

**Conclusion:** The result of this study highlight treatment success among MDR-TB is below the acceptable range. To update the current treatment regimen, the levels of evidence need to be replicated through meticulous surveillance systems.

Multidrug Resistant Tuberculosis in Ethiopian Settings and its Association with Previous History of Anti-tuberculosis Treatment: A Systematic Review and Meta-analysis

**Background:** Efforts to control the global burden of tuberculosis (TB) have been jeopardized by the rapid evolution of multi-drug resistant Mycobacterium tuberculosis (MTB), which is resistant to at least isoniazid and rifampicin. Previous studies have documented variable prevalence of multidrug-resistant tuberculosis (MDR-TB) and its risk factors in Ethiopia. Therefore, this meta-analysis is aimed, firstly, to determine the pooled prevalence of MDR-TB among newly diagnosed and previously treated TB cases, and secondly, to measure the association between MDR-TB and a history of previous anti-TB drugs treatment.

**Methods:** PubMed, Embase and Google Scholar databases were searched. Studies that reported a prevalence of MDR-TB among new and previously treated TB patients were selected. Studies or surveys conducted at national or sub-national level, with reported MDR-TB prevalence or sufficient data to calculate prevalence were considered for the analysis. Two authors searched and reviewed the studies for eligibility and extracted the data in pre-defined forms. Forest plots of all prevalence estimates were performed and summary estimates were also calculated using random effects models. Associations between previous TB treatment and MDR-MTB infection were examined through subgroup analyses stratified by new and previously treated patients.

**Results:** We identified 16 suitable studies and found an overall prevalence of MDR-TB among newly diagnosed and previously treated TB patients to be 2% (95% CI 1% - 2%) and 15% (95% CI 12% - 17%), respectively. The observed difference was statistically significant (P < 0.001) and there was an odds ratio of 8.1 (95% CI 7.5–8.7) for previously treated TB patients to develop a MDR-MTB infection compared to newly diagnosed cases. For the past 10 years (2006 to 2014) the overall MDR-TB prevalence showed a stable time trend.

**Conclusion:** The burden of MDR-TB remains high in Ethiopian settings, especially in previously treated TB cases. Previous TB treatment was the most powerful predictor for MDR-MTB infection. Strict compliance with anti-TB regimens and improving case detection rate are the necessary steps to tackle the problem in Ethiopia.
A98S Mutation/Polymorphism on RT Region of HIV-1 Subtype C Isolates: Possible Impact of Geographical Variation on Drug Resistance

**Background:** The mutation A98S at reverse transcriptase (RT) region of the polymerase (Pol) genome of HIV-1 has been known as a common polymorphism that does not reduce non nucleoside reverse transcriptase inhibitors (NNRTIs) susceptibility. However, recently it is introduced as a resistance mutation to nevirapine (NVP) by the French drug resistance interpretation’s algorithm (ANRS) for only subtype C isolates.

**Methods:** HIV-1 chronically infected antiretroviral treatment naïve (n=220) and treatment experienced (n=100) patients visiting Gondar University Hospital, Northwest Ethiopia were recruited consecutively. Antiretroviral treatment (ART) was initiated based on the WHO clinico-immunological parameters. HIV RNA level and sequence of the entire protease and partial RT (76%) region was determined at baseline and after a median time of 30 months on ART.

**Results:** At baseline, A98S mutation was detected in 24.4% (39/160) of the treatment naïve Ethiopian patients infected with subtype C. Nineteen out of 22 patients with A98S polymorphisms at enrolment initiated NVP containing regimen. After a median time of 30 months on ART, all of the 22 patient were found to be virologically suppressed (HIV RNA less than 400 copies/ml). The mean CD4+ T cell count was increased from 189 to 367 cells/mm3 after 30 months of ART. All isolates with and without this mutation had various genetic signatures and polymorphisms in their protease (PR) region which are considered as compensatory drug resistance mutation in HIV-1 subtype B isolates (I13V, K20I, M36I, H69K, T74S, V82I, L89M, and I93L).

**Conclusion:** A98S mutation is a frequently observed natural polymorphism among Ethiopian HIV-1 subtype C isolates and hence shall not be considered as mutation conferring resistance to NVP among subtype C sub-Saharan isolates.

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Phenotype of Antibiotic Drug Resistance in Isolated Bacteria at Mopti Hospital (Mali)

**Background:** Antibiotic drug resistance represents a major public health problem in the world. This resistance is even more pronounced in resource limited countries such as Mali, which do not have a real antimicrobial resistance (AMR) policy. Approximately 700,000 deaths worldwide are attributed to AMR, which could reach 10,000,000 in 2050 if nothing is done. Our study aims to determine the frequency of MDR bacteria at Mopti hospital.

**Methods:** We conducted a cross-sectional study during January to December 2017 at Hôpital Somine DOLO de Mopti (Mali). The study covered all bacteriological samples received at the laboratory in 2017. We used manual method for bacteria culture, identification and sensibility testing. The Uri Select® medium served as an identification medium for bacteria isolated from UCBA. Bacteria isolated from others samples were identified with an API 20 E gallery. Antibiotic sensibility testing was determined by the diffusion method (CA-SFM / EUCAST recommendation 2016). Data was analyzed by software R version 4.44.

**Results:** We included 351 patients. The ratio-sex was 1.18. The age group of 15 - 45 years was the most represented (63.53%). The UCBA was the most frequent lab-test (70.94%) followed by PL-CBA 5.98%. Among 349 cultures 111 were positive (31.81%). Female were more susceptible to infections (K=10.33, p=0.001). Most frequently isolated species were Escherichia coli 33/111 (29.73%), Enterococcus sp 27/111 (24.32%), Stapylococcus aureus 6/111 (5.40%). Prevalence of phenotype ESBL, HCASE, MRSA, ERG and CPE was respectively 43.76%, 25%, 100%, 44.45% and 6.25%.

**Conclusion:** these data allowed us to know the local bacterial ecology and to highlight highly resistant germs. Developing these tests would help fight bacterial resistance.
PS-1.4-111

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Determination of Bacterial Quality and Antibiotic-resistant Profiles of Bacteria from ‘Suya’ and Smoked Fish (Clarias gariepinus) in Dutsin-Ma, Katsina State, Nigeria

**Background:** ‘Suya’ and smoked fish are cherished ready to eat food delicacy in Nigeria. However, these foods can be a huge source of Multi-Drug Resistant (MDR) bacteria that can be disseminated across the country. However, information on MDR studies from Dutsinma is very scare. Therefore, this study aimed at examining the bacteriological quality and antibiogram profiles of bacteria of these selected foods from Dutsinma, Katsina State, Nigeria.

**Methods:** Twenty of each of both ‘suya’ and smoked fish samples were collected from 10 locations of this area and transported to the laboratory for microbiological analyses. After serial dilution of the samples, the total viable count and coliform count was determined. Characterization and identification of bacteria was carried out by standard biochemical test. Antibiogram were determined on Muller-Hinton agar using antibiotic sensitivity discs.

**Results:** Findings revealed that ‘suya’ samples possessed the highest Total viable bacteria count (3.4×10⁵ to 7.7×10⁵ cfu/g) and coliform count (2.1×10⁵ to 6.2×10⁵ cfu/g). A total of 85 and 78 bacteria were isolated from ‘suya’ and smoked fish samples respectively. E. coli (24.7% and 24.4%) was the most frequently isolated from each sample respectively while Staphylococcus spp was the least (5.9%) isolated among the bacteria from ‘suya’ samples. However, no Staphylococcus spp was isolated from any smoked fish. Highest (66.7%) resistance to each of cefuroxime, gentamicin, amoxillin/clavulanate and ciprofloxacin were observed among E.coli from ‘suya’ while least (33.3%) resistance was to ceftazidime. The most common MDR resistance phenotype observed among the isolates was resistance to ceftazidime, cefuroxime, ampicillin, ciprofloxacin, augmentin and nitrofurantoin. With the exemption of Pseudomonas spp and Klebsiella spp, all other bacteria were multidrug resistant.

**Conclusion:** Findings from this studies is of great public health significance, and raises the need for improved production hygiene and public health awareness.

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PS-1.4-112

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Key Mutations to Reverse Transcriptase Inhibitors of the HIV-1 Virus Extracted from the Cerebral Spinal Fluid of persons living with HIV

**Background:** Central Nervous System deterioration in HIV infected persons is a high priority in their management. However, there is limited information regarding the key mutations that foster resistance to the antiretroviral drugs (ART), since Cerebral Spinal Fluid (CSF) HIV genotyping is seldom done. Therefore, the study described the key mutations to Reverse Transcriptase (RT) Inhibitors of the HIV-1 virus extracted from the CSF of persons living with HIV.

**Methods:** The CSF samples were collected from five individuals admitted at Joint Clinical Research Centre between 2015 and 2017. The patients were HIV positive, had been on ART for more than six months but were presenting with impaired CNS symptoms. HIV RNA was extracted from the CSF samples, reverse transcribed and amplified. The RT fragment was then sequenced using the Sanger sequencing method and the mutations analysed by the Stanford HIV database. The sample size was limited due to the extremely painful method of sample extraction from the patient, and the CSF low viral loads.

**Results:** The most clinically significant resistance mutations against Nucleoside Reverse Transcriptase Inhibitors were; M184V being present in all the five samples and K65R in only one. There were four classical Thymidine Analog Mutations (TAMs) identified (K70R, K219Q/E, M41L and D67N). There was one additional TAM T215Y/F, non-TAM L74I and two accessory mutations identified V75M and T69D. The most significant resistance mutations expressed towards non-nucleoside reverse transcriptase inhibitors (NNRTI) were; Y188F/L, Y181C, G190S, present in four samples and K238N (accessory mutation), present in one sample, only one sample did not express even one NNRTI Mutation.

**Conclusion:** All the HIV-1 viruses extracted from the five CSF samples expressed at least one major mutation which conferred resistance to most reverse transcriptase inhibitors. However, the sample size was limited thus an investigation on a larger scale should be carried out to analyse the clinical significance of CSF genotyping on patient care.
**PS-1.4-113**

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**Prevalence and Rifampicin Resistance Profiles of Mycobacterium tuberculosis in Enugu North Geographical Zone of Nigeria**

**Background:** Despite concerted efforts to end tuberculosis, Nigeria continues to topple the list of countries in Africa with high burden of tuberculosis. The situation is further complicated by the development and spread of multidrug resistant tuberculosis (MDR-TB). Rifampicin resistance is strong, although not always, indicative of MDR-TB. Hence the critical need to determine the prevalence and mutation profiles of rifampicin resistant Mycobacterium tuberculosis and the associated risk factors in Enugu state.

**Methods:** The study group comprised 868 randomly selected individuals accessing clinical services in designated directly observed treatment short course centres in 6 local government areas. Clinical and demographic risk factors for both tuberculosis and drug resistant tuberculosis were determined through the use of questionnaire. Molecular beacon assay (GeneXpert Cepheid), which uses nested real-time polymerase chain reaction platform and probes, was used for simultaneous detection/semin quantification of Mycobacterium and rifampicin resistance.

**Results:** Of the 868 individuals included in the study, 420 (48.4%) were males and 448 (51.6%) females. The overall prevalence of sputum smear positivity was 22.1%. Results showed that of 207 samples subjected to nucleic acid amplification test (NAAT), 44 (21.3%) tested positive, 27 (61%) males and 17 (39%) females. Of the 44 NAAT positive samples, 6 (13.6%) isolates comprising 4 (67%) from males and 2 (33%) from female showed complete resistance to rifampicin. Analysis of rifampicin resistance patterns in the 81 base pair region of the rpoB gene of Mycobacterium tuberculosis showed the highest (50%) mutation occurring along codons 522 – 526 and the least mutation (12.5%) occurred along codons 512 – 517.

**Conclusion:** The results of this study showed that (a) MDR-TB is slowly rising in Nigeria, (b) all identified cases of Rifampicin resistance were on anti TB drug, suggesting poor treatment adherence. It is therefore, recommended to further emphasize strict adherence to treatment regimen.

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**PS-1.4-114**

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**Multicenter Study of the Burden of Multidrug Resistant-bacteria in the Etiology of Diabetic Foot Ulcer Infection in Nigeria**

**Background:** Diabetic foot infection (DFI) is a leading cause of non-traumatic limb amputation made worse by emergence and spread of antibiotic resistance. Very little is available in published literature on the epidemiology of DFIs in West African subregion. We determined the role of multi-drug resistant (MDR) bacterial pathogens on the burden of DFI in Osun state, southwest Nigeria.

**Methods:** Cross-sectional multicentre study was approved by the Ethics and Research Committees of the three tertiary hospitals in Osun State. Demographic and clinical information of eligible patients were obtained followed by collection and culture of tissue biopsies and/or pus aspirate by established laboratory techniques. Antibiotic resistance testing in identified organisms was performed using modified Kirby-Bauer disc diffusion method. Resistance determinants were tested by polymerase chain reaction-based protocols. Data analysis was done with SPSS version 20.

**Results:** Ninety patients presented with 93 cases of DFI from whom 218 organisms were isolated. These organisms were 129 (59.2%) Gram-negative bacilli (GNB), 59 (27.1%) Gram-positive cocci and 29 (13.2%) anaerobic bacteria. The organisms included Staphylococcus aureus 41 (18.8%) Escherichia coli 23 (10.5%), Pseudomonas aeruginosa 20 (9.2%), Klebsiella spp 19 (8.7%) and Enterococcus spp 11 (6.0%). Of the 29 anaerobes, 7 (24.1%) and 6 (20.7%) were Bacteroides spp and Peptostreptococcus anaerobius, respectively. Seventy four (80%) of the DFIs were by MDR bacteria. Thirteen (31.7%) of the Staphylococcus aureus were methicillin-resistant; 10 (76.9%) of which harboured mecA gene. 43 (33.3%) of the GNB were ESBL-producing 30 (81%) of which harboured bla gene for CTX-M production. Only 4 (3.1%) GNB were carbapenemase producers of which blaVIM was the commonest. Factors associated with presence of MDR bacteria were peripheral neuropathy (r = 4.05, p = 0.042) and foot infection duration >1 months (r = 7.63, p = 0.015).

**Conclusion:** Multidrug-resistant aerobic bacteria are overrepresented amongst agents of DFI with the possibility of worsening the burden of the disease.
**Detection of Anti-tuberculosis Drug Resistance from Pulmonary Tuberculosis Patient in a North Central Nigerian Setting.**

**Background:** Tuberculosis (TB), a notable disease usually associated with poverty is a leading cause of mortality globally. And while much advancement have been made in overcoming this disease, the growth and spread of multi drug resistance poses a threat to high TB burden countries like – Nigeria; and this is of major Public Health concern to all and sundry.

**Methods:** A total of 121 clinically diagnosed TB patients who were referred to the APIN-JUTH TB Laboratory in Jos, Plateau State, Nigeria, all participated in this study. The study covers a period of five months (August 2016 to December 2016). Three different testing methods which include GeneXpert MTB/RIF (Gx), Line Probe Assay (LPA), and Nitrate Reductase Assay (NRA) were employed in the analysis of the sputum samples. The data collected were analysed using simple percentages.

**Results:** Out of the 121 patients who participated in this study, 60 (49.6%) were anti-TB drug naïve (Newly diagnosed); while 61 (50.4%) were re-treatment patients. 46.7% (28/60) of the anti-TB drug naïve patients were Rifampicin (RIF) resistant; while 95.1% (58/61) of the re-treatment patients were RIF resistant. The overall prevalence of RIF resistance in the study population was 71.1% (86/121). Correlation of the test assays (Gx, LPA, and NRA) on RIF resistance detection were all positive and significant (p-value <0.05). However, a higher proportion of the RIF resistance was detected by the NRA method including an indeterminate RIF Resistance outcome from GeneXpert Assay.

**Conclusion:** The significantly high prevalence of anti-TB drug resistance (71.1%) recorded in this study is a clear indication of the public health threat this disease poses to the global community. Thus all hands must be on deck to overcoming this great challenge of saving a burdened world – healthy enough for all.

**Rectal Colonization with Carbapenem-resistant Organisms in an Intensive Care Unit, Southwest Nigeria**

**Background:** The emergence and global spread of organisms resistant to the last-resort antibiotics such as the carbapenems is alarming. Increased morbidity, financial burden and mortality have been attributed to infections due to carbapenem-resistant organisms (CROs) which currently have little or no therapeutic option. More worrisome is the asymptomatic carriage of CROs as intestinal microbiota, which usually precedes transmission and infections. We aimed to determine the burden of rectal colonization of CROs including carbapenem-resistant Acinetobacter baumannii (CRAB), carbapenem-resistant Pseudomonas aeruginosa (CRPA) and carbapenem-resistant Enterobacteriaceae (CRE) in patients admitted into the intensive care unit (ICU) of a tertiary health institution in southwest Nigeria.

**Methods:** A prospective observational study was conducted among all new patients admitted from August, 2017 to June, 2018 into the ICU. Rectal swabbing on each patient was done within 48 hours of ICU admission and thereafter weekly until exit using the protocol for active surveillance culture by the US Centres for Disease Control and Prevention. Acquisition rate (AR) was defined as the percentage of patients who acquired CRO which was absent on admission. Organism identification was with Microbact 24E®. Data was analysed using Epi-info 7.2.1.0.

**Results:** Eighty-four patients were sampled. One-third (29/84, 34.52%) of the patients were either colonized upon admission or acquired at least one defined CRO during stay in ICU. Overall 48 hours of ICU admission and thereafter weekly until exit using the protocol for active surveillance culture by the US Centres for Disease Control and Prevention. Acquisition rate (AR) was defined as the percentage of patients who acquired CRO which was absent on admission. Organism identification was with Microbact 24E®. Data was analysed using Epi-info 7.2.1.0.

**Conclusion:** There was a high prevalence of CRO colonization and the AR of CRAB was highest among the patients.
Isolation and Antibiotic Susceptibility Testing of Haemophilus Influenzae From Nasopharynx of Children Under Five Years Attending Maternal and Child Health Clinic in Mbarara Regional Referral Hospital

**Background:** H. influenzae remains an organism of a major public health challenge worldwide despite the availability of the Hib vaccine, particularly among children under 5 years. Information on the current carriage status and antibiotic susceptibility is key on proper health care provision. Therefore, we conducted a study to determine H. influenzae carriage rate and antibiotic susceptibility testing of the isolates among the children.

**Methods:** This was a cross sectional study conducted between January and May 2018, among children under five years attending Maternal and Child Health (MCH) Clinic in Mbarara Regional Referral Hospital (MRRH). We carried out standard Microbiology methods to culture, isolate and identify H. influenzae, and then tested for their susceptibility to commonly used antibiotics following the CLSI standards.

**Results:** Of the 248 participants included in the study, 116 (46.77%) were females and 132 (53.23%) males, and more than half (57%) of them were 1 to 6 months of age. 51 of the study participants had H. influenzae in their Nasopharynx, which represents 20.56% carriage, 95% CI (15.49 to 25.63). There was a general high susceptibility of the isolates to the antimicrobial agents commonly used. There was 100% susceptibility to Ciprofloxacin and Imipenem antibiotic agents, though 6(11.76%) and 4(7.84%) of the isolates showed resistance to Chloramphenicol and Ampicillin respectively.

**Conclusion:** The high burden presented by H. influenzae and the resultant impact on child health requires much attention to prevention of infections associated with the organism. A well-funded molecular study focusing on typing the isolates would determine the impact of the vaccine, given the carriage rates are still high.

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Incidence of Chronic Lymphocytic Leukaemia at a Tertiary Hospital in South Africa (2011–2016)

**Background:** Chronic lymphocytic leukaemia (CLL) is one of the most common leukaemias in the world. Studies describing CLL prevalence in South Africa (SA) and Africa are scarce and the impact of the disease in the SA and African setting is largely unknown. The objective of the study was to describe the incidence of CLL at our centre between the years 2011 and 2016 by year, gender, HIV status and cytogenetic profiling and compare our findings with similar SA studies.

**Methods:** The study was retrospective and included all incident CLL cases diagnosed in the Department of Pathology, National Health Laboratory Service, Tygerberg Academic Hospital, Cape Town, SA. A positive diagnosis of CLL was confirmed by morphological and flow cytometry findings in accordance with the World Health Organisation classification.

**Results:** There were 80 incident cases of CLL diagnosed. There were more females (51.2%) than males (48.8%) and the mean age at diagnosis was 67 years. Ninety one percent of the patients were aged 50 years and above. Males presented with the disease at a younger age (mean 63 years) than females (mean 70 years). CLL concurrent with HIV was not common (4%) and these patients were younger than 50 years.

**Conclusion:** Incomplete cancer registries cause the wide knowledge gap in the incidence of CLL in SA. Monitoring cancer trends is crucial in their management. In SA, cancer registries do not account for specific haematological malignancy entities although their management differ thus hindering efforts for their effective management. Diagnostic laboratories form the backbone of entity-specific cancer registries. Because of non-entity specific cancer registries, we could not compare our CLL study results to the rest of SA. We recommend that SA and African cancer registries become more specific to highlight different cancer entities and add to their effective management.
Prevalence and Molecular Characterization of Extended-spectrum Beta-Lactamase Producing Gram Negative Bacilli in a Tertiary Care Hospital in South-Western Nigeria

Background: Extended spectrum beta-lactamase (ESBL) producing bacteria constitute a huge burden problem in health care systems. The knowledge of prevailing susceptibility patterns and the distribution of ESBL genes is crucial to developing appropriate treatment protocols in health care facilities. Little is known about the epidemiology of ESBL in sub-Saharan Africa especially Nigeria. This study determined the role of ESBL-producing Gram negative bacilli (GNB) in clinical infections in Osun state, Nigeria.

Methods: This cross-sectional study was approved by the Ethics and Research Committees of Lautech Teaching Hospital, Osogbo, Osun state. Nigeria. Isolation and identification of bacteria from clinical specimens were by standard protocols. Antibiotic resistance testing in identified organisms was performed using modified Kirby-Bauer disc diffusion method. ESBL determining genes were identified by polymerase chain reaction. Pertinent clinical and demographic information was obtained using data collection form. Data were analysed using R statistical software package (version 3.3.0).

Results: A total of 359 GNB were isolated from different clinical specimens of which Escherichia coli (84; 23.4%) was predominant. The isolates were cultured from urine (159; 44.3%), wound (105; 29.2%), blood (46; 12.8%) and sputum (28; 7.8%). Ninety-four genes, comprising 7 strains with CTX-M, 4 strains with SHV and 6 strains with TEM gene. Sixty-nine (80.2%) bacterial species harboured multiple genes: 24 harboured bla TEM, SHV, CTX-M, 40 harboured bla CTX-M, TEM, 3 harboured CTX-M, SHV and 2 harboured bla TEM and SHV.

Conclusion: ESBL producing bacteria are prevalent among the clinical isolates with possibility of worsening treatment outcomes. Routine phenotypic testing for detecting ESBL production would be imperative for appropriate treatment of patients with clinical infections thereby preventing further development of antimicrobial resistance.

Association Between Retreatment and First-line Anti-tuberculosis Drug Resistance in Patients Attending National Tuberculosis and Leprosy Training Centre/TB Referral Hospital (NTBLTC) Zaria, Nigeria

Background: Multi-drug resistant tuberculosis (MDR-TB) is a major disease threat nationally and globally. Nigeria according to its first drug resistance survey in 2010 showed 2.9% MDR TB among new cases and 14.3% MDR among previously treated cases. Rifammon resistance is 1.4% and 14.5% among new and retreatment cases respectively. This study was conducted to determine the pattern of first-line anti-TB drug resistance and associated factors in patients attending NTBLC/TB Referral Hospital Zaria.

Methods: A cross-sectional study was conducted among presumptive MDR-TB patients at the National TB Reference Laboratory. Their sputum samples were collected and screened for Mycobacterium tuberculosis (Mtbb). First line anti-TB drugs (rifampicin, isoniazid, ethambutol, streptomycin) resistance tests were performed using Xpert MTB/RIF test, line probe assay (LPA) and conventional drug susceptible tests (Nitrate reductase Assay). Data was collected using a semi-structured questionnaire. Univariate and bivariate analysis with logistic regression were done.

Results: A total of 200 presumptive MDR-TB patients were recruited, 138 (69%) were males and 62(31%) females with an average age of 32 years (range 15 – 75). Among them 156 (78%) were newly diagnosed and 44 (22%) were retreatment cases. Eighty-one (40.5%) tested positive for Mtb, with 55 (67.9%) of these being rifampicin resistant. Of the 55 rifampicin resistant patients, 42(76.3%) had MDR-TB, out of which 32 (58.1%) were retreatment cases. This study was conducted to determine the pattern of first-line anti-TB drug resistance and associated factors in patients attending NTBLC/TB Referral Hospital Zaria.

Conclusion: There is a high rate of rifampicin resistance of MDR-TB among retreatment patients. Health workers should ensure that new TB patients are adequately and repeatedly informed on treatment duration and the need for adherence for better treatment outcomes and to reduce the transmission of MDR-TB.
**High Antimicrobial Resistance Among Clinical Pathogens Isolated from Patients in Zambia**

**Background:** Infectious diseases cause high morbidity and mortality globally. Clinically relevant microbiology laboratory testing is critical for the accurate diagnosis and effective treatment of infectious diseases. These tests determine which microorganisms are causing disease and the drug resistance pattern of the pathogen. Clinicians throughout Zambia frequently must rely only on their clinical judgment and empiric therapy alone because clinical microbiology is not available in a clinically relevant way. In this cross-sectional study, we reviewed result data for specimen tested between 2017 and 2018 March.

**Methods:** Samples analyzed were collected from patients visiting private clinics in Lusaka and Copper Belt provinces. All Samples were tested at Centre for Infectious Disease Research in Zambia, Central Laboratory. Swabs transported in BBL CultureSwab Plus transport media, tissues, deep wound aspirates were inoculated on Blood, Chocolate, and MacConkey agar and were incubated in aerobic and anaerobic condition for 48 hours. Respiratory and urinary tract samples were inoculated in aerobic condition and blood specimen in blood culture bottles. For species identification and drug susceptibility testing, BD Phoenix system was used.

**Results:** In total 85 clinical samples were tested resulting in the isolation of 24 Gram-negative and 18 Gram-positive bacteria. Within Enterobacteria, Klebsiella, Pseudomonas, Salmonella, Escherichia, Citrobacter species were most common. Staphylococcus and Enterococcus species were also isolated. Among the Gram-positive bacteria, the highest level of resistance was to Imipenem, third generation cephalosporins, Clindamycin, Ampicillin, of up to 60%, 70%, 75% and 80% respectively. Gram-negative bacteria had high resistance to Trimethoprim-sulfamethoxazole, Amoxicillin-Clavulanate, and first and second generation cephalosporins, of up to 63%, 67%, and 88% respectively.

**Conclusion:** High drug-resistance levels among clinical isolates reflect possible impact of the long-term empiric use of antibiotics in Zambia. For a better understanding of the scale of this problem, a more comprehensive antibiotic resistant survey is required.
Temporal Changes in Plasmodium Falciparum Reticulocyte Binding Protein Homolog 2b (PfRh2b) in Senegal

**Background:** The Plasmodium falciparum reticulocyte binding protein homolog 2b (PfRh2b) is an important merozoite ligand that mediates invasion of erythrocytes by interacting with a chymotrypsin-sensitive “receptor Z”. A large deletion of polymorphism is found in the c-terminal ectodomain of this protein around the world. The varying frequencies by region suggest that there could be region specific immune selection at this locus. Therefore, this study was designed to determine temporal changes in the PfRh2b deletion polymorphism in infected individuals from Thiès (Senegal) and investigated the presence of antibody against this protein. We also sought to determine the selective pressures acting at this locus and whether prevalence of the deletion in isolates genotyped by a 24-SNP molecular barcode is linked to background genotype.

**Methods:** Infected blood samples (n=849) were sourced from previous studies conducted between 2007 to 2013 at SLAP clinic in Thiès. The dimorphic alleles of the PfRh2b was determined using hemi-nested PCR after DNA extraction. Samples used in this study were previously barcoded and the relation between the PfRh2b deletion and the barcode results was investigated. By Elisa, we also studied the acquisition of humoral responses against PfRh2b in uncomplicated senegalese patients (n=564).

**Results:** We observe a consistent trend of decreasing prevalence of the of PfRh2b deletion over time: from 66.54% in 2007 and to 38.1% in 2013. No association between the presence of this deletion and age was found. For the majority of isolates, the PfRh2b allele tracked with 24-SNP barcoded genotype, indicating a lack of independent selection at this locus. Our results demonstrate also the presence of immune response against PfRh2b.

**Conclusion:** Antibody against PfRh2b exist in Senegalese patient. PfRh2b deletion was found in Thiès with varying prevalence. However, these temporal and spatial variations could be an obstacle to the implementation of this protein as a potential vaccine candidate.

Detection of Carbapenem Resistant Escherichia Coli and Klebsiella Pneumoniae From Cases of Urinary Tract Infections in Aminu Kano Teaching Hospital

**Background:** Carbapenems are group of β-lactam antibiotics with an exceptionally broad spectrum of activities. They are used against many multi drug resistant Gram negative bacteria.

**Methods:** Macroscopy, Microscopy and Biochemical characterization was used for the isolation of Escherichia coli and Klebsiella pneumoniae. A total of 204 urine samples were collected from patients suspected of having urinary tract infections, 92 samples and 112 samples were from males and females patients respectively.

**Results:** Result: Escherichia coli were isolated from 37(62%) of the total Patients, this is followed by Klepsiella pneumoniae 14(38%). A total positive sample for both Escherichia coli and Klepsiella pneumoniae was 37 (18%) out of the total positive samples 13(35%), were isolated from males and 24(63%) were isolated from females. However, there was no significant association between age of patients and culture result (P = 0.054). Carbapenem susceptibility pattern against Escherichia coli and Klepsiella pneumoniae, out of 37 positive cultures, 23 were Escherichia coli and were all susceptible to imiperem, moropenem, etapenem and 14 were Klepsiella pneumoniae and they are all susceptible to imiperem, moropenem, etapenem.

**Conclusion:** Conclusion Based on the result obtained, the susceptibility of E.coli and Klebsiella pneumoniae for Carbapenem was found to be 100%, and resistance is zero 0%, Carbapenem is therefore recommended for Urinary tract infection.

**Background:** Contexte Au CHU Kamenge, l’infection bactérienne occupait la première place en termes de morbidité et la mortalité atteignait 36,8% et le traitement peut se faire sans les résultats de l’antibiogramme suite à des ruptures de stock. L’analyse des variables comme le profil de traitement aux antibiotiques des infections bactériennes, la durée de traitement et l’évolution clinique des malades a été effectuée pour dégager le rôle de l’antibiogramme.

**Methods:** Méthodes et population d’étude La collecte des données a été effectuée à l’aide d’une fiche à partir des dossiers des patients qui ont été traités pour des infections bactériennes au CHU Kamenge du 1er janvier 2015 au 30 juin 2017. 222 patients ont été recensés et l’antibiogramme a été réalisé seulement pour 106 patients. Les données ont été analysées avec Epinfo.

**Results:** Résultats Pour ceux qui ont réalisés l’antibiogramme, 33,96% ont une fois changé de traitement, 10,38% deux fois contre 37,06% ; 10,34% respectivement pour ceux qui n’ont pas réalisés l’antibiogramme. 82,08% traités avec un résultat d’antibiogramme étaient sous une monothérapie et 16,04% sous une bithérapie contre 71,55% et 25,86% respectivement pour ceux qui n’ont pas réalisés l’antibiogramme. Les résistances aux antibiotiques étaient de 17%, 8% et 18% respectivement lors du premier traitement, du premier changement et du deuxième changement de traitement. Les patients qui ont réalisés l’antibiogramme et qui ont été mis sous antibiothérapie durant 6 à 10 jours représentent 46,23%, l’amélioration était de 75% et la résistance se trouve à 1% alors qu’ils représentent 57,76%, l’amélioration était de 65% la résistance était à 5% chez les patients traités sans l’antibiogramme.

**Conclusion:** Conclusions Chez les patients traités avec les résultats de l’antibiogramme, la durée de traitement est relativement courte, l’évolution clinique des malades est bonne, un bon nombre de patients bénéficient le premier traitement relativement courte, l’évolution clinique des malades est bonne, un bon nombre de patients bénéficient le premier traitement seulement avec prédominance de la monothérapie.
The Global Point Prevalence Survey (Global-PPS) of Antimicrobial Consumption and Resistance: Results of Antimicrobial Prescribing at the University College Hospital (UCH), Ibadan

Background: Antimicrobial resistance is a global health challenge. There is inadequate information on antimicrobial prescription practices in many sub-Saharan African countries including Nigeria. A standardized method for surveillance of antimicrobial use in hospitals was employed to assess the antimicrobial prescribing practices in UCH, Ibadan, Nigeria.

Methods: Point Prevalence Survey (PPS) was conducted in December 2017 at the UCH Ibadan. The survey included all in-patients receiving an antimicrobial on the day of PPS. Data collected included details on the antimicrobial agents, reasons, and indications for treatment as well as a set of quality indicators. A web-based application was used for data entry, validation, and reporting as designed by the University of Antwerp.

Results: This survey included a total number of 447 patients from six major wards. The adult surgical ward had the highest number of patients, 183 (40.9%), who were predominantly females, 233 (52.1%). The indications for antibiotic prescriptions were mainly prophylactic, 251 (56.2%). A total number of 189 therapeutic antibiotic prescriptions were issued for Community-Acquired Infections, 128 (56.2%) while 61 (32.3%) were for Healthcare-Associated Infections. The majority, 312 (69.9%), of the patients had parenteral antibiotics but only 95 (21.3%) of all antibiotic prescriptions had a documented stop or review date. Although the reason for antibiotic prescription was indicated in 413 (92.4%) of all instances, targeted therapy was the basis for only 17 (3.8%) of the prescriptions. Frequent antibiotic use included; gentamicin (5.8%) for therapeutic uses, amikacin (2.5%) for medical prophylaxis and metronidazole (12.1%) for surgical prophylaxis. Non-compliance with the local antibiotic guidelines was observed on all the wards.

Conclusion: Our findings suggest poor antibiotic prescription practices and low utilization of laboratory facilities. To stem the rising tide of antimicrobial resistance, there is a need to create National awareness on targeted prescribing of antibiotics and use of evidence-based antibiotic guidelines.
## Phenotypic Detection of Extended Spectrum Beta Lactamase and Carbapenamase Producing Acinetobacter Isolated From Different Hospitals in Abuja, Nigeria

### Background
Multi drug resistant Acinetobacter species have emerged as significant pathogens in clinical settings and have been associated with increasing morbidity and mortality. This study evaluated the resistance patterns among extended spectrum beta lactamase (ESBL) and Carbapenamase-producing Acinetobacter from hospitals in Abuja, FCT, Nigeria.

### Methods
Vaginal and rectal swabs were obtained from women intrapartum and ear, skin, and throat swabs obtained from their babies at birth from April, 2016 to March, 2017. Additionally, blood cultures were obtained from newborns with suspected sepsis from November, 2008 to August, 2017. Antimicrobial susceptibility testing was performed on Acinetobacter species isolated, using the modified Kirby-Bauer disc diffusion method. Isolates were screened for ESBL and Carbapenamase production using the combined disc and the CarbAcineto NP respectively.

### Results
A total 105 Acinetobacter strains were identified from swabs (n=50) or blood culture samples (n=55). Of 50 Acinetobacter isolates from swabs, 37 (74%) were obtained from mothers and 13 (26%) from newborns. All 50 swab isolates were identified as Acinetobacter baumannii/calcoaceticus. Of blood cultured screened 55 Acinetobacter isolated, out of which 51 (92.7%) were Acinetobacter baumannii/calcoaceticus, 1 (1.8%) each were Acinetobacter haemolyticus, Acinetobacter radioresistentes, Acinetobacter iwoffii and Acinetobacter johnsonii respectively. Resistance to third-generation cephalosporins were cefotaxime 97(92.3%) and ceftriaxone 94(89.5%). ESBL producing isolates from blood culture were 5(9%) and swab were 3(6%). Resistance to both imipenem and meropenem was 16(15.2%). Carbapenamase production was phenotypically detected in 12(11.4%) isolates.

### Conclusion
Our results indicate a notable occurrence of invasive and carriage ESBLs and carbapenamase-producing Acinetobacter among pregnant mothers and newborn. A cautious approach to the use of antibiotics is advocated for more effective control of resistance phenotypes and better treatment outcomes.

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## Prevalence of CTX-M ,SHV and TEM ESBL Genes in Escherichia coli Isolated From Door Handles in Federal University, Lafia, Nasarawa State Nigeria

### Background
Resistance to antibiotics, especially extended spectrum cephalosporins has become a global menace. Contamination of door handles with resistance pathogens could be a major threat to public health. This survey investigated the prevalence of E.coli from door handles in Federal University, Lafia, North-Central Nigeria.

### Methods
The E.coli isolates were confirmed using traditional and conventional methods. Antibiotic susceptibility study was carried out according to the CLSI guideline. The production of ESBL was detected using Double Disc Diffusion Test (DDST) and the confirmed ESBL producers were further subjected to molecular detection of CTX-M, SHV and TEM genes using Polymerase chain reaction (PCR) with specific primers.

### Results
Out of the two hundred door handles sampled, E.coli prevalence was 32(16%), out of which 17(53.13%) were confirmed as ESBL producers. The CTX-M gene was detected in 6(35.29%) of the isolates, SHV and TEM were detected in 4(23.53%) and 8(47.06%) of the isolates respectively. A single co-prevalence of SHV and TEM was observed. Also an isolate was found to harbour all three genes.

### Conclusion
It is imperative to monitor the spread of these pathogens in order to avert the probable spread of disease epidemic.
Phenotypic and Genotypic Analysis of Anti-
tuberculosis Drug Resistance in Mycobacterium 
tuberculosis Isolates in Nigeria

Background: Tuberculosis (TB) is a major global health problem 
and the foremost cause of death from a single infectious agent, 
Mycobacterium tuberculosis in Nigeria. The drug resistance TB 
is associated with genetic markers relevant to the responses to 
each drug; genotypic methods have been used for detecting 
these markers to overcome the limitations of phenotypic drug 
susceptibility testing (DST) such as cumbersomeness and long 
turnaround time. The objective of the study was to evaluate the 
performance of the whole genome sequencing compared to 
Lowenstein Jensen proportion method among drug resistant 
mycobacterium tuberculosis patients at National tuberculosis 
reference laboratory.

Methods: We determined the drug susceptibility testing of 
Mycobacterium tuberculosis complex isolated from new and 
previously treated pulmonary TB patients at National Tuberculosis 
Reference laboratory Zaria during 2016 using conventional 
phenotypic DST (Lowenstein Jensen proportion method). All 
the isolates were sent to supra national tuberculosis reference 
laboratory Milan Italy for Validation where Whole genome 
sequencing related to each type of resistance (proB for rifampicin; 
katG and inhA for isoniazid; rrs, es1 and tlyA for amino glycosides 
and gyrA and gyrB for fluoxquinolones) were used.

Results: A total of 33 isolates were tested for phenotypic 
and genotypic DST out of which 15 (45.5 %) isolates had MDR-TB, 8 
(24.2 %) mono-rifampicin resistance and 2 (6.0 %) mono-isoniazid 
resistance by phenotypic DST. Resistance to fluoroquinolones was 
detected in 2/33 (6.1 %), and none to amino glycoside or 
oveldrugs. The sensitivity, specificity, positive predictive value, 
negative predictive value and diagnostic accuracy of drugresistance mutations compared to phenotypic DST were for proB 86.21%, 
100%, 100%, 50% and 87.88%, katG 88.24%, 87.5%, 88.24%, 
87.5%, and 87.5% rrs 100%, 100%, 100% and 100% 
es100%, 100%, 100% and 100% and tlyA100% 
,100%, 100% and 100% gyrA100%, 100%, 100% 100%, 
and 100% and gyrB100%, 100%, 100% 100%, and 100% 
respectively.

Conclusion: The genetic mutation sites for drug resistance in M/ 
XDR-TB are quite variable. The distribution of these mutations in 
each population must be studied before developing the specific 
mutation test panels. The results highlight the burden of drug 
resistant TB and the importance of the genotypic DST in Nigeria.

Évaluation de la Résistance du VIH-1 aux ARVs 
Chez Des Patients Naïfs de Traitement au Mali 
(Projet WANETAM)

Background: L’émergence des mutations de résistance est 
devienne une préoccupation majeure au cours du Traitement ARV 
(TAR) avec le risque de transmission de virus résistants au sein de 
la population naïve. La surveillance de la résistance transmise est 
donc essentielle pour garantir le succès thérapeutique. Ce travail 
avait pour objectif d’évaluer la fréquence de la résistance transmise 
chez les patients naïfs de TAR au Mali dans le cadre du projet 
WANETAM.

Methods: Entre janvier et décembre 2015, des patients naïfs de 
TARV âgés de moins de 26 ans et/ou un taux de lymphocytes T 
CD4 (LTC4) >500 cellules/mm3 étaient inclus. Des prélèvements 
de sang effectués sur tube EDTA ont permis de recueillir le plasma 
qui a été acheminé au laboratoire de Bactériologie-Virologie du 
CHNU Aristide le Dantec (Dakar, Sénégal) pour le génotypage 
de la RT selon le protocole du groupe de travail ANRS AC11 pour 
determiner la résistance aux inhibiteurs nuclosidiques de la 
transcriptase inverse (INTI) et aux inhibiteurs non nucléosidiques 
de la transcriptase inverse (INNTI). L’analyse des mutations de 
résistance a utilisé la liste SDRM version 2009 de l’université de 
Stanford.

Results: Quarante-neuf patients ont été inclus. Le sex-ratio (H/F) 
était de 0,13, l’âge moyen de 22 ans (18-25 ans) et la médiane 
de LTC4 de 111 cellules/mm3. Vingt-sept (55 %) échantillons ont 
déjà été amplifiés et séquencés. L’analyse des mutations a montré 
1 (3,7 %) échantillon résistant aux INTI avec M184V et K65R et 2 
(7,4%) aux INNTI avec L100I, Y188L, K103N et Y181C.

Conclusion: Ces résultats préliminaires de HIVDR au Mali 
montrent un niveau intermédiaire de résistance aux INNTIs 
et impose une surveillance rapprochée et une éducation pré-
therapeutique pour assurer une efficacité à long terme des 
premières lignes de TAR.
Antibiotic Usage in Nigeria – Is Poor Knowledge and Compliance a Driver for Antimicrobial Resistance (AMR)?

**Background:** Antimicrobial resistance is a recognised problem in healthcare and environmental settings globally. The recent review by Jim O’Neill predicts that by 2050, AMR would cause as many as ten million deaths with Africa projected to have the worst outcomes with potentially >4 million deaths annually. Some of the reported factors driving AMR in Africa include poor hygiene, laboratory infrastructure, inadequate surveillance strategies, socio-economic factors and behaviour among others. In Nigeria, it is recognised that antibiotics are among the most used drugs in healthcare and outpatient settings however, data on the true problem of AMR in Nigeria is severely lacking.

**Methods:** A cross-sectional study was carried out in two study sides on >400 outpatients from a private and community healthcare setting in Northern and South East Nigeria, respectively. This study was performed using the knowledge, attitudes and partnerships (KAP) model utilised for surveys with paper questionnaires distributed to outpatients within the centres. Descriptive analysis was conducted to determine the association between socio-demographic factors and knowledge of antibiotics. Spearman’s correlation test was used to determine the association between knowledge of antibiotics and attitudes towards antibiotics as well as usage of antibiotics.

**Results:** Preliminary results analysis demonstrated high use of antibiotics in both settings. Antibiotic use for illnesses such as cough and catarrh was identified as the most common condition for which antibiotics were used and in both settings, a high usage of antibiotics was a main feature. In addition, >30% of patients reported they did not complete their antibiotics because they “felt better”.

**Conclusion:** Knowledge of antibiotics and appropriate use of antibiotics was poor in this study and it is imperative that educational measures to inform outpatients in healthcare in Nigeria is conducted to reduce the overuse and abuse of antibiotics as part of AMR stewardship campaigns in Nigeria.

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Distribution of Multi Drug Resistant Escherichia coli Isolated from Patients with Urinary Tract Infection and Phylogenetic Analysis of CTX-M Gene in Gezira State, Almnagil locality, Sudan (2017)

**Background:** Urinary tract infection (UTI) is caused by Gram-negative bacteria such as Escherichia coli (E.coli), Klebsiella species, Enterobacter species, Proteus species and Gram-positive bacteria like Enterococcus species, and Staphylococcus saprophyticus. E. coli is the most common organism causing both community as well as hospital acquired UTI. The aim of this study was to determine the prevalence of multidrugs resistant (MDR) E.coli isolates against commonly used antimicrobial agents among UTI, the type of CTX gene in MDR E. Coli and phylogeny.

**Methods:** This cross sectional study was conducted in different laboratories in almanagil locality from April 2017 to April 2018. Data of each patient was collected by using a questionnaire. The patients group consist of 33 females and 17 males ranging between the age >20-80 years. Fifty MDR E. coli isolates of fifty-eight E.coli from one hundred patients were identified. Susceptibility to various antibiotics was checked using standard methods.

**Results:** Most of MDR E.coli isolates were resistant to amoxicillin (100%) and cephalexin (87%) and Most Isolates were sensitive to amikacin with 14% resistance. The DNA of ten Isolates of MDR E.coli extracted and was amplified by polymerase chain reaction (PCR) technique to detect CTX-M gene. The product was visualized by gel electrophoresis (544 bp). Then the samples were sent for sequencing which was done by using Sanger normal sequencing and results were analyzed using Finch TV and the multiple sequence alignment and phylogeny tree of the patient sequence.

**Conclusion:** This study concluded that the most cause of UTI was E. coli and most E.coli isolates during this study are MDR and Seventy per cent of MDR E. coli isolates has CTX_M gene. It was highly recommended that antibiotic prescription should be Monitored according to the guidelines. Antibiotic consumption should be monitored both in healthcare facilities as well as in community. The role of Infection prevention and control is crucial in all healthcare facilities to decrease the occurrence of antibiotic resistance.
First Report of Extensively Drug Resistant Tuberculosis From North West Zonal Tuberculosis Reference Laboratory Kano, Nigeria: A Report of Two Cases

**Background:** Extensively Drug-Resistant Tuberculosis (XDR-TB) continues to present a major challenge to Tuberculosis control programs worldwide with lack of precise and effective drugs, high rate of treatment failure and mortality posing a major threat to public health. The study present the first two documented cases of XDR-TB diagnosed in North West TB Zonal reference Laboratory, Aminu Kano Teaching Hospital, Kano, Nigeria.

**Methods:** Sputum samples were collected from the two consented patients and processed using standard microbiological procedures that involves microscopy and culture. The M. tuberculosis isolates obtained were subjected to First line and Second line drug susceptibility testing using molecular line prove assays (MTBDRplus and MTBDRsl). The patients’ treatment history were also documented.

**Results:** The study revealed that both patients were XDR-TB with isolate from Patient No 1 exhibiting resistance not only to fluoroquinolones, kanamycin, amikacin and capreomycin but also viomycin, while the second patient was resistant to fluoroquinolones, kanamycin, amikacin and capreomycin only.

**Conclusion:** The study highlights the need for building and upgrading the capacity of all the TB zonal reference laboratories in Nigeria to perform second-line DST as a requirement for rapid identification of XDR-TB. The lack of such a facility may lead to development and subsequent transmission of XDR-TB.

Prevalence and Risk Factors of Rifampicin Resistant Mycobacterium Tuberculosis Among HIV Sero-positive Patients in Mbarara Regional Referral Hospital, South Western Uganda

**Background:** Tuberculosis is treated using rifampicin and isoniazid as the first line drugs, with rifampicin playing a pivotal role in the effective treatment. However, resistance to rifampicin is common and used as a valuable surrogate marker for multi-drug resistant tuberculosis (MDR-TB). Mbarara is the second most burdened district in Uganda with an estimated HIV/TB co-infection rate of 65% (Ministry of Health, 2013), however the proportion of rifampicin resistance among patients co-infected with HIV is not well known in Mbarara Regional Referral Hospital. This study determined the prevalence and risk factors of rifampicin resistant Mycobacterium tuberculosis in HIV sero-positive patients attending Mbarara Regional Referral Hospital, South Western Uganda.

**Methods:** A cross-sectional study was conducted in Mbarara Hospital between December 2014 and May 2015. A total of 859 HIV positive patients who presented with signs and symptoms of Tuberculosis who were either new or previously treated TB patients, aged 18 years and above were enrolled in this study. A standardized questionnaire was administered to patients who consented to collect their socio-demographic data such as age, sex, family size, marital status, tribe, previous Tuberculosis history, drinking and smoking status. Sputum samples were obtained from the participants and GeneXpert MTB/RIF a real-time PCR test used to simultaneously detect Mycobacterium tuberculosis DNA and rifampicin resistant DNA.

**Results:** Male HIV patients had a higher risk of contracting TB than females (P = 0.001) and more male (1.2%) had rifampicin resistant Mycobacterium tuberculosis compared to 0.9% female patients. The assay detected 159 (18.5%) MTB and 09 (5.7%) MDR-TB positive cases in the study population. Out of which, 09 specimens had both MTB and rifampicin resistance. Rifampicin resistant Mycobacterium tuberculosis was significantly associated with TB history (P = 0.001) and smoking tobacco (P = 0.001). However, rifampicin resistance was not related to household size, consumption of roasted meat, consumption of raw milk and alcohol use (P > 0.05).

**Conclusion:** The prevalence of rifampicin resistant Mycobacterium tuberculosis and Tuberculosis among HIV sero positive patients with 18 years and above in Mbarara Regional Referral Hospital is low.
**Key Mutations to Reverse Transcriptase Inhibitors of the HIV-1 Virus Extracted from the Cerebral Spinal Fluid of persons living with HIV**

**Background:** Central Nervous System deterioration in HIV infected persons is a high priority in their management. However, there is limited information regarding the key mutations that enhance resistance to the antiretroviral drugs (ART), since CSF HIV genotyping is seldom done. Therefore, the study described the key mutations to Reverse Transcriptase Inhibitors (RTI) of the HIV-1 virus extracted from the Cerebral Spinal Fluid (CSF) of persons living with HIV.

**Methods:** The CSF samples were collected from five individuals admitted at the Joint Clinical Research Centre between 2015 and 2017. The patients were HIV positive, had been on ART (second and first line) for more than six months but were presenting with impaired CNS symptoms. The study was experimental. HIV RNA was extracted from the CSF samples reverse transcribed and amplified. The Reverse Transcriptase fragment was then sequenced using the Sanger sequencing method and the mutations analysed by the Stanford HIV database. The sample size was limited due to the extremely painful method of sample extraction from the patient, and the CSF low viral loads.

**Results:** The most clinically significant resistance mutations against Nucleoside Reverse Transcriptase Inhibitors were; M184V-being present in all the five samples and K65R in only one. There were four classical Thymidine Analog Mutations (TAMs) identified (K70R, K219Q/E, M41L and D67N). There was one additional TAM T215Y/F, non-TAM L74I and two accessory mutations identified V75M and T69D. The most significant resistance mutations expressed towards non-nucleoside reverse transcriptase inhibitors (NNRTI) were; Y188F/L, Y181C, G190S, present in four samples and K238N (accessory mutation), present in one sample, only one sample did not express even one NNRTI Mutation.

**Conclusion:** All the HIV-1 viruses extracted from the five CSF samples expressed at least one major mutation which conferred resistance to most reverse transcriptase inhibitors. However, the sample size was limited thus an investigation on a larger scale should be carried out to analyse the clinical significance of CSF genotyping on patient care.

**Urinary Tract Infections and Antibiotic Sensitivity Among Non-insulin Dependent Diabetes Mellitus Patients**

**Background:** Patients with diabetes mellitus type 2 have been found to be more prone to urinary tract infections more than other groups. There is a wide gap of information in developing countries regarding the prevalence and antibiotic sensitivity of the pathogens causing urinary tract infections in diabetic patients.

**Methods:** Clean catch mid-stream urine was collected from all participants and cultured in Cystine Lactose Electrolyte Deficient (CLED) agar for urinary tract infections diagnosis and later cultured in Mueller Hinton for antibiotic sensitivity testing. Classification of a positive culture for urinary tract infection was based on more than 100,000 (≥105) colony-forming units (cfu) of a single bacterial species.

**Results:** A total of 180 patients were recruited, 106 of the participants were male (58.9%) and 74 (41.1%) were female. 63 participants (35%) showed symptoms of urinary tract infections. The overall prevalence of urinary tract infections was 20% with 37 participants testing positive for UTI. Out of the 37 (100%) isolates, 35 (94.6%) were gram negative and the remaining 2 (5.4%) were gram positive. There were 2 (5.4%) isolates of Entorococcus faecalis. Five, three and three of 21 E. coli isolates showed resistance to Ampicillin, nitrofurantoin and co-trimoxazole respectively. Two, one and two of 10 K. pneumoniae isolates were resistant to Ampicillin, cephalexin and co-trimoxazole. All 21 isolates of E. coli (100%) were sensitive to gentamicin and cephalexin. All ten K. pneumoniae isolates (100%) were sensitive to gentamicin and nitrofurantoin.

**Conclusion:** Antimicrobial resistance is an upcoming threat to overall quality healthcare in the world. Evidence-based laboratory findings are key to curbing antibiotic resistance.

Background: Limited data on antimicrobial resistance (AMR) in enteric pathogens is available in Kenya yet diarrhea remains the main cause of morbidity and mortality among rural Kenyan children. We determined antimicrobial susceptibility patterns of enteric bacterial pathogens to commonly prescribed antibiotics among children aged ≤5 years in selected cross-border Kenyan public-hospitals.

Methods: This was a hospital based cross-sectional study. Single stool samples were collected from 1644 outpatients presenting with diarrheal at Busia, Kitale, Malindi, Wajir, and Machakos public-hospitals between June 2013 and June 2016 and shipped to Kenya Medical Research Institute (KEMRI). Pathogenic E. coli, Shigella and Salmonella sp. were isolated using standard microbiological methods. Multiplex Polymerase Chain Reaction (PCR) was used to characterize E.coli isolates. Antimicrobial susceptibility testing was done using Kirby Bauer disc diffusion method.

Results: Of the 1644 enrolled participants, bacterial pathogens identified were; Pathogenic E. coli in 257(15.6%), Shigella in 106 (6.4%) and Salmonella in 52(3.2%). High antimicrobial resistance (AMR) levels were observed. Highest AMR were observed for sulfamethoxazole (93%) and ampicillin (88%) for E.coli isolates, sulfamethoxazole (89%) and ampicillin (88%) for Shigella isolates, sulfamethoxazole (73%) and ampicillin (86%) for Salmonella isolates. Emerging resistance at 15%(CI:10-19), 29%(CI:23-35), 14%(CI:9-18) for E. coli, 26%(CI:18-35), 55%(CI:45-64), 30%(CI:21-39) for Shigella and 31%(CI:18-44), 57%(CI:43-71) 29%(CI:16-41) for Salmonella were observed to ciprofloxacin, nalidixic acid and gentamycin respectively.

Conclusion: Pathogenic E.coli was the most prevalent enteric bacterial pathogen. Highest AMR were observed to sulfamethoxazole and ampicillin and emerging resistance to 3rd line antibiotics is of major concern.
Mobile Biosafety Laboratory in Outbreak Response and Surveillance of Infectious Disease in Senegal

Background: Past and recent outbreaks highlight the vulnerability of humanity to infectious diseases, which represent serious economic and health security threats. Diagnostic needs for pathogens with epidemic potential need to be addressed ahead of the next epidemic. Therefore, the Preasens foundation has developed an all-terrain Mobile-Biosafety Level-3 Laboratory (MBSL-3-Lab) with an easy-to-use technology to better epidemic preparedness, early warning and rapid response for existing and emerging infectious diseases.

Methods: The MBSL-3-Lab was first deployed in Senegal for extensive field evaluation over a period of 6 months and was even mobilized during the latest Dengue outbreak in November 2017. It’s equipped with a closed under-pressure biosafety isolator for the handling of all classes of infectious pathogens and is characterized by good energy self-sufficiency and a capacity to communicate data and results in real-time. It possesses fully automated, real-time PCR instruments (IdyllaTM, Biocartis) and is also flexible for the integration of other modern diagnostic technologies.

Results: During this field evaluation in different localities in Senegal, more than 700 specimens were managed for tropical and respiratory infections. Malaria remains problematic in southeastern areas (75% of samples tested were positive). Nonetheless, respiratory infections were the main reason of consultation, regardless of the locality. Thus, 21 Metapneuvirus, 15 Influenza, 3 Para-Influenza and 3 Picornavirus were diagnosed on board of the MBSL-3-Lab. Concerning the Dengue outbreak deployment, 882 sera were analysed, from which 130 were positives. The MBSL-3-Lab was unexpectedly mobilized as requested by the Ministry of Health. The teams embarked on a 700km journey to Louga, started testing on spot and delivering first results within 36 hours.

Conclusion: This MBSL-3-Lab serves as a decentralization vector for routine and surveillance programs countrywide and can be rapidly deployed in case of an outbreak, while offering a safe and comfortable working environment, connectivity and state-of-the-art technology for effective field diagnostics capabilities.

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Laboratory Evaluation Towards a National Antimicrobial Resistance Surveillance Programme in Nigeria

Background: Antimicrobial resistance (AMR) is emerging as a global health security threat. The WHO Global Action Plan (GAP) against AMR identified surveillance as one of the key pillars to combat this menace. Detection of resistance and monitoring for its spread requires laboratory-based surveillance. Nigeria committed to GLASS which entails ensuring availability of a national reference laboratory and sentinel laboratories. Hence, the need to engage laboratories to serve as reference and sentinel sites for GLASS.

Methods: We administered a standardized AMR detection and reporting laboratory capacity assessment questionnaire adapted from templates of other countries enrolled in GLASS; to federal health institutions and some private institutions in the country. Using standardized criteria, the labs were screened based on the information supplied; and categorized as ‘green’, ‘yellow’ or ‘red’ depending on level of work required to meet standards; green (minimum), yellow (moderate) and red (major). Onsite assessment of ‘green’ and ‘yellow’ laboratories was conducted by subject matter experts, using standardized lab assessment checklist for AMR testing and reporting.

Results: A total of 27 laboratories, across 21 States and FCT, from all geopolitical zones in the country participated in the exercise with the following distribution; 5 (North Central), 6 (North East), 3 (North West), 3 (South East), 4 (South South) and 6 (South West). Based on the screening by colour code categorization; the finding showed 6 ‘Green’, 4 ‘Yellow’, and 16 ‘Red’ labs.

Conclusion: Hence, one of the green labs having met part of the requirements for reference laboratory, was designated as the interim reference lab for the country, while the remaining were assigned as sentinel laboratories. Nigeria has enrolled into GLASS while efforts are sustained to address identified gaps from the laboratories towards ensuring quality data reporting into GLASS.
**Strengthening of Viral Load and Early Infant Diagnosis Specimen Referral Networks Towards Achieving Epidemic Control**

**Background:** Strengthening specimen referral networks is critical in establishing functional laboratories systems in developing countries. We hypothesized that efficient implementation of specimen referral networks increases the access and can demonstrate progress towards epidemic control.

**Methods:** We assessed facilities referring either VL or EID or both specimens linked to the 10-referral testing laboratories accessing data from the national dashboard (April 2017-March 2018). We evaluated specimen types, specimen collection to results availability at facility turnaround time (TAT), result outcomes, remote login of specimens/results, rejection rates and facility-laboratory linkages.

**Results:** Approximately 2400 sites referred VL, and 1629 sites referred EID. The specimens referred for testing were 1,093,443 (VL) and 120,990 (EID). All EID specimens were dried blood spot (DBS) while 67.4% of VL specimens were plasma 32.6% DBS. Sites referring specimens for VL includes 26.7% plasma only, 21.5% both plasma and DBS, and 51.8% DBS only. The average VL TAT was 12.4 days while EID 10.25 days and VL suppression rate was 83.6% with 16.9% sites achieving ≥ 90% and 3.4 % EID positivity. Specimen rejection were 0.65% for VL and 0.62% for EID. No significant differences in specimen rejection rate and TAT between DBS and plasma sites P >0.05. Specimens and results remote sites logging for VL and EID account for 34% and 37% respectively.

**Conclusion:** These findings demonstrate that Kenya has an efficiently functioning specimen referral system nationally and EID has enjoyed reduce TAT due to VL scale-up. These findings further reveal that even though DBS accounts for one-third of the patient’s volume, DBS contributes for reaching over 50% of the ART sites. The full implementation of electronic remote access-login will further reduce TAT for VL and EID map-out hot spot for epidemic control; however, cost-analysis will be critical to scale-up to other countries.

**Evaluation of the Capacities Of Guinea-Bissau’s Laboratories in Disease Surveillance: A Pilot Study Conducted in 10 Regional Laboratories**

**Background:** The last Ebola outbreak has highlighted the critical role of the laboratory in disease surveillance. In support of the REDISSE project, funded by the World Bank and coordinated by the West African Health Organization (WAHO), 47 Epidemiological Surveillance Centers (CSE) were strengthened in 5 countries (Guinea, Guinea-Bissau, Liberia, Sierra Leone ,Togo), with an epidemiology component and laboratory component that aims to study the capacities of laboratories hosted in CSE in disease surveillance.

**Methods:** 10 regional laboratories in Guinea-Bissau have participated. Data collection was carried out using appropriate standardised tools. The following variables were studied: human resources, infrastructures, logistics, testing laboratory types, services quality, biosecurity, samples transportation, surveillance data notification process. Descriptive data analysis was carried out.

**Results:** 7/10 laboratories lack technical rooms separated from sampling rooms, 8/10 are poorly equipped, 9/10 have activities restricted to rapid tests and microscopy, 9/10 use public transport or inappropriate means for sample transportation. 1/10 have inadequate laboratory quality control and assurance systems, 1/10 lack a computerized data management system, 6/10 have passive reporting laboratory data to surveillance services. The key interventions were training, supervision and enrollment of a laboratory in the ‘Oneworld Accuracy’ Quality Control Program. 22 laboratory technicians and 4 epidemiologists, were trained in 5 surveillance modules: diseases with epidemic potential, preventive maintenance, data management, biosecurity and sample transportation. 3 maintenance technicians attended a 9 week intensive training course to support the national maintenance system. Formative supervision was carried out to reinforce and evaluate the impact of training in laboratory practices and their involvement in disease surveillance.

**Conclusion:** At regional level this pilot study may serve as a model for laboratory capacity building to better facilitate laboratory integration in surveillance systems. These findings suggest the need to establish a national laboratory network to harmonize practices at all levels, mainly for referral and counter-referral systems.
Rôle du Centre Pasteur du Cameroun-Annexe de Garoua au Cœur de l’Épidémie de Choléra dans le Nord Cameroun

**Background:** Le choléra reste un problème majeur de santé publique dans les pays du tiers monde. En 2016, selon l’OMS, 132121 cas de choléra ont été notifiés dans 38 pays entraînant 2420 décès. Depuis le 18/05/2018, le Cameroun fait de nouveau face à cette maladie. L’épidémie de choléra a été déclarée le 14/07/2018 dans la région du Nord où 94 cas ont été notifiés. Le Centre Pasteur du Cameroun Annexe de Garoua (CPCAG) a en charge la réalisation de la confirmation bactériologique et de l’antibiogramme sur les échantillons qui lui sont transmis. La présente étude vise à rapporter la place de l’antibiogramme dans le suivi des patients afin de mieux répister en cas de nouvelles flambées épidémiques.

**Methods:** Le CPCAG a analysé 20 échantillons de selles transmises par les 6 districts en épidémie de la région du Nord. L’identification de Vibrio cholerae a été effectuée par les tests de diffusion en milieu gélosé selon les recommandations 2017 du CASFM. L’identification de Vibrio cholerae a été effectuée par les tests de screening sur les colonies suspectes, complétés par galerie Api 20E Biomérieux, et la sensibilité aux antibiotiques testée par diffusion en milieu gélosé selon les recommandations 2017 du CASFM.

**Results:** Entre le 18/05/2018 et le 06/08/2018, le V. cholerae a été isolé dans 14/20 échantillons, chaque souche présentant le sérogroupe O1. Les antibiogrammes ont montré une résistance à l’amoxicilline, à l’Acide nalidixique et à la Colistine. Par contre, les souches sont sensibles à la cefalotine, la gentamycine, au Cotrimoxazole, à la doxycycline et au Chloramphénicol. Les souches isolées sont de sensibilités intermédiaires à l’Erythromycine, antibiotique indiqué chez les femmes enceintes.

**Conclusion:** Cette étude montre le rôle actuel du laboratoire de bactériologie dans la lutte contre les épidémies de choléra. Les résultats des antibiogrammes sont d’une importance majeure pour la prise en charge des patients et des sujets contacts, ainsi que pour l’étude épidémio logique.
Safely Detecting the Next Threat: The Role of Laboratory Networks

Background: Over the last decade, the world has faced several emerging threats, acts of terrorism and natural disasters. Whatever the threat, one thing is certain: a strong public health system is essential for prevention, detection and response. A vital component of any public health system is its laboratory infrastructure — this can be a single laboratory in a jurisdiction or multiple laboratories or networks geographically dispersed to meet the need of its population. This session will focus on the role of laboratory networks in detecting and responding to threats.

Methods: Approaching its 20 year anniversary, the US managed Laboratory Response Network (LRN) serves as a framework for high functioning laboratory systems capable of detecting threats from anthrax to Zika. Utilizing a tiered construct of laboratories, the LRN responds to all-hazard threats. In addition to its role in supporting the LRN, APHL also collaborates with several partners to strengthen biosafety and biosecurity. APHL also supports recovery efforts across the globe. Its crisis management approach to support areas such as Sierra Leone (SL), Puerto Rico (PR) and US Virgin Islands (USVI) to rebuild following Ebola (SL) and the 2017 Hurricane Season (PR and USVI) embody the spirit of partnership and illustrates the importance of linking clinical and public health laboratory networks.

Results: The LRN has a specific methods which it utilizes to ensure its ability to detect the next threat. These methods range from providing standard operating procedures to ensuring systems are in place to electronically message test results. As the network continues to evolve, it is faced with unique challenges of keeping pace with advancing testing and data messaging technologies as well as safety. The programs which APHL has collaboratively implemented for biosafety continues to expand and reach many biosafety professionals. APHL’s engagement across the globe has yielded more resilient laboratories and networks, all positioned to quickly detect the next threat.

Conclusion: Laboratories are essential to safely detecting the next threat and governments must invest in them. As laboratories networks continue to proliferate, their successes and challenges should be shared. APHL’s role in the LRN, its biosafety initiatives and broader role to support laboratories during a crisis are essential to preventing the next pandemic threat.

Evaluation of Laboratory-based Measles Surveillance in Southern Nigeria, January 2013 – June 2017

Background: Measles is a priority vaccine-preventable viral disease which occurs worldwide. It is a major cause of childhood morbidity and mortality in developing countries. It is also one of the diseases targeted for elimination by the World Health Organization (WHO). Successful elimination of any infectious disease requires effective laboratory surveillance. We assessed surveillance performance of a national measles laboratory in Southern Nigeria.

Methods: We performed a descriptive study on data from 2013 - 2017. We retrieved the laboratory measles surveillance data from the Central Public Health Laboratory, Lagos (CPhL) which receives specimens from all southern states of Nigeria. We focused on timeliness of reception and testing of specimens in the laboratory. The WHO Recommended Surveillance Standards for Measles was used to monitor laboratory surveillance indicators. Indicators analyzed were: proportion of blood specimens arriving to the laboratory within 3 days of collection and in good condition, proportion of laboratory-confirmed measles cases, proportion of laboratory results sent out within 7 days of specimen receipt.

Results: Of the 23,851 measles cases investigated by the lab, 8.5% (2,018) were confirmed measles IgM+(target <10% of investigated cases confirmed to be measles by serology). Ninety six percent (22,906) of specimens arrived the laboratory in good condition (target ≥90%). Only 27.1% (6,458) of specimens reached the laboratory in the recommended three days (target ≥80%) while 19.7% (4,593) of results were sent out within seven days (target ≥80%).

Conclusion: The laboratory received most specimens in good condition. However, the timeliness of specimen receipt and of result feedback to the states did not meet the standard. We recommend states should improve their sample delivery methods to the CPhL to improve timeliness and quality of specimens received in the laboratory. The laboratory should implement mechanisms to ensure prompt feedback of the results to states.
**Installation de Laboratoires de Campagne dans 5 Régions du Mali: Succès et Défis**

**Background:** Le Mali a adopté en 1990 sa déclaration de Politique sectorielle de santé et de population. Elle ambitionne de résoudre les problèmes prioritaires de santé du pays. La dotation en laboratoires s’inscrit dans le cadre des priorités stratégiques de la politique malienne dans le domaine de la santé, puisque cela contribue directement aux objectifs du Plan Décentral de Développement Sanitaire et Social ainsi qu’aux Objectifs de Développement Durable 3 et 10. Le projet LABOMEDCAMP vise à installer des laboratoires de campagne dans plusieurs régions du Mali afin d’améliorer la prise en charge médicale des populations rurales, surtout des mères-enfants, à travers un diagnostic et un suivi biologiques de qualité dans les laboratoires de première ligne, au niveau des centres de santé communautaire.

**Methods:** Pour garantir un fonctionnement durable, le processus d’installation d’un laboratoire de campagne comprend : une étude de faisabilité, la définition du paquet maximum d’activités à offrir, la formation du couple médecin-technicien de laboratoire, l’équipement du laboratoire, le suivi-évaluation des pratiques et la participation du laboratoire à un programme d’évaluation externe de la qualité.


**Conclusion:** A terme, 18 laboratoires de campagne auront été installés dans 5 régions du Mali. L’adhésion de la population et la formation et l’entente du couple médecin-technicien de laboratoire sont essentielles pour assurer la durabilité des laboratoires de proximité. Le choix et la maintenance des équipements de laboratoire constituent des défis, de même que le maintien de l’évaluation externe de la qualité sur le long terme.
Challenges to Effective Laboratory Diagnosis of Lassa Fever in Nigeria

Background: Lassa fever is a hemorrhagic fever transmitted through contact with infected rats, discovered 1969 in Lassa town Nigeria has become endemic disease with widespread activity affecting at least 24 in Nigeria. The inability of national laboratories to detect Lassa fever on time has resulted in high morbidity and mortality throughout country even though the number of laboratories with diagnostic capacity has increased in the last decade. During the 2018 season, efforts were made to increase the diagnostic capacity from the present four laboratories. Despite this remarkable achievement, there are still challenges in sustaining diagnosis of Lassa fever from the field to the laboratories in Nigeria. Our objectives are to assess the operational challenges, and prosper solutions.

Methods: Real time rtPCR technique using Altona and Nikisins assays was used. Samples from the North-East, North-West, North-Central, and occasionally from other parts of the country were receive. Epi-Info statistical software version 7.0.1 used for analysis.

Results: Data from 13th January to 20th May, 2018 from 6 geopolitical zones was analyzed. A total of 221 specimens were tested. Out of which 189 (85.5%) were negative and 32 (14.4%) tested positive (95% CI). Age groups most affected were 30-70 with 14 (17.9%) then 0-4 4 (18%), 25-29 3 (12.5), 15-19 2 (13%) and 20-24 2 (11%), the least was 5-9 with 1 (6%) (95% CI).

Females had higher rates of infection than males with 16 (19%) males 16 (12%). Taraba 11 (37%) had highest rates of positives, then Kogi 3 (30%), Adamawa 3 (2%), Kaduna 1 (16), Plateau 6 (16.2%), Gombe 1 (11%), then Bauchi 4 (10.8%), and Nasarawa 2 (4.9%). Thirty (13.6%) of the specimen were not received under good condition (lysed, inadequate sample volume, Spillage, Poor Cold Chain documentation which affects sample integrity and quality, Biosafety. TAT of 24hrs in 68% of the samples was documented.

Conclusion: Laboratory TAT was found to be less than 24hrs but delay in transporting specimen and poor packaging was a problem.
**Laboratory Response to Severe Lead Poisoning Outbreak in Zamfara State, Northwest Nigeria**

**Background:** In 2010 MSF investigated an outbreak of unexplained deaths in children in several villages in Zamfara state. After excluding common infectious causes, heavy metals were hypothesized as a cause, with lead poisoning confirmed on blood samples from 10 cases analysed in Lademannbogen laboratory, Hamburg, Germany. Further samples sent to the CDC (Centre for Disease Control, Atlanta, USA) confirmed severe lead poisoning in a number of villages. The relatively remote and resource-limited setting of the outbreak meant gold standard techniques such as ICP-MS (Inductively Coupled Plasma Mass Spectrometry) were not feasible. The LeadCare II (Magellan Diagnostics) was identified as an option to measure blood lead concentration (BLC) at (near) point-of-care, in an affordable manner (€1200 per instrument, €4 per test).

**Methods:** Since June 2010, venous blood has been collected from patients in the hospital and village clinics and tested in a central laboratory sealed from environmental contamination. The LeadCare II detection limit is 65µg/dl, but many blood samples have concentrations above this, necessitating dilution using a method developed by MSF and CDC. 20 randomly selected blood samples are sent monthly to CDC for quality control (QC) comparison against the ICP-MS. The laboratory is also enrolled in the CDC-run LAMP (Lead and Multi-element Proficiency) scheme.

**Results:** Since 2010, >95,000 BLC tests on >6000 children have been conducted. BLC accuracy was primarily affected by sample type (skin contamination caused falsely high BLC in capillary blood), and high ambient temperature in the laboratory. Therefore, protocols stipulate testing only venous blood in an air-conditioned laboratory.

**Conclusion:** Testing for lead poisoning is challenging for laboratories in low resource settings, particularly with high BLC and large test throughput. Despite some challenges, using the LeadCare II has been a practical solution to support ongoing management and monitoring of a large number of severely poisoned children.

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**Comparison of Surveillance and Response Capacities for Ebola and Marburg Viral Disease Epidemics Between Previously Affected and Non-affected Districts of Uganda: Lessons for Future Preparedness**

**Background:** Deficiency in the development and implementation of robust surveillance and response systems against Ebola/ Marburg and other infectious disease outbreaks in Africa has accounted for devastating outcomes. This study measured the difference in surveillance and response capabilities for E/MVD outbreaks between previously affected districts of Kabale, Kagadi and Luwero and non-affected districts of Amolatar, Kamuli and Soroti in Uganda.

**Methods:** This cross-sectional study design was conducted in 6 districts. Respondents included district managers, health workforce and community workers. Data was collected through document review and interviews and analyzed by STATA13® into percentages and frequencies, chi-square test and logistic regression reported as unadjusted and adjusted odds ratio at 95% confidence interval. The surveillance and response capacity between these district groups were presented as statistical proportional difference.

**Results:** Our findings show a positive difference in facility surveillance, community awareness and readiness as well as district response and control capacities for E/MVD outbreaks between previously affected than non affected districts. Statistically significant difference in surveillance was observed in facilities in previously affected districts that had trained health workers on alert processes and E/MVD verifications [aOR=2.74, 1.31-5.77] than in non affected districts. Conversely, we found significant difference in surveillance for facilities with IDSR technical guidelines [aOR=0.48, 0.24-0.93] and designated staff for surveillance activities [aOR=0.54, 0.31-0.96] in non-affected than previously affected districts. Additionally, significant difference was observed in community members with knowledge about simplified community standard case definitions [aOR=3.09, 1.56-7.19], knowledge of signs and symptoms of E/MVD in humans [aOR=2.23, 1.09-4.23] and willingness to the use of restrictive control measures[aOR=3.14, 1.38-6.19] between previously affected and non-affected districts.

**Conclusion:** Our findings indicate that capacities developed during E/MVD epidemic phases infer some residual capability for a future preparedness. Investment for Ebola/Marburg response as well as preparedness activities will most likely better next epidemic response.
PS-2.1-001

P. Boakye


Implementation of an Open Source Laboratory Information System in Vamed Diagnostic Services, a Private Laboratory

**Background:** Laboratory Information Systems (LIS) support laboratory workflow operations such as specimen registration, processing, storing and retrieval. It allows to effectively manage specimens and all associated data to improve laboratory efficiency. In 2015, the Vamed Diagnostic Services, a private laboratory, Ghana, opted to implement and open source LIS software, as opposed to the exorbitantly available commercial versions in order to manage its patient specimens and laboratory results.

**Methods:** We performed a laboratory needs assessment so as to forge a way for the configuration of an electronic system that would replace the existing paper-based systems. Using open source Basic Laboratory Information (BLIS), we customized the software for specimen registration, results entry, and reports.

**Results:** Vamed Diagnostic Services has fully adapted the customized LIS as their data management software. All patient specimens and laboratory results have been entered. The system has reduced errors by 35%. In addition, the turn-around-times for laboratory results has significantly dropped to within 6 hours of sample reception. Having configured the system, ourselves and being open source, we are able to troubleshoot it whenever any challenges arise - without engaging external assistance. This has had positive implications on their financial budget.

**Conclusion:** Implementing LIS is vital for managing patient specimens and laboratory results. Our open source LIS has been able to keep track of all the specimen from reception to results reporting. It allows simplified specimen retrieval for further testing. This system is ideal for organizations that demand for rapid data retrieval and quality workflows.

PS-2.1-002

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**Scoping for Multi-Disease Point Of Care Technology (POCT) Placement in Resource Limited Settings**

**Background:** As at December 2017, access to Early infant diagnosis (EID) was 70%, viral load (VL) suppression 83.7% and turnaround time (TAT) of 10 days in Kenya. Inadequate testing infrastructure, cost of performing various assays, inefficient sample referral network impact negatively on access, TAT and loss to follow up (LTFU). POCT potentially could address some of these challenges. A baseline assessment of EID and VL testing status in two counties was conducted in May 2018 to inform placement of POC platforms.

**Methods:** Prioritization of potential multi-disease POC testing sites in the country based on data district health information system (DHIS) was used to identify Meru, Wajir county was adopted following pediatric service quality report. Standardized site visits and data was collected in both counties. Data was summarized using median (IQR), frequency counts and percentages. Univariate analysis was used to compare each potential risk factor for poor TAT by the Pearson chi-square test of independent association. To identify factors associated with poor TAT and LTFU, a multiple logistic regression analysis was performed. All factors with programmatic plausibility and P<=0.25 in the univariate analysis were considered in the multiple regression models.

**Results:** EID testing access was 31% and 54%, viral load access 37% and 74% and; non-suppression of 19% and 26% in Wajir and Meru respectively. In Wajir, 63 % of the 46 patients assessed had an EID TAT <5 days. TAT was not associated with patient entry point, gender or staff offering the service p = 0.534. Poor TAT was a predictor to LTFU p=0.02. In Meru, 60% of 55 patients assessed, had an EID TAT < 5days. TAT was not associated with patient entry point, gender or staff offering the service p = 0.654. Poor TAT was a predictor to LTFU p=0.012

**Conclusion:** Baseline assessment that included site level data unmasked uneven landscape, informed and refine prioritization of POCT in Kenya. POCT placement should employ both national and subnational level data in scoping.
**Role d’une Biobanque Moderne dans la Lutte Contre les Maladies re Emergentes**

**Background:** La recherche en biologie humaine continue encore de mobiliser les chercheurs en réponse aux nombreuses maladies. Les différents travaux ont conduit à la production de ressources biologiques sectorielles. Cependant ces dernières ne trouveront toute leur utilité qu’une fois agrégées dans le cadre de grandes collections d’échantillons dûment caractérisés par leurs données biocliniques et sur la base des bonnes pratiques cliniques et de laboratoire. C’est dans ce cadre que l’Institut de Recherche en Santé, de Surveillance Epidémiologique et de Formations (IRESSEF) est entrain de mettre en place une Biobanque moderne capable de générer des échantillons biologiques de qualité en collaboration avec les structures sanitaires et les différents partenaires.

**Methods:** L’essentiel des échantillons provient de patients infectés par le VIH, TB, malaria, et de donneurs sains. Une procédure d’audit et des critères de base (température appropriée, étiquetage, identification, informations associées disponibles, et plan d’utilisation future) permettent de classer les échantillons en éligibilité biobanking ou non. La gestion informatisée du système a été assurée par le logiciel Item Tracker

**Results:** Les ressources biologiques conservées sont constituées actuellement de divers produits, principalement de sérums, plasma, PBMC, Buffy Coat et de sang total. Pour le VIH, plus de 10 000 échantillons de plasma sont conservés dont 4500 correctement caractérisés. 1500 échantillons de sérums et 2000 PBMC y sont également répertoriés. Pour la TB, 8000 échantillons de plasma, 7000 PBMC et 2500 Buffy Coat sont répertoriés et caractérisés à plus de 50%. Pour la malaria et l’hépatite, plus de 15 000 PBMC sont conservés et en cours de caractérisation

**Conclusion:** Une biobanque moderne est devenue indispensable pour les activités de recherche par la mise à disposition de ressources biologiques de qualité utilisables à court et long terme.

**Benefits of Smartphone Implementation for Disease Surveillance**

**Background:** Accurate reporting of diseases in real time is a prerequisite for detecting disease outbreaks and implementing appropriate measures for their control. Currently in Mozambique, notifiable diseases are reported through forms called the Weekly Epidemiological Bulletin (BES); however, this information takes up to 4 weeks to reach Ministry of Health (MoH). To overcome this delay, an application was developed that allows weekly data transmission with real-time access from the district to the central level. This application was initially developed based on the BES file, recommended by MoH. We conducted an assessment of key operational indicators of this smartphone-based system called mAlert.

**Methods:** Weekly data submitted to a PostgreSQL database, corresponding to Maputo and Inhambane Province, was analyzed from July 2016 to March 2018. The statistical package R was used for the estimation of proportions

**Results:** Of the 101 Health facilities in Maputo Province 95 were actively submitting data while of Inhambane’s 135 facilities, 131 sites were actively submitting data. The results showed a 96% submission rate for Maputo Province and 92% for Inhambane. Data submitted within the first week of expected submission dates was 85% and 82% for Maputo and Inhambane, respectively. There was an increase in submissions of up to 94% and 91% respectively in the same provinces in the second week. For data quality, a completeness rate of 100% was verified for the provinces under analysis.

**Conclusion:** The mAlert system proved to be useful and effective as a real time surveillance tool based on data quality and submission rates. Using mobile technology as a mechanism for data submission is a reliable and effective means for disease surveillance and can be readily used for inputting data into electronic alert systems in resource limited settings.
Using Sigma Metrics to Guide Analytical Quality Control Monitoring for Individual Parameters at Soroti Regional Referral Laboratory

Background: Sigma metrics provides a unique quality management procedure for improving assay performance. Less than three Sigma values (<3) indicate poor assay performance. Various Westgard rules are being implemented in Laboratories for Quality control monitoring however, the use of sigma metrics has not yet been explored. In this abstract, we evaluated Quality control approaches at Soroti Regional Referral Laboratory (SRRHL) for monitoring individual parameters using sigma metrics.

Methods: The study was conducted from Nov 2017 to April 2018 using the Cobas C311 for chemistry, Nihon Koden for Haematology and BDFACs Calibur for CD4. Internal Quality Control were tested for Glucose (GLU), Creatinine (CREA), Bilirubin Direct (BILD) & Bilirubin Total (BILT), Alanine Aminotransferase (ALT) & Aspartate Aminotransferase (AST) for chemistry, Absolute neutrophils (NE#), monocytes (MO#), Lymphocytes (LYMP #) and Eosinophils (EO#) for Haematology and Cluster of Differentiation (CD4) for immunology. We calculated Bias (%), coefficient of Variation (CV %) for each of the parameters. Total Allowable Error (TEa) was obtained from the Clinical Laboratory Improvement Amendments. Sigma (α) was calculated using, Sigma=(Total Error-Bias%)/CV%

Results: AST, BILD, BILT, CREA, GLU and EO# achieved <3 while ALT achieved 3–4. MO# achieved <3 for low & normal controls while high control, 3–4. NE# achieved 4-6 for low while normal & high achieved >6. LYMP# achieved <3 for low & high, while normal, 3–4. CD4# achieved 4-6 for high control while normal level, > 6.

Conclusion: For parameters with sigma values <3, Westgard rules, 13S/22S/R4S/41S should be implemented. For tests with 3-4, 13S/22S/R4S/41S and for parameters with 4-6, 12.5S rule in order to improve analytical performance.

Introducing an Easily Assessable Desktop Tool for Laboratory Management Review of Global Laboratory Turn-Around Time (TAT) Performance Across an Extended Network

Background: Current turn-around-time (TAT) information is extracted as management reports or MS-Excel worksheets provided by the National Health Laboratory Service’s (NHLS) laboratory information system (LIS) and/or the corporate data warehouse (CDW). Information extraction is cumbersome and labour intensive: a system that standardizes and automates TAT performance reporting that is easier to interpret and more accessible, is needed.

Methods: For the purposes of this study, weekly CD4-TAT data was extracted from 8 to 14 April 2018, including date/time of total and component TAT variables (including pre-analytical/inter-laboratory, analytical/testing and authorisation/review). Calculated TAT statistics included weekly median, 75th percentile, percentage (%) of tests within stipulated 40-hour TAT target and standard deviation index (SDI) for each laboratory. MicroStrategy© desktop application was used to develop a dashboard with 3 tabs; (i) scatter plot of % within TAT target and 75th percentile, (ii) bar chart of 75th percentile TAT for each phase and (iii) SDI bar chart.

Results: A large cluster of laboratories met both the 90% within-TAT target and a 75th percentile within the 40 hour stipulated TAT (36/46) is graphically displayed (78%). There were eight laboratory with satisfactory performance (75th percentile ≤ 40 hours and (%) within TAT target <90). Two laboratories failed to meet the stated targets with a 75th percentile of 57 and 75 hours (% within TAT target were 31 and 74%). The SDI for the outliers were 1.3 and 2.0. Overall, 91% of all CD4 samples tested met the target TAT with a 75th percentile of 22 hours.

Conclusion: This work revealed how organisational TAT data can be translated and visualized into understandable graphics in an easily assessable desktop tool for laboratory management review of global TAT performance. Laboratories at risk of poor TAT performance are highlighted across a network which can enable timely resolution and meaningful corrective action.
Adoption of e-Checklist Online System Based on SLIPTA

**Background:** The Ministry of Health in Kenya has been adopting and implementing SLIPTA in different laboratories to increase the number of accredited labs. Ensuring that the data being collected by the technicians is correct is the main prerogative of every medical lab. It has a huge ethical impact on the accuracy of the test results being done as it informs the medical procedures and drugs to be prescribed.

**Methods:** An analytical research was conducted which revealed that the main challenge faced by the assessors was the bulkiness of the reports generated during the SLIPTA audit process and the analysis of the data collected to interpret the results of the audit process which affects the turnaround time. An in-depth analysis of the manual tool was done jointly with the various stakeholders involved especially the assessors. A model was generated then translated into a web application that was divided into several modules such as lab profile, audit and data analytics. During the pilot phase, extensive training was conducted by the developing and implementing team with the users' feedback captured and adjusted in the beta version. The system was then rolled out with 20 users actively using the system.

**Results:** The tool is available online to the assessors when visiting the different labs thus eliminating the need to carry around bulky reports. The assessors periodically use the system to generate nonconformance reports based on the observations, challenges and commendations they experienced during the audit process.

**Conclusion:** The ease of use and report generation made the adaption of the system better. The results generated inform each medical lab personnel whether their lab is as per the international standard and points out where they are lacking. This pushes them to improve the service provided to clients to avoid misinterpretation of results that leads to wrong diagnosis.

Detection of Antigen-Binding Cassette (ABC) Efflux Gene Markers in Multi Drug Resistant Mycobacterium tuberculosis from Patients with Pulmonary Tuberculosis in Lagos, Nigeria

**Background:** Multi-drug resistance (MDR) remains a challenge to TB control globally. Mutations of genetic markers targeted at isoniazid and rifampicin in MDRTB have been extensively reported. Efflux of drugs by efflux pumps is one of the mechanisms for MDR in bacteria. There is paucity of studies on efflux pump gene markers in MDRTB in Nigeria. This study investigated Antigen-Binding Cassette (ABC) efflux pump genes encoded by classes Rv 2686c and Rv drrC.

**Methods:** This prospective cross-sectional study was carried out among patients with pulmonary tuberculosis in Lagos, South West, Nigeria. Sputum samples were collected and processed microscopically using Ziehl-Nelson staining technique for Acid Fast Bacilli (AFB). Aliquots of AFB positive sputum sample per patient were used for detection of MDRTB and non-MDRTB using cultural and molecular methods. Chromosomal DNA extraction and amplification of ABC efflux pump genes from MDRTB and non-MDRTB was performed.

**Results:** Analysis showed 48 of the M. tuberculosis were MDR while 199 were non-MDR from which 33/48 (68.8%) participants aged between 31 and 50 years while 15/48 (31.2%) were above 50 years. Of the 48 participants, 26 (54.2%) were females while 22/48 (45.8%) were males. ABC efflux genes Rv 2686c and Rv drrC were detected. MDRTB had 64.6% and non-MDRTB had 2.5% of both alleles. MDRTB was associated with carriage of both alleles of efflux genes Rv 2686c and Rv drrC varying from 1 to 3 bands of molecular weights 200,300 and 400 bp while in non-MDRTB, 180/199 (90.5%) had 1-2 bands (200bp) of Rv drrC efflux genes alleles.

**Conclusion:** ABC Efflux genes Rv 2686c and Rv drrC of molecular weight 100, 200, 300 and 400 bp were detected in the MDRTB and non MDRTB in this study. There was significant difference in the type and frequency of ABC efflux genes between MDRTB and non MDRTB (P= 0.00001).
**Innovation in Diagnostics for Malaria Case Management and Elimination**

**Background:** Malaria infection continues to affect more than 200 million people worldwide. New challenges to elimination have arisen, requiring new tools for malaria diagnosis and treatment. Some of these challenges include submicroscopic infections that support malaria transmission, misdiagnosis due to HRP2 deletions in P. falciparum, and a need for improved diagnostic tests for P. vivax and G6PD to support effective treatment of P. vivax. Public-private partnerships are advancing the availability of diagnostic products to address these needs.

**Methods:** New rapid diagnostic tests (RDTs) for malaria infection detection and point-of-care tests for G6PD deficiency were evaluated and assessed for performance and suitability for use in malaria-endemic settings. These new tests also require reference assays to support product quality assurance and quality control reagents. PATH worked with a manufacturer to develop an ultra-sensitive multiplex quantitative ELISA that enables simultaneous detection of P. falciparum and P. vivax malaria and screening of host inflammatory response using multiple biomarkers. This product, alongside an ultra-sensitive standard ELISA, was evaluated. Additionally, formulations for quality control reagents for point-of-care G6PD products were developed and evaluated.

**Results:** The usability and performance profiles for this suite of diagnostic products are presented. In brief: new RDTs for malaria show a tenfold improvement in limit-of-detection (LOD) for malaria antigens, and associated improvement in sensitivity; point-of-care tests for G6PD deficiency show equivalence to FDA-regulated laboratory assays; the reference assays all show LODs below that of the best RDTs, and stability of G6PD control reagents are aligned with their intended use in minimal laboratory settings.

**Conclusion:** Importantly, the new reference assays combined with the point-of-care tests can support access to high-quality malaria case detection and management. Increased evidence and understanding of how they can be used synergistically to realize their potential will inform the new public-private partnerships required to make them accessible and affordable.

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**Impact of Point-of-Care Testing on Antiretroviral Initiation Rates in Mozambique**

**Background:** Long turnaround time of HIV PCR results negatively affects ART initiation and increases mortality risk among infected children. Based on evidence from a cluster-randomized study showing the impact of point-of-care (POC) technologies at primary healthcare facilities in Mozambique, the Ministry of Health approved the use of POC for routine Early Infant Diagnosis (EID) and national scale-up of POC EID started in 2017. We conducted a follow-up impact study in these routine programmatic settings.

**Methods:** Using a structured questionnaire, data including sample collection date, result reception date and antiretroviral treatment (ART) initiation was collected from patient clinical records at six health facilities from rural and urban settings in Maputo, Sofala and Gaza provinces for the period 2016 to 2017. The data collection period was based on pre- and post-POC deployment at these health facilities. A chi-squared test was used to compare sociodemographic characteristics. An odds ratio (OR) was used to evaluate the two periods with significance level set to 0.05.

**Results:** 2168 patient records were reviewed (1086 and 1082 pre- and post-POC, respectively). Sex, age at sample collection, and maternal and child therapeutic regimens showed no statistically significant differences in the two arms. The median time from sample collection to ART initiation reduced significantly from 57 days in the pre-POC period to same day in the POC period (p-value<0.001). Of the positive children 92% initiated ART within 60 days of sample collection in the POC arm, while in the pre-POC arm only 25% initiated ART within the same interval (OR=34.19, p-value<0.001).

**Conclusion:** Routine programmatic performance of POC EID showed similar results to those observed during the cluster-randomized study. Adoption of POC EID testing is vital to improving result turnaround times and ART initiation for HIV-infected children.
Utility of miR-182, miR-155 and CD4 Count in Monitoring Viral Co-Infection and Epithelial Transformation in the Cervix

Background: Monitoring the extent and effect of viral co-infection, which increases the risk of gynaecological malignancy among immunocompromised persons, is a challenge to health care practitioners. Thus, this study identified cervical lesions associated with Epstein-Barr virus (EBV), Human immunodeficiency virus (HIV), Human Papillomavirus and Herpes Simplex virus 2 mono-infections and co-infections. It also assessed miR-155, miR-182, let-7b and p53 gene expression and CD4 count in relation to classes of Pap smear, extent of viral infections and nature of specimens.

Methods: Following ethical clearance, this case control study included 210 participants within the age-range of 15-70 years in Abeokuta, Ogun State. Consenting participants were further categorized into HIV seropositive and HIV seronegative participants (105 each). Interview based questionnaires were administered to collect socio-economic and clinical demographics. Two specimens were made, stained and classified accordingly while antibodies (IgG and IgM) against the viruses in serum were determined by ELISA method. Expression of miRNAs and mRNA in serum and cervical cells were assessed following RNA isolation, cDNA conversion and amplification by polymerase chain reaction. Data generated were subjected to multivariate analysis, analysis of variance and Pearson’s correlation using GraphPad prism (version 6).

Results: Statistics showed increasing expression of miR-155, miR-182 and p53 gene but decreasing expression of let-7b and CD4 count with increasing severity of cervical abnormality (at p<0.0001, p<0.0001, p=0.08, p<0.0001 and p<0.0001, respectively). Significant correlation was observed between cervical cells and serum in relation to the gene expressions (p=0.05). Higher miR-155 expression was observed in EBV mono-infection while miR-182 increases with viral co-infection (p<0.05).

Conclusion: This study suggests that miR-182 and CD4 count could be used as positive and negative biomarkers, respectively for monitoring viral co-infection and cervical abnormalities among high risk individuals.
Molecular Detection of β-herpesviruses in Brain Autopsies at the University Teaching Hospital, Lusaka, Zambia.

Background: The β-herpesviruses (Human Cytomegalovirus (HCMV), Human Herpesviruses (HHV) 6A, 6B and 7) are neurotropic and neuro-pathogenic DNA viruses that cause central nervous system (CNS)-related diseases and deaths. They are rarely targeted in the diagnosis of CNS-related diseases because of limited diagnostic and treatment capacity. Neurological cases present at the University Teaching Hospital (UTH) are steadily increasing, but the underlying causes are unknown. The ability to diagnose these viruses in autopsy tissue through molecular, epidemiological and biological mechanisms underlying clinical manifestations would help improve treatment and prevention, including awareness and intervention strategies. This study aimed to detect β-herpesvirus in autopsy brain tissues archived at the UTH in Lusaka, Zambia.

Methods: This was a descriptive cross-sectional retrospective study where real time PCR assays were used to screen for β-herpesvirus DNA in autopsy specimens obtained from 2012-2014; and correlations were made with histopathology and premortem clinical data.

Results: A total of 91 hippocampus autopsy specimens (35 from children, 56 from adults), were screened. -herpesviruses were detected in 29.7% (27/91) of specimens, constituting 18.7% (17/91) HHV-6B, 8.8% (8/91) of HCMV, 4.4% (4/91) of HHV-7 and 1.1% (1/91) HHV-6A. CMV and HHV 6A were undetectable among children. In adults, HCMV was independently associated with anatomical CNS pathology and the odds of HCMV infection increased with each year of age (OR, 1.1; 95% CI, 1.0–1.2; p = 0.045) and increased the odds of developing CNS pathology by 28.2 times (p=0.007). In children, HHV-6B was strongly associated with a histopathologically-confirmed diagnosis of bacterial meningitis (OR: 8.65 (95% CI, 1.077-69.075; p=0.042).

Conclusion: β-herpes viruses were detectable in brain autopsies at UTH. HCMV should be considered as a cause of CNS infection pre-mortem, that may respond to treatment. CMV is independently correlated to CNS pathologies in adults, and HHV-6B as co-pathogen with bacteria in paediatric bacterial meningitis at UTH.

HIV-1 Viral Load Quantification Using Aptima HIV-1 Quant Dx Assay in Kenya

Background: Accurate quantification of HIV-RNA (viral load) is crucial for the diagnosis, treatment, monitoring and assessment of HIV-1 infection. The choice of assay platform is very important in influencing treatment decisions of HIV patients.

Methods: The performance of the Aptima assay was compared against the Roche COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Version 2.0 (CAP/CTM) assay. The analytical sensitivity, specificity, diagnostic agreement with CAP/CTM, carryover contamination and precision of Aptima HIV-1 assay was analyzed. Sensitivity of Aptima and CAP/CTM was assessed using clinical specimens from HIV-1 patients on antiretroviral therapy (ART) with quantifiable results. Aptima assay specificity was determined using individual donor HIV-1 seronegative plasma specimens. Linearity and accuracy of quantitation was assessed using clinical specimens ranging in concentration from 1.0-7.0 log10 copies/mL. A method comparison was performed and Bland Altman analysis was used to analyze the level of agreement between the two assays.

Results: Analytical sensitivity of Aptima HIV-1 assay using clinical samples was 99.1% (95% CI: 95.3%-100.0%). Using the 40 HIV-1 negative plasma specimens, all results were negative (specificity of 100%; 95% CI: 99.4-100%). High pearson correlation (r>0.92) and excellent agreement was observed between Aptima HIV-1 assay and CAP/CTM. Aptima’s precision as per the coefficient of variation was less than 3%.

Conclusion: The Aptima® HIV-1 Quant Dx Assay demonstrated good sensitivity, specificity, linearity and diagnostic agreement with the Roche COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test v2.0. The Aptima® HIV-1 Quant assay on the Panther system is a suitable platform for detecting and monitoring HIV-1 viral load in HIV-1 infected patients in Kenya.
**PS-2.2-015**

**Effective Optimization of VL Testing Using a Standard Tracking Tool: A Case Study at PCR Molecular Laboratory**

**Background:** HIV Viral load test (VL) is the gold standard for monitoring HIV treatment response. The VL implementation was scaled up in Nigeria through PEPFAR initiatives to increase access to VL to most facilities that provide HIV/AIDS treatment to clients. To achieve the UNAIDS third 90 goal, the molecular laboratories were tasked to ensure optimization of the laboratory through full utilization of testing equipment at expected capacity on number of test done to meet VL demands. Here to achieve this purpose, we set up major components to monitor and track the optimization of VL test.

**Methods:** VL tracker was developed with key components that enhanced testing in the laboratory namely, reagent and consumables availability, equipment functionality, samples influx at reception and analysis, electric power supply, human resource and equipment error rate. DLHMH molecular laboratory was selected for the pilot. The VL optimization was monitored using a standard tracker over a period of 6 month. Each variable was assigned a maximum score that represented the status of the variable expressed as Full (≥90%), Partial (75-89%[ON1]) and No (<75%) optimization within the period. Weekly data were collected, analyzed and summarized into monthly percentage optimization using an Excel sheet.

**Results:** Analysis of monthly optimization revealed a gradual trend from beginning to the 6 months as follows: April 38.5%, May 74.5%, June 97%, July 96.5%, Aug 97%, and Sept 82%. Full optimization was achieved from June-August. Deep dive analysis showed that reagent stock out, low samples volume at analysis and long equipment downtime were responsible for the Partial and No optimization between the month of April to May.

**Conclusion:** The use of the tracker provides a more effective means of monitoring laboratory optimization for VL, providing accurate information to meet the stakeholder’s requirement on optimization and proffer ways of addressing challenges using accurate data.

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**PS-2.2-016**

**Accelerating Integration of Molecular Testing at Provincial Level Through the CURe (Current Utilization Rate) Tool**

**Background:** Technological innovations that allow for multi-disease testing on the same platform can accelerate integration at different levels of the health system. In the context of HCV, lack of funding and programmatic capacity provides an opportunity to create synergies between existing vertical HIV and TB programs. However, planning the integration of laboratory networks often does not take into account site-specific factors that substantially affect testing volumes. Hence, there is a need to create new tools to operationalize context-specific integration strategies.

**Methods:** FIND developed a tool to determine the existing molecular testing capacity at a provincial level and assess the feasibility for HCV integration. In particular, the tool aims at assessing the Current Utilization Rate (CURe) by taking into account single laboratory factors such as the equipment utilization hours, laboratory operational hours, and monthly sample volumes. Following data collection, a scoring system is developed to assess the feasibility for integration of HCV into existing site molecular capacity.

**Results:** This tool applies to tertiary and district level facilities that have TB, HIV VL and EID molecular capacity. After accounting for the site-specific laboratory factors, facilities are assigned a feasibility score based on the platform’s CURe value. CURe below 10%, between 11-30% and between 31-50% correspond to very low, low, and medium integration feasibility scores, respectively. By taking into account projected sample volume increases, this tool allows to predict the real utilization rate over time and facilitate the planning and integration of HCV molecular testing across different public health programs.

**Conclusion:** Taking into account realistic site-specific factors and projecting sample volume increases, the CURe of molecular testing capacity can be used to integrate HCV testing strategies. The lessons learnt from using this tool will inform integration of HCV testing into existing lab networks and further strategies towards integrated patient-centered care in LMICs.
Evaluating Multi-Disease Testing on Point-of-Care Nucleic Acid Testing Platforms: A Comparison of Integrated TB and HIV Testing Sites Versus Early Infant Diagnosis Exclusive Sites in Zimbabwe

**Background:** The Cepheid GeneXpert is a near point-of-care nucleic acid testing platform primarily used for TB diagnosis. The platform can also perform HIV early infant diagnosis (EID) and viral load (VL) testing. Most platforms are underutilized, providing an opportunity to perform additional tests on existing platforms. This study assessed the effect on EID outcomes of integrating TB, EID, and VL testing on existing GeneXpert platforms in Zimbabwe.

**Methods:** A cross-sectional descriptive study comparing EID outcome data from five integrated TB/HIV testing sites with those from 36 EID-exclusive sites for the period January to June 2018.

**Results:** 3,432 specimens were processed at integrated TB/HIV sites (3,173 TB, 61 EID, and 83 VL) and 1,507 at EID exclusive sites. Percent EID results returned to caregiver was not significantly different; 100% and 99.4% for TB/HIV and EID-exclusive sites respectively (p=0.525). The median turnaround time (TAT) from sample collection to results return to caregiver was same-day for both site types, range 0 – 0.5 days and 0 – 0 days for TB/HIV sites and EID-exclusive sites respectively (p<0.001). The percent of HIV-infected infants initiated on treatment was 67% (2/3) for TB/HIV sites and 89% (64/72) for EID-exclusive sites (p=0.560). The median TAT from blood sample collection to initiation of antiretroviral treatment for HIV-infected infants was same-day for both site types, (range 0 – 0.5 for TB/HIV sites and 0 – 1 for EID-exclusive sites (p=0.048).

**Conclusion:** There was no significant difference between sites in the percent of test results returned and percent of HIV-infected infants initiated on treatment. While median TATs from sample collection to results return to caregiver was same-day for both site types, there was a statistically significant difference in the range, which is likely not clinically significant. Integration of multiple test types on near POC NAT platforms is feasible without compromising result return.

Validation Verification of the Hologic Panther Aptima HIV-1 for National Viral Load Testing in Zambia

**Background:** The Zambia national viral load (VL) demand is expected to increase from estimated 800,000 tests per year to >1.1 million per year by 2020. To increase national VL testing capacity, the Ministry of Health of the Government of the Republic of Zambia requested a validation verification study of the Hologic Panther Aptima HIV-1 Quantitative assay at the Centre for Infectious Disease Research in Zambia Central Laboratory. Precision, accuracy, linearity, carryover, and specificity were verified.

**Methods:** Volumes of 750 µL plasma samples were loaded on the Panther and tested as described by the manufacturer. Extraction, amplification and quantitative analysis are automated closed system. The comparator equipment in this validation was the Roche COBAS Ampliprep/COBAS TaqMan (CAP/CTM).

**Results:** Fifteen replicates with nominal concentrations of 500, 15000 and 150,000 copies/ml were tested within-day with a mean log10 difference of -0.03, 0.12 and 0.12 respectively. Five replicates of 1000, 10000, 150,000 and 1500000 were tested between-days for a total of 5 days, and the mean log10 differences were 0.16, 0.15, 0.09 and 0.27 respectively. Twenty-six samples were cross tested on the Panther and comparator instrument and the result compared using Bland Altman method with a mean difference of -0.15 within 95% limit of agreement (-0.42, 0.26). Log10 differences for all results were within the allowable 0.5log10. The r² of 0.9737 was obtained when 51 samples were tested. Specificity was 100% for 40 HIV-1 Negative samples tested on both instruments. Ten HIV seronegative samples and 10 HIV-1 VL positive samples with range 75,314 to 114,264 copies/ml were interspersed on the run and tested. All the negative samples remained undetectable. The lower limit of detection in our assays was 60 copies/ml.

**Conclusion:** Precision, accuracy, correlation, specificity, and sensitivity of the Aptima assay are acceptable. The reportable range is 60 to 7,000,000 copies/ml.
Validation of Dilution of Plasma Samples with Phosphate Buffered Saline to Eliminate the Problem of Small Volumes in HIV 1 Patient on Art In Military Health Facility

**Background:** Sample volume is one of the criteria for sample acceptability and assay to provided quality results for patient diagnosis and management. However, this may be a serious issue which may lead to sample rejection and may lead to delay in clinical decision. Plasma EDTA sample collection for patient on ART have been a challenge in recent times. Objectives: This research work is intended to solve the discrepancies noticed from HIV 1 results from non-validated dilutions from the original sample value.

**Methods:** Sixty-three (63) previously assayed sample with results ranging from High Positive 10,000,000 copies/mL (>Log 5), Low Positive 1000 to 10,000 copies/mL (Log 2 to Log 3.0) and 1000 to 100 copies/mL were diluted in the ratio 1:1 (x1), 1:2 (x2), and 1:3 (x3) using Phosphate Buffer Saline. Samples were re-assayed for HIV-1 viral load testing using Cobas AmpliPrep/COBAS TaqMan 96 version 2.0 (CAP CTM HIV v2.0). The result shows that there was a strong correlation between the Diluted and undiluted sample using Pearson correlation r=0.80, r=0.90 and 0.90 for HPC, LPC respectively.

**Results:** The result shows that there was a strong correlation between the Diluted and undiluted sample using Pearson correlation r=0.80, r=0.90 and 0.90 for HPC, LPC respectively.

**Conclusion:** The validation of sample dilution for HIV 1 for viral load is very critical so as to facilitate quality result output, this will also help to reduce sample rejection and repeated patient puncturing. It is therefore recommended that dilution of samples for HIV 1 for viral load is validated according to established standards.

The Use of Flow Cytometry Machine to Evaluate Cellular Degradation as a Companion Diagnostic

**Background:** Viral load testing is of major importance in HIV-infected patients and has become the gold standard for monitoring response to antiretroviral therapy and possible emergence of drug resistance. Currently, laboratory methods are validated to measure VL only on plasma and not on whole blood or dry blood spots. There remains a lack of accessibility to centralized laboratory facilities and point-of-care (POC) testing remains attractive for many patients in poor resource settings. These devices would assess viral load on either capillary blood or on dried blood spots. Optimisation of preanalytics for these devices is important as a concern exists that degraded cells may release the virus and contribute to misclassifying the VL result. Previous data have showed that HIV viral loads assessed in plasma are significantly lower than those assessed in whole blood at lower viral load ranges.

**Methods:** This study was performed on whole blood stored in EDTA under ethics clearance from the University of Witwatersrand human research ethics committee (Medical School). Whole blood was passed through a customized filtration system aimed at removing whole cells and cellular debris. The filtrate was assessed for both cellular debris and whole cells using the PLG methodology, Propidium iodide was used as a viability dye and CD45 for leukocyte enumeration. Viral load from pre and post-processing was compared.

**Results:** As expected, filtration significantly reduced viable leukocytes within the filtrate from median value 5094cells/µL (range 8422-2838) to median value 276cells/µL (range 95-608) with remaining percentage of leucocytes after filtrate ranging between (3.2-19%). Approximately 67% of samples analyzed had increased non-viable cells, and lymphocytes were significantly reduced in only 50% of the samples. These results were confirmed by VL data which showed increased filtrate VL in 5/7 samples as compared to plasma VL.

**Conclusion:** Attempts to optimize the POC by using a filtration method did not prove successful in reducing released virus within the samples. Alternative methodologies will be piloted to attempt to address the concerns.
**Viral Load Monitoring Scale-Up in Resource Limited Setting: Uganda’s Country Response Experience**

**Background:** Uganda is among the highly endemic countries as far as HIV/AIDS is concerned. Of the estimated 1.3 million PLHIV in Uganda, approximately 1,045,015 (80%) have been diagnosed. Epidemic control requires that 90% of PLHIV know their Status, 90% of those identified are initiated on ART and 90% are virally suppressed. Achieving the third 90% requires high coverage rates for Viral load testing and high utilization rates of results by health workers in client management.

**Methods:** The Central Public Health Laboratories with support from PEPFAR fast-tracked VL coverage from the initial 2014 COP targets of 16,411 tests to a target of 1,200,000 tests in the 2017/2018 COP. Program interventions included; site-based trainings, coaching, mentorships and support supervision. Focus areas were viral load ordering, eligibility and interpretation of results. Trained health workers in turn carried out patient education, community awareness, Viral load campaigns, viral load camps, monthly viral load review meetings, reminder systems, task shifting and differentiated service delivery models. Results utilization in patient management has been promoted through the roll out the National Viral Load Dashboard for timely access and printing of results. VL committees were established per site to track performance using quality improvement approaches. System interventions were strengthened using the laboratory hub-system, and sample transportation across the country to the central laboratory for testing.

**Results:** The number of health facilities referring samples increased from 835 in COP 2014 to 2400 health facilities in COP 2017. The viral load samples referred increased from 16,411 in 2014 to 857,942 in 2017. The sample rejection rates reduced from 20% in 2015 to 0.6% in 2017. The on-treatment viral load suppression rate improved from 75% in 2015 to 88.8% in 2017.

**Conclusion:** Multidisciplinary approaches are essential for successful viral load scale up.

**Improving DR TB Case Detection Through Scale Up of Accessibility to Xpert MTB/RIF**

**Background:** Nigeria is ranked 4th among the 30 high TB burden countries in the world and 1st in Africa, with a TB incidence of 322 per 100,000 populations with an estimated incidence of 586,000 cases in 2015 (Global TB Report, 2016). MDR-TB prevalence is estimated at 4.3% among new TB cases and 25% among previously treated patients. Availability of adequate diagnostic tools such as Xpert MTB RIF is critical to improving DR TB case detection. Xpert MTB/RIF was adopted in 2011 for DR TB diagnosis in Nigeria. To improve accessibility, through support from Global fund and other partners, there has been rapid scale up of Xpert MTB/RIF tests across the country.

**Methods:** A retrospective study was conducted to review the trend from 2010 till date to determine the effect of scale up of Xpert MTB/RIF diagnosis in the country and its effect on DR TB case detection.

**Results:** From 2011 to 2017 we had 7, 32, 49, 96, 198, 318, and 390 Xpert MTB/RIF Machines respectively while a total of 512,462 presumptive cases were tested, comprising 129; 1,647; 11,189, 24,313; 27,644; 83,070 and 364,470 respectively. Rifampicin resistance among presumptive DR-TB tested for the same period was 6,761 comprising 25; 85; 665; 781; 1,133; 1,686 and 2,286 respectively.

**Conclusion:** Scale up Xpert MTB/RIF technology has contributed to increased DR TB case detection in Nigeria. Further scale up is required to achieve the expected DR TB case detection rate in Nigeria.
**PS-2.2-023**

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Titrating Monoclonal Antibodies for Use in Immunostaining of Rectal Biopsy Tissue Cells

**Background:** In the pursuit of HIV preventive and therapeutic vaccines, it is necessary to perform cell immunostaining assays to determine immune responses to vaccine products. Antibody manufacturers recommend a given concentration based on their experimental data. Assay conditions in the laboratory are different from the manufacturers’ hence determination of optimal antibody concentrations yielding the best staining index is important. When used in excessive amounts, antibodies bind to low affinity targets thus clouding the interpretation of results. The Makerere University Walter Reed Project laboratory received rectal biopsies taken from vaccine trials’ participants to determine immune responses. In August 2016, the antibodies to be used were titrated for. The T cell panel consisted of CD4 PECy-7, CD8 PerCP Cy5.5, CD3 APC, CD38 APC, Ki67 FITC, CCR5 PE, HLADR Pac blue, while the NK/B cell panel, CD56 PECy-7, CD19 PerCP Cy5.5, IgD PE, NKp44 FITC and CD16 Pac blue.

**Methods:** Using manufacturer inserts, the initial dilution factor for each antibody was determined and then eight serial two-fold different dilutions made. PBMCs were thawed, stained and acquired on a BD FACSCanto II. Using FlowJo version 9.9.3, the mean fluorescence intensity and standard deviation of both the positive and negative populations was used to calculate the staining index. Plotted titration curves were used to determine optimal concentrations that were then validated using biopsy cells.

**Results:** Titration resulted in up to 80% reduction in antibody volume required to give good response.

**Conclusion:** Titration supports resource management since it allows for use of available cell types to determine optimal concentration of an antibody to use in the laboratory-specific assay, thus making the assay more cost-effective for large clinical trials.

**PS-2.2-024**

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PCR Laboratory Optimization and Improved Turnaround Time of HIV Early Infant Diagnosis

**Background:** Myriads of studies on the use of Polymerase Chain Reaction (PCR) for the early infant diagnosis (EID) of HIV, especially in resource limited settings have all shown the abysmally poor test results turnaround time (TAT) from PCR Laboratories. Several factors such as scarce human resource and equipment downtime have been associated with this slow and prolonged TAT; with its attendant hampering of the successes of many national Prevention of Mother-to-Child Transmission (PMTCT) of HIV programs.

**Methods:** This study is a review of routinely collected data from October 2017 to June 2018. These data belonging to a total of 37 APIN supported facilities in Plateau State, North Central, Nigeria, was collected from the APIN-JUTH (Jos University Teaching Hospital) PCR Laboratory. A simple percentage analysis was used to analyze the collected data.

**Results:** A total of 1,155 EID data were analyzed from the point of sample reception at the APIN-JUTH PCR Laboratory to the point of test result dispatch to the 37 sending facilities. Of the 1,155 data analyzed, 38.2% (441) test results were dispatched within two weeks (14 days); while 25.5% (294) test results were dispatched between 15 and 21 days. This clearly indicates that a total of 735 (63.6%) EID test results were dispatched within three weeks (21 days). The remaining 420 (36.4%) test results were dispatched at 22 to 50 days. Also, of the total 1,155 test results analyzed, 22 (1.9%) were positive; 1 (0.1%) result was indeterminate, and 1132 (98%) were negative.

**Conclusion:** Due to improvements in workforce, improved incentives, and reduced equipment downtime, long TAT has been drastically reduced as the proportion of babies who gets their test results within 14 days is relatively appreciable (38.2%). Also, there is a marked decrease (1.9%) in the rate of maternal HIV transmission to their infants among this study population.
Integrated Use of the GeneXpert Platform for TB, HIV and EVD testing in Liberia

**Background:** The capacity for molecular testing of Human Immunodeficiency Virus (HIV) Viral load, Tuberculosis (TB) and epidemic prone disease was very limited in Liberia prior to the Ebola Virus Diseases (EVD) outbreak and during the initial stages of the outbreak. The use of point of care and near point of care machines for multiple disease testing of HIV, TB and EVD was adopted as a solution to these challenges. However, the integrated use of the GeneXpert platform for the confirmatory diagnosis of multiple diseases has not been evaluated since its adoption in 2015 in Liberia. The purpose of this study was to evaluate the integrated use of the GeneXpert for the three diseases testing.

**Methods:** A cross sectional study design was used to evaluate the integrated use of GeneXpert platform for TB, HIV and EVD testing. GeneXpert laboratory registers were reviewed. All the information available since the machines were installed and started testing were captured and analyzed. Besides; information was gathered from the laboratory technicians and the clinicians at the GeneXpert sites. Descriptive statistical analyses of quantitative data were conducted.

**Results:** The integrated testing of HIV1 Viral load, MTB/RIF and EVD using GeneXpert platform has played a significant role in Liberia. A total of 706 HIV 1 viral load, 3695 MTB/RIF and 2309 EVD GeneXpert tests have been conducted since the start of the integrated testing in December 2015 to March 2017. GeneXpert introduction for integrated testing significantly reduced the turnaround time for testing.

**Conclusion:** The integrated use of GeneXpert platform for TB, HIV and EVD is very crucial as it has helped in enhancing the services and coordinating resources in a sustainable manner. Lessons learnt from this integration will help to effectively scale up the use of integrated testing. GeneXpert has proven to be an effective tool and has reduced the turnaround time for these test categories in Liberia.

Comparative Evaluation of GenoType MTBDRplus Assay (v2.0) with Solid Culture Method in Diagnosis of Drug-resistant Tuberculosis in Lagos, Nigeria

**Background:** In Nigeria, tuberculosis (TB) is a major public health problem. The key problem faced by the TB Control Programme in Nigeria is the high rate of drug-resistant TB (DR-TB) especially multi-drug resistant (MDR) strains. The use of GenoType MTBDRplus assay for rapid detection of MDR-TB has been endorsed by the World Health Organization (WHO), Geneva and Foundation for Innovative New Diagnostics (FIND), Geneva. We therefore, assessed the diagnostic accuracy of GenoType MTBDRplus assay in detecting resistance to rifampicin and isoniazid taking culture as the gold standard.

**Methods:** A total of 127 adult presumptive pulmonary TB patients from January, 2016 to December, 2016 were enrolled for the study at the Centre for TB Research, Nigerian Institute of Medical Research, Lagos after written informed consent. Sputum samples were subjected to GenoType MTBDRplus assay (v2.0) for detection of mutations associated with the rifampicin and isoniazid resistance. The conventional drug susceptibility testing (DST) on Lowenstein Jensen media using proportion method was also carried out at concentration of 40µg/ml and 0.2µg/ml for rifampicin and isoniazid respectively.

**Results:** Among the 127 samples, 58.3% were MDR, whereas monoresistance to rifampicin and isoniazid was detected in 33.1% and 2.4% of strains respectively by DST. Using the GenoType MTBDRplus assay, among the 74 DST MDR strains, known mutations in both rpoB and in inhA and/or katG were found in 62; among the 42 DST rifampicin monoresistant strains, 38 were identified as having mutations in the rpoB gene; whereas for the 3 isoniazid monoresistant strains, 3 were identified to harbour mutations in the katG or in the inhA gene promoter region.

**Conclusion:** It is concluded from this study that GenoType MTBDRplus assay (v2.0) provides a rapid diagnosis of MDR-TB as treatment can be started immediately without waiting for conventional DST result thereby curbing transmission.
Pre-analytic Assessment of Lassa Fever Blood Samples at Irrua Specialist Teaching Hospital Laboratory, Irrua, Edo State – Nigeria, 2017

Background: Pre-analytic errors account for about 68% of laboratory errors and may affect test result, increase turnaround time, increase treatment cost and may lead to death. Early diagnosis and treatment of Lassa fever improves clinical outcomes. Irrua Specialist Teaching Hospital (ISTH) is a Referral Center for the diagnosis and treatment of Lassa fever in Nigeria. We assessed the pre-analytic quality of blood samples, their effects on test results and determined the difference between samples from ISTH and samples sent from other facilities.

Methods: We conducted a cross-sectional study from January to April 2017. All samples were assessed with a checklist until sample size of 400 was complete. Independent variables included documentation, volume, packaging, time in transit, temperature, labeling and sample container while the dependent variable was test result (negative or positive, assuming test result to be ≥95% sensitive). Sample quality (good, fair, poor) was determined by maximum performance score of 5, 4 and ≤3 respectively. Logistic regression analysis was done to determine effects of sample quality on test result at P value ≤ 0.05 and 95% confidence interval.

Results: Of the 400 blood samples, 228 (57%) were from ISTH. Poor packaging was the most frequent (77.5%) observed error while wrong container was the least frequent (0.25%). Sample rejection rate due to spoiled sample, wrong container and peeled labeling was 1.3% and were referral samples. Mean score of sample quality was 3.74 ±0.75. Based on performance score for each sample, 52 (13%) of the samples were of good quality, 209 (52.2%) were of fair quality, while 139 (34.8%) were of poor quality. Eighty-three (20.8%) were positive for Lassa virus. Only 209 (52.2%) were of fair quality, while 139 (34.8%) were of poor quality. Quality of sample from ISTH and other health facilities.

Conclusion: Pre-analytic error ranged from 34.8% to 52.3%. This fell within WHO range of pre-analytic errors. Samples with sufficient volume and triple packaged are more likely to have positive results. Training of health workers on sample management by ISTH was recommended and implemented.

Performance of GeneXpert MTB/RIF Testing for Detection of Mycobacterium Tuberculosis in Fecal Specimens From Presumptive Tuberculosis Patients in Tanzania

Background: One of the largest challenges in controlling tuberculosis (TB) especially among children is the difficulty in making a timely diagnosis. We evaluated the performance of GeneXpert MTB/RIF (Xpert) assay in diagnosing TB using stool and sputum samples from presumptive TB patients in Tanzania.

Methods: We conducted a cross-sectional study where we collected two sputum and one stool samples from all consented presumptive TB patient for the presence of Mycobacterium tuberculosis using Xpert and compare results to Lowenstein-Jensen (LJ) sputum culture done at the Central Tuberculosis Reference Laboratory (CTRL) as the gold standard.

Results: A total of 590 patients were enrolled, their mean age was 34.3 (SD 19.1) years. Approximately 20% (108) were children aged 15 years and below. The overall sensitivity and specificity of sputum Xpert at CTRL was 84% (95% CI: 81.0-87.0%) and 93.4% (CI: 98.5-99.9%), respectively. The sensitivity of stool Xpert at peripheral laboratories was 63.0% (95% CI 57.8-63.3) and specificity 76.7% (95%CI: 72.1-81.4). Sensitivity and specificity of stool Xpert at CTRL was 84% (95% Cl: 81.0-87.0%) and 93.4% (95%CI: 92.9-94.6) respectively. The sensitivity of stool Xpert at peripheral laboratories was 63.0% (95% CI 57.8-63.3) and specificity 76.7% (95%CI: 72.1-81.4). Sensitivity and specificity of sputum Xpert among children was 33.3 (95%CI: 21.4-45.3) and specificity 76.7% (95%CI: 72.1-81.4).

Conclusion: Stool Xpert has reasonably higher performance and can complement sputum Xpert especially among children living in a high TB burden, in a low-resource setting.
PS-2.2-029

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**Laboratory Verification of Beckman Coulter Aquios CL in Kenya**

**Background:** In Kenya, about 1.5 million people are currently infected with human immunodeficiency virus (HIV). Infection with the virus is characterized by depletion of CD4+ T-cells resulting in susceptibility to opportunistic infections (O.Is). Thus enumeration of CD4+ T-cells is critical to early detection and management of O.Is and treatment failure among HIV-infected individuals. The current study aimed at evaluating the performance of Beckman Coulter Aquios CL for the enumeration of CD4 cells.

**Methods:** A validation panel consisting of 210 whole blood remnant samples obtained from HIV patients attending a care clinic in Nairobi was characterized on the BD FACSCalibur and tested on Beckman Coulter AQUIOS CL as the test method.

**Results:** The Beckman Coulter AQUIOS CL, when compared to the FACSCalibur, had a specificity of 98.2%, 97.8% and 98.3%, and downward misclassification rates of 1.8%, 2.2% and 1.7% across the 100, 350 and 500 CD4 T-cell thresholds. Sensitivity and upward classifications for the assay was 74.4-88.1% and 11.9-25.6% respectively for the same thresholds. The positive and negative predictive values were calculated at 92.5%-99.2% and 70.2%-97.1% respectively. Additionally, linear regression analyses revealed a coefficient of determination (r²) of 0.93 for absolute CD4 counts, 0.95 for percent CD4 and 0.64 for CD3, and a mean bias of 98.84 cells/µl.

**Conclusion:** The AQUIOS CL demonstrated a high agreement with BD FACSCalibur as the reference assay. The AQUIOS CL provides reliable data for both CD absolute and CD4 percentages, and is suitable for CD4 T-cell enumeration to guide HIV-patient management.

PS-2.2-030

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**An Assessment of Prevention of Mother to Child Transmission of HIV through HIV 1 DNA PCR Early Infant Diagnosis in Keffi, Nigeria**

**Background:** In 2016, Nigeria’s, 6 weeks and final mother-to-child transmission of HIV (MTCT) rates were estimated at 13.1 and 23.0%, respectively. This study aims at showing the improvement in figures within the IHVN MTCT program so far, in a secondary health care facility in Nigeria.

**Methods:** We carried out a retrospective analysis of the Child follow up abstracted data for two consecutive years 2015, and 2016. A total of 289; 186 HEI—from booked mothers who had MTCT-ANC interventions during pregnancy and 103 HEI—from unbooked mothers who never went through MTCT-ANC interventions during pregnancy. A total of 208; 134 HEI-booked cases and 74 unbooked HIV exposed infants were enrolled in the MTCT program at the pediatric unit of FMC Keffi, respectively.

**Results:** In 2015, Out of the 191 that had their first PCR 181 (95%) were negative while 10 (5%) were found positive, and 49 had a 2nd PCR test done (median follow up time= 15 months); 45(92%) negative while 4(8%) tested positive. In all, 155 returned for Rapid test to determine the Final Outcome, at 18-24 months. Of these, 137 HEI, 91(66%) booked cases and 46(34%) unbooked, turned out Negative while 16 HEI; 3(2.10%) while 13(9.50%) turned out HIV positive. Two infants (2%) from unbooked cases died while no death was recorded among the booked cases. In 2016, 168 of 175 (96%) (0-2 months) that had their first PCR tested negative while 7(4%) were positive. At the 2nd PCR (median follow up time= 15 months); 65 of 68(96%) were negative while 3(4%) tested positive. 93 of 143 (65%) booked and 50(35%) unbooked ifants, turned out Negative while 2 (1.40%) and 6(4%) tested HIV positive, and 2(1%) booked and 1(1%) unbooked infants died.

**Conclusion:** This study has shown a significant improvement in the Prevention of Mother To Child Transmission of HIV within our program from 2015 to 2016, particularly among booked cases.
**A Comparative Study on the Utility of Trans-Isolate Media and Direct CSF for Culture and PCR Testing of Suspected Meningitis Cases**

**Background:** Collection and transportation of CSF specimens continues to pose a challenge to effective laboratory diagnosis of meningitis-causing pathogens in high-burden regions. The need to optimize the diagnostic yield of available specimens for laboratory testing remains an important gap in effective surveillance for epidemic meningitis. This study assessed the utility of CSF collected in Trans-Isolate (TI) medium versus direct CSF testing in detection of Neisseria meningitidis (Nm) using both standard culture and molecular methods.

**Methods:** During the 2018 meningitis epidemic, paired CSF samples collected from suspected cases of meningitis into plain tube and in TI medium were processed in the Sokoto State Government/IHF laboratory in Sokoto state. The samples were subjected to standard culture and to Real-time PCR using species-specific assays for Nm. Rates of detection of Nm from the two specimen types were compared.

**Results:** A total of 31 paired Direct CSF and TI samples were analysed. By culture, 6 (19.3%) samples in all yielded N.meningitidis, of which 4 (66.7%) occurred in direct CSF compared to 5 (83.3%) in TI (Fisher exact test, p = 1.0). By PCR, 25 (80.6%) of all samples tested detected N.meningitidis, with 23 (92.0%) from direct CSF compared to 5 (83.3%) in TI (Fisher exact test, p = 0.15).

**Conclusion:** Our findings suggest that use of dual collection methods where possible could enhance detection of N.meningitidis. The modest size of this study may have limited our ability to detect smaller differences between these sample types. Further larger sized studies may help provide additional evidence of the value in dual sample testing in optimizing our capacity for identifying meningitis pathogens in these settings.
TRACK 2: LABORATORY RESPONSE

PS-2.2-033

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Comparing the Yield of Frontloading Microscopy Examination with Conventional Sputum Microscopy Examination for the Diagnosis of Tuberculosis in Tanzania

Background: In the resources limited countries, presumptive TB patient is required to submit two sputa (spot and morning) samples for diagnosis. This diagnosis pathway may lead to pre-treatment loses from care. These lose could be curbed if a diagnosis could be completed on the same day. We compared the yield of a frontloading (two spot sputum samples on the same day) approach in diagnosing TB with that of conventional approach (spot-morning sputum samples).

Methods: All presumptive TB patients attended at St. Benedict’s Hospital between 2015 and 2016 were asked to submit the usual spot and morning sputum samples and an additional spot sputum specimen (Xspot) an hour after the first spot sputum sample. Sputum samples were processed using both Ziehl–Neelsen stain (ZN) and GeneXpert.

Results: We enrolled a total of 473 participants. All submitted spot 1 sputum samples, 470 (99.4%) submitted Xspot sample and 374 (79.1%) submitted morning sample. Nineteen percent (90/473) of the participants who submitted spot 1 samples tested ZN positive. Nineteen percent (69/470) of those who submitted Xspot sample tested ZN positive. All the 89 who tested positive on Xspot also tested ZN positive on spot 1. Twenty percent (74/374) of those who submitted morning sputum samples tested ZN positive and their results were similar to those of spot 1 and Xspot. Additional, GeneXpert tests were performed to 180 (38%) spot 1 samples, and 42 (23.3%) of them tested GeneXpert positive, these were also ZN positive on spot 1.

Conclusion: The frontloading approach yielded similar results as the conventional approach. This approach, if adopted at the health facilities with no GeneXpert services, may contribute to reducing the magnitude of pre-treatment loses from care among TB presumptive patients in resources limited settings.

PS-2.2-034

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Comparative Use of Media in Isolation of C. albicans

Background: This experiment was carried out in the Department of Medical Laboratory Sciences, University of Nigeria, Enugu Campus (UNECS) in Enugu State of Eastern Nigeria.

Methods: Media preparation: The frozen palm wine was thawed and then filtered aseptically through four (4) layers of sterile muslin napkin. One hundred ml (100ml) each was carefully put into three (3) sterile 250ml beakers (Pyrex) and labeled appropriately for three different media: Palm wine Agar (PA): -Filtered boiled palm wine (100ml) -Agar Agar No (2) at 15g/L (i.e. 1.5g/100ml). Because of the observed gelling problem, this was made up to 3.0g/100ml. Palm wine Dextrose Agar (PDA): -Same as above -Dextrose at 40g/L (i.e. 4.0g/100ml). Palm wine Nutrient Agar (PNA): -Same as above and General purpose mycological enrichment agents: Peptone 10.0g/L, NaCl 3.0g/L, Yeast extract 3.0g/L, were calculated for 100ml media. 4. Sabouraud Dextrose Agar (SDA): -Prepared according to Manufacturer’s instruction.

Results: The inference drawn from tables 2, 3, 4 and 5 below (withheld) reveals that the number of colonies on Palm wine Agar (PA) in all cases is the highest followed by Palm wine Nutrient Agar (PNA); thirdly by Sabouraud Dextrose Agar (SDA) and least by Palm wine Dextrose Agar (PDA). These reflect the size and colony population under colonial morphology shown in table 1 below (withheld) in which PA is tiny (∼1mm) and numerous, PNA is moderately robust (∼2mm) and fewer, SDA is also moderately robust (<2.5mm) and fewer than PA, and PDA being the most robust (∼3.5mm), is the least numerous.

Conclusion: From the results obtained, there is an indication that palm wine medium can be used for the isolation and cultivation of Candida albicans and indeed the general yeast population from both clinical and non-clinical sources can therefore serve as an alternative to the commercially prepared agar used in routine laboratories. It has been shown to contain adequate sugar content, essential metabolite and macronutrients all which will contribute to the good growth of these organisms. These could also be enhanced by adding more nourishment as done in this work to increase the efficacy of the medium as good culture environment since some of these especially sugar sources would have been reduced slightly by fermentation.
**PS-2.2-035**

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**Improving Treatment Monitoring for ART Clients Using Viral Load Testing in Four High Burden Facilities in Balaka District, Malawi**

**Background:** Malawi is scaling up viral load testing (VLT) to measure HIV viral load suppression progress and support patient management into differentiated service delivery models. However, low uptake of VLT and results utilization may lead to delayed ART failure detection and client management. We implemented quality improvement (QI) collaborative projects at four high burden facilities in Balaka district to improve uptake and utilization of VLT results for ART clients.

**Methods:** The Department of HIV/AIDS, Balaka District Health Office and University Research Company, LLC facilitated formation of multi-disciplinary QI teams (QITs) at each facility that served as a catalyst for improving the uptake and utilization of VLT results in ART clients’ management. Health care workers from each QIT attended a three-day training on QI methods and tools. Baseline assessment results from March 2018 showed 61% (654/1,079) of ART clients received a routine VLT test, of which 78% (36/46) with high VL (HVL) results were enrolled on intensive adherence counselling (IAC). The QIT teams performed a root causes analysis of low VLT uptake, and results utilization by HCWs, and tested five change ideas: 1) routine VLT screening of clients, 2) weekly data reviews, 3) flagging HVL results on patient cards using colored stickers, 4) efficient division of tasks among members, and 5) prompt tracking and follow-up of HVL clients upon receipt of results from laboratory. The QITs received on-site monthly coaching visits and participated in learning sessions where teams shared their results and changes that led to improvement.

**Results:** Routine VLT of eligible clients increased from 61% (654/1,079) to 97% (1,678/1,735) in all facilities. Enrollment in IAC increased from 78% (36/46) to 95% (84/88) for clients with HVL from March to August 2018.

**Conclusion:** VLT uptake and results utilization improved by using available human resources and simple quality improvement approaches and techniques.

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**PS-2.2-036**

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**Performance Evaluation of Dried Blood Spot Clinical Specimens from Infants for HIV-1 Diagnosis Using the Aptima HIV-1 Quant Dx Assay**

**Background:** Early testing of HIV exposed infants decreases morbidity and mortality significantly. Current testing platforms have low throughput and large footprints; robust, high throughput technologies can help decrease sample backlogs and improve turnaround times to results. The Aptima HIV-1 Quant Dx assay (Aptima) is an in vitro nucleic acid amplification test for detection and quantification of HIV-1 in infected individuals. Aptima is run on the high throughput automated Panther platform that can test up to 700 tests on a single instrument per day. In this study, we aimed to compare the Dried Blood Spot (DBS) results generated using Aptima on Panther with the Roche Ampliprep/Cobas Taqman HIV-1 qualitative test version 2 (CAP/CTM).

**Methods:** This cross sectional study was conducted using DBS samples drawn from all over Western Kenya. For method agreement, DBS specimens from 2348 infants aged up to 18 months old born to HIV+ mothers were tested in both Aptima and CAP/CTM assays. All positive results were retested for confirmation, and only confirmed positives were included for analysis. Data analysis was conducted using Stata v 14. Two sided 95% CI (CI) was calculated using Score method.

**Results:** Results from DBS specimens collected from 1975 patients tested in both Aptima and CAP/CTM were included for analysis. The diagnostic agreement between the assays was 99.6% (CI 99.3-99.8). The sensitivity and specificity of Aptima assay was 95.2% (CI 89.9-98.8%) and 99.8% (CI 99.5-99.9%) respectively, while the positive predictive value was 95.2% (CI 88.4-98.1) and the negative predictive value 99.8% (CI 99.5-99.8).

**Conclusion:** The study showed comparable diagnostic agreement between Aptima HIV-1 Quant Dx Assay and Roche CAP-CTM version 2 qualitative assay. The excellent performance, coupled with a high throughput, made the Aptima Assay a potential gamechanger in EID testing.
Laboratory Evaluation of Bio-Rad Geenius™ HIV-1/2 Confirmatory Assay in Kenya

Background: The highest burden of the human immunodeficiency virus (HIV) is in Sub-Saharan Africa where approximately 1 in every 25 adults (4.2%) is living with HIV. Currently, in Kenya, people aged between 15–64 years have a HIV prevalence of 5.6%. There is need to conduct routine and accurate HIV testing to achieve the UNAIDS 90-90-90 targets since this is the initial step in the cascade.

Methods: In this validation, we sought to verify the performance characteristics of Geenius HIV1/2 test kit as a confirmatory assay. A total of 231 specimens (whole blood, plasma and DBS) were used to conduct the validation at the National HIV Reference Laboratory in Nairobi, Kenya. Agreement between the Geenius HIV1/2 to current serial diagnosis was assessed using Cohen’s Kappa. All the statistical analysis was performed using STATA.

Results: We found that, the sensitivity of BioradGeenius was 98.1% and the specificity 100% when compared to the Kenyan HIV testing algorithm. The positive predictive value was 100% in this evaluation while the negative predictive value was 95.6%. The assay was able to identify 95.6% of the negative samples. When replicates of the same samples were analyzed the precision was 98.94% (kappa 0.968).

Conclusion: This evaluation shows that Biorad Geenius assay is able to differentiate between HIV 1 and HIV 2 and it would be important for clinicians when making treatment choices. Besides, the Biorad Geenius assay can be used in HIV prevalence surveys and it is can easily be interfaced with the laboratory information system. No errors were reported during the evaluation and the procedure has three simple steps.

Expanding HIV Viral Load Testing in Tanzania: Evaluation of the VERSANT HIV-1 RNA Assay

Background: Since 2016 the viral load (VL) testing capacity in the Southern Highlands (SHZ) region of Tanzania has been scaled-up from 20,201 to 69,743 tests per year across 4 labs in order to meet the target for monitoring clients on ART. However, space and infrastructure requirements to accommodate high-throughput platforms, erratic reagents supply, untimely instrument support and safety recall issues have posed challenges to delivering quality VL testing services. Hence, there is a need to evaluate the requirements, performance and support systems of other platforms in the market that could work in resource-constrained environments. The VERSANT HIV-1 RNA 1.5 Assay uses an automated technology with a throughput of 89 samples per 6 hours shift, has reduced space requirements and a contamination control mechanism.

Methods: Accuracy, linearity and precision were determined using 120 plasma samples which were tested on the VERSANT HIV-1 RNA 1.5 Assay and Cobas Ampliprep / Cobas Taqman (CAP/CTM) HIV-1 Test v.2 which is currently being used in the SHZ.

Results: There was high correlation (R²=0.96) between the two assays. Determination of linearity resulted in a quasilinear curve up to the initial concentration of 4.2x10⁶ copies/mL. Quantitative results obtained by the kPCR assay were found to be lower than those obtained by COBAS AmpliPrep/COBAS TaqMan assay (mean = 0.38 logs), with an intra-assay variation of % CV=6.3 (n=48).

Conclusion: VERSANT kPCR HIV-1 assay performs comparably to the CAP/CTM assay and could be used to scale up viral load testing in SHZ Tanzania. The platform can be easily integrated into the laboratory work flow due to inbuilt contamination control and reduced space needs. Including kPCR to the portfolio of approved platforms for VL testing would decrease reliance on one supplier and improve continuity and quality of testing services if reagent supply, service and support as well as quality assurance systems are streamlined.
Evaluation du Test AMPLIX HBV (BIOSYNEX) pour la Quantification de la Charge Virale du Virus de l’Hépatite B

**Background:** La quantification de l’ADN du virus de l’hépatite B (VHB) constitue un des éléments clés de la prise en charge de l’hépatite chronique B permettant une mesure plus directe et fiable de la réplication virale mais aussi le suivi de la réponse virologique sous traitement antiviral. De nouvelles plateformes de PCR en temps réel réalisant cette quantification et adaptables aux laboratoires intermédiaires ont été développées parmi lesquelles AMPLIX NG16/AMPLIX 48 (Biosynex, France). Cette étude avait pour objectif de vérifier les performances sur site du test AmpliX® HBV et de réaliser une comparaison avec la technique Cobas AmpliPrep™/Cobas TaqMan™ HBV.

**Methods:** Les performances de la technique AMPLIX® HBV ont été évaluées selon les recommandations du Comité Français d’accréditation (COFRAC) pour la validation des méthodes d’analyse quantitatives. La comparaison avec la technique Cobas TaqMan™ utilisée comme référence a été réalisée en testant en parallèle 42 échantillons de plasma. L’analyse statistique a porté sur la détermination de la corrélation et la concordance grâce au logiciel MethVal® en considérant le Cobas TaqMan™ comme méthode de référence.

**Results:** La vérification de performance du test Amplix® HBV a montré une bonne reproductibilité et une bonne répétabilité avec des moyennes de coefficient de variation respectives de 1,86% et 4,9% de même qu’une justesse de 0,55% et une contamination inter échantillons très faible (C=0.0288). La comparaison des mesures de charge virale entre Amplix® et Cobas TaqMan™ a montré une bonne concordance avec un coefficient de 0,927 et une bonne concordance avec un biais moyen de 0,43. De plus, Amplix HBV nécessite une prise d’éssai (200µl vs 650 µL) et un temps de réalisation beaucoup plus faible.

**Conclusion:** Ces résultats montrent que le test Amplix® HBV constitue un système fiable et adapté aux laboratoires intermédiaires pour la surveillance des patients atteints d’hépatite chronique.

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Validation of Automated Temperature Monitoring Systems: I-HAB’s Perspective

**Background:** Stable temperature conditions are critical to the integrity of stored biological samples. Auditable temperature monitoring of refrigerators and freezers ensures that the samples are kept in optimal conditions, Institute of Human Virology-Nigeria, H3A biorepository (I-HAB) utilized a combination of manual temperature charting and automated temperature monitoring systems (Smartvue and Tutela) to log and monitor the temperature of storage units.

**Methods:** I-HAB’s Quality Assurance plan included twice daily manual temperature monitoring, emergency contacts and a team of responders in the event of a monitoring device alert. High and low limit set points were established as the normal operating range. I-HAB procured Smartvue automated temperature monitoring system, and later Tutela to provide 24/7 monitoring, status alerting via phone call, SMS message and email to responders when temperature exceeds the set points. Functionality of the systems was evaluated (Smartvue for two years, Tutela for four months).

**Results:** All three systems were useful for identifying shifts and trends in temperatures. Manual system provided on the spot temperature readings, while automated systems provided continuous recording of storage temperatures, local alarm and email alerts during temperature excursions, only Tutela supported phone call and text notifications, critical for temperature monitoring in limited internet settings.

**Conclusion:** Manual system should not be used by itself as it is prone to manipulations by the staff, but be supported by automated systems which forecast potential failure points, facilitate early tracking of changes and proper response mechanisms. Performance verification is key to the choice of system.
HIV Viral Load Testing of Semen Samples – A Comparison Between Abbott m2000 and Cepheid GeneXpert

**Background:** Measurement of HIV-1 RNA levels in other body fluids, including seminal fluid, is important for understanding pathogenesis and transmission of HIV. Abbott’s m2000 RealTime HIV-1 assay is CE-marked and FDA-approved for plasma samples, and is widely recognized as a gold standard for conventional HIV RT-PCR in clinical research. The Cepheid Xpert® HIV-1 Viral Load test is CE-marked and was accepted for the WHO list of prequalified in vitro diagnostics on 20-July-2017 using plasma samples. Both systems allow the user to optimize sample preparation for off-label use with other sample types.

**Methods:** Pooled negative donor semen was obtained from Innovative Research (Novi, Michigan, USA) and spiked with inactivated HIV virus donated by UNC CFAR HIV and STD Core Lab then added to Viral Transport Media (VTM) to generate a series of samples containing approximately 20-200,000 copies/mL of HIV. The spiked and non-spiked samples were tested using the Abbott RealTime HIV-1 RNA Assay 0.6mL protocol and the Cepheid Xpert® HIV-1 Viral Load test using the GeneXpert Dx.

**Results:** The Abbott m2000 RealTime HIV-1 assay detected all semen samples (50 of 50, 100% [92.9, 100]) with spiked HIV-1 concentrations above the manufacturer’s stated plasma sample limit of detection (LOD) of 40cp/mL and 22 of 30 (73.3% [55.5, 85.8]) HIV-1 spiked semen samples with nominal concentrations below the LOD. Similarly, the GeneXpert® HIV-1 Viral Load test detected all of the semen samples (38 of 38, 100% [90.8, 100]) above the 40cp/mL LOD and 9 of 13 (69.2% [42.4, 87.3]) with nominal concentrations below the LOD. For this study, the VTM had no effect on the detection of the internal control for either test platform, all samples resulted valid. Un-spiked semen donor samples were all undetected and all commercial controls were valid.

**Conclusion:** Both the Abbott RealTime HIV-1 RNA assay and the GeneXpert® HIV-1 Viral Load test have high analytical sensitivity and specificity for the detection of HIV-1 RNA in seminal fluid added to VTM. Methods for HIV-1 RNA detection in semen informs the care of patients, as well as recommendations for public health guidelines. Having an “on demand” assay, such as the GeneXpert is convenient for use in health centers and other settings where near real time results would be needed and provides comparable results to conventional PCR.

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**Comparative Evaluation of Cefoxitin Liofilchem® MIC Test Strips and Cefoxitin Disc on Methicillin Resistant Staphylococcus Aureus Isolated from Hospital Patients in FCT, North Central, Nigeria**

**Background:** Worldwide MRSA infections remain one of the most reported causes of mortality and morbidity in both developed and developing countries. In combating antibiotic resistance an advance development and use of rapid innovative Diagnostic test, for identification and characterization of MRSA calls for urgent prioritization.

**Methods:** This study evaluated the efficacy of Cefoxitin Liofilchem® MIC Test Strips and the disc diffusion test on methicillin resistant S. aureus isolated from hospital patients in Abuja, Nigeria. Specimen collection, identification, isolation and antibiotics susceptibility test of S. aureus were done following standard microbiological procedures.

**Results:** The result showed that out of 192 samples collected from 6 area councils in Abuja, the prevalence rate of S. aureus was 38% (73/192). The antibiotics susceptibility study showed that Vancomycin was the highest effective drug of choice (100%) for the treatment of infections associated with S. aureus in Abuja, Nigeria. High resistance was observed against cefoxitin (86.3%), Amoxicillin (84.9%), oxacillin (74.0%), tetracycline (67.1%), erythromycin (61.6%), ceftazidime (56.2%), clindamycin (38.4%), ciprofloxacin (34.2%) and linezolid (26%). High percentage (28.8%) of the isolates were multidrug resistant while 71.2% of the isolates had MARI ≥ 0.3. Out of 48 phenotypically identified MRSA isolates on agar disc diffusion method, further evaluation using MIC test strip showed that 62.5% (30) were susceptible to cefoxitin, while 37.5% (18) were resistant. All the isolates were resistant to more than 5 antibiotics tested; the MIC of these isolates to cefoxitin ranges from 6 - 64 µg/ml and 0.38 – 2 µg/ml for vancomycin. Vancomycin MIC test strips were 100% susceptible.

**Conclusion:** This study observed that MIC strip test is more efficient than agar disc diffusion method as 62.5% of the isolates that were resistant to cefoxitin on agar disc diffusion test were observed to be susceptible while 37.5% were resistant.
**Comparison of Serum Separator and Sodium Fluoride Tubes for Laboratory-based Measurement of Blood Glucose Concentrations**

**Background:** Sodium fluoride/potassium oxalate (NaF/KOx) tubes were once regarded as the gold-standard tubes for glucose analysis. Despite the ineffectiveness of sodium fluoride in immediately inhibiting glycolysis has been reported in several studies especially in the first 1–4 hours, its use in clinical Biochemistry laboratory for glucose measurement is widely practiced. However in the absence of NaF/KOx tubes, Serum Separator Tubes are employed for glucose measurement. The study aims to determine whether SSTs is a suitable candidate to replace NaF/KOx tubes for laboratory-based measurement of blood glucose and to assess the stability of glucose concentrations for 3 days period in the both tubes.

**Methods:** During the study period (1 March to 11 April, 2015), a total of 50 paired samples collected separately in NaF/KOx tubes and SSTs from healthy adult participants in the Gambia Adults Reference Intervals Study (GARIS) project were used as the project sample size. The samples were analysed within 2 hours, and at 24 hours, 42 hours and 72 hours time-points following blood collection using Vitros 350 dry chemistry analyser. The GARIS samples were treated as clinical samples.

**Results:** There was no significant difference in the mean glucose concentrations between the two tubes (Mean difference = 0.06 mmol/L; P=0.38) recorded in the different time-points. Using growth trajectory and mixed effects model, the study data showed no significant change in the glucose concentrations (p=0.25) for three days period in both tubes.

**Conclusion:** The study confirms that SSTs can produce similar glucose results when employed in the absence of NaF/KOx tubes. Besides, the glucose concentrations were stable in both tubes for three days when the samples were separated within two hours and refrigerated in 2-8°C.

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**Progress with Scale-Up of HIV Viral Load Monitoring of Patients on Antiretroviral Therapy – Lesotho, January 2015–June 2018**

**Background:** To reach UNAIDS 90-90-90 targets, it is imperative that all PLHIV are treated with ART and virologically monitored. Lesotho is one of the highest burden countries for HIV with a HIV prevalence of 25.6% and incidence rate of 1.5%. Following the launch of “Test and Treat” in 2016, there has been steady progress in increasing access to ART and VL monitoring. Viral load is now decentralized to five laboratories throughout the country and testing coverage has increased to more than 50% of patients on ART.

**Methods:** VL test results were collected from an electronic LIS at the National Reference Laboratory (NRL). Data were generated on a quarterly basis, analyzed and reported.

**Results:** Lesotho implemented a phased approach in rolling out routine VL testing. From 2015 to 2018, the average number of VL tests performed increased from 2,860 to 40,000 per quarter. To meet the demand, VL testing is now decentralized to additional four laboratories through infrastructure development and an equipment/rent lease agreement. The VL platforms were optimized to increase use by shifting from the initial 8 hour work day to 12 hours per day for five days a week. In 2017, VL monitoring coverage for patients receiving ART increased to 42%. Currently, there are 190,569 PHLIV on ART and the VL coverage has increased to 50%. The VL suppression rate has increased from 87% in 2016 to 90% in 2017 and 2018.

**Conclusion:** Results of the Lesotho Population-based HIV Impact Assessment in 2016 revealed 77% PLHIV diagnosed, 90% on treatment, and 88% were virally suppressed. The program data for VL suppression rates were well aligned with the assessment. The VL suppression rate has now reached 90%. Lesotho’s strategic objective is to achieve the PEPFAR 95-95-95 goals for epidemic control by 2020. Several factors have attributed to Lesotho’s progress including strong governmental support, sustained advocacy, improved laboratory and clinical services, and forging partnerships with international donors. Despite this progress, there are challenges including infrastructure, human resources, sample transport from remote areas, periodic backlogs from equipment breakdown, and reagent stock outs. Developing successful strategies to overcome these challenges are essential to reaching the third “95”.
Scaling-up HIV-1 Viral Load Testing in Madagascar: Progress and Perspectives

Background: In Madagascar it is estimated that 35,000 adults and children are currently living with HIV, and 2772 are under antiretroviral therapy (ART). HIV viral load (HIV VL) testing was available in the past at the National Reference Laboratory (NRL), but since 2012 this activity was discontinued. In 2015, the Centre d’Infectiologie Charles Mérieux (CICM), a public research institution based at the University of Antananarivo, set up an open polyclonal platform using the French ANRS generic assay (HIV Generic charge virale, Biocentric, Bandol, France) to measure HIV VL with the objective to strengthen laboratory capacity and subsequently increase access to HIV VL in Madagascar. This project was supported by grants from Fondation Mérieux and France Expertise.

Methods: PLHIV attending treatment facilities and hospital located in Antananarivo city and its immediate surrounding were first targeted. Access to HIV VL test was then enlarged to 2 remote areas: Mahajanga and Morondava cities.

Results: Between August 2015 and June 2018, we analysed 1476 samples for 1103 PLHIV (mean 0.7 HIV VL/PLHIV). Mean age was 35.5 years and sex ratio M/F was 1.9. In total, 832 patients (75.4%) were under ART of which 609 (73.2%) had undetectable VL (<1000 copies/mL). Success of ART after 6 months and 12 months was 57.4% and 61.8%, respectively.

Conclusion: This project aimed to enhance the national capacity of both LNR and CICM to conduct HIV VL testing in the country. Efforts should be done in improving screening and monitoring of PLHIV on ART with the ultimate goal to reach the UNAIDS 90-90-90 targets.

Implementation of SAMBA Near Point of Care Viral Load Monitoring Among HIV-1 Infected Children and Adolescents in Rural Zimbabwe

Background: Implementation of near point of care VL (POC VL) monitoring in rural clinics can identify virologic failure and prompt adherence counseling, confirmatory testing and drug switching in key populations.

Methods: A total of 357 children and adolescents; 50% from 8 rural ART outreach sites and 50% who came to Chidamoyo Mission Hospital receiving community based ART (>12 months) were tested for HIV VL (WHO and MOHCW 2017 guidelines) between Feb 1 2018 and June 24 by either near POC SAMBA Simplified Amplification Based Assay, (Diagnostics for the Real World) or Roche Cobas ampiPrep/Taqman v 2.0 or both. Sensitivity, specificity, positive and negative predictive value (PPV& NPV) and level of agreement of SAMBA vs Roche Cobas ampiPrep (gold standard) to identify VF > 1,000 copies/ml (WHO) were assessed on Stata/MP 14.1. Roche Quantification allowed classification of low level viremia (LLV) >20 and < 1,000 cps/ml.

Results: Of the 357 children and adolescents enrolled, 260 were tested by SAMBA. Of the 260, 52 (20%) had >1,000 copies/ml with an assay-to-provider turn around time (TAT) of < 4 days. Of 180 samples tested by Roche, 38(21%) had >1,000 copies/ml, 42(23%) LLV (>20-999 copies/ml) and 100(56%) < 20 copies/ml with an estimated TAT of > 4 weeks. Of the 90 samples with both platforms, 79(88%) were concordant in detecting VL>1000 and<1000cps/ml. Sensitivity, specificity, PPV and NPV of SAMBA vs Cobas ampiPrep were 87%, 88%, 71% and 95% respectively. The level of agreement of both methods (Kappa value=0.6) was moderate.

Conclusion: Near POC VL diagnostic testing to monitor ART among HIV-1 infected young people with SAMBA, offers consistent performance despite power cuts and limited transport with rapid turnaround of results for actionable responses to virologic failure. The clinical impact of LLV is controversial. Longitudinal sampling will help to clarify the clinical significance.
**Can Visual Interpretation of NucliSens® Graph Reduce the Need for Repeat HIV Viral Load Testing?**

**Background:** In Zimbabwe, viral load (VL) testing for people living with HIV on antiretroviral therapy is performed at the National Microbiology Reference Laboratory using a NucliSens machine. Anecdotal evidence has shown that invalid graphs for “Target Not Detectable (TND)” will upon repeat VL testing produce a valid result for virus not detected, therefore removing the need to repeat the test. This needed formal assessment. The objectives were to determine i) intra- and inter-rater agreement of the visual interpretation of NucliSens graphs compared with repeat VL results. Intra-and inter-rater agreements were almost perfect. The negative predictive value translates to a false negative rate of 11%. If repeat VL testing is not done, the clinical consequences need to be balanced against cost savings and the risks outweigh the benefits.

**Methods:** Cross sectional study using secondary data. Two laboratory scientists independently rated graphs one week apart for intra-rater agreement and compared final ratings with each other for inter-rater agreement. Consensus interpretations of graphs were compared with repeat VL results. Kappa coefficients were used to obtain measures of agreement.

**Results:** There were 562 patients with NucliSens graphs and repeat VL. Kappa scores were: 0.98 (Scientist A); 0.99 (Scientist B); 0.96 (Scientist A versus Scientist B); and 0.65 (NucliSens graphs versus VL). Sensitivity, specificity, positive predictive value and negative predictive value for graphs compared with VL were 71%, 92%, 79% and 89% respectively.

**Conclusion:** Intra- and inter-rater agreements were almost perfect. The negative predictive value translates to a false negative rate of 11%. If repeat VL testing is not done, the clinical consequences need to be balanced against cost savings and the risks outweigh the benefits.

**Performance Evaluation of HIV Dried Blood Spot Clinical Samples for Monitoring Viral Load of Adult Patients Using the Aptima HIV-1 Quant Dx Assay**

**Background:** In resource-limited settings, use of Dried Blood Spots (DBS) is a pragmatic alternative to plasma for viral load (VL) monitoring in HIV+ patients. In Kenya, VL testing is conducted using Abbott m2000sp and Cobas Ampliprep/Taqman automated systems. The platforms are medium throughput, and at least two-thirds of samples they test are DBS. Aptima HIV-1 Quant Dx assay is a nucleic acid amplification test for detection and quantification of HIV-1 run on the high throughput Panther platform. This study was intended to compare VL results of finger-stick (FS) DBS and venous blood (VB) DBS with plasma in the Aptima Assay on Panther.

**Methods:** In this cross-sectional study, whole blood, FS and VB were collected from 3000 consenting patients in 5 facilities in Western Kenya and shipped to KEMRI-Alupe HIV lab. Study was designed to include atleast 40 samples with VL in each 1 log concentration range to ensure evaluation of performance across the Aptima assay range. Plasma obtained from whole blood was tested on Abbott to determine VL. FS, VB and plasma samples meeting concentration range criteria were tested on Panther. Data was analyzed using Analyse-It software.

**Results:** Plasma, FS and VB results from 258 patients were included in the analysis. In Aptima Assay, overall agreement at 1000 cp/mL between plasma and FS, and plasma and VB were 92.2% and 93.0% respectively. For method correlation, 153 paired FS and plasma samples with quantifiable results gave an r of 0.905. For venous DBS and plasma, 143 samples gave an r of 0.892, while for 144 FS and VB samples, r was 0.968.

**Conclusion:** The study showed significant diagnostic agreement at 1000 cp/mL of HIV-1 for both FS and VB versus plasma results in Aptima. Method correlation demonstrates comparable performance between DBS and Plasma sample types across the assay range.
Analytical Evaluation of the Roche Plasma Separation Card (PSC) for HIV-1 Plasma Viral Load Testing

**Background:** Global viral load (VL) scale-up is challenging in areas where cold chain requirements of plasma viral load testing, the gold standard, are not feasible. The plasma separation card (PSC) developed by Roche Molecular Diagnostics is a sample collection device where plasma is obtained from the addition of whole blood to the card, eliminating the need for centrifugation and cold chain. We sought to evaluate the accuracy of PSC as an alternative to conventionally prepared plasma for HIV-1 VL to be used in resource-limited settings.

**Methods:** An analytical evaluation of the Roche PSC using HIV negative whole blood spiked with cultured virus or using the third HIV-1 International WHO Standard. Prepared dried plasma spots were tested within two weeks using the COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2. The limit of detection (LOD) was calculated using PROBIT analysis. The precision of measurement, cross-contamination, and linearity for subtypes A, B, C, D and CRF02-AG were also determined.

**Results:** The LOD for PSC dried plasma spots on the Roche CAP/CTM was calculated to be 685.2 copies/ml using PROBIT analysis with a 95% confidence interval of 486.3-1544.0 copies/ml. No cross-contamination was detected among the 40 samples tested, alternating between 20 high positive and 20 negative samples. Standard deviation within run was found to range from 0.08 to 0.12 log10 copies/ml and the standard deviation between runs was from 0.09 to 0.12 log10 copies/ml. Linearity assessment of subtypes A, B, C, D and CRF02-AG showed R2 values between 0.983 and 0.988.

**Conclusion:** The PSC met accepted standards for precision, linearity, and LOD. The verified LOD was below the WHO threshold of 1000 copies/ml for HIV-1 viral suppression. The PSC may be useful in areas with poor sample transport networks or limited cold-chain capacity for VL scale-up.
Characteristics of Sputum Sample Referred to National Tuberculous Reference Laboratory for Culture and Drug Susceptibility Testing

**Background:** National Tuberculosis guideline recommends all previously treated patients and Multi Drug Resistance (MDR) contact should have sputum collected and referred to NTRL as part of routine MDR surveillance. Additionally all MDR patients on treatment should have monthly treatment monitoring testing using TB culture. Describe herein characteristics of the samples received at NTRL in 2017.

**Methods:** Data form the 2017 (January-December) were extracted from Laboratory information system (LIMS) at National Tuberculosis Reference Laboratory (NTRL). Information extracted were patient type, age, gender, HIV status, as reported in the laboratory request form, number of samples referred, test results outcomes for MGIT and LJ and drug susceptibility testing (DST). Data was analyzed using Microsoft excel.

**Results:** 53 facilities submitted <20 samples to NTRL contributing to 38% of the workload, the samples came from 21 counties. This analysis covers 5028 samples, of 31.5% (1582) were MDR follow-up. HIV status was documented in 24.4 % (1228). There were 29.3% (1471) female, 70.5% (3544) male and 0.2% (13) unknown. Age ≥ 15 years were 94.4% (4768), ≤ 14 years 2.1% (108) and missing age were 3% (152). Culture positivity was 29.9% (1,503), Culture negative 66.2% (3,327) and 3.9% (198) were contaminated. of the 202 cultures positive MDR follow up 28.7% (58) were of this were HIV positive. Out of 1503 culture positive, 76.2% (1145) were male, 23.5% (353) were females and 0.3% (5) were missing gender. Among the ≤ 14 years were 1.1% (16), ≥ 15 years were 95.7% (1439) and 3.2% (48) were missing age. MDR follow up accounted 31.5% (1582), previously treated 43.5% (2185), New 18.6% (935), MDR contact 1% (48) and unknown 4.4% (278). Of the total culture positive 54.2% (814) were subjected to DST, 9.7% (79) were resistant to Rifampicin, 10.1% to Isoniazid/ Rifampicin resistance were 8.1% (66), 14.5% (118) resistant to Isoniazid and 5.5% (45) resistant to Ethambutol.

**Conclusion:** This study revealed good adherence to TB guidelines given that 75% of samples received were from patients of high risk of MDR. Further research is needed to establish reason for non culture growth among 70% of the samples received.
**A Review of Rapid HIV Test Proficiency Testing in Malawi**

**Background:** Besides monitoring of the HIV testing quality in general, the National HIV Reference Laboratory (NHRL) has been mandated to carry out proficiency testing (PT) in all the sites and for all the providers that analyse rapid tests for HIV as one way of improving quality HIV testing services. PT administration is done twice a year, in the first and third quarter.

**Methods:** Five panels of dry tube samples were distributed to all providers. The results were then sent to NHRL within two weeks of distribution. The NHRL evaluated the results of the first quarter of 2016 and the first quarter of 2018 in order to determine if there had been improvements in the overall performance.

**Results:** In the first quarter of 2016, there was a 72% participation rate for providers with a pass rate of 79%. The sites participation rate was only 68% while in the first quarter of 2018, the participation rate for providers increased to 88% with a pass rate of 95% and sites participation rate of 98%.

**Conclusion:** PT performance has improved greatly in 2018 as compared to the years before due to supervisions by NHRL which focuses on corrective action, improvement projects and other nonconformities that would affect the performance of PT. More sites were created and more providers were trained. The number of provider participating in PT activity increased. More providers performed well in the activity. Despite the improvements, there are still some providers and sites that are not participating. Moreover, some providers are still failing the PTs. Some sites did not send the results to NHRL in time. There is need for the district management team to ensure that there is 100% site and provider PT participation. The management should support the NHRL on providing corrective actions to individuals that have failed PTs.

**Performance Characteristics of TB Smear Microscopy at the CIDRZ Central Laboratory**

**Background:** Although efforts are being made to scale up the use of more sensitive diagnostic tools for tuberculosis (TB) such as Xpert MTB/Rif, smear microscopy remains the most widely used method for diagnosis and treatment monitoring of TB in primary health care facilities in Zambia. We report the current performance characteristics of smear microscopy at the CIDRZ Central Laboratory (CCL) in Zambia; a research laboratory with highly experienced laboratory staff and a robust quality management system in place.

**Methods:** Specimens were collected during a study that was evaluating the effect of Xpert MTB/Rif implementation on the sensitivity and specificity of empirical TB diagnosis and treatment compared to smear microscopy. Participants included HIV-positive presumptive TB patients accessing routine services at two primary health care facilities in Lusaka, Zambia. As part of this study, sputum specimens were sent to the CCL where a direct smear was prepared and stained using the ZN method and TB culture done on both MGIT and LJ for each specimen.

**Results:** A total of 562 presumptive TB cases were included in this analysis. Of these, culture identified 89 Mycobacteria tuberculosis-positive cases while smear microscopy identified 27 AFB positive cases. The sensitivity and specificity of smear microscopy was 29% and 99.8% respectively. The positive and negative predictive value was 96% and 88%, respectively. 71% of TB cases were smear negative.

**Conclusion:** The sensitivity of smear microscopy was low at 29% and could even be lower in primary health care facilities with less robust quality management systems in place. There is an urgent need to scale up the roll out of more sensitive Fluorescent microscopy and Xpert diagnostic methods. The low sensitivity of smear microscopy in high HIV burden settings results in missed opportunities to detect TB, interrupt transmission and reduce TB-associated morbidity and mortality.
**PS-2.2-055**


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**Full Blood Count Estimation using Abbott CELL-DYN Ruby 5-Parts in Comparison with Boule Medonic M-Series 3-parts Differential Haematology Analyser**

**Background**: Full Blood Count (FBC) is a significant laboratory investigation in disease diagnosis, patient management, screening and safety testing for vaccine or drugs clinical trials. Given its critical relevance, laboratories should have alternative comparable methods to be able to perform this test uninterrupted. The aim of this study was to assess comparability between the Boule Medonic M Series 3-parts and Abbott Cell Dyn Ruby 5-parts differential haematology analysers and to assess alternative means of determining bias between two quantitative clinical laboratory analytical methods.

**Methods**: 108 leftover EDTA blood samples, ranging from low to high measurement parameters concentrations were analysed on both analysers in quick successions in compliance with manufacturer’s instructions and documented internal procedures. Following Clinical and Laboratory Standard Institute’s guidelines, the bias between the two analysers for each haematological index tested were determined using Passing & Bablok linear regressions and Bland-Altman’s plot.

**Results**: Passing & Bablok linear regression showed strong positive correlation (0.600 and above) between the two methods for all 12 parameters tested. Bias for all tested parameters were calculated from regression equation, and were all within the a priori defined clinically acceptable limits at low medical decision concentrations, but at high medical decision concentrations, Haemoglobin (HGB), Hematocrit (HCT), Platelets (PLTs), Mean Cell Volume (MCV) and Lymphocytes(%) have bias -1.7g/dl, -2.8%, -110.9 x 109/L, -5.3fl and -1.4% respectively, which all fell out of the clinically acceptable limits. Overall bias for all concentrations between the two methods were determined using Bland-Altman’s plots; only the bias from PLTs, and MCV and LYM (%) fell out of the clinically acceptable bias limits.

**Conclusion**: The two analysers can be used interchangeably for all the 12 haematological indices tested except PLTs, MCV and LYM (%), results of which must be interpreted using equipment specific reference intervals.

**PS-2.2-056**


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**TB Culture Contaminants in Sputum Samples Collected from HIV Infected Patients in Zambia: Need for New Strategies to Preserve Patient Samples for TB Testing in Routine Care Settings**

**Background**: Mycobacterium tuberculosis (MTB) causes high morbidity and mortality globally especially among immunocompromised people living with HIV. Culture is still the ‘gold standard’ for laboratory diagnosis of MTB. Although it is the gold standard, it can be hindered by fast-growing contaminants that may affect the growth of Mycobacteria. Any growth in the TB cultures that is not Mycobacteria is often disregarded with no additional examination to identify and study drug susceptibility to aid clinical care. In this study, we described sputum culture contamination for samples received in the period July 2016 to October 2017 at CIDRZ Central laboratory in Lusaka Zambia.

**Methods**: Samples were decontaminated using Sodium Hydroxide and inoculated on both Lowenstein-Jensen (L.-J) and Mycobacteria Growth Indicator Tube (MGIT) media. Positive cultures were examined microscopically for acid-fast bacilli (AFB) using Ziehl-Neelsen staining. All other organisms were scored morphologically.

**Results**: Of the 674 samples tested, 130 (19.29%) were positive, 474 (70.33%) were negative and 70 (10.38%) were contaminated on both media. The mixed growth of Mycobacterium and contaminants were reported in 43 cases. Individual contamination in MGIT and L.-J were 25.9% and 22.0% respectively. Of the 330 microscopically scored contaminations, 99 (30%), 89 (27%) and 37 (11.2%) were fungi, cocci, and rods respectively. Mixed growth of cocci/fungi, cocci/rods and fungi/rods were 17 (5.2%), 9 (2.7%) and 6 (1.8%) respectively. Unscored slides were 73 cases.

**Conclusion**: The combined contamination rate for both MGIT and L.-J was 10.38%. However, individual contamination rates were much higher in both the MGIT and L.-J at 25.9% and 22.0% respectively. Further studies are needed to identify new strategies and products to reduce TB culture contamination and better preserve patient samples for TB testing. Further investigations including drug susceptibility patterns are also needed to understand the significance of these contaminants within this population.
**Evaluation of Cepheid Xpert® Versus Roche Cobas Amplicre/Theman (CAP/CTM) for Quantification of HIV-1 Viral Load Using Plasma in Kenya**

**Background:** Determination of Viral load (VL) plays a significant role in monitoring the efficacy of antiretroviral drugs, treatment failure, and disease progression. VL testing volume in Kenya has significantly increased over the past three years following UNAIDS 90:90:90 HIV treatment targets. Expansion of VL services with a near point of care (POC) and an easy to use equipment is required to meet the ever increasing demand for VL tests for patients on antiretroviral therapy (ART). The Cepheid Xpert® HIV-1 viral load assay is an easy to use in vitro diagnostic test designed for the rapid quantitation of HIV-1 in human plasma. In this study, we evaluated the clinical performance of Xpert® viral load assay against in-country Roche CAP/CTM v2. We also aim to establish the agreement of Cepheid Xpert® with the Roche CAP/CTM.

**Methods:** Plasma samples were randomly selected from remnant specimens collected from treatment experienced patients within central and Nairobi Kenya. Standard quantitative assay performance parameters with accompanying 95% confidence were evaluated relative to Roche CAP/CTM as the ‘gold standard’ equipment on 210 HIV-1 seropositive samples selected to cover the assays quantification range (40 copies/mL-10,000,000 copies/mL).

**Results:** The study population consisted of patients aged 15-50 years old and comprised of 52% and 48% male and female respectively. The sensitivity and specificity of the Xpert VL assay was found to be 100% and 97.3%, respectively. Out of 210 samples, 153 were quantified by both platforms with a correlation coefficient of 0.9364. The discordance between the two assays was found to be 2%.

**Conclusion:** Xpert® HIV-1 VL assay showed a good performance for the detection and measurement of HIV-1 viral load. Therefore, it can be used for HIV-1 monitoring during disease progression and response to ART at POCs.

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**Laboratory Evaluation of the Xpert® HIV1 Qual Assay as a Point of Care Technology for HIV Early Infant Diagnosis in Kenya**

**Background:** A prompt return of results in early infant diagnosis (EID) of HIV among HIV exposed infants (HEI) is essential for rapid initiation of antiretroviral therapy (ART). Point of care (POC) technologies can significantly improve the turn-around-time for HIV diagnosis in infants, thereby increasing both retention rates and the proportion of pediatrics that are linked to care. Further to this, these technologies are expected to accelerate the uptake of HIV diagnosis in line with the first ‘90’ of the UNAIDS global 90-90-90 targets. The current study aimed at assessing the performance characteristics of the Xpert® HIV1 Qual Assay.

**Methods:** Performance characteristics for Xpert® HIV1 Qual Assay were compared those of Roche Cobas AmpliPrep/Cobas TaqMan (CAP/CTM) HIV1 at the National HIV Reference Laboratory, Kenya using routinely collected EDTA whole blood from 200 infants attending the Kenya national hospital elimination of mother to child transmission (eMTCT) clinic. Statistical analysis assessed the sensitivity, specificity, positive and negative predictive values, and the kappa value in comparison to the gold standard.

**Results:** A sensitivity of 98% and specificity of 100% was observed for Xpert® HIV1 Qual Assay. Positive and negative predictive values were 100% (95% CI: 96.4-100) and 98% (95% CI: 93-99.8) respectively. The assay time to result for Xpert® HIV1 Qual Assay was <2 hours while that of the reference method is 5 hours. Kappa value of 0.98 (95% CI: 0.952 - 1.000) was observed, denoting a near-perfect agreement between the two assays.

**Conclusion:** Xpert® HIV1 Qual Assay demonstrated high agreement with Roche CAP/CTM making its roll-out a great initiative for Kenya in the race towards the UNAIDS 90-90-90 targets. Its ability to relay results to patients in a single visit could greatly improve patient retention rates, provide better linkage to care, and ultimately improve clinical outcomes.
Performance of the Roche cobas® HIV-1 Plasma Viral Load Assay on the Roche cobas® 4800 and 6800 Platforms

Background: Roche has announced end-of-support for the COBAS® AmpliPrep/COBAS® TaqMan HIV-1 test, v2.0 (CAP/CTM) for 2020; urgently necessitating evaluation of its new platforms as replacement reference standards. The Roche cobas® 4800 (c4800) and the cobas® 6800 (c6800), provide higher testing throughputs, and decreased operator interactions throughout the testing process. Our aim is to evaluate the performance of these new platforms in collaboration with World Health Organization (WHO) Prequalification and to provide considerations for use in PEPFAR-supported countries.

Methods: Analytical evaluation of the Roche cobas® HIV-1 assay on both cobas® 4800/6800 using a panel of HIV negative plasma spiked with virus culture or 3rd WHO HIV-1 RNA Standard. This panel covered subtypes A, B, C, D, and CRF02-AG and was used to estimate the limit of detection (LOD) as determined by PROBIT analysis, repeatability, within-laboratory precision, linearity and cross-contamination.

Results: The LOD was estimated to be 20.58 copies/ml (95% Confidence Interval (CI): 14.93-40.47 cp/ml) on c4800 and 12.52 copies/ml (95% CI: 8.86-43.51 cp/ml) on c6800. Repeatability of c4800 and c6800 were found to be between 0.06-0.11 log10 copies/ml and 0.06 log10 copies/ml, respectively. Within-laboratory precision was shown to be between 0.07-0.11 log10 copies/ml on c4800 and 0.06 log10 copies/ml on c6800. Both instruments demonstrated excellent linearity on all tested subtypes with R2 values between 0.989-0.999. No evidence of cross-contamination was found either platform.

Conclusion: The Roche cobas® HIV-1 assay on the c4800 and the c6800 performed comparably, or better than, the Roche CAP/CTM in all portions of this evaluation. The improved chemistry of c6800 makes it more sensitive and supports use as new reference standard for Roche plasma VL.

Evaluation of Lateral Flow Immunoassay for Diagnosis of Cryptococcal Meningitis, Kenya, 2017

Background: Cryptococcal meningitis (CM) is the second leading cause of death in HIV-infected persons in Sub-Saharan Africa. Many fatalities from CM can be averted by early diagnosis and treatment. We compared the performance of lateral flow immunoassay (LFA) on capillary blood, serum and cerebral spinal fluid (CSF) with that of latex agglutination (LA) on CSF and sera, CSF on India ink preparation and CSF culture.

Methods: We conducted a cross-sectional study at Mbagathi Hospital, Nairobi, Kenya. We enrolled CM suspect cases prospectively between April and June 2017. We drew capillary blood, sera and CSF samples from the cases. The capillary blood samples were tested using LFA, sera samples tested with LFA and LA, and the CSF samples tested with LFA, LA, India ink and Culture. We calculated sensitivity, specificity and agreement levels using GraphPad Software.

Results: A total of 124 capillary blood and sera and 99 CSF samples were tested. The agreement between LFA and LA on serum was 94.4%, (kappa 0.88), sensitivity (100%) and specificity (91%). The agreement between LFA and LA on CSF, was 97.9%, (kappa 0.96), sensitivity (100%) and specificity (96%). The agreement between LFA and India ink was 96.9%, (kappa 0.94), sensitivity (100%) and specificity (94.1%). On CSF culture, the agreement was 72.7%, (kappa 0.43), sensitivity (100%) and specificity (64%). The agreement level of LFA on capillary blood, serum and CSF was 100%, (kappa 1.00), sensitivity and specificity of 100%

Conclusion: The high agreement between LFA, LA and India ink on different sample types shows that LFA is a reliable diagnostic test. The evidence of test agreement between LFA in capillary blood, serum and CSF, coupled with the ease to perform test, rapid and accuracy forms the basis of LFA as a choice for point-of-care testing for Cryptococcal meningitis.
**Rollout of Automated Molecular Testing of Ebola Virus Disease in Liberia.**

**Background:** Automated reverse transcription polymerase chain reaction (RT-PCR) testing for Ebola virus (EBOV) (GeneXpert®) has minimal space requirements; lower initial implementation cost; uses a simpler, faster cartridge-based process that requires less sophisticated lab skills and decreases potential for operator error. During the response to the 2014 Ebola outbreak in Liberia, GeneXpert machines were successfully deployed at four sites, with support from the U.S. Centers for Disease Control and Prevention and the World Health Organization, significantly reducing turnaround time and helping contain the outbreak. Following the outbreak, the Liberian Ministry of Health (MOH) developed a plan to rollout the automated RT-PCR testing capacity for EBOV to strategic locations countrywide, while maximizing capacity to test other diseases.

**Methods:** Sites were identified by the MOH. Pre-installation site assessments were followed by installation of 4-module machines, a laptop and a UPS. Cartridges and supplies, as well as personal protective equipment for bedside blood sample collection and virus inactivation, were provided to all sites. Laboratory staff received baseline and follow-up training at three months, as well as a competency assessment at six months with remedial coaching. Pre- and post-training testing were conducted for all trainees.

**Results:** Eleven sites were initially identified, two failed the pre-installation assessment due to poor physical infrastructure. Fifty-four laboratory staff received initial training at nine sites, with support from the U.S. Centers for Disease Control and Prevention and the World Health Organization, significantly reducing turnaround time and helping contain the outbreak. Following the outbreak, the Liberian Ministry of Health (MOH) developed a plan to rollout the automated RT-PCR testing capacity for EBOV to strategic locations countrywide, while maximizing capacity to test other diseases.

**Conclusion:** GeneXpert rollout helped in the integration of EBOV, HIV and tuberculosis testing in Liberia; however, staff attrition, limited computer skills, low sample volume and stockouts risk hampering its sustainability.

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**The Clinical Utility of Automated Schistocyte Counting at the Charlotte Maxeke Johannesburg Academic Hospital**

**Background:** The presence of significant schistocytes on a peripheral blood smear (PBS) according to local laboratory policies is a hematological emergency. This requires urgent investigation for a thrombotic micro-angiopathy (TMA). The automated fragmented red cell (FRC) parameter is a promising diagnostic tool for rapid diagnosis of patients with suspected TMA in particular in the South African context where there is a high burden of thrombotic thrombocytopenic purpura secondary to Human Immunodeficiency Virus.

**Methods:** A prospective study was performed at Johannesburg Academic Hospital in 136 samples. Schistocytes evaluated by microscopy by two competent morphologists according to International Council for Standardization in Haematology (ICSH) recommendations were compared with the FRC on the Sysmex XN-9000 analyzers. The degree of agreement was measured using the Bland and Altman method and Deming-regression statistical methods.

**Results:** Schistocytes were observed in patients with TMA (8.82%), malignancies (11.76%), hemodialysis (28.68%), hemoglobinopathies (11.76%), nutritional anemias (16.91%) and in neonates (2.21%). The Sysmex overestimated the schistocyte count (2.61, CI, 2.15 to 3.07) and revealed a poor correlation with microscopy (0.21 CI, 0.05 to 0.38). There was no correlation between the percentage of microcytic and hypochromic red cells (%Micro-R and %Hypo-He) and the FRC.

**Conclusion:** The presence of moderate red cell abnormalities contributed to overestimation of the schistocyte percentage. The FRC requires confirmation by microscopy.
PS-2.2-063

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Supporting National Viral Load (VL) and Early Infant Diagnosis (EID) Scale-Up: Experience from Clinical Research Centre (CRC) Laboratory in Kericho, Kenya

Background: The role of the laboratory in scaling up of VL/EID testing is essential for the diagnosis and effective management of HIV. The Kericho CRC laboratory is CAP-accredited and one of 10 regional laboratories for VL/EID testing in Kenya, supporting over 1,800 facilities. Co-ordination and technical guidance to the in-country technical working group, thorough assessment of resources, technical requirements and monitoring indicators to ensure the laboratory provides access to timely, quality testing, is essential.

Methods: We describe our experience in implementing VL/EID testing since 2014 in a laboratory with strong quality management systems (QMS) in place.

Results: To accommodate high throughput platforms with a capacity to run ~1,000 samples per 8 hour shift, 8 trained staff were hired, testing workflow and infrastructure re-arrangements were made and inspected to ensure they met technical specifications for molecular testing. The national lab information system was installed and data clerks trained to enter test requests and follow up with facilities when issues arise. Service contracts, quarterly reagent and consumable supply chain with effective monitoring indicators were established. All platforms were enrolled in EQA schemes with over 80% performance rate. Performance indicators such as turn-around time (TAT), rejection rates, redraws/ repeats and monthly quality control Levy-Jennings charts are monitored continuously. Challenges have been identified in the pre-analytical phase such as completion of test request forms and version of forms which impacts quality of data, TAT and rejection rates.

Conclusion: Strong technical and logistical systems, monitoring of quality indicators and management, are key components to continuous quality improvement in the VL/EID testing laboratory. Implementing tools such as the VL/EID scorecard would identify gaps and improve efficiency of the laboratory while instituting data quality assurance activities. Communicating performance indicators with mentorship teams would allow for targeted improvements in the VL/EID spectrum and service delivery.

Sample Collection Volumes for Blood Culture and Pathogen Recovery from Febrile Paediatric Patients in Ibadan

Background: Invasive bacteraemia accounts for a significant proportion of community-acquired infections and is best diagnosed through blood culture. Adequate blood volumes are a reported requirement for optimal pathogen recovery from blood culture and some pathogens, notably invasive Salmonella, are present at very low counts in infected blood. Collection of sufficient blood volume is challenging and sometimes impossible, particularly for paediatric and critically-ill patients for whom blood culture is most valuable. This study examined blood culture sample collection volumes and pathogen recovery in paediatric patients.

Methods: During a cross-sectional study of the aetiology of fever in Ibadan between 16 June and 16 October 2017 we measured the volume of samples collected for blood culture from febrile paediatric patients (0 to 16 years old) presenting at four healthcare facilities in Ibadan, Nigeria. The samples were subjected to a single automated blood culture using the BACTEC FX40 system.

Results: We sampled 264 paediatric patients for blood culture and the recommended 1-3 mL was collected from 218 (82.6%). A probable pathogen was recovered from 37 (20.9%) of the 177 patients from whom 2-3 mL blood sample was cultured, and the contamination rate was 5.1%. For the 41 paediatric patients from whom only 1-1.9 mL was collected, pathogens were recovered at 26.8% but the contamination rate was 9.7%. No pathogens or contaminants were recovered from the 3 samples under 1 mL. Recovery rates for Salmonella spp. were 2.3% from specimens under 2 mL and 6.8% for samples equal or greater than 2 mL.

Conclusion: Optimal blood volume collection is quite challenging to achieve but appears to be associated with lower contaminant rates and higher volumes may improve Salmonella detection. While larger studies are needed, our data support aiming for the highest volume possible within the recommended range for blood culture collection particularly within our typhoid-endemic setting.
**PS-2.2-065**

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**Background:** HIV testing services (HTS) are critical HIV care entry points. All South African HTS sites have introduced the Rapid Test Continuous Quality Improvement (RTCQI) process.

**Methods:** The 2017/8 intervention covered 399 facilities across 4 districts. Baseline Stepwise Process for Improving Rapid Test (SPI-RT) data, scored and categorized by levels from 1 (lowest) to 4 (highest), were used to design facility-specific Quality Improvement interventions. This was designed as either short-term, high-intensity interventions (STIs) (114 facilities) or long-term interventions (LTIs) (285 facilities). SPI-RT levels showing HTS quality were measured again at three months (STI) or 12 months (LTI) after addressing facility-specific gaps. Proficiency Testing (PT) panels containing six serum specimens were distributed to facilities. SPI-RT score changes were analysed using the paired t-test.

**Results:** Improvement across all facilities was highly significant ($P<0.0001$). STIs facilities average scores improved from 70% to 90%. Facilities scoring Level 1 dropped from 34% to 0%, Level 2 facilities reduced (53% to 5%) and facilities receiving level 4 compliance increased from 10% to 65%. The LTI facility scores averaged a 15% improvement (from 71% to 86%). No facilities remained on Level 1, Level 2 facilities reduced from 50% to 25%. Facilities scoring Levels 3 and 4 increased from 30% to 53% and 10% to 22%, respectively. Major contributors to SPI-RT score gains were Personnel Training and Certification, Testing Phase and PT in both intervention models. A 30% improvement (79%) for all facility’s PT response rates was attained in the STI model, of which, 73% achieved satisfactory results ($\geq 80$%). PT response rate improved from 71% to 98% in the LTI model, with satisfactory scores increased from 77% to 86%.

**Conclusion:** After STI and LTI’s, we found significant improvements in HTS quality assurance (QA). PT results indicate improved uptake of independent QA activities. Improved QA can contribute to improved HTS.

**PS-2.2-066**

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**External Evaluation of the Quality of the Rapid Testing of the Virus of Human Immunodeficiency in Mozambique, 2016 – 2017**

**Background:** Quality assurance of the diagnosis of Human Immunodeficiency Virus is essential for improving patient care. In this context, in 2006 the National Institute of Health introduced the Program of Quality Assurance of the Rapid Test of the Human Immunodeficiency Virus. This program identifies key problems in rapid testing in the country and through this, draws up mechanisms to support underperforming sites. The study aims to evaluate the results of the panels sent of 2016 - 2017.

**Methods:** This retrospective study evaluated the results of 2016-2017. The performance was determined by comparing the expected and reported results. The results were revising into an Excel database and issued in percentages and frequencies.

**Results:** Three panels were evaluated, two of 2016 and one of 2017. In panel one, there were 225 sites where 198 responded to the panel, of which 178 (89.5%) had acceptable results. Of those not acceptable, 19 presented errors in the recording of the result, 14 false-positive results and 9 false-negative results. In panel two, 221 participated, where 200 answered, of which, 161 (80.5%) had acceptable results. Of the non-acceptable, 33 presented errors in the result, 26 false negative and 15 false positive. In the 2017 panel, there were 221 places, 201 answered. Of these, 161 (82.1%) had acceptable results. Of the non-acceptable, 48 presented errors in the result, 44 false negative and 12 false positive. Unacceptable results may be related to incorrect panel reconstitution, transcription errors, incorrect reading time of results and algorithm.

**Conclusion:** In all three panels, all evaluated sites had a performance below 100%. The non-acceptable results were due to errors in the result, false positive and false negative results, also showing a weakness in the testing in Mozambique.
**Challenges to Effective Utilization of Gene Xpert in TB Diagnosis in Nigeria- A Comparative Study of Two Facilities in Nasarawa State**

**Background:** Xpert MTB/RIF is recommended by the World Health Organization (WHO) as the initial tuberculosis (TB) diagnostic test in individuals suspected of HIV-associated TB. Deaths were still being recorded in Nigeria due to delayed diagnosis of TB and MDR-TB. The gene xpert systems were introduced to breach this gap. The effective use of the xpert systems are bugged down by challenges that still affect TB diagnosis and treatment in Nigeria. We sought to ascertain what these challenges were.

**Methods:** A comparative study was done at two facilities in Nasarawa state. The facilities were chosen based on the frequency of faults call-outs. A questionnaire was administered to both facilities, observation of operational procedures and an analysis of the error log generated by the gene xpert system was carried out. The data analyzed was from the installation date of the gene xpert system to December 2017.

**Results:** Both facilities had trained operators and similar operational conditions, but work ethics was more consistent in facility A than B. Facility A with better work ethics had higher daily sample run (>12), fewer call-outs (<10) and had not replaced any module in 5 years. Unlike A, facility B had poor work ethics, lower volume of daily sample run (<10) but higher call-outs (>20) and had replaced a module in two years. The system error log analysis revealed facility B with a higher call-out also had a higher percentage of module errors and higher percentage of run-time error.

**Conclusion:** The results reveal that correct and high standard work ethics is important for the xpert to function effectively and to avoid damage to the module. This in turn affects the turnaround time for results. Well managed Xpert machines lead to speedy diagnosis of MDR-TB cases, saves lives, reduces transmission and prevents current diagnostics.

**Validation of Cepheid Xpert® BCR-ABL Monitor and Ultra Test Kits Used in the Molecular Monitoring of Chronic Myeloid Leukaemia (CML) Patients**

**Background:** Chronic myeloid leukaemia (CML) is a white blood cell cancer resulting from the reciprocal translocation between chromosome 9 and 22 which produces the BCR-ABL oncogene that encodes the BCR-ABL1 tyrosine kinase (TK) protein. Tyrosine kinase inhibitors (TKI) are the standard treatment for CML which targets the oncogenic activity of BCR-ABL1. Thus molecular monitoring of the BCR-ABL transcript is essential as it aids in prognosis, monitor treatment response and help predict relapse. Quantitative reverse transcription PCR (qRT-PCR) is the method of choice to monitor treatment response by measuring the amount of BCR-ABL transcript. It is thus critical that the BCR-ABL test is accurate, adhere to an international scale (IS) and have improved sensitivity. Aim & Objective The aim of this study is to evaluate and validate the BCR-ABL Monitor and Ultra tests kits using the Cepheid GeneXpert and to compare the performance of the two kits. In addition, a cost and labour analysis of this automated qRT-PCR methodology will also be done and compared to the manual methods used in other diagnostics settings.

**Methods:** A total of 20 samples (10 newly diagnosed and 10 follow up patients) was collected for this study. Both the Monitor and Ultra assay was used on the same sample and run on the Cepheid GeneXpert system. Twenty negative controls was also included.

**Results:** A total of 20 samples (10 newly diagnosed and 10 follow up patients) was collected for this study. Both the Monitor and Ultra assay was used on the same sample and run on the Cepheid GeneXpert system. Twenty negative controls was also included.

**Conclusion:** The Ultra assay was more sensitive than the Monitor assay and was found to be an accurate test for the detection of the BCR-ABL transcript. It was also found to be superior in terms of specificity, sensitivity, turnaround time and labour intensity compared to manual methods.
Yield of Interpretable Results on (HAIN) GenoType® MTBDR sl ver. 2.0 Among Smear Microscopy Outcomes: A Study Done at National Tuberculosis Reference Laboratory Kenya

Background: Line Probe Assay (LPA) GenoType® MTBDR sl Ver 2.0 detects the presence of Mycobacterium Tuberculosis complex (MTBC) and second line Drug Susceptibility patterns within 48hrs. This test also identifies mutations in gyrA and gyrB genes for fluoroquinolone resistance and second line injectable drugs regions (rsr/eis genes). The manufacturer has validated the likelihood of getting interpretable results from smears results grading of 1+, 2+, 3+ but also indicated that Smear negatives and scanty smears have a higher tendency to indeterminate results. We compared yield of GenoType® MTBDR sl Ver 2.0 interpretable results given the smear microscopy results grading.

Methods: Rifampicin Resistant and MDR follow-up’s samples are routinely referred to NTRL for TB culture. The samples are decontaminated, seeded into liquid and solid media and a smear was done. GenoType MTBDRsl ver 2.0 assay was performed on the samples. Data was stored on LIMS and analyzed using Microsoft excel. We compared the level of interpretable results for MTB and second line DST using GenoType MTBDRsl ver 2.0 assay based on the smear microscopy test outcome for 271 samples received during January- May 2018.

Results: Out of 271 samples the smear outcomes were 1+ 37 (14%), 2+ 23(8%) 3+ 67 (25%) scanty 43 (16%) smear negative 101 (37%). GenoType MTBDRsl ver 2.0 assay interpretable results among Smear negative and scanty yielded 76 (75%) indeterminate results, 25 (25%) yielded interpretable results. GenoType MTBDRsl ver 2.0 assay on smear negative smears yielded 104 (72%) indeterminate and 40(28%) interpretable results. GenoType MTBDRsl ver 2.0 assay on scanty smears yielded 28(65%) indeterminate and 15(35%) were interpretable results. GenoType MTBDRsl ver 2.0 assay on smears of >1+ had a 116(91%) interpretable results and 11(9%) indeterminate. GenoType MTBDRsl ver 2.0 assay on 3+ smear results gave 66(98.5%) interpretable results.

Conclusion: Data from this study conforms with the manufacturers recommendations with the respect to the level of interpretable results of smears results of >1+. However this study revealed that there is value in using GenoType MTBDRsl ver 2.0 among the smear negatives and scanty smear samples since we found 25%(25) of interpretable results among this category. Further research is needed to validate our data.

The Diagnostic Utility of an Alternate Erythrocyte Sedimentation Rate Method

Background: World-wide most laboratories have adopted the use of modified or alternate methods for measurement of the erythrocyte sedimentation rate (ESR). The iSED (Alcor Scientific Inc., Smithfield, RI) is a novel alternate ESR method based on photometric rheology which offers improved operator safety and reduced analysis time. This study evaluated the utility of the iSED in a South African patient population with a range of clinical disorders.

Methods: We compared the iSED with the predicate modified Westergren method (StaRssed, Mechatronics, Zwaag, the Netherlands) measured at 60 minutes. Analysis was performed on K2EDTA samples at three ESR levels (<20, 20-80 and >80mm/hour) in 120 adult and paediatric inpatients and outpatients over a two-week period. Precision, stability and carry-over were performed in accordance with the revised International Council for Standardisation in Haematology guidelines.

Results: There was good correlation between the iSED and StaRssed methods (r=0.88). The y-intercept was 3.98 (CI, 0.01-7.95), indicating a difference of a constant nature with a mean difference of 7.99 mm/hour (CI, 5.87 to 10.13) (P < 0.001). Analysis at three ESR levels revealed a significant increase in the differences at ESR values >80mm/hour with an observed mean difference of 8.66 mm/hour (CI, -0.42-17.73). This was not influenced by haematocrit or mean cell volume levels. The coefficients of variation did not differ significantly between the analysers. Carryover was 2.86%, ESR measurements were stable up to 24 hours when stored at room temperature or 4-8°C.

Conclusion: The iSED provides rapid and precise determination of the ESR. Major advantages include reliability, simplicity, use of EDTA samples with reduced sample volume and prolonged sample stability. This has the potential to reduce the sample rejection rate in routine clinical practice. This study confirmed differences in ESR results measured by the iSED as compared to the reference StaRsssed method. Careful monitoring is advised.
Evaluation of a Late-PCR Base Method for the Specific Detection of Schistosomiasis Mansoni Causing Intestinal Tract Infection in Humans

**Background:** Schistosomiasis caused by water related trematode Schistosoma mansoni is a serious public health problem in tropical and subtropical countries which completes its life cycle partly in snails and partly in humans. It is associated with considerable morbidity and mortality in developing and underdeveloped countries. This study aims to evaluate Linear-After-The-Exponential- Polymerase Chain Reaction (LATE-PCR) base method for the detection of Schistosoma mansoni in stool sample

**Methods:** Methodology: In an effort to establish and enhance accurate diagnosis of Schistosoma mansoni infection, LATE-PCR method was used to detect the parasite in stool samples due to the test being highly sensitive and specific, relatively simple, rapid, easy to perform. Primers and probes targeting for gene ribosomal subunit were designed for species specific amplification of Schistosoma mansoni. In this study, the LATE-PCR base method parameters were optimized and detection of PCR products was performed on 2% agarose gel electrophoresis and the nitrocellulose membrane was coated with biotinylated anti-mouse IgG (control line), anti-FITC(target line) and assembled as lateral flow strips.

**Results:** The high sensitivity enabled detection of parasite DNA in stool samples containing as low as 1 ng/µl of parasite DNA in faeces. The amplification reaction showed to be specific without any cross reaction with DNA from other micro-organism

**Conclusion:** The findings of LATE-PCR based method, developed in this study may constitute a valuable alternative for the diagnosis of patient suffering from Schistosoma mansoni infection in underdeveloped countries like Nigeria. Keywords: LATE-PCR, Lateral flow assay, Schistosoma mansoni, Intestinal Tract infection, stool sample

Benefits of Using a Standard Electronic Checklist to Conduct Laboratory Quality Management Systems Audits

**Background:** The Stepwise Laboratory Improvement Process towards Accreditation (SLIPTA) checklist measures the level of compliance with ISO 15189 requirements in a medical laboratory. A paper-based SLIPTA checklist system is conventionally used to conduct audits in Kenya. Amref through the support of Strathmore University, iLab Africa and the US Centers for Disease Control and Prevention, Kenya, piloted an electronic SLIPTA checklist (e-Checklist) in selected Ministry of Health laboratories in lower eastern and coast region. To evaluate the efficiency and effectiveness of using e-SLIPTA checklist system to conduct audits in terms of data quality, time taken, user friendliness and report reproducibility in comparison with the paper-based system.

**Methods:** The e-checklist was administered in 6 laboratories in August 2017 following a two days’ workshop-based training for 6 laboratory mentors at Strathmore University by iLab Africa. The mentors used their personal laptops in conducting the audits. An online e-SLIPTA portal was created with the following features: log-in page, registration page, dashboard page, audit page, reports page, charts page and export data page. Rights were provided to the mentors to access and analyze the data.

**Results:** A total of 6 audit reports were generated. Each audit took 4 hours to conduct using e-checklist compared to 8 hours using paper-based hence reducing the number of days for auditing in the six laboratories from 9 to 6 days. E-checklist was user friendly, quality of data generated was precise, clear and reproducible. Two out of the six mentors used offline mode option where there was no access to internet but it was not able to upload data in the system once internet was available.

**Conclusion:** The e-SLIPTA checklist system saves on auditing time, the quality of reports generated are precise and clear. The offline mode needed improvement for easy uploading into the system.
Evaluation of BACTEC MGIT 960 for the Detection of Mycobacterium Tuberculosis Complex in Nigeria

Background: Tuberculosis (TB) caused by Mycobacterium tuberculosis complex (MTBC), remains a major global health concern and ranks as the second leading cause of death from infectious diseases. Evaluation of new laboratory techniques for precise and accurate identification of Mycobacteria in clinical specimens is of great importance to improve the diagnosis as part of the global TB control efforts. The superiority of BACTEC MGIT 960 method has already been established in comparison with Lowenstein–Jensen (LJ) culture for the isolation of MTBC among presumptive TB patients. This study was aimed to evaluate the effectiveness of MGIT within the Institute of Human Virology Nigeria (IHVN) TB program.

Methods: The study was conducted among patients attending the National Tuberculosis Reference laboratory Zaria. A total of 419 diagnostic specimens were tested using BACTEC MGIT 960 in comparison with LJ culture for the isolation of MTBC among presumptive TB patients.

Results: Among the 419 tested samples 46 (34.8%) and 191 (45.5%) were culture positive from LJ and MGIT 960 culture methods respectively. Recovery rate of MTBC was 170 (40.5%) by MGIT 960 and 132 (31.5%) by LJ culture and non-tubercular Mycobacteria (NTM) were 21 (5%) by MGIT 960 and 14 (3.3%) by LJ culture and The average time to detection were 27 days for LJ and 9 days for MGIT 960 respectively. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of MGIT in detecting Mycobacterium tuberculosis Complex were 100%, 83.5%, 76.4%, 100% and 89% respectively.

Conclusion: Within our program and in our hands, in the detection MBTC, MGIT 960 has higher sensitivity and specificity when compared with LJ method and is an effective method of detecting MTBC, with a shorter turnaround time as earlier reported.

Diagnostic Value of Widal Test in the Diagnosis of Typhoid Fever: A Systematic Review and Meta–Analysis

Background: Typhoid fever is the common cause of morbidity and mortality especially in the developing countries where Widal test is routinely used as diagnostic tool to rule out the disease. The diagnostic ability of Widal test is debatable as the test method has a low sensitivity, specificity and positive predictive value (PPV). Therefore, systematically reviewing articles and analyzing the pooled diagnostic accuracy of Widal test is necessary.

Methods: A systematic review and meta-analysis of published articles regarding the diagnostic value of Widal test to rule out typhoid fever were carried out from September to December 2017. Published articles were identified from Pubmed, Google Scholar, Health InterNetwork Access to Research Initiative (HINARI) and other sources manually and using a standard searching system. Pooled sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and summary receiver operating characteristics (SROC) curve was analyzed using Meta-DiSc version 14 software.

Results: A total of 15 articles were included in the systematic review with the oldest publication in the year 1994 and the recent in 2015. About 66.7% (10/15) of the studies concluded that a single Widal test is not reliable to rule out typhoid fever. The pooled sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and DOR of Widal test was 57.9%, 67.7%, 34.5%, 51.7% and 8.6, respectively. The odds of having typhoid fever is 8.6 times [DOR, 95% CI: 8.6(1.5-47.9), P<0.001] significantly higher in individuals with reactive Widal test result than their counterparts. The area under the curve (AUC) in SROC curve was 0.72 which shows that Widal test has fair accuracy and better than empirical guessing.

Conclusion: The systematic review and meta-analysis results show that Widal test is better than empirical guessing but its reliability is comparatively poor. Therefore, a single Widal test should not be used as a diagnostic tool to rule out typhoid fever unless supported by invasive clinical pictures and other confirmatory tests.
**PS-2.2-075**

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**Evaluation of HIV Retesting Results in Testing Points Supported by APIN in Nigeria**

**Background:** The most important reason for HIV Retesting is to ensure that individuals are not needlessly placed on lifelong Anti Retro Viral treatment with the accompany side effects. The WHO 2015 guideline on HIV Testing discussed the concept of Retesting; the guideline was adopted for use in many African countries including Nigeria. The Retesting concept in conjunction with implementation of HIV Rapid Testing Continuous Quality Improvement (RTCQI) is expected to reduce the rate of HIV misdiagnosis especially among lay testers in non-laboratory settings. Data collection on Retesting is an ongoing activity across the various testing points supported by APIN Public Health Initiatives with funding from US Centre for Disease control and prevention. Here we present the outcome of retesting for the verification of HIV positives tracked over a period of eight months.

**Methods:** Fourteen thousand, One Hundred and seventy Nine HIV positive results initially identified were tracked for retesting across 700 HIV Testing points. Data collection tools were developed to document and track positives identified. Retesting data was collected at point of retesting and traced back to the initial TP. Data collected were analyzed to determine testing concurrence or discordancy. Few cases of discordancy identified were subjected to Root Cause Analysis and corrective action process. Source documents for the data include: HIV Testing worksheets and HTS registers.

**Results:** All (100%) the HIV Test results tracked have the retesting results documented. Three (0.02%) out of the 14,179 positive results were retested and confirmed as Negatives. The main issue identified include the linkage of the result of initial testing with the retesting results using the appropriate identifier for the tester.

**Conclusion:** The outcome of this study shows that chances of false positive is about 0.02% in testing points implementing HIV RTCQI. Retesting data is a useful prognostic tool for evaluating HIV misdiagnosis.

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**PS-2.2-076**

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**PIMA CD4 Analyser Field Performance and Error Rate in Namibia Population-Based HIV Impact Assessment (NAMPHIA)**

**Background:** The CD4 count is a diagnostic method that evaluates the immune system of Human Immunodeficiency Virus (HIV) infected individuals. With an increase in ART coverage due to the test-all policy, ready access to testing still improves patient outcomes. CD4 point of care (POC) improves access to CD4 testing and linkage to care in remote areas. One such POC platform is the Alere PIMA CD4. This analyser has been extensively evaluated and shown to produce results that are comparable to routine laboratory CD4 technology. However, at an operational level, it has presented challenges due to the proportion of invalid results originating from errors generated during analysis.

**Methods:** Biomarker testing for Namibia population-based HIV Impact Assessment (NAMPHIA) survey included testing of CD4 counts using the PIMA CD4 analyser. Results from these analyses were obtained via the Alere sharepoint. This data was studied to establish total number of analyses performed and proportion of errors generated was calculated and stratified according to user, analyser and period of analysis.

**Results:** A total of 22,615 analyses was performed, 7,247 were of PIMA CD4 and 15,368 were of PIMA Beads. The error rates were 15.7% and 2.2% for CD4 and Beads, respectively. Individual user PIMA CD4 error rates ranged from 0 to 45.5% and the most common PIMA CD4 error type was Error 860 accounting for almost two-thirds of all errors (62.7%). The individual analyser PIMA Beads error rate ranged from 0 to 26.3% and the most common error type being Error 210 (52.5%). Furthermore, 42.2% of all analysers had to be withdrawn from field use to be serviced.

**Conclusion:** This study demonstrated the PIMA machine to be a robust machine capable to suit needs for field work, however the error rate and need for service suggests a need for close observation of regular maintenance to achieve optimal performance.
**Improving the Quality and Availability of Viral Load Results to Accelerate HIV Viral Load Monitoring for Patients on ART AT TASO Mbarara, 2018**

**Background:** During 2016 average sample rejection rate at TASO Mbarara was 1.5% and missing results, 2.1%. This translated into 90% of the results available at the facility useful for patient management. These rates were bound to hinder the progress towards achieving the third 90 goal for the program and the country at large. The aim of the study was to reduce sample rejection, and missing results to less than 0.5% in order to improve results usability by clinicians from 90% to >95% as a measure of quality and availability of viral load results.

**Methods:** We reviewed records from: the national viral load dashboard for TASO Mbarara for the period 2017 for rejections and facility registers for missing results following implementation of CQI activities (mentorships and trainings). SOPs implementation, review of request forms for completeness, appointment of focal personnel and monitoring Turn Around time were implemented at the laboratory. Patient files were also reviewed for evidence of clinical management, non-suppressed patient’s files were marked with red stickers. The missing results and sample rejection rates were computed as percentages and compared with 2016.

**Results:** The sample rejection rate for the year 2017 was 0.4% (25/6258) which indicated a reduction of 1.1% compared to 2016, 1.5% (95/6338). This reduction was attributed to proper documentation and implementation of the viral load bleeding criteria. The missing results rate was 0.4% (25/6528), which indicated a reduction of 1.7% compared to 2.1% (136/6338) from 2016. This reduction was attributed to weekly register reviews and printing of results. This improved results usability & availability from 90% to 95% at the facility.

**Conclusion:** Reduction in rejection and missing results rates at the facility was attributed to the continual quality improvement activities conducted at the facility. We recommend similar studies for ART facilities having similar challenges in order to achieve the 90-90-90 goals.

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**Facteurs Limitants la Securite Transfusionnelle cas du Service de Pediatrie du Centre Hospitalier Regional de Ouahigouya au Burkina Faso**

**Background:** Le Burkina Faso a réorganisé son système transfusionnel avec la mise en place d’un opérateur unique du sang appelé Centre national de transfusion sanguine (CNTS). Cependant le CNTS ne couvre pas tout le pays. Les zones non couvertes continuent de produire et d’utiliser leurs propres produits sanguins labiles (PSL) selon des standards différents de ceux du CNTS. Les pratiques transfusionnelles dans ces zones ont beaucoup d’insuffisances. Le but de cette étude est de présenter les pratiques et attitudes qui limitent la sécurité transfusionnelle dans les zones non couvertes, c’est le cas du service de pédiatrie du CHR de Ouahigouya.

**Methods:** Il s’agit d’une étude transversale à visée descriptive sur les pratiques transfusionnelles du personnel soignant du service de pédiatrie du CHR de Ouahigouya. Les instruments de collecte de données étaient composés de questionnaires auto administrés, de grille d’observation des pratiques et du guide d’entretien.

**Results:** Notre étude a impliqué 18 infirmiers généralistes et 2 infirmiers spécialisés en pédiatrie. La prescription des produits sanguins labiles est effectuée exclusivement par le personnel paramédical. 45% des prescripteurs ne connaissaient pas les indications des PSL. 50% des enquêtés ignorent les principaux signes d’un incident transfusionnel et la conduite à tenir en cas de survenue. 50% des personnes enquêtées ignorent les étapes de la transfusion sanguine. Aucun personnel soignant n’a eu une formation continue en transfusion en dehors de celle initiale reçue à l’école et n’a été supervisé au cours des trois dernières années.

**Conclusion:** Cette étude révèle de graves insuffisances dans la gestion de l’acte transfusionnel. La prescription du sang est un acte médical à défaut, elle devrait être encadrée. 45% des personnes interrogées ne connaissent pas les indications des PSL utilisés. Les conséquences de ces insuffisances sont importantes : transfusions non indispensables, multiplication des incidents transfusionnels pénurie en PSL.
**Analysis of Complaints on Safety, Quality and Performance of in Vitro Diagnostic Medical Devices (IVDs) Reported to WHO**

**Background:** Post-market surveillance for in vitro diagnostic medical devices (IVDs) is the process of detecting, assessing and acting on information about safety, quality and performance of IVDs. An important element of post-market surveillance is the ability to make complaints about real or perceived issues to the IVD manufacturer for their immediate attention. WHO started to collect complaints for IVDs within the scope of WHO prequalification since 2015.

**Methods:** Information related to complaints for prequalified IVDs is collected by WHO through a standardised form. The data is transcribed into a MSExcel database for analysis using pivot tables.

**Results:** Since 2015, 108 complaints have been received by WHO. 36 were serious adverse events (33.3%), 45 were moderate adverse events (41.7%), and 26 were mild adverse events (24.1%). 88 complaints were for HIV or HIV-related IVDs (81.5%). For malaria IVDs, 8 complaints were received (7.4%), the remaining 12 complaints were for HCV, HBV, EBV IVDs (11.1%). Manufacturers of IVDs reported 69 complaints (63.9%), users reported 39 complaints (36.1%). For 50 of the 108 complaints, the root cause of the complaint could be determined, it could not be found for 43 complaints. A correction (that is an action immediately to eliminate a detected nonconformity) was conducted for 40 complaints. A customer warning was issued for 9 complaints, IVDs were modified (the labelling) for 18 complaints, and nine recalls were undertaken by the manufacturer of the IVD. WHO has issued one WHO information notice to users.

**Conclusion:** WHO’s guidance on post-market surveillance of IVDs empowers end-users to detect issues, and for national regulatory authorities to investigate, communicate and contain events that threaten public health security, and for authorities to take appropriate action.

**Evaluation of Performances of a Rapid Diagnostic Test for Detection of Hepatitis B Surface Antigen in Douala, Cameroon**

**Background:** Cameroon is a high endemic country of hepatitis B. To ensure safe blood transfusion implies a meticulous screening of Hepatitis B surface antigen (HBsAg) among donors. In resource-limited countries especially in community area, rapid diagnostics test are commonly used for that purpose. The objective of this study was to evaluate performances of diaspot-HBsAg, a rapid diagnostic test usually used for hepatitis antigen detection.

**Methods:** A cross-sectional and prospective study was undertaken at the blood bank of Laquintinie during six months from November 2017 to April, 2018. Hepatitis B antigen detection was performed on blood of each donor by 2 techniques: immunonographic-Diaspot® and ELISA-Fortress (Gold standard). Comparison of categorical variables were performed by Epi info 7.0 using a X2 test and for p<0,05, the difference was considered as statistically significant.

**Results:** Out of 376 blood donors ignoring their AgHBs status, men were predominant compared to women (89% vs 11%) and the mean age was 49.5±1.9 years (min:18 ; max : 68). The Frequency of HBsAg was 7.98% (30/376) by Diaspot®-AgHBs and 8.78% (33/376) by FORTRESS-ELISA. Diaspot®-AgHBs performances were: sensibility 75.75%, specificity 98,54%, positive predictive value 33%, negative predictive value 97,68%, accuracy 96,5 %.

**Conclusion:** This study revealed that the test Diaspot®-AgHBs used for the screening of HBsAg in our context has lower sensibility than what is recommended by WHO for rapid diagnostic test (Se>95%). A local technical evaluation most always be done before and after use as far as rapid diagnostic test concerns.
Comparison of Throat Swabs, Oral Fluid Collection Devices (Oracol) and FTA® Cards for the Molecular Detection and Genotyping of Measles Virus

Background: The genetic characterization of measles viruses is an important tool for measles surveillance. Among the obstacles to genotyping are the reverse cold chain requirements for transportation of samples to reference laboratories and the restrictions placed on shipping infectious material. FTA® cards facilitate transport of virologic samples at ambient temperature as non-infectious material; however, the utility of FTA® cards for detection and genotyping of measles virus from clinical samples had not been evaluated.

Methods: Throat swabs (TS) and oral fluid samples (OF) were collected from 238 suspected measles cases in the Democratic Republic of the Congo. Virus detection by RT-qPCR and genotyping were compared for samples that were either transported using the reverse cold chain or at ambient temperature on FTA® cards.

Results: Virus detection by RT-qPCR showed excellent positive agreement for TS and OF (95.3%, CI [91.6, 97.4]), while the positive agreement for TS and OF on FTA® cards was 79.4% (CI 73.5, 84.3) and 85.5% (CI 80.2, 89.6), respectively, compared to TS or OF. Viral loads above the threshold needed for genotyping were found in 77.3% of all TS samples and 71.0% of OF compared to only 41.6% of TS and 41.3% of OF samples on FTA® cards. Similar results were found for a subset of 16 measles-negative samples that were confirmed as rubella cases.

Conclusion: In outbreak settings, FTA® cards can be used to transport samples for virologic detection if the reverse cold chain is not available; however, this method would have reduced utility for molecular surveillance of sporadic cases of measles.
**Performance and Feasibility of Using Both Stool Culture and Nested PCR for Improved Detection of Typhoid Fever in Buea Health District, South West Cameroon**

**Background:** Presently diagnostic tests for typhoid fever include serology and culture which both have relatively low sensitivity and specificity. Polymerase chain reaction (PCR) has exhibited mixed performance for blood specimens in the detection of Salmonella. This study compared the performance of stool test, stool culture and nested PCR and their feasibility in the Buea Health district in South West Cameroon.

**Methods:** Three hundred and sixty (360) patients suspected of typhoid fever and sixty one (61) apparently healthy controls were selected for the study. Blood specimens were analyzed using Widal serology test. Stool was cultured and grown cells further analyzed using biochemical tests and nested PCR targeting the flagellin gene of Salmonella species. Performances of tests were determined using standard formulas.

**Results:** Fifty (50) test group participants (13.9%) were stool culture positive for Salmonella following identification with API 20-E test kit. Nested PCR had the highest sensitivity of 91.9%, P = 0.000, while Widal slide and tube tests had the overall lowest performance. When nested PCR was considered as gold standard, stool culture had the highest specificity of 94.6%, P = 0.000. Based on cost, turnaround time and performance, stool culture and PCR appeared as suitable methods for reliable diagnosis of typhoid fever.

**Conclusion:** Stool culture could be used as gold standard in conjunction with serology to improve diagnosis of typhoid fever in the study area. Additionally an algorithm should be explored using PCR for suspected or severe cases negative for both serology and stool culture. Impact of the Study: Clinical laboratories can benefit from this study by adopting the proposed algorithm for diagnosis of mild and/or severe typhoid fever.

**ASLM2018 INTERNATIONAL CONFERENCE PROGRAMME**

**TRACK 2: LABORATORY RESPONSE**

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**PS-2.2-083**

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**PS-2.2-084**

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**Evaluation de la Concordance de 3 Plateformes Utilisées pour la Mesure de la Charge Virale VIH au Togo**

**Background:** En vue d’améliorer l’accès à la charge virale aux personnes vivant avec le VIH (PVVIH), le Togo a opté pour la décentralisation de cette activité dans les différentes régions sanitaires du pays. Cependant, le plateau technique est composé d’équipements de marques différentes. Ce travail vise à évaluer la concordance entre les différentes plateformes disponibles afin de juger de leur interchangeabilité dans le cadre du suivi virologique.

**Methods:** Il s’agit d’une étude transversale réalisée en mars 2018 au laboratoire Biolim (FSS/UL) et au CNR VIH/ST Lomé (Togo). Un total de 195 aliquotes de plasma provenant de 65 PVVIH sous TAR (3 aliquotes par patient) conservés à -80°C ont été manipulés sur les plateformes ABBOTT™, BIOSYNEX™ et BIOCENTRIC™. Les résultats obtenus ont été analysés à l’aide du logiciel EXCEL 2013.

**Results:** Pour les 65 patients inclus, la plate forme ABBOTT (plateforme de référence) a révélé 38 (58,5%) patients indétectables, 13 (20%) ayant une charge virale comprise entre [1.6log - 3log] et 14 (21,5%) avec une charge virale ≥ 3log. Pour les deux autres équipements évalués nous avons obtenu respectivement pour la plateforme BIOCENTRIC, 41 (63%) patients indétectables, 5 (7,7%) avec une charge comprise entre [1.6log - 3log] et 19 (29.2%) qui avaient une charge virale ≥2log et pour l’équipement BIOSYNEX, 44 (67,7%) patients avaient une charge virale indétectable, 6 (9.2%) présentaient une charge virale comprise entre [1.6log - 3log] et 12 (18,5%), une charge ≥ 3log. L’étude de la moyenne des différences selon la technique de Bland Altman entre ABBOTT-BIOCENTRIC, ABBOTT-BIOSYNEX et BIOCENTRIC-BIOSYNEX a montré respectivement une moyenne de différence de 0,13Log10, -0,27 Log10 et 0,4 Log10. La comparaison des taux d’échec entre les différentes plateformes n’a pas montré de différences statistiquement significatives (p=0,621, p=0,851 et p=0,508).

**Conclusion:** Cette évaluation démontre l’existence d’une concordance acceptable entre les différentes plateformes car les moyennes des différences en valeurs absolues restent inférieures à 0,5Log. Cependant, sur la base de l’échec virologique à une CV≥3Log, l’on pourrait déclasser ou surclasser un patient ayant une charge virale détectée.
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Physico-chemical Profiling and Determinants of Staining Quality of Romanowski-type Stains used for Malaria Microscopy in Plateau State, Nigeria, February - August 2018

Background: Blood smear microscopy remains gold standard for malaria diagnosis in resource-poor settings. Though strong relationship exists between the dye composition of aqueous stains and their performance in blood smear microscopy, there is paucity of studies done on the composition of malaria microscopy stains in Nigeria.

Methods: This was a cross sectional study in which 155 laboratory facilities were selected by multi-stage sampling across the three senatorial districts in Plateau State. Ninety-two stain samples and two reference stains used for comparison were analyzed. UV-spectroscopy and HPLC were carried out on the stains. Data was analyzed using Epi Info version 7 and MS Excel. Univariate, bivariate and multivariate analysis were performed at p<0.05.

Results: Of the 94 stains samples, 38(40.4%) were Field stains, 36(38.3%) were Giemsa stains and 20(21.3%) were Leishman stains. For Giemsa stains median concentration of Methylene blue, Azure A, Azure B, Eosin B and Eosin Y were 17.7(range= 0 - 293.7), 145.9(range = 0 - 1282.9), 115.6 (range = 0 - 476), 27.4(range = 0 -177.3) and 104.7(range = 18.5 - 231.0) mAUs respectively. Concentration of dye components varied significantly: Methylene blue (t= 3.6706, p<0.01), Azure A (t= 3.9101, p<0.01), Azure B (t= 5.2755, p<0.01) and Eosin Y (t= 9.5379, p<0.01). Similar results were obtained with Field stains and Leishman stains. Field stains with satisfactory staining were 9(23.7%). Giemsa stains with satisfactory staining were 12(33.3%). Leishman stain yield neither excellent nor good staining. Dye concentration and proportion of Azure B present in the stains were significantly associated overall staining quality of the stains (OR= 7.9, 95% C.I= 2.4 - 26.3). Both emerged as independent predictors at logistic regression: dye concentration (OR= 7.1, 95% C.I.= 2.0 - 26.1), proportion of Azure B present (OR= 9.4, 95% C.I.= 2.5 - 35.2)

Conclusion: The stains used for malaria microscopy in Plateau State were not of constant composition as there was evidence of varying dye components. This is a prelude to inaccurate malaria microscopy due to poor cellular coloration.

Posters

LABORATORY RESPONSE - IMPROVING QUALITY, SAFETY AND COST EFFECTIVENESS OF LABORATORY SYSTEMS

Peculiarities are Important for Designing Optimal Strategies for Laboratory Equipment Maintenance

Background: Automated laboratory analyzers employ increasingly complex technologies and remain critical to the missions of biomedical surveillance and diagnostic laboratories. Adopting optimal strategies for maintenance of laboratory equipment is essential for minimizing operational costs while maximizing service efficiency. We sought to review equipment maintenance incidences necessitating the intervention of respective equipment authorized service agents in an accredited Ugandan laboratory.

Methods: A retrospective review of respective equipment manufacturer’s agents’ maintenance activity records was conducted covering 5.5 years for two FACS Calibur flow cytometers and 2.5 years for three Roche chemistry analyzers. The nature and frequency of all equipment problems was documented and categorized, along with the amount of time in hours needed to resolve them noted. The average workload associated with each piece of equipment was also noted.

Results: Of 115 records reviewed, 61 (53%) and 54 (47%) were with respect to flow cytometers and chemistry analyzers respectively. Across all the equipment combined, the minimum, maximum, and median time taken to resolve critical failures was 0.3, 24, and 3 work hours respectively; while the interquartile time range was 1.5 to 5 hours. Agent visits noted were categorized as related to QC and calibration failure (16.5%), scheduled preventive maintenance (PM – 23.5%), hardware failures (17.4%), Software failures (9.0%), functional failures (36.5%), and training or installation (5.2%). There were significant statistical associations observed (Pearson Chi-Square values of 0.001 in each case), between the instrument type and the nature of problem; and between the instrument type and the time spent resolving those problems. Majority problems were functional (88.1%) for flow cytometers and hardware (65%) for chemistry analyzers

Conclusion: Equipment peculiarity appears strongly linked to the nature of problems to envisage and the associated maintenance time required. Optimal maintenance strategies for critical equipment ought to make due consideration for these when determining details of service agreements, and planning related downtime.
The Journey Towards Achieving ISO-15189 Accreditation: The National Tuberculosis Reference Laboratory Saye Zaria Kaduna State Nigeria’s Experience

Background: Laboratory services in Nigeria is among the weakest components of TB treatment and control in public health, hence strengthening quality management system (QMS) is a key component of laboratory services. This is also a fundamental component of tuberculosis (TB) control, as it ensures that results released by the laboratory are precise, accurate and timely. This study aimed at ascertaining the effectiveness of implementing QMS towards accreditation using internal audit to minimize nonconformance in the laboratory.

Methods: A quasi experimental design was used to conduct this study. Scores from structured SLIPTA checklist was used as an indicator. Three internal audits were conducted and followed-up at an average of 6 months intervals.

Results: At the SLMTA baseline audit the laboratory scored 54.5% (zero star) with a total number of 73 non-conformances (NCs) in the major areas of Documents & records, Equipments, Evaluation & Audit, Process control, Purchasing & Inventory and Identification of non-conformance, corrective & preventive action. At the first follow-up audit the laboratory scored 65.93% (two stars) with a total number of 45 NCs in the areas of Documents & records, Equipments, Evaluation & Audit, Process control, Purchasing & Inventory and Identification of non-conformance, corrective & preventive action. At the second follow-up the laboratory scored 90.41% (four stars) with a total number of 23 NCs mainly in Equipments.

Conclusion: Management and staff commitment; mentorship and improvement projects have tremendously contributed to this success towards achieving ISO15189 stepwise implementation. This will lead to the provision of quality medical laboratory for qualitative case detection in patient care, disease surveillance, and clinical research, especially in the context of emerging and re-emergence of TB cases.

Facility and Safety Improvement Project at North Central Tuberculosis Reference Laboratory Jos Nigeria

Background: The North Central Tuberculosis Reference Laboratory (NCTBRL) Jos commenced QMS from October 2015. Baseline rating by (SLMTA) external audit was zero-star in May 2016. Non conformances were raised by the auditors on safety for implementation to meet acceptable accreditation requirements. Facility and safety was chosen as improvement project (IP) during one of the SLMTA workshops.

Methods: Quasi-experimental design using the Plan Do Check Act (PDCA) cycle (IP) model was used to carry out this study at the NCTBRL, JUTH Jos. Tools used include WHO-AFRO SLIPTA 2015 version 2 checklist, ISO 15190:2012 for safety standard in Medical Laboratory accreditation and unstructured oral interview. Activities were drawn for 4 months. Safety audit was carried out at baseline. Unavailable safety equipment and materials were purchased; and some were supplied by IHVN. Safety audit was carried out on each workstation after the last review. Medical statistical software was used to analyze the categorical data using chi square.

Results: Improvements from baseline and last review were: Waste bin from 3 (21.4%) to 14 (78.6%) chi squared= 8.83, p=0.003; First Aid box and accessories 1(25%) to 4(75%), chi squared= 1.75, p=0.1859; Spill kits 1(33.3%) to 3(66.7%), chi squared= 0.188, p=0.664; Fire alarm 0(0.0%) to 3(100%), chi squared= 22.52, p=0.0001; Safety SOP’s 4(44.4%) to 9(55.6%), chi squared= 1.75, p=0.1859; Spill kits 1(33.3%) to 3(66.7%), chi squared= 0.188, p=0.664; Fire alarm 0(0.0%) to 3(100%), chi squared= 22.52, p=0.0001; Fire extinguishers 5(50%) to 10(100%), chi squared= 6.33, p=0.0118; Smoke detectors 0(0.0%) to 10(100%), chi squared= 3.96, p=0.2046 respectively. There was no improvement on exit doors 3(75%) and stool seats with leather covers 3(30%).

Conclusion: Safety requirements for low to middle income settings must ensure that safety procedures are appropriate, operational, and sustainable within the laboratory. Staff adherence to safety in the NCTBRL, though still a challenge, had remarkably improved.
Evaluating the Impact of the Monthly Section Based Monitoring of Non Conformities on the Quality Management System at Mildmay Uganda Laboratory

Background: Since 2016, Mildmay Uganda Laboratory’s section based monitoring involved monitoring of selected quality indicators with little focus on nonconformity (NC) closure through weekly quality tours. However, records of internal and external audits highlighted NCs at the section level which would have otherwise been closed during the quality tours. Therefore, the scope of the tours was expanded to include capturing nonconforming work and their closure and the frequency of the tour was changed to monthly. This study was aimed at evaluating the impact of the monthly section based monitoring of NCs on the QMS from Oct 2017 to Feb 2018.

Methods: Retrospective data was collected from five randomly selected consecutive months before the intervention and compared with prospective data for five months after. During the intervention, selected members were assigned: some to carry out quality tours and produce reports while others tracked captured NCs from the tour reports until closure. The records generated in the tour report included: equipment service reminders, incomplete maintenance logs, service report typographical errors and missing/misplaced records, nonconformities.

Results: The results revealed that from Oct 2017 to Feb 2018, 100% of all the 24 NCs captured were completed yet none of the 24 NCs captured in the Sep 2016-Jan 2017 period had been closed. Unlike before, QMS error alerts and reminders were generated after the intervention like Equipment service reminder (53.3%) of which 81.3% where performed on time following the intervention, incompletely maintenance logs (3.3%), Service report typographical errors (10%) and Missing/misplaced records (33.3%).

Conclusion: There was a lot of marked improvement of various aspects of the QMS at the sections that radiated from capturing and review of potential nonconforming activities at section level. Therefore, laboratories should incorporate NC handling into their section based data collection.

Impact Of External Quality Assurance in Diagnosis of Tuberculosis Patients in Hoima Region, Uganda

Background: Tuberculosis (TB) remains an important public health problem globally and within sub-Saharan Africa despite significant progress made in the past decade. External quality assurance (EQA) systems are essential to ensure accurate diagnosis of TB and drug-resistant TB. The implementation of EQA through organizing regular EQA rounds is one of the key activities of the National Tuberculosis and Reference Laboratory network (NTRL). The aim of this study was to assess the impact of External Quality Assurance (EQA) in diagnosis of TB patients Hoima region.

Methods: We retrospectively reviewed EQA results for 2018 Quarter 1 for performance for the seven districts in Hoima Region. Reports received from participating laboratories were analyzed against reference results as determined by the EQA provider, National Tuberculosis Reference Laboratory (NTRL) and the percentage of correct results for each district was calculated by dividing the number of correct results by the total number of tests in each district. Laboratories scoring 80-99.9% were ranked as “good” and 100% as “excellent”. Scores under 80% were considered to indicate poor performance.

Results: The performance of laboratories within the region ranged from 38%-100%. The EQA performance from the seven districts was as follows; Kakumiro 100%, Kibaale 100%, Hoima 93%, Masindi 93%, Bulisa 83%, Kiryandongo 66%, Kagadi 38%. Kakumiro and Kibaale district were ranked as excellent, while Hoima, Masindi and Bulisa as good. Kiryandongo and Kagadi were ranked as poor.

Conclusion: Overall, laboratories demonstrated good proficiency with scores exceeding the 80% threshold in the vast majority of the laboratories. We recommend targeted refresher trainings and onsite mentorship about TB microscopy for facilities with poor performance.
**Quality Control of the Mozambique Nacional External Quality Assurance Program**

**Background:** The National Program for External Quality Assessment was implemented in 2011 with the aim of raising the quality and reliability of testing in testing sites. One of the methods of External Quality Assessment implemented is the proficiency testing and currently has 13 EQA schemes. In order to guarantee consistency of the produced panel, in 2017 was introduced the panel validation as a mandatory procedure. Objective Describe the quality assurance strategy of the program trials.

**Methods:** To confirm the consistency of the test items and that they are stable and homogeneous, validations of the pre-shipment tests were introduced to validate the assay, validations during and at the end of the assay as a way to assess the effect of heterogeneity and sample instability. To validate the assay, at least 3 batches of samples from the panel to be submitted are tested, and then compared to the results. These results should be similar and or concordant and then defined as expected result and key scoring database. During the panel period, readings of 1 batch of the assay sent once per week including the last day of reporting the results are done. All results are placed in a database built to monitor homogeneity and stability, and it is expected that these results will be consistent.

**Results:** The mandatory validations of the test items were introduced in March 2017 and submitted for 5 shipments. The program has 12 proficiency tests and it is expected to have at least 5 validations. Of all AEQs, 12 (100%), the average compliance with the delivery of weekly validation reports was 69.35%. Of the AEQs that complied with the reporting process, they were found to have achieved 100% (7/7) of concordant results.

**Conclusion:** The quality assurance of the tests of the program is carried out by carrying out the validations. Results of this practice demonstrate that the Mozambique assays provided are sufficiently stable and do not undergo any significant change during the period of proficiency testing.

**Implementing an Accelerated 100-Day Rapid Results Initiative Through the Strengthening Laboratory Management Toward Accreditation (SLMTA) Approach in 42 Clinical Laboratories in Kenya**

**Background:** Since 2012, when Kenya started implementing the Strengthening Laboratory Management Toward Accreditation (SLMTA) program, 142 laboratories have enrolled, but only 17 (12%) have been accredited. In 2017, CDC, the Ministry of Health, and other stakeholders initiated a 100-day rapid results initiative (RRI) to fast-track laboratory accreditation.

**Methods:** A multi-agency team selected 42 of 125 eligible laboratories to complete baseline, midterm, and end-term Stepwise Laboratory Improvement Process toward Accreditation (SLIPTA) audits. Laboratories were scored based on 0-5 stars: 0: <55%; 1: 55-64%; 2: 65-74%; 3: 75-84%; 4: 85-94%; 5: >95%. Based on the baseline scores, interventions were tailored for each laboratory, including intensive trainings and mentorship to build laboratory and quality document control systems, mentorship to target internal audits and management reviews, management review meetings and occurrence/incidence management, and corrective and preventative actions. Management-level leadership buy-in was sought at each facility.

**Results:** At baseline, eight laboratories (19%) received 0 stars, 24 (57%) received 1–2 stars, and 10 (24%) received 3–4 stars. After 100 days, only one laboratory received 0 stars (2%), 26 (62%) received 1–2 stars, and 15 (36%) received 3–5 stars. At baseline, 81% of the laboratories had at least 1 star, which increased to 98% at the exit audit. All 15 laboratories that scored 3 or more stars were recommended for Kenya National Accreditation Scheme (KENAS) assessment for ISO 15819 accreditation with prior tailored mentorship. Those with 2 stars were audited by Africa Society of Laboratory Medicine (ASLM) auditors for SLIPTA star recognition. Those with 0 or 1 star continued to receive standard mentorship.

**Conclusion:** Establishing a clear, site-based, tailored approach supports accelerated laboratory accreditation. Management buy-in is critical in ensuring support and success at the facility level. Stakeholder engagement ensured successful national coordination of the initiative.
Strengthening Waste Management During HIV Viral Load Scale-Up in Countries Supported by the United States President’s Emergency Plan for AIDS Relief (PEPFAR)

Background: The President’s Emergency Plan for AIDS Relief (PEPFAR) supports viral load (VL) scale-up in over 40 countries. By 2020, more than 30 million VL tests will be performed globally, the majority in areas with limited infrastructure and inadequate waste management policies. Guanidinium thiocyanate (GTC), a corrosive compound used in nucleic acid extraction and found in VL waste, requires specialized disposal. Identification of effective, sustainable waste management options is necessary.

Methods: A technical working group consisting of laboratory scientists, biosafety experts, chemical hygienists, and waste management specialists was created to understand the waste quantities generated by HIV VL testing laboratories, the treatment and disposal of the effluent and identify disposal methods for both solid and liquid VL waste. Existing waste technologies were reviewed to include encapsulation, landfills, pyrolysis, incineration and waste transportation.

Results: Based on approximate waste volumes from VL testing laboratories, 30 million VL tests are estimated to produce approximately 924,000 L of effluent chemical waste and 2,102,100 kg of solid biohazardous waste. To meet this need, neutralization of GTC by calcium sulfate dihydrate is an option merit further research. High temperature incineration with appropriate chemical control measures may be difficult to implement due to the volume of liquid waste, temperature requirements, emissions, and financial constraints. Cement kiln burning may prove unfeasible because the calorific value of VL waste is low, and high calorific waste is more desirable. Encapsulation is not a viable long-term option because storage is bulky and requires constant monitoring for leakage.

Conclusion: Ministries of Health, partners, and manufacturers of GTC-containing products should consider GTC disposal problems. Investigation into environmentally friendly, sustainable waste disposal methods and GTC alternatives is needed.
**Efforts in QMS Implementation in South West Zonal TB Reference Laboratory, University College Hospital, Ibadan-Nigeria**

**Background:** Quality medical laboratory services are integral part of health care services, public health systems and medical research. This is critical because of Africa’s burden of diseases including Nigeria.

**Methods:** We used SLIPTA checklist version 2: 2015 for clinical and public laboratories which specifies all the requirements for quality and competency aimed to develop and improve laboratory services to raise quality to established national standards. We evaluated areas for improvement from the gaps identified in a 2016 SLIPTA audit report and conducted an initial gap analysis for to come up with ways to implement the requirements of ISO 15189 Standard. Implementation of corrective actions was with support and mentorship of QA experts from IHVN, reviewing and providing guidance for our laboratory QA and QMS activities.

**Results:** Forty (40) major and twenty-seven (27) minor non-conformances were identified at the baseline audit. Most of these NCs were in the areas of Management review and Evaluation and audits, were addressed within two months as agreed in our action plan. At the first follow-up audit, we scored zero in sections 2 and 6 respectively and low scores in other sections on sections 1,3,4,5,7,8,9,10,11 and 12 of the checklist used for the audit. At the second follow-up SLIPTA audit results in 2017, improvement in the scores of SLIPTA internal audit was 32.2% demonstrating a significant improvement (p-value 0.005).

**Conclusion:** Improvement in QMS was achieved and largely dependent on the introduction of Management Review Meetings (MRM) with UCH University College Hospital top Management. Improvement in the in-house internal and external audits was achieved through commitment by trained internal audit team with support, from our ASLM, SLMTA mentors.

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**Intensive Adherence Counselling, a Measure of Behavioral Response to Anti- Retroviral Uptake and Virological Suppression: A Case Study of Greater Masaka Health Facilities, Uganda**

**Background:** In 2016, Uganda non suppression was 11%, with Masaka district at 9.8%. Majority of the patients on ART in Masaka region with VL >1000 cp/ml were switched to second ART treatment without Intensive Adherence Counseling (IAC) which reduces limits future options for ART therapy. The study assessed the outcome of Intensive adherence counselling IAC, on HIV positive persons with greater than 1000 viral copies per ml of blood from July 2017 to June 2018.

**Methods:** We retrospectively reviewed results from the ART clinic for the period June 2017-June 2018. Non suppressed patients were entered into the non-suppression register and initiated on Intensive Adherence Counselling (IAC) for four consecutive months. At the end of the IAC, Viral load measurements were done to determine the impact of the IAC. The outcome of the IAC was measured as percentage suppression by the patients.

**Results:** 12,540 records from the ART clinic were reviewed between June 2017 and June 2018. 9.8% (1229/12,540) of the patients had non-suppressed viral loads and were initiated on Intensive Adherence Counselling. 40% (492/1229) of the patients initiated on IAC completed all the sessions, 25% (307/1229) were transferred out while 35% (430/1229) were lost to follow up. Of the patients who completed the IAC sessions, 97% (477/492) had suppressed viral load results while 3% (15/492) were unsuppressed.

**Conclusion:** IAC as an intervention to have 90% virologically suppressed at the end of the fourth IAC showed that non-suppression rates can be reduced by 97%. The challenge however remains with the increased lost to follow up of the unsuppressed patients that needs to be mitigated in order to attain HIV epidemic control within Masaka region.
**Reusable Supplies and Equipment for Sustainable National Specimen Transport**

**Background:** Laboratories in low-resource countries face multiple challenges with their national specimen referral and transport systems, including a lack of access to sustainable shipping materials, reliable cold chain, and safety and security in handling. These issues can compromise the quality of laboratory testing results, especially for temperature-sensitive samples. Typical specimen transport materials currently utilized in the field are disposable and can only maintain optimal temperatures for a number of hours. The US Centers for Disease Control and Prevention (CDC) and Association of Public Health Laboratories (APHL) collaborated to equip national laboratories in select countries with kits comprising reusable secondary and tertiary containers. The program has three aims: 1) provide sustainable containers for shipping, 2) preserve the quality of specimens for testing, and 3) improve the safety of specimen transport.

**Methods:** CDC and APHL selected containers to build reusable triple packaging kits. Each kit includes autoclave-safe secondary containers and lockable tertiary containers suitable for decontamination. The team then developed a questionnaire to document countries’ current specimen packaging and transport methods, scope and size of the laboratory network, capability to support new supplies, and commitment to monitor and evaluate the use of the kits. The questionnaire was sent to 24 low-resource countries.

**Results:** Twenty countries responded and were eligible to participate. Based on responses to the questionnaire, CDC and APHL procured 328 reusable triple packaging kits. Distribution of these materials is currently under way. Program impact will be assessed through the six-month and one-year evaluation reports provided by participating countries.

**Conclusion:** This project supports existing specimen transport networks by providing reusable supplies intended to increase laboratory capacity to collect, store, and transport specimens between national and sub-national laboratories in a reliable, cost-effective, and sustainable manner. Furthermore, these supplies support optimal specimen transport conditions, thus ensuring quality specimens for improved diagnostic, surveillance, and outbreak response testing.

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**3rd SLMTA Round Implementation in Mozambique**

**Background:** SLMTA tool is being implemented in Mozambique since 2010 with the objective of improving laboratory services for clinical analysis and public health throughout the country. The third round of implementation counted on the participation of 34 laboratories. Objective: Disseminate the results of the third round of implementation of the SLMTA tool.

**Methods:** A technical group was set up to plan, evaluate, guide and oversee the implementation process. Tool shapers, supervisors and auditors were available to monitor the program’s laboratories. The implementation was based on 4 workshops every 4 months and a total of 7 technical support visits. Baseline and final audits were performed using the WHO-AFRO SLIPTA checklist.

**Results:** Thirty-three laboratories were registered, 8 of reference, 3 central, 8 provincial, 2 General, 1 district, 1 of Sant'Egidio, 2 of Health Center and 9 of Blood Bank. In the initial evaluation a laboratory had 3 stars, 5 with 2 stars, 6 with 1 star and 22 with 0 stars. In the final audit 18 laboratories maintained with 0 stars, 1 lost star, 4 with 0 reached 1 star, 3 maintained 1 star, 2 with 1 star increased to 2, 3 maintained with two stars, 1 with 2 increased to 3 stars, 1 with 3 stars kept his score and 1 with 2 stars got ICAP Accreditation in March 2018.

**Conclusion:** While technical support visits and the support of a committed technical working group and support from partners in the implementation of the SLMTA were maintained, there was little progress in the participants’ performance although best practices are noted. More improvement was found in the labs with mentoring. The current results refer to the National Program to strengthen the mentorship and adopt practices and / or other tools to leverage better results for the 4th round.
**Path of Proficiency Testing of the National Program for Evaluation of External Quality between 2011 and 2017**

**Background:** The National Program for the Evaluation of External Quality (PNAEQ) is a program that performs proficiency tests for several testing sites, aiming to increase the quality and reliability of laboratory tests since 2011 and has sent the panels at least twice a year. Objective: Describe the main challenges, lessons learned and current perspectives of PNAEQ.

**Methods:** Comparisons between test sites for Performance Evaluation (AD) are made by sending proficiency tests at least twice a year. The submitted panels are valid at the beginning and at the end of the test for validation and proof of the absence of the effects of heterogeneity and instability. AD is based on the comparison of the participant’s result with the participants’ consensus value (mean of the measurements and analysis of extreme values) for quantitative tests and with the expected result determined in the panel validation.

**Results:** The performance over the last 7 years (2011 to 2017) varied by panel, with a satisfactory average annual performance of CD4 assay panels of 93.3% with variations between 90.7 (2016) and 96.3% (2012), mean performance for HIV assay of 74.3 with a variation between 52.3 (2017) and 83% (2016), mean performance for PCR assay of 92% with variations between 69% (2017) and 100% (2012, 2013 and 2014), mean performance for Serology of Malaria of 89.8% with variations between 76% (2012) and 96% (2017), mean performance for Tuberculosis test 77% with variations between 65% (2017) and 93.7% (2011) and with a satisfactory performance for the test of Gram of 43% with variations between 33.3% (2014) and 52.4% (2016). The average performance of the trials has varied substantially, especially in cases where there is an increase in participants, which shows some difficulty in maintaining consistency in quality.

**Conclusion:** The main challenges of the program observed between 2011 and 2017 in addition to the guarantee of 100% response rate are the increase of sites with satisfactory performance due to the limitation of the technical support visits for the follow up of the sites with poor performance allied to the limitations financing.

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**Implementation of Dried Blood Spots Viral Load Verification Panel in Resource-Limited Settings**

**Background:** Dried blood spot (DBS) is a suitable alternative specimen type to plasma for monitoring the viral load (VL) in HIV-infected individuals in resource-limited settings. The specimen panel to verify the performance of DBS VL assay prior to implementation is limited. Centers for Disease Control and Prevention developed and implemented a DBS VL verification panel to help laboratories in resource-limited settings verify the DBS VL assays in a fast and cost-effective way.

**Methods:** DBS were prepared from serial dilution of HIV-1 positive human whole blood. The verification panel consisted of six specimens of different VL concentrations (from 0 to 6.0 log10 copies/ml). Seven replicates of each specimen were tested and results were evaluated as pass or fail verification according to a predefined set of criteria. 27 sets of DBS VL verification panel were tested on 27 instruments from nine countries between Aug 2017 and Aug 2018.

**Results:** A total of 1,111 (1,111/1,134=98.0%) valid results from 27 sets of DBS VL verification panel were submitted to CDC. The average difference between the Abbott and Roche DBS assays are 0.11, 0.23, 0.11, 0.03 and 0.06 log10 copies/ml for the five positive specimens with a correlation coefficient R2 = 0.99. The testing were completed within a median of 6 days (inter-quartile range 3 to 14 days) after the laboratories received the panels. DBS VL assays on all 13 Abbott systems and 12 out of 14 Roche COBAS systems received “pass” grades.

**Conclusion:** DBS VL verification panel has proven effective and practical approach for method verification. The time required for verification process has been reduced from years to only days. It is also more cost-effective as the DBS verification panel eliminated the need for collecting and testing patient samples. This innovative approach will facilitate continuous quality improvement of DBS VL testing in resource-limited settings.
Ps-2.3a-101

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**Error Rate in POC-CD4 Sites Can Predict the Site Performance in the External Quality Assurance Program for CD4 Testing, in Moçambique**

**Background:** Moçambique implemented Point-Of-Care technology for CD4 counting (POC-CD4) to expand this testing to sites with non-existent laboratory infrastructures. POC-CD4 has a connectivity tool that enables the transmission of data via mobile phone network. This tool manages an online database which monitor the consumption of reagents, test’s number performed, types and rate of errors and identify the operator that perform the tests. However, there are POC-CD4 sites that have a high error rate (more than 5%) that could means bad performance and inaccurate CD4 results of patients. This study evaluate if the error rate can predict the performance of the sites in the external quality assurance Program for CD4 testing (EQA-CD4).

**Methods:** We collected performance data of POC-CD4 sites in the EQA-CD4 that also have the error rate available in the connectivity tool, between 2015 and 2017. The sites was grouped in good and bad performances based on EQA-CD4 results. Results with standard deviation index within ±2 was considered good and outside de range, considered bad. In each group, we calculated the median of error rate and compare using p-value that greater than 0.05, the differences was not significant. We also, identify the more frequent error code.

**Results:** POC-CD4 sites with bad performance in EQA-CD4 had high error rate than sites with good performance, 87.5% and 70.3%, respectively, but the difference was no significant (p=0.73). The most frequent error codes was 850, 860, 880, and 910. These are technical errors related to use of samples over 48 hours of collection, problems with optical alignment of the instrument due bench vibrations and inaccurate volume of sample in the cassette.

**Conclusion:** Although differences are not significant, the error rate may predict poor performance in EQA-CD4 that could allow timely implementation of corrective actions to this sites and accurate CD4 results for patients.

Ps-2.3a-102

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**Cost-Effectiveness of HIV Viral Load Sample Collection and Testing Methods in Malawi**

**Background:** HIV viral load (VL) monitoring informs antiretroviral therapy (ART) failure and helps to guide regimen changes. Typically, VL monitoring is performed using plasma or dried blood spot (DBS) samples transported and tested in a central laboratory. Novel sample collection technologies, such as the cobas® Plasma Separation Card (PSC), are evolving. The objective of this study was to evaluate the potential cost-effectiveness of a PSC sample collection and test method compared to the traditional DBS sample collection and test method for routine HIV VL testing in Malawi.

**Methods:** We developed a decision-tree model to evaluate the cost-effectiveness of two different sample collection and testing methods: DBS sample collection transported and tested at central laboratories (DBS-CL) and PSC sample collection transported and tested at central laboratories (PSC-CL). The analysis used publicly-available data and was performed from the Malawi Ministry of Health perspective. We estimated costs of sample collection, transportation, and testing. The primary clinical outcome was test accuracy (proportion of patients correctly classified with or without treatment failure). Sensitivity and scenario analyses were performed to assess the robustness of results.

**Results:** The estimated test accuracy for DBS-CL and PSC-CL were 87.1% and 90.7%, respectively. The estimated cost per patient for DBS-CL test method was $19.17 (USD), compared to $17.42 for a PSC-CL approach. Based on this, a PSC-CL approach “dominates” DBS-CL. (i.e., PSC-CL is associated with lower costs and higher accuracy).

**Conclusion:** The base-case analysis shows that a PSC-CL testing approach is less costly and more accurate (correctly classifies more patients with or without treatment failure) than DBS-CL. Our study suggests that a PSC-CL testing approach is likely an optimal strategy for routine HIV VL monitoring in Malawi.
PS-2.3a-103

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“Uberizar” a Última Milha do Transporte de Amostras – Alavancar Relações de Parceria para Reduzir o Tempo em Trânsito

Background: Em Moçambique o transporte de amostras encontra-se fragmentado por local, doença, financiamento de organizações e é exacerbado pelas fracas infraestruturas e geografia do país. A VillageReach está a testar uma abordagem inovadora (“AmosTaxi”) em dois Distritos Rurais, da Provincia de Sofala para o transporte de amostras de Expectoração (análise de TB), CV e DPI. Através da tecnologia, o AmosTaxi alavanca a coordenação entre os transportadores (MISAU e parceiros clínicos) e as solicitações de transporte de amostras, melhorando o rastreamento e a documentação dos processos.

Methods: Em Junho de 2018, 30 profissionais de saúde e 14 transportadores (10 MISAU e 4 FHI) foram treinados na tecnologia/abordagem do AmosTaxi, atribuídos aos transportadores Smartphones com GPS e a aplicação “Fleet” incorporada. Através de um número gratuito, os profissionais de saúde solicitam o transporte de amostras laboratoriais para o “centro de despacho” do AmosTaxi, onde são inseridas as solicitações (plataforma “Fleet”) e identificados os transportadores disponíveis na área geográfica. Estes, recolhem as amostras na unidade de saúde, etiquetam-nas com códigos QR e são rastreadas através do GPS.

Results: O tempo em trânsito para as amostras de DPI e CV monitoradas pelo AmosTaxi reduziu para 5 dias, em comparação com 28 dias, em média para o total das amostras, no mesmo período de tempo. Desde o início do projeto, foram realizadas 79 chamadas, correspondentes a 1246 amostras transportadas. O AmosTaxi permitiu, através da coordenação dos transportadores parceiros, responder a 42 (53%) dos pedidos.

Conclusion: Os dados preliminares suportam o potencial do AmosTaxi em transformar a desarticulação no transporte de amostras, com recurso a pouco investimento financeiro, através de parcerias direccionadas entre transportadores e as solicitações/necessidades das unidades de saúde. Os próximos passos incluem a introdução do aplicativo “Fleet” nortus parceiros privados locais, integração em redes de trânsito paralelo e avaliação para interoperabilidade com sistemas de dados de laboratório.

PS-2.3a-104

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Improving the Return of HIV Proficiency Testing Results Using Communication App

Background: Quality assured HIV testing is the entry point for the identification of new infections and subsequent enrolment on antiretroviral treatment. The Eswatini Health Laboratory Services (EHLS) implements quarterly proficiency testing (PT) scheme to over 350 HIV testing points in the country. The scheme was however challenged by low results return rate which was below 80% due to lack of transportation to send back the results to the EHLS for scoring. We report an experience of using a social media application, WhatsApp, on the improvement of the PT scheme.

Methods: In the second quarter of 2017, the quality unit started using a WhatsApp enabled tablet and created a contact database to improve the relay of the results from the testing points to the quality unit for grading their performance. Health care workers were advised to send the outcome of the testing via WhatsApp by taking a snapshot of the script of the results sheet to the quality unit for evaluation. The pictures were downloaded, printed and graded for the correctness of the testing outcome. Feedback on performance were sent back to the testing points printed in a result reporting form.

Results: An average of 29% of the testing points used the WhatsApp for returning results. The results return rate improved significantly from 76% to 81%, 92%, 95% from 2nd quarter of 2017 to the 3rd, 4th quarters of 2017 and beyond in 2018, respectively.

Conclusion: The use of a communication app has encouraged testing points to timely return their results for grading and to consistently participate in the PT scheme. With more testing points returning their results and being graded on their performance, the EHLS can effectively monitor testing points and provide needed technical support.
Viral Load Suppression Rates Among HIV Infected Adult Patients Using Optimized Health Care Worker Delivery Model in Western Nigeria

**Background:** In sub-Saharan Africa where genotypic drug resistance testing is rarely performed and poor adherence is blamed for the inability to achieve viral suppression and treatment failure, programmatic approaches to preventing & handling these are thus essential. This study was aimed at determining and monitoring HIV/AIDS disease progression using viral load to provide prognostic information and evaluate patients for viral suppression using the World Health Organization (WHO) guideline strategies.

**Methods:** This study was an observational longitudinal prospective cohort study of subjects living with HIV already initiated on antiretroviral therapy for at least six months, enrolled in health facilities across Ondo & Ekiti States, Western Nigeria, during a 12-month observation period starting January 2017 till December 2017. All data were statistically analyzed, using Statistical Package for the Social Sciences (SPSS), with multiple comparisons done using Post Hoc Bonferroni test.

**Results:** A total of 3920 (1005 males & 2915 females) subjects eligible for the study were recruited. Most of them are in the age range of 25 – 54 years, with a mean age of 39.35 ± 10.41 years. 3086 (78.7%) of the subjects had viral suppression of <1000 RNA copies per ml. The 834 subjects went through intensive adherence counseling optimized health care worker delivery model for three months and viral load test repeated three further months after, which made 3377 (86.1%) of the subjects have <1000 RNA copies per ml during the period of observation.

**Conclusion:** HIV treatment enhanced adherence counseling is key to the achieving viral suppression and determine infection prognosis, thus, routine viral load monitoring will ultimately help in HIV/AIDS disease progression follow up and reduce treatment failure tendencies. This will help more patients stay on first line regimen and prolong their life expectancy, indicating that the UNAIDS last 90 target is achievable.

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Knowledge and Utilization of HIV Post Exposure Prophylaxis Among Health Care Workers at Busia County Referral Hospital

**Background:** The Post Exposure Prophylaxis is intended to prevent sero-conversion after exposure to potential risk factors. The most common occupational exposures among Health Care workers are; needle stick injuries and splashes to blood and body fluids which pose a potential risk of transmission of blood borne infections like HIV and Hepatitis B.

**Methods:** Methodology: Cross-sectional study was used where self-administered questionnaires containing open and closed ended questions were subjected to the respondents. Objective To determine HIV-Post Exposure Prophylaxis awareness and utilization among Healthcare workers at Busia County Referral Hospital. Specific Objectives -To determine level of knowledge on HIV PEP among Health Care workers at Busia County Referral Hospital between Jan-May 2018. -Determine the level of utilization of PEP services -Establish factors associated with utilization of PEP among Healthcare workers -Identify support measures offered to H/Workers seeking HIV PEP services

**Results:** Results Knowledge; (73) 63.4% out of the 115 respondents lacked information on PEP, (50) (43.5% out of the 115 who had information on PEP did not know the correct meaning of PEP. This means there is lack of information regarding PEP protocol including the correct time to obtain PEP Utilization; (43) 21% respondents had been exposed to risk factors for HIV infection. However, only 19% (8) out of 43 exposures were reported, (39) 34%of the respondents thought were not at risk of contracting HIV infection, 32% (37) were convinced that the source of the prick had no signs of HIV, 14%(16) did not want to do a HIV test whereas (23) 20%of the respondents did not know how and who to report to after exposures

**Conclusion:** -There was low level of knowledge on HIV-Post Exposure Prophylaxis among the Health Care workers. -The level of utilization of PEP services was low at Busia County Referral Hospital. -Most of the staffs fail to report occupational exposures due to HIV testing outcome stigmatization.
Using Modified SLMTA Facility-Focused Mentorship Approaches for Laboratory Quality Management Systems Improvement in Kenya

Background: Kenya uses various mentorship models to strengthen medical laboratory quality management systems (QMS) toward achieving ISO 15189 international accreditation. The US Centers for Disease Control and Prevention (CDC) Kenya and the Clinical and Laboratory Standards Institute (CLSI) used a modified facility-focused mentorship (FFM) to help laboratories in Kenya move toward accreditation. The purpose of this study is to describe our hybrid model, which measures the 12 laboratory quality system essentials (QSE) and implements the Strengthening Laboratory Management Toward Accreditation (SLMTA) program.

Methods: We analyzed data collected between 2014 and 2017 both retrospectively and prospectively from all the laboratories supported by CLSI. FFM mentors alternated every month to provide facility-based guidance on laboratory QMS implementation. The World Health Organization Stepwise Laboratory Improvement Process Towards Accreditation (SLIPTA) checklist was used to collect laboratory performance data at baseline, midterm, and at end-term. A SLIPTA percentage improvement score $\geq 10\%$ between baseline and end-term was considered good improvement for individual QSEs. Data were managed using Excel and were analyzed using SPSS 20.0.

Results: At baseline, the 11 laboratories had an average score of SLIPTA STAR 0 (48%). At end-term, of the 12 QSEs assessed, eight had improved by $\geq 80\%$, and 2 (management reviews and evaluation and audit) were rated 64% and 73% respectively in improvement. At end-term, 7 (64%) laboratories had achieved accreditation in 24 months on average (median, 20 months), and 4 (36%) continued to receive mentorship.

Conclusion: Through the modified mentorship approach, laboratories rapidly improved their performance in QMS toward accreditation. Continuous improvement in QSEs such as management review, evaluation and audit are slow to improve as they need constant facility management involvement.

Assessment of Knowledge and Perception of Medical Laboratory Microbiologists on Best Practices that Facilitate Implementation of Quality Management System

Background: Quality Management System (QMS) is a formalized system regulated by International Organization for Standardization (ISO 15189:2012) and has been used to improve the practice of laboratory medicine worldwide

Methods: The aim of this survey was to assess the knowledge of Medical Laboratory Microbiologists on the best practices enhancing the implementation of QMS in medical microbiology laboratories in Lagos, Nigeria. Semi-structured questionnaire was used to obtain information from participants working in medical laboratories, and those who attended conferences, trainings, workshops and symposium. Data obtained was analyzed using SPSS software (ver. 24.0). Knowledge score was assessed using Likert scale.

Results: Of the two hundred and sixty-eight (268) questionnaires distributed, 224 (83.6%) were returned. From this, 105 (46.9%) were Medical Microbiologist. The study showed that 71% of laboratory scientists working in medical microbiology laboratories are aware of the importance of QMS and its practice obtained mostly from conferences 33/105 (30.5%), seminars 31/105 (29.5%), trainings 16/105 (15.2%) and workshops 14/105 (13.3%). On the average, 65.5% of the respondents strongly agreed to have knowledge of the 12 essential of QMS. The survey showed that 46.7% of participants worked at hospital based public laboratories. Lack of adequate equipment and technology (51.4%), inappropriate funding and information technology (47.6%), inability to sponsor staff for training (42.9%) and reluctance to accept change (41.9%) were identified as the major factors hindering the objective of achieving quality management. Lack of mentorship and cost involved in initially starting up the system was also seen as challenges.

Conclusion: A high proportion of Medical Laboratory Microbiologists in Lagos have knowledge of the best practices that facilitate implementation of Quality Management System and challenges that might mitigate it implementation. There is a need for further training and retraining to obtain maximum level of awareness. Such should also define approach on how to enroll and implement QMS.
Assessment of the Knowledge and Practices of Handling of Rowmanowsky-type Stains used for Malaria Microscopy among Suppliers in Plateau State, Nigeria, February to June, 2018.

Background: Quality of microscopy depends largely on the quality of reagents used. The Rowmanowsky-type stains used for microscopy are mainly procured from open markets either as powder or solutions. We set out to assess knowledge and practices related to handling of stains among suppliers in Plateau State.

Methods: A cross-sectional survey was conducted among 20 supply houses selected using simple random sampling. Structured questionnaires were used to elicit information on socio-demographics, knowledge and practices of stains handling. Knowledge and practice were graded “good” if score was >50%. Descriptive analysis was done. Data were summarized using mean, frequency and proportions.

Results: In all, 20 suppliers were interviewed (mean age of 47 + 7.5 years). Laboratory professionals were 6(30%) and 8(40%) had degree-level education. Median experience was 13.5(range=7 - 28) years. Those having IVD training were 4(20%) and 19(95%) confirmed non existence of suppliers union. Knowledge assessment revealed 7(35%), 6(30%), 5(25%) and 3(15%) knew the term IVD, Rowmanowsky-type stains, stains are regulated products respectively. In practice, 10(50%) sourced stain solutions from local manufacturers, 5(25%) claimed having system for verifying stain quality, 1(5%) claimed compliance with regulatory requirement, non had stains certified by any authority in-country, non had been previously approached by any government regulatory agency for product certification. Stains were stored on open shelf by 14(70%) who also claimed to obtain storage information from product leaflets. Product documentation register was noted among 7(36.8%) and 19(95%) claimed stain expiry date was most crucial item. Nearly all claimed discarding expired stains whereas expired powder stains were seen in 50% of shops. Overall 14(70%) has poor knowledge while 11(55%) exhibited poor practices.

Conclusion: Poor knowledge, practices and non-regulatory supervision among suppliers could impact negatively on the quality of microscopy testing done in Plateau State due to proliferation of sub-standard stains.
Flaccid Paralysis Surveillance: A Descriptive Assessment of the Knowledge of Community-based Health Workers in Plateau State, Nigeria

**Background:** AFP surveillance is a major strategy in the eradication of polio and underpins the entire eradication initiative. It is impossible to prove the interruption of the wild polio virus without good-quality AFP surveillance. Knowledge of stakeholders operating the AFP surveillance system is crucial. We set out assess the knowledge of key operators of the AFP surveillance system in Plateau State.

**Methods:** A cross-sectional survey was conducted from February to April 2018. Multi-stage sampling was used to select community-based health workers involved in AFP surveillance across the three senatorial districts. Structured questionnaires were used to elicit information on socio-demographic characteristics and knowledge of AFP surveillance system. Data was analyzed using Epi Info and MS Excel and descriptive statistics was performed.

**Results:** A total of 57 health workers were interviewed with a mean age of 40.7+6.8 years. Males were 33(61.1%). Their average years of experience were 15.7+6.1 years. CHEW were 34(59.6%). All respondents knew meaning of AFP whereas only 32(56.1%) knew the target age group as under 15, 33(57.9%) said two forms are filled when notifying new AFP case and 45(79%) said forms are sent to the LGA health office. While 54(94.7%) knew stool is the right specimen, 15(26.3%) did not know number of stool samples to be collected, 27(47.7%) said specimen is collected within 14 days of onset of paralysis, 14(24.6%) did not know storage temperature for stool sample and only 36(63.2%) knew stool should arrive laboratory within three days of collection. While 39(68.4%) said the time period to investigate and notify an AFP case is 14 days, 30(52.6%) said AFP case follow-up is done after 14 days of onset.

**Conclusion:** Knowledge of health workers on key components of the AFP surveillance system in Plateau State not total. This may impart negatively on the performance of the system. Keywords: Assessment, flaccid, knowledge, paralysis, surveillance.

Predictors of Knowledge Malaria Microscopy among Laboratory Personnel in Plateau State, Nigeria, February to June, 2018

**Background:** Microscopy remains gold standard for malaria diagnosis. Effective microscopy requires good knowledge and technical competence. We assessed the knowledge of microscopy and its determinants among laboratory personnel in Plateau State.

**Methods:** A cross-sectional survey was conducted in 155 laboratories selected using multi-stage sampling. Structured, self-administered questionnaires were used to elicit information on socio-demographics, microscopy training and knowledge. Responses to knowledge were scored and good knowledge was defined as knowledge score of >50%. Univariate, bivariate and multivariate analysis were performed at p<0.05.

**Results:** A total of 327 personnel with a mean age of 34.9 + 8.5 years were interviewed. Males were 177(54.1). Personnel included 109(33.3%) with degree-level education, those in hospital-based laboratories (73.7%, n = 241), urban-based laboratories (87.2%, n = 285), secondary level laboratories (57.2%, n = 187) and privately owned laboratories (59%, n = 193). Median years of experience was 6(1 - 34) years and 295(90.2%) had no post-qualification training in microscopy. Overall, 174(54.7%) had poor knowledge of microscopy. Type of laboratory (OR = 1.9, 95% CI = 1.1 - 3.2), level of education (OR = 2.3, 95% CI = 1.4 - 3.6) and laboratory ownership (OR = 0.5, 95% CI= 0.3 - 0.7) were associated with knowledge of microscopy while microscopy training was associated with knowledge in secondary-level laboratories (OR = 3.85, 95% CI = 1.64 - 9.02). Independent predictors of knowledge of microscopy were level of education (OR = 3.6, 95% CI = 1.0 - 13.2), laboratory ownership (OR = 2.95, 95% CI =1.1 - 8.0), microscopy training (OR = 0.3, 95% CI = 0.1 - 1.0) and level of laboratory (OR 0.36, 95% CI =0.2 - 0.9).

**Conclusion:** Poor knowledge of microscopy among laboratory personnel in Plateau State was significantly associated with level of education, laboratory ownership, microscopy training and level of laboratory.
A Descriptive Assessment of Knowledge of Laboratory Personnel on Malaria Microscopy in Plateau State, February to June 2018

Background: Microscopy remains gold standard for malaria diagnosis. Sound knowledge of microscopy is crucial for technical competence in performing quality microscopy. We set out to determine the socio-demographic characteristics and knowledge of microscopy among laboratory personnel in Plateau State.

Methods: A cross-sectional survey was conducted among 327 laboratory personnel in 155 laboratories selected using multi-stage sampling. Structured questionnaires were used to elicit information on socio-demographics, microscopy training and knowledge. Knowledge was graded “good” if score was >50%. Descriptive analysis was carried out. Data were summarized using mean, percentages, frequency and proportions as appropriate.

Results: total of 327 laboratory personnel were interviewed with a mean age of 34.9 ± 8.5 years. Males were 54.1(177). Technicians constituted 183(56%). Median years of experience were 6 (range1 - 34) years. Whereas 120(36.7%) respondents knew that Giemsa stain is the gold standard, 251(76.8) knew Field, Giemsa and Leishman stains are Romanowski-type stains and 60.6 %(198) knew Giemsa is the most stable. On stain solvents, 148(55.3%) and 218(76.7%) did not know alcohol- and water-based stains respectively and 115 (35.2%) knew a mixture of absolute methanol and glycerol is most appropriate solvent for stock Giemsa stain. About half (n=173, 52.9%) and 150(45.9%) knew of use of buffered water for stain dilution and stained film rinsing respectively. Differential staining of cells by stains was unknown to 200(61.1 %) while 179(54.6%) and 235(59.1%) did not know colour of cytoplasm and chromatin of malaria parasites respectively. On stains physico-chemical properties, 178(55.4%), 144(44%) and 139(42.5%) did not know dye components, preparation and optimal pH of Giemsa stain respectively. Overall, 179(54.7 %) respondents had poor knowledge of microscopy.

Conclusion: The low proportion of laboratory personnel in Plateau State with good knowledge of microscopy has implication as microscopy results could be incorrect, leading to wrong diagnosis and treatment of malaria.
All-inclusive Mentorship Approach, a Game Changer in Accelerated QMS Establishment in Western Kenya

Background: Improving Laboratory Quality Management Systems (LQMS) is critical in improving services to ensure efficient, effective and quality access to health care. To achieve this, several approaches are used to conduct mentorship each with different results. We reviewed the approach used in Homabay, Ahero, Muhoroni and Butere county laboratories in western Kenya.

Methods: Global Implementation Solutions (GIS) embarked on an accelerated mentorship approach where mentors with different skills, specialties and experiences were paired to offer joint LQMS mentorship. The teams who included laboratory mentors, managers and staff offered structured mentorship on all the quality system essential (QSEs) as per ISO 15189:2012 standard. LQMS audits were conducted at baseline, midterm and exit to measure progress. Facility-based training, continuous medical education (CME), coaching, task-based assignments to teams, teach-back and performance feedback were used in implementation. Descriptive and comparative retrospective analysis of LQMS progress trend in Western Kenya laboratories from enrolment to exit was completed.

Results: At baseline, the laboratories’ SLIPTA star score ratings for the four laboratories were as follows; zero for Butere, 1 star for Homabay and Ahero and 2 stars for Muhoroni. All the laboratories improved at exit audit: 3 SLIPTA stars for Butere, 5 for Homabay and Ahero and 4 for Muhoroni. There was process ownership by the county government, hospital management and laboratory staff. Attitude and habit changes that included punctuality, taking lead in lab CMEs, writing and adherence to lab SOPs were the most notable changes among the laboratory staff and management in these laboratories.

Conclusion: These results reveal that ISO 15189 is achievable in resource limited laboratories when an all-inclusive mentorship approach is used as an accelerated approach to avoid stagnation. Countries should adopt this kind of approach for rapid results and to achieve behavior change required for adoption of quality management system.

Improving Retention: Predicting ART Retention Among PLHIV Using a Supervised Machine Learning Approach

Background: Poor ART care retentions due to loss to follow up have dire clinical consequence including poor treatment outcomes among HIV+ individuals and increased transmission rates in populations especially in sub-Saharan Africa (notably Nigeria) and has long beleaguered goals to achieve HIV global targets. Several studies have been conducted to predict or prevent this loss.

Machine learning, a field in artificial intelligence, employs statistical, probabilistic and optimization techniques for pattern recognition applied for predicting future events from large (and often complex) data sets and has been used successfully in business, engineering and health analytics. Owing to the need to reduce loss to follow up, the objective of this study is to predict candidate HIV+ individual who would potentially be lost to follow up when they are still enrolled in ART care using a computational approach.

Methods: Using a supervised machine learning approach, we trained and tested a prediction model we generated using an ensemble algorithm (random forest and bootstrapping) with clinical and diagnostic data collected from 354 patients enrolled in ART in 5 networked health facilities across Nigeria after obtaining ethical approval for data use. A k = 10-fold cross-validation was performed with various diagnostics to determine optimum predictor variables. This was implemented in R (v3.4.4.).

Results: The model predicts HIV+ individuals lost to follow up in the testing set with an estimated “in-set” testing accuracy of >80% determined by confusion matrix. Marital status was shown to be the strongest predictor variable.

Conclusion: Correlational data obtained from this study provides a potential means to identify prospective or “would-be” individuals lost to follow-up while they are still enrolled in the ART care. Extra follow-up resources can be applied to this targeted group with much more efficiently to improve retention in ART care. Further in-field evaluation in experimental validation is however required.
L. E. Koffi  

Analysis of HIV Point of Care Testing Sites in Cote d’Ivoire Reveals Gaps in Tester Competence

Background: Côte d’Ivoire has ~460,000 people living with HIV (PLHIV) and >3000 point of care testing (POCT) sites and tens of thousands of testers nationwide poised to implement test and start, however the nation continues to experience challenges with access to quality HIV testing and technical support is required to ensure quality of diagnostic testing, data collection, management, communication and scale up of effective approaches that strengthen the HIV response including linkages to supporting laboratories. The purpose of this evaluation was to assess current HIV POCT site performance in order to guide the national rapid test continuous quality improvement program (RTCQI).

Methods: This descriptive evaluation was based on baseline audit data of 204 HIV POCT sites located nationwide using the Stepwise Process for Improving the Quality of HIV Rapid Testing (SPI-RT) checklist which allocates 5 scoring levels (0 to 4) to sites. Twenty-five field teams conducted sites audits from July 2017 to March 2018. Being a stand-alone physical structure was a major strategic selection criteria for sites.

Results: 1.23% of sites audited with the SPI-RT checklist achieved level 0, 40.49% of sites achieved level 1, 56.44% achieved level 2, and 1.84% achieved level 3. No POCT sites achieved level 4. The average performance per SPI-RT section was as follows: 15.90% in Training & Competence, 85.60% in infrastructure, 68.45% in Security, 65.83% in pre-analytical phase, 46.16% in Analytical Phase, 70.88% in Post-Analytical Phase, 56.37% in External Quality Assessment.

Conclusion: This evaluation of a subset of POCTs shows that HIV testing points nationwide may require significant technical follow-up to improve quality of HIV screening services to patients. The Training & Competence section and the Analytical Phase are the two priority areas for which I-TECH will develop new strategies to bring sites to level 4 and achieve site certification.

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Training Impact on DBS Specimen Integrity Logged at Lagos State University Teaching Hospital–Antiretroviral Clinic Laboratory (LASUTH-ART)

Background: Rejection of Poor quality dried blood spot (DBS) specimens from LASUTH –ART laboratory has caused delay in care and treatment of children exposed to HIV/AIDS. Challenges around sample integrity has affected the result outcome and use. Hence, there was a need to look into these problems which resulted into training of personnel responsible for DBS specimen collection, packaging and transporting from sending facilities to reduce the number of specimens being rejected. This study analyzed laboratory data to describe the impact of training towards reduction in the rejection rate of DBS specimen sent to the LASUTH-ART laboratory within the period of review.

Methods: The number of samples rejected against the total DBS specimen received for early infant diagnosis (EID) was collected from January, 2015 to December, 2017. We analyzed this data in pre and post training period. Training was conducted in conjunction with APIN PUBLIC HEALTH INITIATIVE for 49 sites logging samples at LASUTH in March and April, 2016. These were a combination of both general hospitals and primary health care centers in two batches. Training was centered on specimen collection, drying, packaging, storage and transportation.

Results: Of the 794 pre training specimens received as at February, 2016, 9.6% were rejected for pre-analytical problems ranging from improper spotting, drying, packaging and transportation. Of these, 68.4% were rejected as a result of improper spotting. By December, 2016, 492 specimen had 6 specimen rejected (rejection rate = 1.2%). In 2017, 1225 DBS specimen was received in the laboratory, 17 were rejected with a 1.4% rejection rate.

Conclusion: Reduction in specimen rejection rate (by approximately 8%) was achieved and sustained after training health workers involved with DBS collection, which transcended to improved linkage to care. Regular training is recommended to sustain the process due to staff attrition.
**Track 2: Laboratory Response**

**PS-2.4-120**


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**Structured Mentorship Using the GLI Tool to Bridge the Gap Between Training and Implementation of Quality Management System Through Structured Mentorship**

**Background:** Nigeria currently has ten TB reference laboratories and in order to achieve immediate Laboratory improvement and accelerate the process toward accreditation readiness, Stepwise accreditation through Strengthening Laboratory Management Towards Accreditation (SLMTA) process was put in place. Audit which is a component of SLMTA process, showed a lot of gap arising from sub optimal implementation of the SLMTA process. To ensure this gap was effectively closed, a structured mentorship using Global Laboratory Initiative (GLI) Laboratory Quality Stepwise Implementation Tools with a four phased roadmap structure was put in place to entrench quality management systems in day to day laboratory functions and help the laboratories (AKTH, JUTH, NTBLTC and UCH TB reference) achieve accreditation goals.

**Methods:** GLI Tool which is specific to Tuberculosis diagnostic Laboratories were used for structured mentorship using the phased roadmap. The mentorship period was one week of onsite one on one mentorship with the Laboratory scientists on the bench for each phase. Action plans were developed for non-conformances during the mentorship and other audits, and guidance was provided for corrective action implementation.

**Results:** AKTH Kano laboratory improved from 22% through 29%, to 65%; JUTH Jos improved from 29%, through 70%, to 71%; NTBLTC Zaria made 55%, 66% and 90%; while UCH Ibadan grew to 65%; JUTH Jos improved from 29%, through 70%, to 71%; NTBLTC Zaria improved from 60% through 51% to 70% at the baseline, first follow-up, and second follow-up audits respectively.

**Conclusion:** Structured mentorship using the GLI tool bridged improved performance significantly at the TB reference Laboratories.

**PS-2.4-121**


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**Ongoing Competency Assessment to Maintain HIV Testing Skills**

**Background:** Knowledgeable personnel are very essential to the outcome of any test results. It becomes more imperative when the testing personnel are not laboratoryians to have the required competence. Competency of testing personnel which is demonstrated ability to apply knowledge and skill is a key component of quality assurance to ensure test results are accurate and reliable. Different cadres of health professionals are currently involved in the testing of Human Immunodeficiency Virus (HIV) using the Rapid Tests kits to increase access to HIV testing. Competency assessment is one of the five pillars of HIV Rapid Test Quality Improvement Initiative (RTQII) put in place to ensure HIV rapid tests are accurate and reliable.

**Methods:** Competency assessment of 558 HIV testers were conducted using a standardized competency assessment tool by trained Quality Assurance Team following training of HIV testing across supported HIV testing points in four states within the country. The methods used for the assessment includes direct observation of test procedures including internal quality control, client testing, safety practices, monitoring the interpretation of test results, recording and reporting of test results and review of work records. Retraining was conducted for all failed competencies and reassessment was conducted at six month interval.

**Results:** Out of the 558 HIV testers whose competencies were assessed, State A with 251 testers moved from 40 – 96% of testers competent. 59 testers in state B had 97% of them competent at initial assessment and 81% at reassessment. A total of 50 testers in State C had 90% of the testers competent at reassessment while only 64% were competent at initial assessment. State D with 198 testers had 48% testers competent at initial assessment and had made significant improvement by the reassessment with 93% of the testers now competent to accurately carry out HIV rapid testing.

**Conclusion:** To assure the accuracy of HIV test results, the testing personnel must in addition to been trained be competent to accurately carry out the test procedure and interpret the outcome of the test.
Assessment of Tuberculosis Infection Control Knowledge, Attitude and Practices of Healthcare Workers in Jos North, Plateau State Nigeria

**Background:** Tuberculosis is a leading cause of increased mortality among infectious disease worldwide and highly prevalent in Africa, thereby increasing the risk of infection transmission. The World Health Organization recommends TB infection control (TBIC) in healthcare facilities, as a preventive measure towards the reduction of TB infection.

**Methods:** A quantitative cross-sectional study was carried out among Healthcare workers in Jos North, Plateau State Nigeria. Data was collected using self-administered 37-item questionnaires that contained sections designed to provide relevant information in respect to knowledge of TB and TBIC, as well as respondents attitudes and practices. Questions on knowledge of disease were scored as correct or incorrect, while attitude and practices questions were assessed using Likert’s scale.

**Results:** A total of 93 HCWs study filled the questionnaire. Sixty-one percent (60.2%) of the respondents were male and 39.8% were female. Out of this 48/93 (52%) HCWs had previously received training on TBIC measures. Overall (75%) correctly identified all the symptoms of TB, while 95.7% were knowledgeable about the spread of the infection. Only 25% of the respondents answered all the questions on TBIC correctly. However, there was no association (p= < 0.27) between respondents level of education and knowledge, attitude and practices in regards to TBIC measures.

**Conclusion:** Although a high proportion of the respondents had good knowledge and correct attitudes towards TBIC, Healthcare Workers (HCWs) trained on TBIC were found to have more knowledge on infection control measures than those not trained. As respondents with good TBIC knowledge are likely to exhibit good TBIC practices with improved attitude towards TB prevention measures. Training of HCWs in infection control measures should be prioritized in addition to TBIC best practices.

The Impact of Mentorship Program in the Molecular Biology Laboratory of José Macamo General Hospital, Maputo/Mozambique

**Background:** To achieve viral suppression in the “90-90-90” paradigm, HIV viral load (VL) monitoring programs must be successfully implemented. Limited molecular testing capacity and poor quality management systems present a challenge to scaling up VL laboratory testing services. To build technical capacity and guarantee quality VL testing, Mozambique implemented a mentorship program in its molecular laboratories. This study evaluates the impact of the laboratory mentorship at José Macamo Hospital (JML) and describes the challenges and lessons learned.

**Methods:** A mentor provided in-service training and worked directly with lab staff from September, 2017 to June, 2018, to improve organization and workflow, and standardize lab practices. To assess efficiency of services, data on pending tests and results awaiting validation were extracted from the DiSA Laboratory Information System and routinely monitored. [1] Action plans were developed and implemented to address issues identified. To measure the overall impact of mentorship, the mentor conducted a baseline and exit assessment using the CDC VL Balance Score Card.

**Results:** Laboratory staff developed SOP’s, implemented quality management systems and adopted good laboratory and biosafety practices during mentorship. As a result, laboratory efficiency improved and the number of pending results significantly reduced from 12999 at baseline to zero; and results awaiting validation from 2123 to zero. Overall, the laboratory demonstrated improvement in balance scorecard scores from 46.5% (Level Zero) to 70.3% (Level Two) from September, 2017 to June, 2018. Major challenges identified include inadequate infrastructure, staff and resources; as well as poor staff engagement.

**Conclusion:** Mentorship provided a mechanism to achieve rapid results in improving efficiency and quality of VL testing services at JML. However, greater involvement, change in attitude and behavior of laboratory staff, are crucial factors for better laboratory performance.
**PS-2.4-124**

T. M. Abera


**Building Capacity for Sustainable Training and Credential Maintenance Systems for Laboratory Professionals to Address HR Concern in TB Laboratory Programs**

**Background:** The workforce in TB laboratories is impaired by insufficient supply, unfair distribution, compromised safety containment, and limited motivating opportunities. These factors contribute to high rate of attrition and professionals prefer other fields where there are good opportunities. Additionally, basic pre-service trainings, professional registration, level of qualification, and certification requirements vary in different countries which hinders the free movement of professionals.

**Methods:** Two Laboratory Quality Management System training workshops were facilitated in November 2016 and October 2017 to TB laboratory professionals from 18 African countries to build the capacity and improve quality TB diagnostic services. Self-administered questionnaire was distributed to assess the HR issue and work force development plans of these 18 NTRLS. All laboratory managers were interviewed.

**Results:** Fifteen out of the 18 NTRLS reported that more than 5 staffs have left the laboratories while 3 laboratories indicated that 3 staffs resigned. The calculated attrition rate for the 15 laboratories is close to 25%. More than 95% of the turnover is voluntary one. None of the laboratories have a system to conduct exit interviews and it was difficult to understand which benefits employees value. Because of this it was difficult to receive feedback and identify areas for improvement.

**Conclusion:** Even though there are few strategies to retain laboratory staffs, there should be a strong advocacy for the development of strategic plans that can address the integration of laboratory practices, standardizing training and certification programs across countries. In addition, ASLM need to encourage African countries to establish mutual recognition of laboratory specialists in order to allow for free movement of professionals across countries.

**PS-2.4-125**

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**Biosafety Awareness and Practices Among Medical Laboratory Personnel in Bayelsa State, Nigeria**

**Background:** Most accidents in the laboratory are due to lack of proper knowledge and poor implementation of biosafety standards. The study was a quantitative, cross-sectional survey to assess awareness and practice of biosafety among Medical Laboratory personnel working in 10 selected hospitals in Bayelsa state who were participants at a workshop on laboratory biosafety.

**Methods:** A standard structured questionnaire was administered on each of the participants. Data analysis was done with SPSS version 20 and was presented using frequencies and percentages. A total of 101 participants made up of 57 females (56.4%) and 44 males (43.6%) participated in the study. The mean age of all participants was 33.8 ± 7.0 years. 22 (21.8%), 46 (45.5%) and 33 (32.7%) of the participants had <1 year, 1 – 5 years and >5 years work experience related to medical laboratory services respectively.

**Results:** The study found that only 36 (35.6%) of the participants had attended a formal biosafety training. The minimum biosafety level for testing laboratory was correctly identified by 49 (48.5%) of the participants. Only 37 (36.6%) of the participants had a safety handbook in their laboratory. The knowledge of appropriate use of personal protective equipment was found to be a common practice in 86 (85.1%) of the participants. Only 66 (65.3%) of the participants have been vaccinated for hepatitis B and 14 (3.9%) of the participants had a functional biosafety cabinet in their laboratory while only 31 (30.7%) know how to use a biosafety cabinet. 60(60.4%) of the study participants did not know how to maintain a biosafety cabinet and how to safely use centrifuge machine for separation of specimen respectively.

**Conclusion:** There is poor awareness and practice of biosafety among laboratory workers in their day to day practice. Trainings/retraining on biosafety to improve on the awareness on biosafety among Medical Laboratory personnel is recommended.
Mentorship and Supervisory Programme to Improve Quality of Tuberculosis Reference Laboratories in Nigeria: An Implementation Research

Background: Laboratory diagnostics involve activities, ranging from use of diagnostic technologies, processes, infrastructure and personnel. An effective way to strengthen laboratory services is to implement quality management system that meets international quality standards. Laboratory mentoring and supervisory program can contribute to establishing and sustaining quality management systems and prepare laboratories to achieve accreditation. This study described the effect of a laboratory mentoring and supervisory program to Tuberculosis (TB) Reference Laboratories as an intervention strategy.

Methods: Structured questionnaire derived from mentorship and supervisory check list was given to staff involved in quarterly mentoring/supervisory visits to TB Reference Laboratories. This focused on key operational areas in the laboratory to access laboratory organization, personnel, equipment, purchasing and inventory, process, information management, documents and records, occurrence management, assessment, improvement process, customer satisfaction, facility and safety. A score of 0-5 points was given for each indicator based on level of adoption and effective use in the laboratory processes from initial visit (baseline) and last visit (after a minimum of 8 mentoring visits). Visits involved collection of information using a checklist and other documents, onsite training and follow-up on recommendations from previous visit. Data was analyzed using GraphPad Prism V. 6.07.

Results: At base line visit, quality management system was either lacking or poor. There was no facility based training programs for laboratory staff. Mentorship and supervisory visits allowed staff of TB Reference laboratories to adapt the culture of a “learning organization”. All components of quality essentials have been accepted and adapted. There is evidence of penetration; “the right thing to do becomes the easy thing to do” and sustainability; “when the right thing to do becomes the easy thing to do” in the laboratory.

Conclusion: Mentorship and supervisory visits allowed laboratories to adapt and implement concepts of quality management system while offering routine laboratory services.

Ensuring Quality of HIV Testing by Non-Laboratory Staff in TASO-Mbarara, 2018

Background: Determination of human immunodeficiency virus (HIV) sero-status of individuals is an important step in halting global spread of HIV. Non-laboratory personnel find challenges in performing HIV testing given inadequate training yet they need to remain skilled and knowledgeable to provide reliable testing serves. This highlighted the need for competency assessment of the non-laboratory staff as a way of ensuring quality of HIV testing. The aim of the study was to assess the use of HIV Proficiency testing reports and a laboratory developed tool as a measure for competency assessment for non-laboratory staff.

Methods: We performed a retrospective review of HIV Proficiency test results for 10 non-laboratory staff in 2017. The staff were then subjected to laboratory developed competency assessment tool that included Internal Quality controls (IQC) procedures, sample testing, result documentation and interpretation. The criteria for assessing laboratory competency was based on percentages scores i.e. personnel scoring ≥80% was deemed competent. The results from the HIV Proficiency testing program were compared with the laboratory competency based percentage average scores for agreement and conformance.

Results: The average scores for the HIV Proficiency test results was 100% for all the participants. The average scores for all the participants on the laboratory competency tool was 84%. 100% (10/10) of the participants scored ≥80% on the competency assessment tool. The least performed sections for the laboratory competency assessment was preparation of in-house IQC materials at 73% while the best performed was results documentation at 91%. The 16% difference between proficiency test results and the laboratory based competency assessment was attributed to preparation of in-house IQC materials.

Conclusion: It was noted that non-laboratory staff are competent in HIV testing as per the methods used. There is still need for improvement of these personnel in areas of internal quality control assurance.
**Impact of Personnel Training in Method Verification on Equipment Acceptance Testing in Mulago National Referral Hospital Laboratories**

**Background:** It is a requirement of ISO 15189:2012 standard that a laboratory performs acceptance testing for new equipment and methods before they are put in use. There has been a knowledge gap at Mulago National Reference Hospital Laboratories about the evaluation acceptance testing that meets the requirements of the standards. In 2017, the laboratory management addressed this issue by conducting a targeted mentorship where the laboratory personnel were given practical training in equipment and method verification. This study therefore assessed the impact of method verification training on the equipment acceptance testing processes in the Chemistry Department of the laboratory.

**Methods:** A cross sectional study was conducted in May 2018 in the chemistry department. The study assessed the verification report produced during the verification study of the new Abbott Architect ci4100 Chemistry/Immunoassay analyzer by the staff that attended the training and compared with the report produced during the verification study of the replaced Cobas 6000 chemistry analyzer before the training. The parameters under study included number of performance characteristics evaluated, number of statistical methods used and the acceptability of meeting the specified requirements.

**Results:** There was a 75% increase in number of performance characteristics after the training. There was a 40% increase in the number of statistical methods before the training. The lower limits of the reportable range were AST 17 U/L, ALT 15 U/L, glucose 1.41 mmol/L, creatinine 125.7umol/L and cholesterol 1.05mmol/L. The within run CV, bias and % deviation where compared to CLIA total allowable error limits.

**Conclusion:** Training in method verification leads to better outcomes and decision making for accepting equipment and methods for use. Its therefore recommended that medical laboratories receive method verification training to ensure quality and accuracy of results produced. However because of lack of reagents the analytes studied were not consistent for all performance characteristics analyzed during verification.

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**The Impact of Personnel Training on Biosafety Practices in Private Laboratories Within Kampala District**

**Background:** The nature of work in laboratories exposes personnel to risk of infections and injuries. Currently over 90% of laboratories in Kampala are privately owned, however, a lot of effort and resources are invested in improving bio safety practices mainly in public laboratories through capacity building, national bio safety audits among others. The magnitude of the infections, injuries and contamination occurring in private health laboratories is also not known due to inadequate documentation. This study was carried out to assess the impact of personnel training on bio safety practices in 7 private laboratories within Kampala district between May and June 2017.

**Methods:** A longitudinal study was conducted in seven laboratories that were subjected to a baseline safety audit in May 2017 using the WHO AFRO SLIPTA checklist section 12 (facilities and safety). The audit revealed inadequate knowledge in bio risk management, stock out of supplies and poor waste management as major challenges. IDI intervened by training two laboratory workers from each laboratory in bio safety followed by improvement projects and onsite mentorship visits to help address the identified gaps. An exit audit was conducted in June 2018.

**Results:** The general percentage improvement between the exit and baseline audit in all seven laboratories was 54.7%, two laboratories had a percentage improvement above 60%, four laboratories had a percentage improvement above 50% whereas one had a percentage improvement of 44%. Most improved areas of the checklist include: 12.10, Waste management, 12.15, Safety equipment and 12.14.

**Conclusion:** According to the study there was marked improvement in bio safety practices as a result of the trainings. There is need for the Ministry of Health and its partners to scale up bio safety trainings in private laboratories across the country.
Implementation of a Professional Development Program in Laboratory Leadership and Quality Management in Zambia from 2016 - 2018

Background: Without strong leadership and effective management, laboratories may provide poor quality diagnostic testing services, a critical component of healthcare. Competent laboratory management and personal leadership are vital for any organization and especially in healthcare for quality service delivery. However, few laboratory managers receive comprehensive training in organizational management and leadership skills.

Methods: I-TECH’s 9-month long Certificate Program in Laboratory Leadership and Management (CPLL) was implemented in 17 public and military hospital laboratories across Zambia in two cohorts, in 2016 and again from 2017-2018. Participants included 17 laboratory managers in cohort 1, and 17 laboratory managers and 16 laboratory quality officers (QOs) in cohort 2. The program employed a mentored, blended learning approach, utilizing both in-country didactic and job-specific online training, with practical application, through Capstone Project implementation at the laboratory sites to improve service-delivery. The program, with particular attention to cultural appropriateness and effectiveness, focused on improving participants’ competencies in leadership, management, communication, policy development, laboratory data analysis, and international quality management principles.

Results: Both cohorts achieved a high graduation rate: 16/17 participants in 2016 (94%), and 30/35 participants in 2017-2018 (86%). Strong mentorship, faculty support, and collective problem-solving aided exceptional participant retention online. Laboratory quality at the 17 sites was advanced and 36 quality improvement/ Capstone projects focused on specific areas of total quality management- from specimen collection to results reporting.

Conclusion: This program and approach affirms the impact of formal leadership and management training on organizational capacity development and can be a tool to expand functional practices of laboratory quality to laboratory management in any setting, effectively supplementing quality principles training programs such as the Strengthening Laboratory Management Towards Accreditation (SLMTA) program. The modular online curriculum allows the program to be customized with location-specific case studies for any environment.

Customer Satisfaction with Clinical Laboratory Service at Public Hospitals in Ethiopia, 2017

Background: Determining the level of customer satisfaction has a useful tool for getting patient views on how to improve and provide quality laboratory services. However, there was no a baseline data about the satisfaction level of laboratory clients at the national level.

Methods: A cross-sectional study design was employed from November 1-30/2017. A total of 2399 clients and 327 physicians were selected randomly from 60 selected public hospitals in all regions of Ethiopia. Data were collected using pre-tested and structured questionnaire and analyzed with SPSS version 23 software.

Results: Overall, 78.6% of the laboratory clients and 55% of physicians were satisfied with the clinical laboratory services. Clients were more dissatisfied with easily accessibility of laboratory and latrine location (19%, 20%), adequacy of waiting area (25%), cleanness of latrine (47%), waiting time (30%), orientation/advisory service during specimen collection (26%), missing of result (12%), availability of service (18%) and cost of service (17%). The frequency of visit (P=0.01), type of hospital (P=0.00), distance (P=0.007) and needle stick attempts (P=0.00) were significantly associated with client satisfaction. Regarding to physicians, most of them were dissatisfied with availability of lab handbook (88%), test menu (50%), referral or back up service (62%), notification of TAT (54%) and panic result (55%), urgent service (31%), advisory/expert service (19%) and quality of service in all working shift (71%).

Conclusion: Most of the laboratory clients and nearly half of the physicians were satisfied with the service provided for them. However, both customers were dissatisfied with different clinical laboratory services. Therefore, responsible bodies in each level should act on the identified gaps and improve the need of clients in each hospital laboratory. In addition, all hospital laboratories should conduct a satisfaction survey and meet the needs of all laboratory customers.
The Role of Psychosocial Support in Improving Adherence and Viral Load Outcome Among Adolescents Living with HIV/AIDS in Tanzania

Background: Poor parental care, stigma and discrimination may affect an adolescent and the entire family leading to poor adherence to antiretroviral drugs and ultimately lead to high viral load. CDC Tanzania works closely with its implementing partners by providing the technical and financial assistance to support service delivery, strengthening health systems and infrastructure development and use strategic information. This abstract demonstrate the role of psychosocial support to adolescents living with HIV, on treatment with unsuppressed viral load in Tanzania.

Methods: A psychosocial support addressing psychological and social problems of HIV individuals, their partners, families and caregivers as part of care and treatment strategy was introduced. This was followed by an enhanced adherence and counseling sessions that was tailored to an individual adolescent. Poor adherence was found to be a possible cause for poor viral suppression. All adolescents living with HIV/AIDS were provided with nutritional support, involved in sports and bonanza, sexual and reproductive health education and provision of entrepreneurship skills as part of psychosocial support. All adolescents were followed up biweekly for 3 months while conducting enhanced adherence counseling in every monthly clinic visit. This was followed by collecting viral load samples.

Results: A total of 123 adolescents with more than 50,000 viral copies as baseline viral results were eligible for psychosocial support. Among these adolescents, only 100 (81.3%) adolescents had their parents signed consent form to allow them participates in the psychosocial camping. Out of 100 adolescents who were enrolled in the camp, 69 (69%) had shown viral suppression whereas 31 (31%) were not suppressed. Among the 31 adolescents, 3 adolescent (10%) had maintained high viral load, 10 (32%) adolescents had viral suppression by 50% and 18 (58%) adolescents had viral suppression by 75%.

Conclusion: Psychosocial support plays a pivotal role in improving the quality of their lives of adolescents, and prevents further transmission of HIV infection through an improved drug adherence and suppressed viral load.
**PS-2.5-134**

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**Health Professionals Perception and Satisfaction on Quality of Laboratory Malaria Diagnostic Service; The Case Awi Zone, North Ethiopia**

**Background:** Inappropriate perception and inadequate satisfaction of health workers pose significant challenges on malaria diagnostic services in the fight against malaria. Such information however is a gap in most rural health facilities.

**Methods:** A cross-sectional facility based study was conducted in 2013 among 136 participants (110 clinicians and 26 laboratory professionals) engaged in malaria management. Level of perception and satisfaction was measured using a validated structured questionnaire. The structured data were entered using Epi-Info version 3.5.3 and analyzed by SPSS version 20.

**Results:** About 61% (67/110) of the clinicians and 50% (13/26) of laboratory professionals were satisfied with the quality of work. Those clinicians who request laboratory malaria diagnosis based on sound clinical judgment were more satisfied (AOR=3.12, 95%CI=1.06-9.13) than their counterparts while those who trust laboratory malaria diagnostic result as just reliable were 68.0% (AOR=0.32, 95%CI=0.13-0.83) less likely to be satisfied than the referent groups. Laboratory professionals with no limiting factors for laboratory diagnosis were 30.6 times (AOR=30.6, 95%CI=1.83-511.8) more satisfied on the service compared with those who had constraints in their health facility.

**Conclusion:** The level of health professional satisfaction in the current study was not encouraging and is lower than some previous studies conducted in the country. Thus, targeting the identified limiting factors are crucial steps to consider in the fight against malaria.

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**PS-2.5-135**

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**Use of Point of Care Early Infant Diagnosis Reduces Time to Art Initiation in Lesotho**

**Background:** Without treatment, 20% of HIV-infected infants die within 2 months of age. Early infant diagnosis (EID) followed by immediate antiretroviral therapy (ART), reduces HIV-related morbidity and mortality. Long turn-around-time (TAT) of EID results delays ART initiation. In Lesotho, point of care (POC) EID was introduced in 2017 by the Elizabeth Glaser Pediatrics AIDS Foundation using funding from UNITAID. This evaluation compares TAT for EID results before and after introduction of POC EID.

**Methods:** Using a pre-post intervention design, TAT across the EID cascade were compared. We analyzed POC EID results for infants tested between January 2017 and May 2018. Patient-level data were collected from 104 sites implementing POC EID. POC EID data were compared with retrospective EID data from registers in a sub-set of nine purposively selected intervention sites. Descriptive statistics were used to summarize key outcomes. TAT was summarized using medians and interquartile ranges (IQR) stratified by EID system.

**Results:** Conventional EID use in 270 infants showed a median TAT from sample collection to results received by caregiver of 63 days (IQR: 45-76.3). Four infants were HIV-positive and all were initiated on ART. The median time from sample collection to ART initiation was 61 days (IQR: 50-64). Two (50%) HIV-infected infants were initiated on ART within 60 days from sample collection. Following introduction of POC EID, 6,145 non-confirmatory tests were conducted. The median TAT from sample collection to results received by caregiver was 0 days (IQR: 0-6). Of the 6,145 tests, 78 were HIV positive. Median time to ART initiation was 0 days (IQR: 0-1) with all 78 infants initiated on ART within 60 days from sample collection.

**Conclusion:** POC EID considerably decreased TAT between sample collection to results receipt and increased timely ART initiation for HIV-infected infants in Lesotho, suggesting significant clinical benefits to incorporating POC into the existing national EID network.
PS-2.5-136

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Background: Viral load (VL) testing is critical to achieving the United Nations Joint Program on HIV/AIDS (UNAIDS) 90-90-90 goal for epidemic control by 2020. Since 2014, Kenya has rapidly scaled up VL testing through national networks for specimen transport and results transmission. We retrospectively evaluated the timeliness, availability, and utility of VL results in guiding clinical interventions for patients in public health facilities.

Methods: VL data (May 2016–May 2017) were abstracted from 1,123 selected patient files at 12 facilities within the counties of Kisumu, Homa Bay, and Siaya, which have high HIV burden. These facilities refer VL specimens to the Kenya Medical Research Institute (KEMRI) HIV-Research laboratory in Kisumu, Kenya, for analysis. We used a standardized checklist to evaluate the VL turnaround time, VL suppression rates, and documentation of clinical interventions for patients with VL non-suppression (>1,000 copies/mL). VL turnaround time was defined as time from sample collection to results documentation in patient file; the optimal period is 14 days. Clinical interventions for patients with non-suppression were evaluated by assessing inclusion in facility-level high-VL registers, documentation of adherence counselling, and multi-disciplinary team (MDT) consultation notes.

Results: Of the 1,123 patient files, 5 (0.4%) lacked VL results. The average turnaround time was 12 days. Results from 918 patients (82%) showed viral suppression. Of the 205 patients with high VL, 31 (15%) were missing in the high VL registers, 69 (33%) lacked adherence counselling documentation, and 32 (15%) lacked documentation of MDT consultation notes. The average time from receipt of high VL results to first adherence counselling was 8 days.

Conclusion: Optimal VL turnaround time was achieved, and patients with non-suppression received timely adherence counselling. However, further effort is needed to improve the utility (adherence counselling and MDT notes documentation) for subsequent clinical interventions among patients with non-suppression.

PS-2.5-137

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eLABS: Digital Health Intervention Strengthens the Clinical-Laboratory Interface for the HIV Viral Load Value Chain in the Luanshya District, Zambia

Background: The Copperbelt province in Zambia with a population of 2.4 million people has an estimated prevalence of 18.2% People Living with HIV (PLHIV), 18,360 of which reside in the Luanshya district. The eLABS application was designed to strengthen the viral load (VL) clinical-laboratory interface and evaluated in a demonstration project conducted between Oct’17 and Mar’18. eLABS is a mobile workflow solution that electronically registers VL samples at the facility, tracks the samples from the facility to delivery and registration at the testing laboratory and delivers an electronic result back to the facility with full integration with the in-country laboratory information system (LIS).

Methods: The eLABS mobile application was designed using user-centred design principles and extensive stakeholder engagement. The application was rolled out in a demonstration project using 15 healthcare facilities and two referral testing laboratories. Implementation involved facility readiness assessments, training, change management with go-live and post-implementation support. Field evaluation for usability was conducted using a System Usability Scale (SUS) survey.

Results: In the demonstration period, 3,942 VL tests were registered on the eLABS application. The eLABS dashboard showed that TAT was reduced from a baseline of 31 days or greater to 13 days by end Mar’18. The eLABS-LIS integration with automated sample registration reduced registration to <1 minute, contributing to a reduction in intra-laboratory turn-around-time (TAT). The eLABS dashboard highlighted service interruptions, platform failures, inadequate logistics reagent and commodity stock-outs facilitating immediate interventions. An excellent 94/100 usability score was recorded for 36 participants.

Conclusion: eLABS improved the performance of the VL scale up in the Luanshya district by providing real-time monitoring across the entire laboratory value chain. The intervention was viewed favourably by users and further expansion is planned.
Role of Viral Load Remote Login System in Monitoring Antiretroviral Therapy for People Living with HIV

Background: To meet the third "90" UNAIDS target for epidemic control, Kenya started to routinely test viral load (VL) for all patients on antiretroviral therapy (ART) in 2014. During the initial phase, return of test results took more than 14 days after sample collection hampering optimal patient management. The purpose of this pilot study was to reduce the turnaround time (TAT) to 14 days, using remote login functionality within the electronic laboratory information system (LIS) at the National HIV Reference Laboratory (NHRL). The Association of Public Health Laboratories (APHL) developed a feature to link facilities through a password-protected remote login to the LIS at NHRL. This allowed facilities to register samples in the LIS before transport to NHRL, monitor testing progress and retrieve results immediately after release. This was done at four high volume sites from June to August 2017.

Methods: We analyzed turnaround time (TAT) from data entry at the facility to the time of result release from LIS. Median TAT and the interquartile range for pilot sites were compared to median TAT at 4 non pilot sites. To ensure success and sustainability, APHL trained implementing partners, data entry personnel, and modem owners were provided where there was no internet.

Results: Median VL TAT reduced from 16 to 7 days for the pilot sites compared to 15-11 days for non-pilot sites. The Interquartile range for pilot sites was 3.8(p25) and 7.4(p75), the non-remote login sites was 6(g1) and 11(g3). Remote login facilitated retrieval of archived results and reduced transcription errors. This pilot increased demand for remote login, which enabled scale-up to 29% of facilities (45/155) between October 2017 and April 2018. Remote login samples currently constitute 72% of NHRL's VL workload.

Conclusion: Remote login provided timely VL results to clinicians which improved management of people living with HIV.

Impact of Laboratory Test Turn Around Time (TAT) on Customers Satisfaction in PLASVIREC: Jos

Background: It is assumed that patients and physicians are the primary customers of services rendered in a laboratory. In addition the turnaround time (TAT) is an important yardstick for measuring quality services from a laboratory. Laboratories seek ways to improve services and customer satisfaction can be a great area to include as part of a quality indicator as outlined by ISO 15189:2012. Customer surveys are conducted bi-annually and data is used to improve laboratory services, increase customer satisfaction and capture any complaints.

Methods: A well-structured questionnaire was developed at the Plateau State Human Virology Research Centre (PLASVIREC) to capture customer satisfaction for walk in patients, nurses and clinicians who seek laboratory-testing services. There are 6 questions with 3 options ranging from Strongly agreeing to Strongly disagreeing about a service received on their visit day. Counselors hand out the questionnaires and provide a space for customers to fill in and drop off in an assigned suggestion box. Questionnaires can be filled anonymously if preferred. All data is analyzed using an in-house developed Microsoft Excel template and results are presented to the laboratory team for further discussions and actions. The desired satisfaction level for TAT is > 90% .

Results: A total number of 80 individuals participated in the survey conducted in June (N=23) and November (N=57) 2017. Out of the 23 participants in June 2017, 6 (26%) disagreed and 4 (43.5%) strongly disagreed with their results issued within the agreed TAT. This improved significantly in November 2017 with only 2 (4%) disagreed and 1(2%) strongly disagreed out of 57 participants (64.0007) after efforts put by the laboratory team to improve services and the TAT.

Conclusion: These surveys help to identify areas of improvement in the overall laboratory services and provide quality and timely results. All laboratories should adopt the process of asking their clients for input on how they are doing in providing services as required by the clients. The laboratory team needs to continuously monitor the TAT and maintain a high satisfaction level of above 90% with all customers.
Using an MHealth Intervention to Link Health Facilities and Testing Laboratories in Improving the Uptake of Viral Load Testing in Southern Tanzania

Background: In southern Tanzania, HJFMRI identified the need to strengthen documentation in facilities and communication between patients, facilities and laboratory to improve viral load (VL) uptake, result utilization and viral suppression rates. HJFMRI is piloting a Viral Load Tracking System (VLTS) containing a facility and laboratory module. The VLTS allows visibility of the sample pathway from collection and dispatch from facility to receipt at the laboratory and return of VL results. The system generates alerts when VL testing is due, delays in transmitting results, high VL, delays in clients receiving results and tracking enhanced adherence counselling (EAC) for non-suppressed clients. This system prompts action by clinical and laboratory staff and sends a text to the client to return to the facility to receive results.

Methods: Twenty facilities with >1000 HIV clients on treatment were selected for the pilot. Clinic and laboratory staff were trained on use of the system including enrolment of clients and checking and acting on alerts. Clients were sensitized to return to the facility when a text message is received.

Results: 24,441 patients were enrolled in the VLTS from March to July 2018, 15,642 of whom owned a mobile phone. 80% of phone owners were successfully contacted and returned to the health facility to receive their results. A total of 2,444 clients were non-suppressed and contacted to return to the facility. 60% of returning clients received EAC.

Conclusion: A high number of clients contacted through the VLTS returned for results. Of those who were non-suppressed, further analysis is needed to determine reasons for the incomplete uptake of EAC. Factors may include a direct switch to second line or client failure to engage in EAC. Limitations include timely entry of data into the system and prompt action upon alerts. Future analyses comparing routine systems to VLTS will further determine practical utility and impact.

Exploring Automation of Viral Load Result Transmission from Reference Lab to Electronic Medical Record Systems in Central Kenya

Background: The transmission of viral load results from the Kenya national reference laboratory (NRL) database to electronic medical records (EMR) at health facilities has been suboptimal in central Kenya. Out of 11,422 available results, only 1,907 (17%) were available on EMR as at July 2017. Of the results available on EMR an estimated 10% had data transcription errors following manual data entry of each record. To mitigate this problem, a Microsoft. net integration software Viral Load Automation Tool (VLAT) was developed by CHS to automate this process.

Methods: The VLAT was piloted in 6 county and sub-county health facilities in central Kenya. The number of viral load results (VL) uploaded into the EMR were compared before (February – July, 2017) and after (August 2017 - January 2018) VLAT implementation. Wilcoxon rank-sum test of medians and Poisson regression analyses were done to compare the VL tests upload incident rate ratios (IRR) and 95% confidence intervals pre and post migration.

Results: The total number of VL results uploaded was 3,059 (31.3%) pre-migration and 10,276 (97.7%) post-migration. There was a significantly higher median number of viral load results uploaded into the electronic medical record (EMR) system post-migration compared to pre-migration: 2130 (Inter Quartile Range: 164 – 2710) vs. 500 (IQR: 418 – 618), p<0.001. The rate of VL results upload into EMR in post-migration was over 3 times that of pre-migration.

Results adjusted for number of active clients at each site were similarly: IRR = 3.36 (95% CI 3.23 – 3.50), p<0.001. Results adjusted for number of active clients at each site were similar; IRR = 3.14 (95% CI 3.01 – 3.27), p<0.001

Conclusion: The VLAT tool improved the proportion and speed of transmission of viral load results to EMR. The tool also reduced man-hours required to enter each result into the EMR. Consequently, transcription errors that would occur during manual data transfer were eliminated. The VLAT tool is recommended for scale-up in the region and beyond.
Improving the Turn-around-Time for Laboratory Tests in the Immuno-Heamatology and Chemistry Sections at Levy Mwanawasa University Teaching Hospital Lusaka Zambia

Background: The Laboratory department at Levy Mwanawasa University Teaching Hospital (LMUTH) had challenges in sustaining Turn-Around-Times (TAT). On average, TAT ranged from the established 4 hours and 12 hours to 24 hours and 48 hours respectively. The project intended to identify and mitigate challenges in the sample and result process flow through the implementation of managerial and technical work processes.

Methods: The project was conducted at LMUTH from September 2017 to March 2018 and focused on five (5) test profiles which included Full Blood Count, Rapid Plasma Reagin, Human Immunodeficiency Virus, Chemistry and Cluster of Differentiation 4 tests, and sample and result management in the Laboratory Reception Area (LRA). The team retrospectively collected 200 baseline TAT data points for each of the five (5) test profiles using a systematic sampling method, mapped the specimen process flow by tracking a total of 20 samples on five (5) consecutive days, implemented mitigation measures by collaborating with stakeholders, orientated clinical care staff and awarded individual efforts. In March 2018, 200 prospective endpoint TAT data points were re-collected for each test profile. Data was compiled through progress reports, inspections and review of documents, and analysed using Microsoft Excel, 2007 Version.

Results: Baseline TAT indicated that 343 (34%) out of 1000 collected data points were out of the laboratory established range. Process mapping showed delays in service due to commodity stock outs, equipment failure, erratic water supply, unfamiliar laboratory requirements by some clinical care staff, increased traffic flow to the LRA used collectively for sample collection, receipt and result dispatch and its distant location from the testing laboratories. End point TAT on analysis indicated that 39 (3.9%) out of 1000 collected points were out of the established range.

Conclusion: The overall out of range TAT data points improved from 34% to 3.9%, thus, improving the laboratory TAT. Contributing measures included the projection of stock needs, acquisition of a water tank, equipment maintenance and acquisition of back up equipment, relocation and partitioning of the LRA near the testing laboratories creating space for distinct sample collection, receipt and result dispatch areas and improved laboratory and clinical care relations.
**On-site EID and VL Testing Through Integration on GeneXpert Devices Leads to Increased and More Timely Clinical Action: Pilot Results from Zimbabwe**

**Background:** HIV services in Zimbabwe are decentralized, however access to nucleic acid testing (NAT) for early infant diagnosis (EID), and viral load (VL) monitoring, is centralized. In 2016, the estimated EID coverage was 73% and the estimated VL coverage was 55% in 2017. Point-of-care (POC) technologies enable decentralization of testing within facilities where patients receive care and have been shown to increase rates and timeliness of clinical action for adults and children living with HIV. In 2016, Zimbabwe had 130 GeneXpert (Xpert) machines for near POC TB testing, with an estimated overall device utilization of 27%. The Ministry of Health and Child Care (MoHCC) conducted a pilot to determine the feasibility and clinical impact of offering EID and targeted VL (prioritized for pregnant and breastfeeding women, children/adolescents and individuals suspected of treatment failure) in addition to TB diagnosis on Xpert to leverage this excess capacity and potentially increase access to POC testing.

**Methods:** HIV and TB testing on Xpert was conducted in eight facilities from October 2017–February 2018. Pre/post analysis was used to determine the impact of integrated POC testing on the proportion of results received at the clinic and median TAT from sample collection to clinical action for HIV positive infants or patients with unsuppressed VL (UVL).

**Results:** During the pilot, the median time from sample collection to clinic receipt of EID results decreased from 14 days (IQR:13-19) at baseline to 1 day (IQR:0-3). 64% of EID tests were performed and 46% of results were received at the clinic on the same day as sample collection, using POC testing. The proportion of HIV positive infants who initiated ART increased from 83% to 100% during the pilot, with the median time to ART initiation decreasing from 41 days (IQR:25-42) at baseline to 2 days (IQR:1-5). Using POC VL, 83% of clients with UVL received a clinical action compared to 48% during baseline. The median time to enhanced adherence counseling (EAC) or regimen switch decreased to 2 days (IQR:1-4) and 19 days (IQR:3-55) respectively, from 35 days (IQR:24-74) and 113 days (IQR:65-185) at baseline. There were no difference observed in TB testing TATs.

**Conclusion:** Integrating EID and VL testing on existing Xpert devices improves timeliness and rates of clinical action, enabling increased access to POC testing.

**Non-clinical Factors Associated with Unsuppressed Viral Load among Children on ART — Côte d’Ivoire, October 2016–September 2017**

**Background:** HIV viral load (VL) suppression indicates treatment adherence, lower transmission risk, and good patient status. In Côte d’Ivoire, 10,427 children were on antiretroviral therapy (ART) as of September 2017. The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) Côte d’Ivoire program data indicate that rates of VL suppression are lower among children (52%) and adolescents (54%) than among adults (77%). We examined non-clinical factors associated with pediatric viral VL suppression to refine program interventions.

**Methods:** PEPFAR program data on VL suppression were available for 6,754 children aged 0–14 years who received ART from 165 clinical sites during October 2016–September 2017. VL suppression was defined as <1000copies/mL. Univariate and multi-variable logistic regression were conducted to analyze the association between pediatric VL suppression rates >50% and the following variables: facility characteristics, patient volume, district types, implementing partner performance, proximity to VL laboratory, and VL coverage.

**Results:** Pediatric VL suppression rates >50% were associated with facility volume >400 patients (odds ratio [OR] = 2.02; 95% confidence interval [CI]: 1.24–3.29) and the highest performing implementing partner (OR = 2.67; 95% CI: 1.27–5.61), compared to a reference partner. When adjusting for district type, patient volume, implementing partner, and pediatric VL coverage, pediatric VL suppression rates were associated with proximity to VL laboratory (adjusted OR [aOR] = 2.02; 95% CI: 1.12–3.64) and patient volume (aOR = 1.80; 95% CI: 1.07–3.04), but not VL coverage (aOR = 0.68; 95% CI: 0.4–1.17).

**Conclusion:** Non-clinical factors associated with pediatric VL suppression (i.e., patient volume, proximity to VL laboratory, and implementing partner performance) highlight facility-level contributors that should be monitored and used to guide interventions to improve HIV VL suppression among children.
An Evaluation of the Use of the GeneXpert in the Rapid Diagnosis of Presumptive MDR TB in PTB Patients at the University Teaching Hospital, Lusaka, Zambia

Background: Current methods for the diagnosis of Multi-Drug Resistant Tuberculosis (MDR TB) take a long time. This has led to delay in the treatment of MDR TB hence the spread of the disease. Early diagnosis of MDR TB entails immediate treatment and infection control. Genexpert is one of the rapid diagnostic tools for TB that has been recommended by the World Health Organization (WHO). It is a highly sensitive molecular diagnostic test that not only detects TB but also rifampicin resistance.

Methods: A retrospective comparative study was conducted at the University Teaching Hospital, TB Laboratory, from January 2015 to June 2018. A total of 255 results were analysed for both Genexpert MTB/RIF and conventional drug susceptibility testing (DST). Chi square was used to compare the performance of the Genexpert MTB/RIF assay with the gold standard, the conventional DST. A p-value of less than 0.05 was considered as statistically significant.

Results: From the 255 samples analysed in the study, 108 samples were confirmed MDR by conventional DST and of the 108 samples, 107 samples were genexpert rifampicin resistant. The Genexpert MTB/RIF sensitivity and specificity were calculated in comparison with the gold standard conventional DST. The sensitivity was 99.1% and the specificity was 93.1%. The positive predictive value was 91.5% and the negative predictive value was 99.3%. 1 sample was resistant to rifampicin by conventional DST method and negative for resistance to rifampicin by Genexpert. 10 samples were sensitive to rifampicin by conventional DST and resistant to rifampicin by genexpert. The calculated significance value was 0.031 less than the predetermined value of 0.05. The Chi-square test value was less than 0.05. Statistically there was no significant difference between the diagnostic performance of the Genexpert MTB/RIF and the conventional DST method in the detection of MDR TB.

Conclusion: Genexpert was found to be highly sensitive and specific and comparable to the gold standard conventional DST method for diagnosis of MDR TB. Rifampicin resistance from the Genexpert MTB/RIF assay may be used as surrogate marker for MDR TB diagnosis.
Reducing the Viral Load and Early Infant Diagnosis Results’ Turnaround Time in Northwestern Province, Zambia

**Background:** Viral load (VL) is recommended as the preferred monitoring approach to determine the performance of Combined Antiretroviral Therapy (cART) in HIV-infected individuals. According to the Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection (ZCG) 2018, the first VL is done at 6-months post-initiation, and if VL is less than 1000 copies/ml, 12-months post-initiation and every 12 months, if it remains below 1000 copies/ml. All these DBS and VL specimen are sent to the PCR Laboratory for processing. The turnaround time for these tests results is crucial in management of clients, more especially the HEIs. This is because clinicians’ decisions are solely dependent on these results. The objective of this study was to assess the impact of electronic VL/EID results transmission in reducing the turnaround time in Northwestern province of Zambia.

**Methods:** Direct inward system access (DISA) service at the PCR Laboratory was used to populated VL/EID results recently processed. The password encrypted Excel Workbooks for both VL and EID results raised from the DISA service were shared with responsible Clinicians and Data Entry Clerks (DECs) via email and WhatsApp group platform. Unsuppressed VL and DBS Detected spreadsheets are separated and colored red for quick intervention.

**Results:** From an average turnaround time of 30 days when using the motorcycles, the turnaround time of electronic results reduced to less than 5 days — to allow sample preparation and processing. Otherwise, electronic results transmission can take less than 1 hour. Unlike hard copy transmission of VL/EID results via motorcycles, using the electronic results enabled the clinicians and clients to immediately have access to the results soon after the specimen is processed and authorized — reducing the turnaround time to the shortest possible time.

**Conclusion:** Electronic transmission of VL/EID results system greatly reduced the turnaround time and allowed prompt informed decisions to be made by clinicians. It is recommended however, that both methods of results transmission be used concurrently as they supplement each other very well.
Thursday, 13 December
ALL POSTER SESSIONS WILL BE HELD IN THE POSTER MARQUEE FROM 12:30 TO 13:30

TRACK 2: LABORATORY RESPONSE

POSTER SESSION PS-2.3b
IMPROVING QUALITY, SAFETY AND COST EFFECTIVENESS OF LABORATORY SYSTEMS

PS-2.3b-001
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Quality Control Practices for Quantitative Tests in Ethiopian Public Health Facility Laboratories

Background: Quality control is a critical component of quality assurance in the laboratory. Laboratory tests without quality control is not reliable. This study was used as a baseline information for quality control usage in public health facility laboratories in Ethiopia.

Methods: A cross-sectional study were conducted from November 1, 2017 - December 31, 2017. Systematic random sampling technique was used to select hospital laboratories. Standardized questionnaire were developed to collect data from selected 71 public health facility laboratories nationwide.

Results: A total of 71 public health facility laboratories were participated in the study, of which 5 specialized, 6 referral, 20 general and 29 primary hospital laboratories and 11 were regional reference laboratories. Among the study participants 51 (71.8%) were used directly manufacturer’s set mean and standard deviation to monitor their quality control performance while 20 (28.2%) were calculated their own mean and standard deviation. Out of 71 public health facility laboratories, 42 (59.5%) laboratories perform quality control lot verification during receiving new batch to their laboratory while 29 (39.5%) don’t do lot verification. But 48 (67.6%) laboratories faced inconsistent or shortage of quality control supplies.

Conclusion: Although laboratory quality management system implemented in Ethiopia for the last 10 years, quality control practice showed a poor performance. Therefore, the national laboratory program should give attention to improve the quality control practice in the laboratory nationwide.

Comparison of Measurement Uncertainty Values Across Clinical Chemistry Laboratories in Kenya

Background: Laboratory results are expressed as single value but actually represent a dispersion of values attributed to the measurement as a result of inherent random variation in the test method. This dispersion of values is characterized by measurement uncertainty. As a result the true value of a measurement is not known at the time of releasing the results. Measurement uncertainty therefore defines an interval within which true value is believed to lie at a stated probability and is a requirement of ISO 15189:2012 accreditation. This review provides an insight into the performance of different analysers and supports decision making during selection.

Methods: Review of measurement uncertainty data from 10 laboratories implementing ISO 15189 in Kenya. Laboratories were selected on the basis of the accuracy and completeness of the data. The UM data was considered complete if it included data on imprecision and bias of the method, combined uncertainty and expended uncertainty. The tests included were ALT, potassium, Glucose, cholesterol, calcium, total protein, urea, bilirubin, albumin and creatinine. The laboratories were categorized into 5 groups per the type of analyser used as follows; Cobas Integra, abbot architect, Vitros, AU480 Beckman and Humanstar. The means of each group were calculated for each test and compared.

Results: The average uncertainty values were as follows; glucose±0.9mmol/l, potassium±0.3mmol/l, ALT ±5.7U/L, creatinine ±16µmol/l, total cholesterol ±0.34mmol/l, total protein ±4g/l, bilirubin total ± 3.1µmol/l, urea ±1.4mmol/l, calcium 0.16mmol/l, and albumin 4.6 g/l. These values would be considered fit for purpose. Abbot architect analysers had the best uncertainty values for total cholesterol, urea and calcium. Cobas analysers were best in ALT, Total protein, total bilirubin and albumin; Vitros analysers were best in glucose and creatinine while AU480 Beckman was best in potassium.

Conclusion: No single analyser gives the best uncertainty estimates in all analytes in clinical chemistry. Most common analysers used in Kenyan laboratories give measurement uncertainty values that are fit for purpose. Cobas Integra and Abbot Architect chemistry analysers have the lowest uncertainty values for the most analytes included in this study.
The Role of the External Quality Assessment in Evaluating Laboratory’s Staff Competency

Background: EQA refers to an external assessment of a laboratory performance in comparison to its peer and/or to accuracy based reference system. EQAs are normally organized into surveys which are carried out by sending a set of blinded samples from the EQA service provider to a participating laboratory, for analysis in the same way patient samples are analysed. EQA can be used for educational purposes; assessment of laboratory performance against set standards; comparing laboratory performance against peers; and provides evidence that a laboratory is competent to produce reliable and accurate results. Moreover, it interprets best practice standards into a numerical score. The objective of the study was to evaluate use of EQA material to assess competency and training of KEMRI-Wellcome Trust STAT laboratory performance and its staff.

Methods: The study evaluated the use of past EQA materials in evaluating staff competency using the standard operating procedure for training and competency of laboratory staff; and the EQA reports in grading the laboratory’s performance. Competency assessments for 10 STAT laboratory staff were reviewed against staffs from other laboratories. Previous EQA reports for haematology and chemistry tests from 2013-2017, were reviewed to evaluate its performance against other laboratories that perform the same the EQA tests.

Results: Out of the 10 staffs, 8 (80%) were found to be competent when assessed using the past EQA materials. A total of 320 EQA reports checked from three laboratory sections that performed the same EQA material; 160 (50%) of the EQA reports were for chemistry tests and while 160 (50%) for haematology tests. Out of the three laboratory sections reviewed, STAT laboratory performed 87% on both reports, haematology laboratory section scoring 80% while clinical chemistry laboratory section scored 81%.

Conclusion: STAT laboratory section had excellent performance in the EQA schemes than other laboratory sections because of its competent staffs that were assessed using past EQA materials. This explained why most users within KEMRI-Wellcome Trust have more confidence on STAT laboratory section than other laboratory sections like clinical chemistry and haematology. EQA can be used to assess and monitor the quality status of internal procedures and processes and competence of the staff as well as earning international recognition in relation to quality standards.
Assessment of Malian Biomedical Laboratory Capacity by a Global Health Security Agenda Project

Background: Biomedical diagnostic laboratories are essential to the advancement of the Global Health Security Agenda (GHSA), which aims to strengthen prevention, detection and response to infectious disease threats to human and animal health. Laboratories should provide high-quality, efficient diagnostic services throughout the public health emergency management cycle; to achieve this in limited-resource contexts, laboratories often require further development and strengthening. Unfortunately, limited information regarding existing capacity of Mali’s national laboratory system (in terms of buildings design, organization, human resources, laboratory equipment, biosafety/biosecurity, and capacity to detect and respond to diseases of international public health importance) hinders organized action to fill in gaps. Thus, a holistic evaluation was needed to understand existing capacities.

Methods: In 2016, we carried out a prospective assessment of biomedical diagnostic laboratories in the regions of Kayes and Sikasso and the district of Bamako, using a digitized, nationally-validated questionnaire. The evaluation aimed to document laboratory capacity in relation to: infrastructure, human resources, technical platforms, diagnostic procedures executed, and data management systems.

Results: In total, 76 laboratories were assessed and geographically referenced. The overall condition of the buildings was fairly good, although certain inadequacies in laboratory design were observed. Other weaknesses noted included: gaps in qualified human resources; low rates of hepatitis B immunization for laboratory staff, limited written laboratory procedures, inadequate procurement systems for reagents and supplies, and a dearth of effective resources; low rates of hepatitis B immunization for laboratory staff, limited written laboratory procedures, inadequate procurement systems for reagents and supplies, and a dearth of effective laboratory systems for equipment maintenance and laboratory information management. Strengths were also noted, including the existence of national and international laboratory networks for surveillance of epidemic-prone diseases.

Conclusion: Although this assessment was not exhaustive, it provides a useful indication of Mali’s current biomedical laboratory capacity in the GHSA era. This assessment should be extended to all regions. Laboratory capacity data should be integrated into the national District Health Information System for real-time updates, analysis, and decision-making.

Cartographie des Laboratoires au Niger: Défis et Perspectives d’un Projet Pilote

Background: Le renforcement des systèmes de santé en Afrique implique nécessairement un renforcement de la composante laboratoire. L’objectif général de ce projet était de recenser les laboratoires au Niger, et de faire un état des lieux de tous les aspects du laboratoire en vue de renforcer ce maillon essentiel du système de santé.

Methods: L’évaluation a concerné les principaux laboratoires répartis dans les 8 régions du Niger. Les données ont été collectées en Février-Mars 2018 au moyen d’un questionnaire validé au niveau national, développé à travers la plateforme Open Data Kit, puis installé sur des tablettes. Le questionnaire, dont le niveau de complexité (simple/moyen/complexe) a été adapté à la taille des laboratoires à visiter, a été administré par 3 équipes d’enquêteurs préalablement formées. Les données collectées et synchronisées sur le serveur Ona ont ensuite été extraites sur Excel, nettoyées et analysées avec le logiciel SPSS.


Conclusion: Si le questionnaire était facile à administrer, la phase de nettoyage des données a constitué un défi. Une nouvelle collecte de données concernant les Centres de Diagnostic de la Tuberculose et les laboratoires privés informels est en cours. Une réflexion est menée avec le Ministère de la Santé pour intégrer les informations recueillies pour la composante laboratoire dans le système d’information sanitaire DHIS2. L’analyse approfondie des données recueillies lors de cette cartographie permettra d’identifier les besoins précis des laboratoires et d’entreprendre des actions correctrices pour leur renforcement par la Direction des Laboratoires de Santé.
Accreditation and Sustainability of ISO 15189:2012 Implementation in a High Volume HIV Molecular Testing Laboratory in Western, Kenya

Background: Medical laboratory plays an integral part in the delivery of health care services. Evidence-based diagnosis as opposed to syndromic management is key in the quality of clinical decisions. AMPATHPlus Care Laboratory was established in January 2015 to provide HIV molecular testing and monitoring services in the North Rift region of Kenya. AMPATHPlus Care laboratory aims to share its experience in the path to accreditation and sustainability for accreditation status on ISO: 15189: 2012 standard.

Methods: In the path seeking accreditation to ISO 15189:2012, the AMPATHPlus Care Laboratory implemented laboratory quality essentials (QSE) in all sections of the laboratory. CLSI/CDC conducted facility mentorship using the WHOAFRO SLIPTA checklist and registered nonconformities (NCs) at baseline, midterm and end term respectively. Seven quality indicators were monitored on a quarterly basis in reference to laboratory expected targets, Staff trainings were conducted on QMS for both technical and management processes, Laboratory workload, quality performance and staff retention were monitored overtime.

Results: The Lab achieved accreditation in Dec. 2016 with 16 NCs identified at initial assessment, 4 and 5 NCs reducing in the successive assessments in 2017 and 2018 respectively. Performance on the 12 quality essentials using the WHOAFRO rating improved from 57% at baseline to 65% and 91% at midterm and end term respectively. Staff training was >95% or the following trainings; internal auditor-ISO-15189-standard, implementation of ISO 15189 standard, method validation, measurement uncertainty and biosafety safety. Workload increased from a cumulative 85,807 test at pre accreditation to 403,802 by accreditation and post accreditation.

Conclusion: Accreditation provides formal recognition to competency, improvement of quality of laboratory services for patient care. Full implementation of the 12 QSEs ensures sustainability of accreditation and provides assurance to laboratory users of quality services provision. Management commitment remains key in the quality of sustainability of accreditation status.

Mitigating Sample Rejections in a High Volume HIV Molecular Testing Lab, Experience at AMPATHPlus Care Laboratory - Eldoret Kenya

Background: Effective patient management depends on the accuracy of laboratory results; Sample collection errors constitute an important reason for repeat collections prior to testing. All samples received by the laboratory should be assessed for acceptability. Pre-analytical errors account for highest causes of sample rejections, and specimen collection, handling and transportation are among the important pre-analytical variables. We aim to share our experience in mitigating sample rejection in a high volume AMPATHPlus facilities supported by USAID Kenya.

Methods: Data was analyzed retrospectively on sample rejections from January 2016 to June 2018 using the AMPATHPlus Care Laboratory data collection tools. The specimen rejection rate and reasons for rejection for viral load (VL) and early infant Diagnosis (EID) were analysed.

Results: Of 379,517 viral load samples received, 1481 (0.4%) were rejected and from 33,290 EID samples, 704 (2.1%) were rejected. After a root cause analysis in 2017, improper collection technique was realized as the major cause of viral load sample rejection (36.6%). Duplicate entries was the major cause of EID samples rejection (32.2%) in 2016 through 2017 and use of expired filter papers accounted for (27.7%) in 2018. Interventions were done through trainings, improved communication to facilities and follow-up with facility visits. Subsequent analysis in June 2018 indicated that the rejection had reduced from (0.5%) to (0.2%) for VL and from (1.4%) to (1%) for EID.

Conclusion: Laboratories should consistently monitor pre-analytical processes and incorporate continuous quality improvement interventions to reduce errors associated with sample rejection. This will improve patient management and clinic retention and contribute to PEPFAR goals on access to therapy and UNAIDS target of 90:90:90.
Laboratory Quality Indicator Monitoring in a High Volume Molecular Testing Laboratory: Experience of AMPATHPlus Care Laboratory in Eldoret, Kenya.

Background: Laboratory services are essential in health care provision. Quality indicators (QIs) have been used to monitor laboratory performance and ensure quality service provision. We sought to determine the performance of selected QIs in compliance with ISO: 15189: 2012 Standard towards quality care.

Methods: AMPATHPlus care laboratory monitored the following QIs: work load, specimen rejection rate (SRR), turnaround time (TAT), client satisfaction (CS), external quality assessment (EQA) performance, internal quality control (IQC) performance and critical value reporting. Data was analyzed from January 2015 to June 2018.

Results: Of 481,397 samples received in AMPATHPlus Molecular Laboratory from 2015 through 2018 respectively, (n=444,312; 92.3%) and (n=37,085; 7.7%) were tested for HIV-1 Viral Load (VL) and Early Infant Diagnosis (EID) respectively. Laboratory workload for VL increased from 52,576 (11.8%) to 150,015 (33.8%) in 2015 through 2017 respectively; 2018 accounted for 97,110 (21.9%). EID increased from 3,704 (10.0%) to 14,635 (33.8%) in 2015 through 2017 respectively; 2018 accounted for 9,185 (24.8%). SRR for VL and EID was (n=1,890/444,312; 0.4%) and (n=452/37,085; 1.2%) from 2015 through 2018, remaining below target of 2%. TAT for VL improved progressively from 25 to 5 days and, EID from 13 to 6 days respectively from 2015 through 2018. Customer satisfaction remained >90% throughout the period. EQA average performances for VL remained >90% through 2018. EID recorded 100% performance throughout. Success rate for IQC in first run attempt was above laboratory set threshold (>90%), data available only for 2017 and 2018 respectively. Critical results for EID (positive case) were reported at 100% and 90% for VL (>1,000 copies/ml) respectively.

Conclusion: Laboratory QIs are important in monitoring laboratory internal performance translating into quality service provision to patients and other laboratory users. It’s essential that all clinical laboratories identify and monitor QIs performance to improve laboratory services.
Centralized Rechecking as an External Quality Assurance Method for Point of Care Early Infant Diagnosis in Kenya

Background: In 2016, there were 79,425 HIV exposed infants (HEI) eligible for early infant diagnosis (EID) in Kenya. However, only 46% of HEI accessed testing through DNA PCR by two months of age. Moreover, ART initiation among those diagnosed as HIV-positive (2,257 infants) was 80% with the 20% being lost to follow up or dead due to delays in return of results to caregivers. Point-of-care (POC) diagnosis equipment placed at health facilities provide an opportunity to reduce turnaround time of EID results by eliminating the need to transport samples over long distances to centralised laboratories. Since August 2017, Kenya has been introducing POC testing in selected facilities in western Kenya and Turkana. To ensure quality of POC EID testing, centralized rechecking has been implemented as one of the external quality assurance methods.

Methods: 22 sites implementing POC EID are required to collect dry blood specimen (DBS) from every 10th (10%) infant with HIV-negative result and all (100%) infants with HIV-positive results. The DBS are shipped to the National HIV Reference Laboratory (NHRL) for retesting. A root cause analysis is instituted for resolution of any discordant results between POC and conventional EID.

Results: 303 specimen were referred to NHRL for retesting between August 2017 and June 2018. Of the 303 specimen, 54 were concordantly positive by both POC and conventional EID with 2 false negatives, giving a sensitivity of 96.4%. 244 were discordantly negative by both POC and conventional EID with 3 false negatives, giving a specificity of 98.8%. One of the false positives and three false negatives were case of transcription error from the POC testing laboratory and accounting for this scenario increases specificity to 100%. The other four infants with discordant results have been scheduled for retesting.

Conclusion: There was good concordance between POC and conventional EID. Centralized rechecking in addition to other EQA methods is a viable option in quality assurance in the early implementation phase of POC EID in Kenya.

Nigeria's TB Reference Laboratories Accreditation Experience: The Journey So Far

Background: WHO AFRO through US CDC and African Society for Laboratory Medicine has made accreditation process possible in a step by step manner, with some level of certification, which makes it accessible and encouraging to low and middle income countries like Nigeria. Although the program was initially established for laboratories involved in HIV testing, a modified version was later produced for laboratories involved in TB diagnostics as well.

Methods: Four TB reference laboratories in Nigeria namely, NTBLTC Zaria, UCH Ibadan, JUTH Jos and AKTH Kano were enrolled into SLMTA Nigeria’s cohort 4 accreditation process in August 2016. Each of these laboratories have completed three work SLMTA workshops, a total of nine improvement projects, a baseline, 1st and 2nd follow up audits using the WHO-AFRO SLIPTA 2015 version 2 Checklist, and local mentorship visits. The SLIPTA checklist is tailored towards confirming conformance or otherwise, to the ISO 15189 standard. Non-conformances were classified into major and minor and itemized on the NC form at the end of each audit to enable sites perform corrective action and follow-up. In addition, each audit was opened with an in-brief to the management, de-brief and an action plan with persons responsible and timeline was generated to enable follow-up.

Results: Nonconformities were addressed following the action plan; corrective actions and mentorship were provided to the site staff which resulted in the “rise in stars” using the structured SLIPTA checklist as an indicator. AKTH Kano scored zero stars (22% and 29% scores), at both the baseline and first follow-up visits respectively; and 2 (65%) stars at the second follow-up audit. JUTH Jos scored zero stars (29%), 2 stars (70%), and 2 stars (71%) at the baseline, first follow-up, and second follow-up audits respectively. NTBLTC Zaria, made zero stars (55%), 2 stars (66%) and a four stars, while UCH Ibadan had 1 star, zero star and a 2 stars, at the baseline, first follow-up and second follow-up respectively.

Conclusion: From our experience, the different levels of improvement towards accreditation observed in these four laboratories was largely a reflection of the institutional commitment, strong laboratory leadership, staff motivation, adequate infrastructure and a comprehensive action plan. There is still a lot to be done but we are encouraged by the initial improvement in laboratories with dedicated lab and management teams.

Background: Working towards the elimination of new HIV infections under PEPFAR’s Combination, and in response to USAID’s and World Health Organization’s call for universal access to prevention, care and treatment; HIV rapid testing has expanded worldwide. UNAIDS 90-90-90 targets and the new World Health Organization guidelines recommending test and treat will require emphasizing efforts to ensure the accuracy of HIV testing.

Methods: Baseline data were gathered across the 300 selected testing points (PMTC, HCT, PITC, Laboratory and TB DOT). Intervention strategies and measures to monitor impact: training of HIV testers; enrollment into Dried-Tube Specimen (DTS) based proficiency testing, provision of DTS for internal quality control and recruitment of qualified supervisors, were developed, implemented and its effectiveness evaluated.

Results: Prior to the intervention strategies outlined above, 75.3% (N=226) received training however only 29.2% (N=66) had refresher training within 2years. 90.3% (N=271) received external supervision at least on quarterly basis, but 32.5% (N=88) received corrective action feedback. 14% (N=42) were enrolled and participated in proficiency testing (PT), 12% (N=31) of those enrolled had received performance feedback from the PT provider. 52.3% (N=157) had QC material, however only 19.8% (N=31) had records of QC run. Post intervention however, all the 300 testing points received comprehensive training, had external supervision on a monthly basis with feedback provided and enrolled into DTS based PT program. For round one comprising of 93.3% (N =280) participation, 58.2% passed, 41.8% failed. Following round two with 94.7% (N =284) participation, 75.4% passed, 24.6% failed. At round 3, 96.3% (N =289) participation, 86.9% passed, 13.1% failed. Performance feedback was provided to all participating sites and appropriate corrective action was provided as applicable. All participants were provided with QC material.

Conclusion: Our study shows that implementation of HIV rapid tests quality improvement initiative is essential for any HIV rapid testing services. A systematic approach to the implementation and evaluation of RTQII was useful in improving and ensuring quality HIV rapid testing services in our experience.

Maintenance of a Quality Management System Including Accreditation Status in Provincial Tertiary, Regional and District laboratories in the National Health Laboratory Service of South Africa

Background: Quality Management System (QMS) in the National Health Laboratory Service (NHLS) is based on compliance with the International Organization for Standardization (ISO) 15189:2012. We identified success factors and challenges in laboratories that did or did not participate in the Strengthening Laboratory Management Towards Accreditation (SLMTA) program while maintaining QMS and national accreditation.

Methods: We surveyed 15 NHLS laboratories, accredited by the South African National Accreditation System (SANAS) between 2008 and 2017. These laboratories, six Provincial Tertiary, seven Regional, and two District, maintained SANAS accreditation status after six months’ follow-up audit, one-year audit on 75% of the laboratory scope of work and two or four-year audit on 100% of the laboratory scope of work. We developed a questionnaire based on 15 management and 10 technical requirements of ISO 15189:2012 and 15 laboratory managers assessed QMS maintenance, identify aspects successfully implemented and challenges.

Results: The sample included two laboratories in the SMLTA program. On management, 70% of laboratories reported no challenges in maintaining and complying to the requirements while 30% reported difficulties in maintaining laboratory quality due to shortage of competent personnel. Most, 79%, reported no difficulties meeting the technical requirements. However, 21% reported experiencing difficulties including shortages of technical personnel, laboratory equipment, reagents, and consumables. Successfully laboratories designated Quality Assurance (QA) personnel to manage and monitor the QMS system, standardised their Standard Operating Procedures, implemented monthly checklists, and conducted internal audits. SANAS non-conformances decreased from 162 in 2016 to 105 in 2017.

Conclusion: Overall, QMS including accreditation status was maintained by the laboratories that participated in both the SLMTA program and those that did not. Continuous training on QMS has been initiated with standardised training materials developed by the QA team; however, preventive and corrective actions are still a challenge. Future programs should consider incorporating these activities.
Adequate Management of Equipment is Critical to the Success of TB Genexpert - The Nigeria Experience

Background: Tuberculosis is a public health issue affecting 8 million people every year (new cases), resulting to 2 million deaths, globally. Nigeria is one of the 30 high burden countries for TB with a prevalence of 322 per 100,000 population according to WHO 2015 report. SLMTA/QMS program has resulted in improved quality of laboratories but the area of equipment management can be strengthened when there is commitment or extra effort to identify/resolve any equipment/infrastructural issues. In USA, William et al initiated a laboratory equipment program that resulted to reduced repair and operating cost while improving the efficiency of the laboratory. The objectives of this study was to assess improvement of TB lab services via equipment maintenance program, also to identify and fix equipment related gaps.

Methods: The National TB pre assessment checklist was used to assess the needs of the Genexpert laboratories in South West and North Central Nigeria. The Genexpert facilities identified to have infrastructural issue (faulty inverters, batteries, air conditioners, and expired warranties for Genexperts) were followed up in order to resolve the issues. The interventions employed were refresher training of lab staff on user preventive maintenance of equipment, service contract for annual maintenance of equipment, procurement/replacement of batteries and inverters and annual calibration of Genexperts. Data analysis of performance indicators (lab throughput, turnaround time etc) was used to assess improvement from baseline and identify process gaps.

Results: After the fixing of faulty equipment, the determinants of equipment maintenance improved, as equipment downtime moved from 3 months to 0 and Turnaround time from 1 week to 24hrs. 41 Laboratories out of 64 (64%) showed a marked improvement after Quarter 2 of 2018.

Conclusion: Proper laboratory equipment maintenance is one of the keys to improving the functionality of the Genexpert laboratories for early detection of Tuberculosis.

Implementing a Continuous Quality Improvement Process for Laboratories Seeking ISO15189 Accreditation in Zambia Using Structured Mentorship

Background: In 2018, the Zambian Ministry of Health in collaboration with the Centers for Disease Control (CDC) and African Society for Laboratory Medicine (ASLM) under The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) grant, implemented structured mentorship in 5 laboratories (University Teaching Hospital Haematology, Maina Soko Military Hospital, Chipata Central Hospital, Lewanika General Hospital and University teaching Hospital Laboratories) in Zambia. The objective of the study was to evaluate the impact of structured facility-based mentorship with implementation of Quality Management System (QMS) towards international ISO 15189 accreditation.

Methods: Between January and June, 2018, the 5 laboratories each received 5 mentorship visits, each lasting 2 weeks. There was at least two weeks between each visit. Site specific plans were developed jointly with the laboratory based on baseline assessments. The embedded mentor assisted the laboratory implement the plan in a peer-to-peer iterative approach. Progress was measured at baseline and end of 10 weeks mentorship using the WHO/AFRO SLIPTA checklist.

Results: Baseline and exit mean scores were 47% (Zero stars) (SD 13.5; range 35-65%) and 75.6 (3 stars) (SD 5.8; range 69-84%), respectively. The score changes from baseline to exit ranged from 19-40%. There was statistically significant increase between baseline and exit scores (p value= 0.0023). One laboratory was recommended for international ISO 15189 accreditation, 5 months after the mentorship. The most improved elements in the accredited laboratory were internal audits, management review and process control (53%,42% and 37% respectively). The accredited laboratory exit score was higher than the average exit score for the five laboratories on five sections of the WHO/AFRO SLIPTA checklist: evaluation & audits (15.7%), process control (14.7%), information management (12%), equipment (11.8%) and management reviews (11.2%).

Conclusion: Structured facility based mentorship is one means of effective implementation of QMS towards international accreditation. An investment of at least 2 weeks onsite mentorship in an embedded fashion is effective in building a sustainable QMS.
TRACK 2: LABORATORY RESPONSE

PS-2.3b-017

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Documents and Records Improvement Project at North Central Tuberculosis Reference Laboratory Jos Nigeria

Background: The North Central Tuberculosis Reference Laboratory (NCTBR) Jos commenced QMS from October 2015. Baseline rating by (SLMA) external audit was zero-star for the Laboratory in May 2016. Gaps were elucidated by the auditors on documents and records that needs development and amendment to meet accreditation requirements. These gaps were chosen as improvement project (IP) during one of the SLMTA workshops.

Methods: Quasi-experimental design using the Plan Do Check Act (PDCA) cycle Improvement Project model was used to carry out this study at the NCTBR JUTH Jos. Tools used include soft and hard copies of documents and records in existence as at the time of this project. This was measured against the minimum requirement set by ISO standard (ISO 15189:2012) for Medical Laboratory accreditation. Therefore a comprehensive plan of activities was drawn to cover a period of four months comprising baseline data collection, 1st and 2nd review assessments. Study of existing documents and records was done using ISO 15189:2012 as guide. Existing documents were collected, collated and reviewed for appropriateness and usefulness, and minor amendments corrected. Unavailable documents (154) were developed for the 2nd review period, printed and copies distributed to units. MedicaStat statistical software was used to analyse the categorical data using chi square.

Results: Forty-seven (23.5%) out of 200 documents were available leaving a gap of 154 (76.5%). Baseline assessment of this Improvement Project shows the level availability of the following documents and records: safety (77.8%), managerial (34%), technical and preventive maintenance SOPs, 20% and 0% respectively. At the end of the 1st and 2nd review, all missing documents were developed. There was a statistically significant difference between the baseline and the second review using 2 test (p<0.0001) at 95% confidence interval (CI=69.88% to 81.84%).

Conclusion: There was remarkable progress during the Improvement Project, from baseline assessment of 23.5% to 100% for all documents in the laboratory. The objectives for this IP were achieved because of mentorship received from ASLM trained mentors, dedication of the Laboratory staff, sometimes working after official hours of duty. Without documents and records, there is no direction for the Laboratory.

PS-2.3b-018

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Role of Corrective and Preventive Action Root Cause Analysis in Implementing Quality Management Systems at Tuberculosis Referral Laboratory in Kenya

Background: The National tuberculosis laboratory has been implementing quality management systems (QMS) between 2015 and 2018, where a series of internal and external audits were conducted to identify existing gaps. Root-cause-analysis (RCA) was conducted to identify the real cause of the non-conformances. Corrective actions and preventive actions were initiated to address the non-conformances. We describe here in the role of root-cause-analysis in closing identified non-conformances.

Methods: We reviewed audits, root-cause-analysis and corrective action & preventive action reports that were based on ISO 15189: 2012 standard for the period 2015 to 2018. Data variables extracted were; # of non-conformances reported, # of RCA completed, # of CAPA initiated. Data was entered in Excel for windows version 8 and simple analysis was conducted.

Results: A total of 368 Non- Conformances (NC) were detected between 2015 and 2018, 28% (103/368), in 2015 20% (76/368) in 2016, while the remaining 52% were identified during 2016 and 2017 audit findings. A total of 45% (46/103) NCs reported in 2015 were pending closure and clearance while 55% (57) had been concluded. All the non- conformances identified in the year 2018 had documented root cause analyses and corrective and preventive actions completed. Overall, a total of 785 root cause analyses were conducted, (43%) 338 were management related and (57%) 447 were technical related. Out of the 785 root cause-analysis conducted, (58%) 455 were related with personnel behavior such as non-adherence to standard operating procedures and lack of awareness on how to conduct RCA and CAPA.

Conclusion: Lack of awareness on how to conduct RCA and CAPA may result in unresolved non-conformances. Addressing personnel behaviour is a critical activity during QMS implementation. Further analysis is required to establish the extent to which lack of RCA and CAPA might affect the quality of test results.
The importance of Biosafety /Biosecurity on Laboratory Quality improvements at the National Tuberculosis Reference Laboratory in Kenya

**Background:** Biosafety has been a major impediment to achieving ISO 15189 for the biosafety level 3 (BSL3) National Tuberculosis Reference Laboratory (NTRL), which handles highly infectious specimens. In June 2018, an external assessment of the laboratory was conducted by the Kenya National Accreditation Systems (KENAS) which recommended accreditation. We describe the processes undertaken in achieving biosafety/biosecurity best practices based on section 12 of the SLIPTA checklist.

**Methods:** Biosafety internal and external assessments were conducted during the year 2013 to 2018 using the SLIPTA checklist. The ISO 15190 was the standard used to establish assessments and maintain the requirements of the laboratory safety. Action plans and improvement projects were developed to identify and address the non-conformities. The action plans were used to lobby for resources to address the non-conformities. Improvements and corrective actions focused on the biosafety manual, BSL3 laboratory operations, biosafety trainings, medical surveillance programs, chemical storage with access to material safety data sheet (MSDS), waste management system, incineration system, personal protective equipment (PPE), equipment maintenance and service including biosafety cabinets (BSCs), safety equipment, and risk assessments.

**Results:** Optimal operation and maintenance of the BSL3 laboratory hampered the NTRL’s ability to satisfactorily meet the biosafety standards. The SLIPTA biosafety scores stagnated for several years until optimal air handling and autoclave systems were put into place. Internal audits scores for assessing the facilities and safety at NTRL were as follows: 2013 (34/43), 2015 (39/43), 2016 86% (37/43), 2017 (34/43), 2018 (39/43) and finally 2018 (43/43). For external assessment scores were: 2013, 38/3, 2015, 38/43, 2016, 40/43, April, 2018 (39/43) and finally zero non-conformities during the final ISO 15189 assessment.

**Conclusion:** A robust biosafety/biosecurity program is essential in maintaining a safe work environment and quality operations in a laboratory setting. It plays a significant role in the journey towards accreditation and is rightfully awarded the highest points in the SLIPTA checklist.

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Implementation of a Locally-driven Ugandan National Biosafety Cabinet Maintenance and Certification Program

**Background:** As an integral part of laboratory systems, biological safety cabinets (BSCs) protect lab personnel, products, and the environment from exposure to biohazards and cross-contamination during routine procedures – but only if they are certified, maintained, and used as recommended by international standards. Historically, across Africa there has been limited capacity within the public sector to conduct this crucial work. In Uganda, BSC calibration and certification was previously outsourced at high cost, if at all, serving as one barrier limiting the country’s ability to ensure sustainability of their laboratory equipment management program.

**Methods:** With PEPFAR and Centers for Disease Control and Prevention (CDC) support, in 2015 American International Health Alliance (AIHA) launched an in-service training program on maintenance and repair of laboratory equipment vital to HIV diagnostics. Working with the Uganda Ministry of Health (MOH) Health Infrastructure Division (HID) and Central Public Health Laboratories (CPHL), AIHA is addressing the country’s barriers to maintaining laboratory equipment through establishing their laboratory equipment management program; the BSC calibration and certification (BSCC) training program being a key component. In partnership with the Eagleson Institute, AIHA implemented this year-long comprehensive BSCC training, the first to be fully implemented in the host-country. Field assessments took place between each training phase to ensure full comprehension and acquisition of hands-on skills.

**Results:** In August 2017, the four biomedical engineers successfully completed the training. Over the year, the trainees assessed nearly 80 BSCs. AIHA in partnership with CPHL and the certifiers updated the national BSC inventory and to date have certified over 146 BSCs nationally. This represents a cost-savings to the MOH as previously service contracts costed approximately $1,500 per BSC, plus travel, consumables and any spares.

**Conclusion:** Countries have local capacity to implement sustainable laboratory equipment management programs in targeted specializations. This approach ensures sustainability of investments and increases quality of patient diagnostics.
Evaluation of Laboratory Information System in Ethiopia Based on Collage of American Pathologist Standard

**Background:** Electronic laboratory information system (eLIS) is a type of software that receives process, and stores information generated by medical laboratory processes electronically. eLIS is a highly configurable application that facilitate a wide variety of laboratory workflow, that enhance the quality and efficiency of laboratory data management by minimizing turn-around-times (TAT) of laboratory results and by providing complete full-fledged data archiving system. Assessing and evaluating LIS is essential to standardize the system and to inform program planning and implementation in parallel with service expansion.

**Methods:** Across sectional study was conducted in 22 medical laboratories of Ethiopia which uses eLIS from October, 2017 to December, 2017. The study data were collected by reviewing records of the laboratory, interviewing end users and observing different parameters per the college of American Pathologists (CAP) checklists. The checklist has 7 sections and 42 items. The content validity of the checklist was confirmed by three professionals, one information technology professional and two laboratory technology professionals. The data was entered into Excel Spread sheet and exported to Statistical Package for Social Sciences (SPSS) version 21 software systems for analysis of Frequency, percentage, mean, standard deviation and independent t-test, Pearson chi square was calculated to determine the association between conformity to CAP standard and the type of software.

**Results:** The mean conformity of LIS for private and government laboratories were 62.3% and 48.8% respectively. There is no significant association based on type of laboratory and conformity to CAP (P>0.05) but there is a significant association based on software type and conformity to CAP.

**Conclusion:** Based on our study the electronic laboratory information system in Ethiopia has low conformity to the standard criteria of CAP. Therefore, advance studies are required to be conducted; so that various suppliers will be able to evaluate the presented systems regarding compatibility to the standard.
External Quality Control of Hepatitis in Bloods Bank in Mozambique, 2016-2017

**Background:** External Quality Control (EQA) is the program introduced by Instituto Nacional de Saúde, in 2014, with the aim to assure the quality of results obtained by laboratories. The quality assurance of hepatitis virus testing in Mozambique is essential to improve the care provided to users in the National Health Service, as a wrong diagnosis can cause an increase in the number of new infections and resistance. The aim of the present study is to evaluate the results of panels sent by laboratories in 2016 and 2017.

**Methods:** We conducted a retrospective study, where data were collected from panels in the period between 2016 and 2017. The performance of the laboratories was obtained based on reports for external quality control program, and the results were presented in percentages.

**Results:** We analyzed a total of three panels, two of which were from the year 2016 and the third from 2017. In the first panel for the year 2016, 47 sites participated of which 44 (93.6%) responded to the panel. Of these 32 (72.7%) had acceptable results and 12 (27.3%) were not acceptable results. In the second panel, 47 sites participated where the response rate was 100%, of these about 31 (66%) obtained acceptable results and 16 (34%) were not acceptable results. In the third panel of 2017, participated 46 sites, of which 37 (80.4%) responded to the panel. Of these 42 (91.3%) obtained acceptable results and 4 (8.7%) were not acceptable results. Unacceptable results may be due to technical problems such as sample elution errors, incorrect follow-up of the reaction time recommended by the test manufacturers and failure during reconstitution of the sample.

**Conclusion:** This study showed that all the sites have a performance above 80%, this suggests that these laboratories are committed with the Quality system.

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Impact of Internal Quality Control (IQC) in Production of Quality, Safe and Reliable Results That Reduces Equipment Breakdown, Cost of Reagent and Cost of Patient Care

**Background:** According to International standard ISO 15189:2012(E) Clause 5.6.2.1 the laboratory shall design Quality control procedures that verify the attainment of the intended quality of results. Internal Quality Control (IQC) helps the laboratory to detect equipment and reagent errors that can affect the reliability of patient’s results. Internal Quality Control should be done before any patient test to ensure that quality and safe results are produced. This study shows how Internal Quality Control is vital in the production of safe and quality results that are cost effective to the patient and the hospital.

**Methods:** A comparison on the frequency of equipment breakdown cost of reagents and frequency of patient visitation to hospital for testing due to unreliable results from laboratory records was made between Jan – Dec 2013 when the laboratory was not doing Internal Quality Control and between Jan-Dec 2017 when they were doing the controls.

**Results:** It was noted that in Jan – Dec 2013 when the laboratory was not doing Internal Quality Control, there was equipment breakdown 17 times, frequent patient visitation to hospital for testing due to unreliable results 12 times and high reagent costs. When the laboratory was doing Quality Control in 2017, equipment breakdown reduced to 2 times in the year, patient visitation reduced to 0 times and reduced reagent cost.

**Conclusion:** Internal Quality Control is a key element in production of Quality, reliable and cost effective laboratory results. This has reduced equipment breakdown, cost of reagents and patient frequency to hospital for testing thus cost effective patient care. Therefore a laboratory should be doing Internal Quality control on a daily basis to reduce errors in testing and produce accurate results to the patient.
Proficiency Testing for Malaria Microscopic Diagnosis: Two Years of Implementation in Ghana

**Background:** Malaria remains an important endemic parasitic disease affecting all age groups in Ghana. WHO recommends parasite-based diagnosis prior to anti-malaria therapy. Blood film microscopy remains the gold standard for parasitological diagnosis of malaria for effective case management. Accurate and reliable test results have therefore become critical to sustain prescribers' compliance with WHO recommendation. Thus, the Ghana Health Service established Malaria Microscopy Proficiency Testing Scheme (PTS) to assess malaria diagnostic performance of clinical laboratories in Ghana. This paper is to document the observation of the assessments.

**Methods:** Three rounds of PTS were performed in 34 out of 250 (13.6%) purposively selected facilities across the ten regions of Ghana between 2017 and 2018. In each PTS round, Clinical Laboratory Scientists examined a panel of ten validated blood slides selected from Ghana Malaria Slide Bank and were scored for parasite detection, species identification and parasite density. Mean scores were calculated to assess the laboratories diagnostic performance.

**Results:** Analysis of the three rounds of PTS showed that 85%, 41% and 74% of the participating laboratories passed the WHO standard thresholds (90%, 90% and 50%) for parasite detection, species identification and parasite density respectively. Overall, mean scores were 95.3%, 82.8% and 56.0% for detection, identification and density respectively. Mean scores for parasite detection decreased from 97.5% for PTS 2 to 92.8% for PTS 3. For parasite speciation, mean scores increased from 84.7% for PTS 1 to 84.8% for PTS 3. Parasite density mean score was 61.0% for PTS 1, 50.7% for PTS 2 and 56.3% for PTS 3.

**Conclusion:** Some participating laboratories showed high proficiency in malaria detection and counting, but low proficiency in species identification. It is recommended that PTS should expand to include more facilities. More refresher training should also be conducted. Highly proficient laboratoryians should support routine supervision in their districts.

Quality Assurance and Accuracy of HIV Testing in Côte d’Ivoire

**Background:** In 2009, Côte d’Ivoire revised the HIV testing guidelines to include a laboratory based three-test algorithm to confirm all initially screened HIV positive individuals. The recent adoption of the 2015 World Health Organization (WHO) recommendations in February 2017 to test and start treatment makes the confirmation of HIV diagnosis more critical to ensure the accuracy of HIV test results. Thus, to assess the effectiveness of the retesting for verification approach being implemented in Côte d’Ivoire, we conducted a retrospective review of the testing data.

**Methods:** From July to December 2015, we reviewed 35,137 HIV positive test results reported by various testing sites to 24 confirmatory laboratories located in 12 regions. Testing data and other site information obtained from the testing logbooks were entered into Microsoft Excel spreadsheet. We compared the rapid test results between the sites and the laboratories to determine the agreement rates.

**Results:** Of the 35,137 HIV results reported positive by the testing points, 34,931 (99.41 %) were confirmed positive by the 24 confirmatory laboratories, 188 individuals (0.54%) were classified negatives and 18 (0.05 %) identified as indeterminate. The positive agreement rates between the laboratory and the testing sites was 99.41%.

**Conclusion:** Our data shows a significantly high concordance rate between the screening sites and the confirmatory laboratories. The rate of misdiagnosis (0.54%) observed in this study appeared to be lower than those previously reported in other sub-Saharan African countries. Our data supports the need to continuously implement quality measures to improve the accuracy of testing.
Up-scaling of HIV Proficiency Testing for Rounds 14, 15, 16, 17 and 17 in Murang’a County

Background: HIV proficiency testing (PT) is performed as a measure of quality assurance, providing confidence that quality requirements are fulfilled. Despite rapid task-shifting and scale-up of HIV testing services in high HIV prevalence countries, quality assurance testing to evaluate accuracy remain limited. PT monitoring remained a key objective aimed to assess overall participation of PT, accuracy level and mitigation of unsatisfactory results in HIV rapid testing in Murang’a County.

Methods: Descriptive method was used. HIV panels were prepared centrally at the National HIV reference Laboratory (NHRL). They were packed, addressed and delivered to the County by partners. They were processed and results returned to the County office en-route to NHRL by partners. They were marked, results sent to the participants and shared with stakeholders.

Results: The programs that participated were PMTCT, PITC, VCT and Laboratory. The number enrolled in PT rose gradually from 175, 359, 407 and 563 in rounds 14, 15, 16 and 17 respectively. Response was 52%, 73.5%, 94% and 67.9% in the respective rounds. Satisfactory results were 79%, 77%, 85.6% and 85.1% in respective rounds. Having received standard HIV rapid testing training and adherence to the national HIV testing algorithm were positively associated with accuracy and participation being spearheaded by the County EQA teams. Incorrect results constituted 89.5%, 77.4%, 60% and 37.5% while wrong algorithm was 10.5%, 14.8%, 20% and 1.8% in respective rounds. Wrong kit data was 5.3%, 23%, 38% and 46.4% respectively. Incomplete results was 10.5%, 14.8%, 23.6% and 23.2%.

Conclusion: Unresponsiveness and unsatisfactory results interfere with evaluation of all HIV Testing Service providers and the quality of testing respectively. Therefore improvement in response rate and unsatisfactory results is necessary for quality results.

Point of Care for Viral Load Testing; a Solution to Integrated HIV Care for Adolescents Living with HIV in Kenya

Background: In Kenya, more than half of all new HIV infections are among adolescents and has largely contributed to the significant increase of adolescents living with HIV. The standard of care for ALHIV include among others monitoring of their viral loads and additional services such as STI screening and adherence counselling. The viral load monitoring is done through a referral system where samples are collected and shipped in cold chain to centralized labs for testing. While Kenya has a robust HIV laboratory network, this referral system is marred with lots of challenges including less uptake of the viral load service and loss to follow up of the ALHIVs due to the long turn-around times. In view of this, HIV POCT has been identified as helpful in implementing the much needed integrated models of primary care that will allow the ALHIV to get the viral load results and other services near the patient or at the service delivery point. In this regard, the National Public Health Labs through partner and stakeholder involvement developed The Key Considerations in Implementing Point of Care in Kenya guidelines that provides a framework on how POC will be implemented for all populations living with HIV among them the ALHIVs. This document is intended for use by various stakeholders including national and county health policy makers and program managers, development partners, investors, implementing partners, logistics and procurement personnel, laboratory and health care service providers.

Methods: Development of key thematic areas in POC programming and a road map necessary for implementation. In addition, mandatory requirements that need to be enforced as a part of a quality management system in compliance with ISO 22870 particular for quality and competency were also developed.

Results: Successful development of a comprehensive national Point of Care business plan in Kenya that now allows for POC implementation even for ALHIV

Conclusion: The newly developed national Point of Care Business plan is a promising government initiative that will better treatment outcomes to ALHIVs with the overall goal in using innovative technology to attain the 3RD UNAIDS 90-90-90 targets among adolescents in Kenya. Their ability to relay results to the ALHIV in a single visit could greatly improve their treatment outcomes, provide better linkage to care and minimized loss to follow ups (LTFUs).
**A Review of Pre-Analytical Laboratory Errors at a Tertiary Health Facility in the Southern Highlands of Tanzania**

### Background:
Identifying laboratory errors and implementing corrective actions and preventive actions (CAPA) promptly should be part of every laboratory’s quality monitoring and improvement plan. This can be used to minimize errors that occur in the pre-analytical, analytical and post-analytical phases of the testing process that contribute to delays in results. Current evidence suggests that up to 70% of errors occur in the pre-analytical phase of laboratory testing. We describe the type of errors and their frequency as identified in the Mbeya Zonal Referral Hospital Laboratory in Tanzania and the rate of corrective actions taken, as timely and accurate laboratory testing services are critical to making clinical decisions for patient care.

### Methods:
Data on pre-analytical errors and corrective actions were obtained from specimen rejection forms. Data from January 2014 to June 2018 was entered into Excel and frequency of errors was calculated.

### Results:
144 sample rejection forms for test requests received from hospital departments were analyzed. Hematology test requests made up 53% of the rejections, while collectively chemistry, viral load and parasitology requests made up 22% of the rejections. Of the errors reported, clotted samples and incomplete test requisition forms were a majority at 18% each. Other errors included wrong containers, insufficient and hemolyzed samples. All errors and corrective actions required were communicated to the relevant department but only 55% of errors were corrected.

### Conclusion:
Clotted samples and incomplete test requisition forms were the most frequent pre-analytical errors. There is a need for laboratory quality managers to monitor these indicators continuously and share data with hospital management, laboratory and clinical mentors. They can also utilize the data to target CAPA, conduct sensitization and training for health workers on sample collection technique and completion of test requisition forms in order to improve performance of laboratory indicators that impact quality and timeliness of laboratory and clinical services.

Background: Laboratories play significant role in viral load (VL) monitoring for HIV infected individuals on antiretroviral therapy. Most VL testing in Sub-Saharan countries is done in centralized laboratories. In advent of ambitious treatment targets of 90:90:90 by UNAIDS, the number of patients in need of viral load test has increased immensely. This has increased work load to limited laboratories conducting VL testing. Herein, we describe seamless practices at National HIV Reference laboratory (NHRL) in Kenya which facilitates linking specimens to the correct client information on worksheets, enabling specimen traceability and intercommunication to achieve least turnaround time.

Methods: NHRL receives plasma for VL from health facilities networked to it throughout the country. Initial practices involved receiving specimens, verifying and storing them without any particular order of arrangement; while worksheets were generated manually using Excel spreadsheet. In the current practice, specimens are received, verified against laboratory request forms and entered into the laboratory information management systems (LIMS). The order of specimen entry into LIMS is batched in hundreds to reflect physical arrangement of specimen in respective cryoboxes and numbered serially. Worksheets generated include details of the patient’s facility name, patient’s unique identifier, cryobox number and worksheet. Specimen arrangement is made to mirror platform plate-map of the analyzer equipment. Worksheet specimen arrangement model is made to differentiate processed, unprocessed, sorted and unsorted specimens.

Results: The information collected on the worksheet helped in specimen sorting for retrieval and testing. Implementation of these practices evidenced 100% specimen traceability and linkage of results of respective worksheets, evidenced through quarterly validations using LIMS. Turnaround time reduced from an average of 14-30 days to 2-10 days. Specimen processing efficiency improved with less of inter-staff inquiries.

Conclusion: These practices have demonstrated good and traceable specimen handling and management for plasma viral load at central laboratory. The practices are recommended to busy laboratories performing viral load testing.

Decentralization of HIV Commodities Management in Kenya

Background: Testing for HIV/AIDS is one of the strategies of its prevention and elimination to achieve the first 90 targets. The availability of commodities at the testing sites in sufficient quantities is key in supporting the effort towards identification and treatment. In the past, NASCOP quantified and supplied the HIV Rapid Test Kits (RTKs) quarterly to the 47 counties without their involvement which led to numerous complaints on inadequate stocks. To improve on this, the order management process was decentralized to the 47 counties.

Methods: NASCOP in collaboration with key stakeholders, KEMSA, CDC, USAID and CHAI trained county and sub-county laboratory coordinators on commodity management using an online data management system (rtk.nascop.org) for reporting and quantification of test kits aligned to their targets. This provided county teams the oversight to manage and have accountability for all the kits supplied whilst ensuring rational use to achieve their targets and avoid stock outs.

Results: There was an improved level of accountability and as a result, more testing achieved at the county level at a monthly average of 1.4 million from 1.1m (30% increase). There are no facilities/counties currently returning orders to KEMSA due to erroneous allocation which has resulted to minimized costs associated with reverse logistics, a reduction from an average of 20-30 facilities in each supply. Reporting rates across the 47 counties increased from 60% to above 80% in 2017. Additionally, data matching allocations and consumption across at 47 counties is available online and provides NASCOP and counties to determine counties excess kits to redistribute based on potential expiries.

Conclusion: The order management process of program commodities in particular ordering and oversight is best placed at the regional levels. This allows the national team carry out the national oversight role, procurement, distribution and donor coordination.
**PS-2.3b-033**

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**Suitability of Reconstituted Dried Tube Specimen Panels for HIV Rapid Testing External Quality Control Program**

**Background:** Quality assurance is the dynamic and ongoing process of monitoring a testing system for reliability and reproducibility of results. Dried tube specimens (DTS) had been found to be a simple cost-effective method for preparing HIV Proficiency testing and quality control (QC) materials. External quality control (EQC) programs are implemented to check performance of HIV rapid test kits (RTKs) using DTS panels positive and negative QC materials. However, due to harsh climate condition in sub-Saharan environment, stringent storage and transport conditions, the QC materials become unstable and unfit for QC testing. Thus, EQC is done daily on test kits resulting in the use of RTKs for QC at an alarming rate. To address this challenge, we conducted an evaluation to determine the stability of reconstituted DTS QC panels stored at room temperature over a period of 6 days and suitability of its usage for EQC at 4 priority states supported by FHI 360.

**Methods:** DTS was prepared following the standard operating procedure at four laboratories in Cross River, Akwa Ibom, Rivers, and Lagos States selected for the evaluation. A total of 24 DTS samples (12 positive and 12 negative) were used. Three HIV positive and 3 HIV negative) were reconstituted, pooled together and labelled respectively for stability evaluation in each Laboratory. The panels were tested using Determine, Unigold and Stat-Pak in line with the Country approved serial testing algorithm and results documented on log sheet on Day 1. The reconstituted QC panels stored at room temperature (between 25°C to 28°C) each day were retested on Day 2, Day 3 and Day 6 using the same RTKs. The results were collated and analyzed.

**Results:** Results obtained from testing the reconstituted DTS Panels over a period of 6 days yielded the expected outcomes (100% true positive and negative). The concordance of results obtained verifies the stability and suitability of reconstituted DTS panels as QC material. QC guideline developed resulted in judicious use of test kits.

**Conclusion:** DTS panels for EQC in HIV rapid testing can be reconstituted and used over a period of one week following the DTS stability concurrence. Implementation of this guideline resulted in strengthening the EQC program, reducing the waiting time of clients, and efficient use of test kits for HIV rapid testing in FHI 360 Nigeria Program.

**Poster no. PS-2.3b-034 was withdrawn.**

**PS-2.3b-035**

**J. W. Njuhigu**²,³


**The Challenges of Implementing Quality Management Systems in a Tuberculosis Reference Laboratory in Kenya**

**Background:** Pre-analytic and post-analytic processes play a critical role in patients care and management. Therefore implementation of quality management systems as outlined in ISO 15189:2012 standard is vital in every laboratory in order for the Laboratory to demonstrate quality and competency of their services.

**Methods:** This was a Laboratory based study involving the use of ISO 15189:2012 standard audit checklist to assess the challenges involved in implementing quality systems essentials at pre-analytic and post-analytic steps in the year 2016. A report was generated with findings including action items for staff to document evidence of root cause analysis and final corrective action.

**Results:** Out of 22(100%) staff conducting pre-analytic and post-analytic processes, only 1(4.5%) of staff was trained on internal audit. Acceptable contamination rate target of 3-5% was exceeded at a rate of 7-28% for solid culture. The rate of samples rejected at sample reception was upto 479/7980 (6%) majority due to unlabelling and leaking container. Delays between the time of sample collection and reception at the laboratory was > 14 days. The time between receiving samples and release of results was prolonged >90days. Lack of properly defined and implemented rota caused 22(100%) staff to work on one bench for more than a year. Not all equipment were on service contract.

**Conclusion:** Challenges that were evidenced constituted pre-analytical and post-analytical processes and impacted the quality of services offered to clients in one way or the other. The laboratory identified the challenges and put corrective actions after defining root cause analyses which lead the laboratory to be recommended for accreditation by the kenyan accrediting body (KENAS) after an audit done in June 2018.
PS-2.3b-036

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Poor Quality Control and Quality Assurance Practices in a Major Hospital Laboratory, Ghana- 2016

Background: An accurate and reliable laboratory test report which is a true representation of patient’s condition is necessary in disease detection and diagnosis. Laboratory quality control practices ensure accurate and reliable laboratory findings. The aim of this study was to assess the level of quality control practices in the laboratory.

Methods: A cross-sectional study was conducted between 26th and 27th September, 2016 at St Joseph Hospital laboratory in Koforidua. The WHO Stepwise Laboratory Improvement Process Towards Accreditation was adopted and used. Laboratory data on the internal and external quality control were reviewed and laboratory processes observed.

Results: No quality control test was done on the glucometer. Test strips were well stored. No calibration and control tests were done on FBC analyzer to ensure validity of test results. Glucose 6 phosphate dehydrogenase enzyme test had negative and positive controls for each test sample. Sickling test fluid was stored in the fridge and used daily. There was no protocol available for malaria blood film staining and working solutions were not labeled. Control slides for malaria test were not available and expired stains were being used. Daily calibration and control tests were done and the results passed before patient samples were analyzed for all clinical biochemistry investigations. Test results were not validated for serological investigations and control assays were not available.

Conclusion: St Joseph hospital laboratory scored 27.3% for quality control activities. No validation of all serological investigations and expired reagents were used in testing. Recommendations Laboratory Quality Management Systems training was recommended for the laboratory staff and a quality control officer should be appointed to ensure adherence to daily quality assurance guidelines. Public health action taken Expiry test reagents were disposed immediately.

PS-2.3b-037

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Risk Assessment of Avian Influenza Vaccines Waste

Background: Influenza vaccines waste is kind of waste containing infectious (or potentially infectious) materials. Discarded sharps are considered biomedical waste whether they are contaminated or not, due to the possibility of being contaminated with influenza viruses and their propensity to cause injury when not properly contained and disposed of. Many of pathogens of public health threats are routinely and daily used in quality control of veterinary vaccine before market use in CLEVB laboratories. Application of good bio safety measures by CLEVB staff is a key driver for minimizing such risk.

Methods: Assessment of biomedical waste containment measures has been carried out for sharps container in 9 bio safety cabinet (BSC) in 4 different departments dealing with zoonotic pathogens (e.g. avian influenza).

Results: Five sharps container showed full dispose in autoclave, while the rest 4 showed residual viral contaminations indicated by re-isolation test. The common breaches of waste contamination are sharps containers filled above the indicated line, usually two-thirds full. Unlocking and unsalable sharps containers, so that sharps easily penetrate through the sides. A feedback report on finding had been provided for bio safety committee and authorities for target training for responsible persons.

Conclusion: Regular audit on bio safety system application is very important to detect weakness of current system, make sure bio safety standards are being upheld and continue to be maintained.
Early Infant Diagnosis of HIV Exposed Infants of a PMTCT Program in Nigeria; Laboratory Intervention Successes and Challenges

Background: The laboratory is paramount in Early Infant Diagnosis (EID) of HIV in HIV exposed infants (HEIs) using Dried Blood Spots (DBS), to ensure early detection and placement on antiretroviral (ARV) treatment to reduce mortality. This study aimed at reporting the implementation of an EID testing program implemented in Nasarawa state over a five-year period at Prevention of Mother-to-Child Transmission (PMTCT) facilities. We looked at enrolment rates and HIV positivity of exposed infants based on number of enrolled and number of samples collected and sent for EID testing.

Methods: Data were collected through the review of laboratory registers and the electronic database at the PLASVIREC testing laboratory where samples are received and tested. Review period was from 2013 to 2017. All DBS samples were tested using ROCHE COBAS Ampliprep/Taqman qualitative test.

Results: A total of 4,930 HEIs samples were received at PLASVIREC for EID testing. 4,822 (97.8%) were tested using DBS. Rate of infants tested per year increased; from a total of 255 infants in 2013 to 1,642 in 2017 (p= <0.0001). Out of the total tested, 221 (4.6%) were confirmed HIV-1 positive. There was a gradual decrease in the percentage of infected children from 4.9% in 2013 to 3.6% in 2017 (p= <0.0001, [95%= CI 4.31-5.55]). Following breastfeeding, only 422 (9.2%) returned for follow up testing with 13 (3.1%) confirmed HIV-1 Positive. Loss to follow-up (LTFU) after the first EID test was high at 90.4% for HEIs.

Conclusion: The effectiveness of the PMTCT program in Nigeria depends on successfully identifying HEIs and testing them early in life. We observed that even with the high LTFU, HIV infection was detected in previously negative HEIs at their follow up visits which highlight the need for getting HEIs tested after cessation of breastfeeding as outlined in the national guidelines.

External Quality Assessment Scheme for Molecular TB Assays in Nigeria

Background: An effective and sustained TB diagnostic technology requires a quality assured implementation programme. The Institute of Human Virology Nigeria (IHVN) Xpert MTB/RIF, Line Probe Assay (LPA), culture and Drug Sensitivity Test (DST) implementation provides and sustains concise quality assurance system that improves the reliability and efficiency of our DR-TB diagnostic services.

Methods: IHVN rolled out 4 cycles of quality assurance from 2013-2017. In each cycle, panels of TB Dried Tubes (DTs) were produced and distributed to Xpert sites, Dried Culture Spots (DCs) and DTs were produced for LPA in 2013, DTs in cycle 1, 2015 & cycle 1, 2016 and Heat killed mycobacteria isolates in Cycle 1, 2017. These panels were characterized NTMs and MTBC prepared according to National Reference Laboratory’s standard operating procedures.

Results: The Xpert MTB/RIF PT, panels were administered to 34 sites (2013), 114 sites (2015), 206 sites (2016) and 302 sites (2017). In the LPA PT scheme, panels were administered to 6 LPA sites (2013), 114 sites (2015), 206 sites (2016) and 302 sites (2017). In the LPA PT scheme, panels were administered to 6 LPA sites (2013), 114 sites (2015), 206 sites (2016) and 302 sites (2017). In the LPA PT scheme, panels were administered to 6 LPA sites (2013), 114 sites (2015), 206 sites (2016) and 302 sites (2017).

Conclusion: Above results provide evidence that the TB reference laboratory has capacity to successfully establish a TB EQA program in Nigeria and that this program is absolutely critical for improving the performances of the TB testing sites in Nigeria. Results show that it is important to continue to work with sites to improve their performance and thereby the reliability of the test results they produce through the provision of LPA and GeneXpert panels at a regular interval.
Optimizing Quality Testing in Nigerian Laboratories Through Participation in the Nigerian National External Quality Assessment System (NNEQAS)

**Background:** Before 2017, External Quality Assessment (EQA) schemes in Nigeria were conducted by several Governmental or Non-Governmental organizations, making it difficult to analyze trends in the quality of laboratory results at a national level. The Nigerian National EQA System (NNEQAS) emerged from the shared vision of the Medical Laboratory Science Council of Nigeria, One World Accuracy (1WA) and key stakeholders, to harmonize EQA, schemes to target improvement in the quality of laboratory results while saving costs allocated to EQA.

**Methods:** NNEQAS was launched in June 2017 along with the new collaborative and comprehensive EQA scheme which included nine national programs designed and manufactured in Nigeria, three programs procured from 1WA. To facilitate national oversight and analysis, all managed on a single informatics system, OASYS. Shipping and EQA event calendars were also consolidated, with all samples distributed from one facility. Laboratories in Abuja and Port Harcourt were trained on OASYS while continuous support was provided to NNEQAS staff on managing the national scheme.

**Results:** Laboratories formerly enrolled with 1WA under organizations such as the Institute of Human Virology Nigeria and Global Fund were transferred to the NNEQAS umbrella. 294 laboratories previously funded through these organizations were thus enrolled in the first EQA, demonstrating successful early stages for the in-country collaboration. The consolidated EQA calendar resulted in savings of over 75% in shipping costs and streamlined the workload relating to quality assessments for the participants. National monitoring such as a performance of >90% in HIV and Hepatitis Serology, and recommended for all staff members and respective management. Due to the aforementioned bottlenecks, pertinent discussion with responsible bodies conducted so that additional staff members were recruited, training provided, the required safety measures fulfilled. Due to lack of certified companies, calibration and traceability issue is a bottleneck for additional scopes in the laboratory. For those occurrences identified, detailed root cause analysis was performed and notified for all staff members and respective management. Finally, HIV molecular laboratory was accredited by August 16, 2017 for HIV early infant diagnosis. Findings are described thematically.

**Conclusion:** Since 2017, NNEQAS continues to receive immense acceptance with increasing applications for enrollment. This successful collaboration with 1WA offers an increasingly reliable picture of laboratory performance and EQA awareness in Nigeria, empowering laboratories and stakeholders by focusing on continuous improvement.

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**Progress Towards Accreditation in Ethiopian Public Health Institute National HIV Molecular Reference Laboratory, Addis Ababa, Ethiopia.**

**Background:** Quality management system in Ethiopia implemented more than one decade and training was provided in different seasons. Meanwhile, there is no encouraging implementation in the system even in the center of excellence national reference laboratory. This is therefore, this study is aimed to assess progress towards accreditation, the case of Ethiopian Public Health Institute (EPHI) national HIV molecular reference laboratory (NHIVMRL).

**Methods:** Retrospective record review was applied from January 2016 to December 2017, meaning from inception of document preparation to accreditation by Ethiopia National Accreditation Office in EPHI, NHIVMRL. After being finalized all the documents based on required standard, baseline audit and bi-annual intensive internal audit conducted, and action items developed regularly. Advanced molecular technique is used for testing of HIV viral load and early infant diagnosis. Findings are described thematically.

**Results:** During the base line (2016) assessment using the ISO15189 checklist, the main challenges identified were inadequate human resource, turnaround time out of range, lack of inventory system, lack of awareness, poor sample management, lack of address for referring sites, lack of appropriate safety measures, calibration & traceability. To address those aforementioned bottlenecks, pertinent discussion with responsible bodies conducted so that additional staff members were recruited, training provided, the required safety measures fulfilled. Due to lack of certified companies, calibration and traceability issue is a bottleneck for additional scopes in the laboratory. For those occurrences identified, detailed root cause analysis was performed and notified for all staff members and respective management. Finally, HIV molecular laboratory was accredited by August 16, 2017 for HIV early infant diagnosis.

**Conclusion:** Accreditation was successful with all challenges in the national HIV molecular reference laboratory. All staff and management commitment is crucial to resolve challenges and oversee changes on accreditation. Continual follow-up and maintenance of accreditation in the laboratory is recommended.
**The Percentage of No Result Submissions for Nine African Countries Participating in the South African National Health Laboratory Service (NHLS) General Chemistry Proficiency Testing Scheme from 2013 to 2016**

**Background:** Proficiency Testing Schemes/External Quality Assurance (PTS/EQA) schemes are used to access the quality of results issued by laboratories. The NHLS provides 28 schemes including a General Chemistry PTS. Enrolment is open to the NHLS, private South African and non-South African laboratories. The scheme provides 27 analytes 12 times a year. The enrolment fees ranged from $229 in 2013 to $245 in 2016 per participant. The objective was to review the percentage of results not submitted by participants on the General Chemistry PTS from 2013 to 2016 in six groups from nine African countries.

**Methods:** Participants enrolled in the General Chemistry PTS annually. The laboratories receive samples, analyse them monthly and submit the results. The data was analysed for the following countries; Lesotho, Malawi, South Africa and Swaziland that enrolled all laboratories, as well as private and MSF sponsored laboratories from the following countries Burkina Faso, Democratic Republic of the Congo, Eritrea, Ethiopia, Guinea, Kenya, Mozambique, Nigeria and Zimbabwe. The percentage of no returns was calculated from the number of results not submitted against the expected returns. The cost for participation per country was also calculated to indicate the wastage of enrolling in the scheme and not submitting results.

**Results:** Over the four-year period 16,192 enrolments were received ranging from 287-327 per annum. The cost to the participants to enrol in the Chemistry PTS over the four years was $102,267.30. The percentage of no result submission was 15% (2,419/16,192) over the four years. This ranged from 3% in Group-1, 20% in Group-2, 61.3% in Group-3, 48% in Group-4, 46% in Group-5, 49% in Group-6.

**Conclusion:** It is important for enrolled laboratories to participate in PTS. The 15% of laboratories show $41,868.50 in wasteful expenditure due to enrolling and not submitting PT results.
**Management Review Meetings – a Significant Turning Point in Laboratory Management in Western Kenya**

**Background:** Laboratory departments in Kenya receive resource allocations and budgets without quantification of the actual needs of the laboratories. The introduction of strengthening laboratory management towards accreditation (SLMTA) program, the need for change in the approach to enable buy-in from the hospital and County management became evident. Periodic review of laboratory quality management systems (LQMS) design, implementation, monitoring and improvement to evaluate system suitability, effectiveness and contribution to patient healthcare is an ISO 15189:2012 requirement.

**Methods:** Ten laboratories in Western Kenya participated in this process. Laboratory stakeholders including laboratory staff, hospital departmental leadership, County health Management and care & treatment partners participated in annual LQMS management review meetings. LQMS Performance analysis and trends in each functional laboratory unit/section were discussed during the meetings as per the ISO 15189:2012 standard requirements. Challenges and successes were identified and action plans developed for follow up.

**Results:** Infrastructural improvements that included: renovation of laboratory benches, water systems, shelves, painting, leaking roofs, temperature control system and electricity back up. Equipment service contracts increased from 10% to 95%. Resource allocation and budgets for the laboratories increased by between 300% and 580%. Six additional staff were employed by the hospitals due to testing scope and workload review. This improvements/changes resulted in an increased revenue collection of between 100% and 450% in these laboratories. There was marked improvement in LQMS establishment in 8 laboratories: 2 laboratories at 5 stars, 4 laboratories at 4 stars and 2 laboratories at 3 stars.

**Conclusion:** Management review meetings are a major component in ensuring implementation of LQMS and provision of good laboratory service delivery. Conducting effective management reviews should be added as an in-depth teaching unit in SLMTA training, as this has proven to be effective in implementing LQMS.

**Increasing Utilization of Laboratory Diagnostic Services for Patient Management in Kenya: the Critical Role Of External Quality Assurance Program**

**Background:** Lack of quality laboratory services hinders patient management. To bridge this laboratory-clinical gap and improve clinical outcomes, Kenya adopted external quality assurance (EQA) programs. The purpose of this study was to compare CDC-supported laboratories’ EQA performance against overall laboratory services based on the US President’s Emergency Plan for AIDS Relief Site Improvement Monitoring System (SIMS).

**Methods:** We reviewed EQA performance of HIV-related tests (HIV-Rapid Test, CD4, RPR, AFB, and HIV-Viral load) among 134 laboratories implementing Step-wise Laboratory Improvement Process Quality Toward Accreditation (SLIPTA) from 2016 to 2018 and SIMS scores of laboratory service delivery set (Set 10A). EQA performance was based on the percentage (%) score interpretation, where ≥80% was acceptable, 60-79% received a warning, and <60% was unacceptable. SIMS scores were color-coded: green (meets expectations), yellow (needs improvement), and red (needs remedial action).

**Results:** From 2016 to 2018, EQA performance increased for rapid HIV testing (91% to 95%), RPR (60% to 80%), T-lymphocyte (CD4) counting (30% to 55%), and HIV viral load (60% to 80%). However, performance in acid-fast bacilli microscopy decreased from 90% to 80%. On the SIMS scale, 102 (76%) laboratories were rated green, 32 (24%) were rated yellow, and none were rated red. Most laboratories (86, 64%) with a mean EQA performance of 80% were rated green on SIMS scores. Of the 32 laboratories that were rated yellow on SIMS scores, 24 (75%) had a mean EQA performance of 65%.

**Conclusion:** Good performance in EQA is a good measure of quality of laboratory services as assessed by SIMS. Investing in EQA will assure quality of laboratory diagnostic services and increase utilization of laboratory testing for patient management. Strengthening EQA programs will ensure maintenance of high-quality test results and enhance patient management, thus strengthening the laboratory-clinical interface.
External Quality Assessment of AFB Smear Microscopy: The Impact of Blinded Rechecking Programme in North Western States of Nigeria

Background: To ensure the implementation of EQA, the National Tuberculosis and Leprosy Control Programme (NTBLCP) with support from Global fund provided assistance on capacity building for improving the quality of TB diagnosis through AFB smear microscopy. Currently there are 589 functional Microscopy centers across the 7 states of the North West Zone of Nigeria. This study is aimed at demonstrating an improvement in the quality of results produced by laboratories after the introduction of the blinded rechecking program and continuous ‘on-site’ mentoring and supervision.

Methods: Comparative analysis was done involving AFB smear microscopy laboratories within the 7 North Western States that participated in Blinded Rechecking of the EQA programme. The EQA coverage per states, concordance rates, false positive rates (FP) and false negative rates (FN) in the blinded rechecking of 7,770 slides from 518 participation laboratories in the 4th quarter of 2017 were compared with those of 8,295 slides from 553 participating laboratories in the 4th quarter of 2017.

Results: The proportion of functional laboratories participating in EQA (coverage) increased from 88.9% to 96.1%. The average concordance rate increased significantly from 88.2% to 97.0%. The average FP decreases from 4% to 2.4% while the average FN decreases from 4.8% to 2.7%. The sensitivity, specificity, PPV and NPV of panel reading by microscopy centers were 92.6%, 99.7%, 95.5% and 99.4% respectively and Positively likelihood ratio, Negative likelihood ratio and disease Prevalence were 273.5, 0.074 and 7.23% respectively.

Conclusion: The Blinded rechecking program in Nigeria has the potential for strengthening the quality of AFB smear microscopy and smear positive case detection rate in Nigeria. The observation highlights indicate that this is valuable in resource limited country and there is need for clear and well organized structure of awareness of participation to all laboratories. Our experience shows that on-site visits, regular feedback on individual results and re-training is key to improvement in the quality of the AFB smear microscopy in the country.
National Laboratory Mapping: Senegal’s Efforts to Collect and Use Data to Improve Laboratory Diagnostics

**Background:** Laboratory confirmation is critical for pathogen identification and implementing appropriate responses for Global Health Security. In Senegal, the Directorate of Laboratories (DL) did not have an accurate count of the number of functional public and private clinical laboratories in the country and their respective capacities for clinical diagnostics.

**Methods:** From March 2016 to September 2017, a four-phase process was implemented using the DHIS2 health management information system platform with the objective of collecting information on laboratories in Senegal including general information, laboratory personnel, infrastructure, geographic position, pre-analytical and analytical capacity, and equipment. In Phase 1, the information to be collected was determined. Phase 2 included the development of the tools for data collection and their Standard Operating Procedures. Phase 3 was the pilot phase. Finally, Phase 4 was the scaling up of the pilot and analysis of the data collected from all laboratories.

**Results:** To date, out of 168 laboratories identified, 135 were included in the mapping exercise. A total of 13 private and 122 public laboratories were identified. Out of 122 public laboratories, there were 13 national, 19 regional, and 103 peripheral laboratories. A wealth of information has been collected about these laboratories including updated contact information, the number and qualifications of laboratory personnel, functional equipment, types of specimen collected and analyzed, and the yearly average number of samples analyzed and tests completed in each laboratory. Some issues encountered included limited access to internet, high personnel turnover, a lack of computers and an initially low response rate. The quality of the data was controlled by conducting supervision missions in 36 laboratories to validate the data collected from DHIS2 and control for self-reporting errors. For the other laboratories, anomalies identified while controlling the data were addressed by contacting the laboratories by phone to verify the information entered.

**Conclusion:** Information obtained from this data will strengthen the laboratory network and allow the DL to make informed decisions concerning the most appropriate management of financial, human and material resources for better health outcomes. The depth of this data can transform how laboratories are supported throughout Senegal.

Viral Load Testing Scale Up and Optimization in Resource Limited Settings: Benue State, Nigeria. The Hub And Spoke Approach

**Background:** In Benue, it was estimated that 197,959 people living with HIV in Benue state in 2014, 121,643 was validated to be currently on life-saving antiretroviral therapy, a total of 1,408 health facilities exist in the state, with majority of them located in the rural areas with inadequate infrastructures for sample separation, storage, epileptic power supply absence of back-up generators. Based on these realities on ground, the hub and scope strategy was adopted in order to achieve the third 90. The objective of the work is to monitor the impact of the hub and spoke model approach adopted for VL testing scale up and optimization in PEPFAR supported health facilities in some LGAs of Benue State Nigeria.

**Methods:** Some selected sites were assessed, the facilities that met the criteria were selected as hub and a hub and spoke mapping was developed based on proximity. The hub and spoke strategy was allowed to run for three months and data collected thereafter.

**Results:** A comparative analysis of three (3) months data before the implementation and three (3) months into the strategy showed that the hub and spoke strategy implementation resulted to an improvement in the number of VL samples logged into the PCR Lab in FMC Makurdi for the sites under study as indicated in the chart below. With a significant increase in months 1, 2 and 3.

**Conclusion:** The hub and spoke approach for VL optimization has been shown to be one of the sustainable approaches to be employed in VL testing scale up in resource limited settings.
Analysis of EQA HIV Serology Data in Côte d’Ivoire Reveals Gaps in Quality Testing

Background: Proficiency testing (PT) is an important part of an external quality assurance (EQA) program for diagnostic testing, and implementation of corrective actions following non-satisfactory results is essential in improving quality of testing. The CDC Retro-CI laboratory established the HIV serology PT program in 2013 with > 2900 HIV testing sites (POSDV) and 186 clinical laboratories participating in this program to date. We conducted an evaluation to elucidate factors that contributed to non-satisfactory scores during the November 2017 PT round. Results from this evaluation will inform strategies and appropriate interventions to improve quality at all POSDV.

Methods: This retrospective study was conducted from May to June 2018 in Côte d’Ivoire. All data were collected from corrective action forms from laboratories and POSDV. Participating facilities and POSDV included those with non-satisfactory results due to incorrect test results during the relevant EQA session.

Results: Overall, 425 facilities and POSDV were identified with non-satisfactory results at the November 2017 PT round. Among all sites with non-satisfactory results, 70.75% committed errors in the test results. In addition, among all sites that returned a corrective action form, 3.65% reported a problem with the quality of samples received for PT, 0.46% reported challenges with samples storage conditions onsite, whereas 29.68% were non-compliant in following testing procedures. Furthermore, 65.30% of all sites undergoing corrective actions were staffed with testers lacking adequate training either in PT or HIV testing, and 44.75% of all these sites reported a stock out during the PT round.

Conclusion: This evaluation indicated that non-satisfactory HIV serology PT scores were mainly due to errors in the test results. Competency of HIV testers as well as stock outs of HIV test kits remain major challenges that I-TECH will address in collaboration with the PNLS and other implementing partners.

Inspection and Certification of Microbiological Safety Cabinet as Part of the Global Health Security Agenda (GHSA) Program in Senegal

Background: The primary purpose of a Biological Safety Cabinet (BSC) is to protect the laboratory worker and the surrounding environment from Laboratory Acquired Infections (LAIs). The maintenance and certification of laboratory equipment such as BSCs are critical, but still a severe limitation in strengthening laboratory systems in developing countries. The objective of this program was to provide support for the inspection and possibly the certification of class II BSCs in Senegal.

Methods: Between July and December 2017, a total of 60 BSC have been verified by trained staff as per class II requirement prior to being selected in the certification program. Finally, 39 class II BSC have been retained through the One Health approach including clinical, animal, agricultural and environmental laboratories in Dakar and other regions in Senegal. This first round GHSA activities included spare part (UV lamp and HEPA filters) replacements after general inspection, in addition to engineering calibration (airflows measurements, HEPA filter integrity test, smoke test, and user protection test).

Results: Overall, 32 (82%) of the 39 selected BSC were located in Dakar, the Senegalese capital. Two BSC required UV lamp and HEPA filter replacement before engineering. Overall, four (10.25%) of the 39 tested BSC did not pass the certification test. Among those 4 BSC, 2 BSC failed because of downstream and inflow laminar air test issues. While failure in HEPA filter integrity had been observed with 1 BSC from a facility using Bunsen burner flame, while lack of air laminar quality had also been detected in 1 other BSC.

Conclusion: Proper use, maintenance and certification of class II BSC is a particular concern in low resources settings. Four (10.32%) of the targeted BSCs failed the certification inspection in Senegal, suggesting that a continuous maintenance and certification program including spare part replacements and corrective action engineering are needed on a yearly basis.
Performance Assessment of Proficiency Testing for Blood Banks in Nigeria

Background: Proficiency testing (PT) facilitates laboratory quality assurance and is required for laboratory quality certification/ accreditation. In Nigeria, no blood center is known to participate in any PT program, except National Blood Transfusion Services (NBTS) laboratories currently participating in South African National Accreditation System (SANAS) PT program through support from the US President’s Emergency Plan for AIDS Relief (PEPFAR) program. CDC conducted a multicounty PT study including 20 blood blanks in Nigeria: 10 NBTS laboratories and 10 non-NBTS laboratories stratified according to the volume of blood processed annually.

Methods: A questionnaire and a set of 25 blinded plasma panel samples (positive/negative) each for HIV, HBsAg, and HCV were distributed to each participating laboratory. HIV screening for NBTS Laboratories was by ELISA and mostly by rapid test in Non-NBTS centers. Both NBTS and Non-NBTS laboratories screen HCV and HBsAg with either ELISA or rapid tests. The test results were compared against the Institut National de la Transfusion Sanguine (INTS) gold standard. All statistical analysis were done using STATA version 15.1. We used linear regression to compare specificity and sensitivity results by test done.

Results: We found that 100% of the NBTS laboratories and 90% of the non-NBTS laboratories returned PT results. The overall satisfactory score was 89.5% (95%CI: 65.2-97.5), 63.2% (95%CI: 39.6-81.8) and 57.9% (95%CI: 35-77.7) for HIV, HBsAg and HCV tests respectively. The overall satisfactory score was better in NBTS (92.5% (95%CI: 78.7-97.6) compared with non-NBTS laboratories (61.1% (95%CI: 44.2-75.7), p=0.002). After accounting for laboratory type, HCV and HBV tests were distributed to each participating laboratory, HIV screening for NBTS Laboratories was by ELISA and mostly by rapid test in Non-NBTS centers. Both NBTS and Non-NBTS laboratories screen HCV and HBsAg with either ELISA or rapid tests. The test results were compared against the Institut National de la Transfusion Sanguine (INTS) gold standard. All statistical analysis were done using STATA version 15.1. We used linear regression to compare specificity and sensitivity results by test done.

Conclusion: The NBTS laboratories had relatively better satisfactory scores for overall PT outcomes. The poorer sensitivity results of HCV and HBsAg are worrisome and require further investigations.

Scale-up and Integration of a Specimen Referral System in Burkina Faso Using the National Postal Service

Background: Through the Global Health Security Agenda (GHSA), Burkina Faso developed a laboratory-based sentinel surveillance system for severe acute respiratory illness (SARI). Part of the surveillance structure included a specimen referral system, which is designed to transport specimens from four districts to the National Influenza Reference Laboratory (LNR-G) in Bobo-Dioulasso by the national postal service, Sonapost. Given the good performances of the pilot system with Sonapost, the Ministry of Health (MoH) has shown great interest to expand it to more sites and include other specimen types.

Methods: After the evaluation of the initial pilot specimen referral system, results were shared by the MoH with various departments to build consensus for scale-up and integration of other programs, such as HIV/AIDS, tuberculosis and other diseases under surveillance. Then, inclusive of all stakeholders, planning for the newly expanded and integrated system began and financing mechanisms for multiple stakeholders were discussed.

Results: A scale-up plan was developed and costed by all stakeholders. The plan incorporates the addition of new referral sites, from four to one hundred sixty-one sites (161), and the integration of four other specimen-types covering eight diseases. All specimens will be transported by Sonapost to their respective referral laboratories with Sonapost taking responsibility for transport and logistics. Sonapost will also be trained by the referral laboratories on proper packaging, handling, timeliness and biosafety, as they were trained for the SARI specimens.

Conclusion: The scale-up of this successful specimen referral system with the national post and the integration of several specimen-types and diseases is unique and could be a model for other countries in the region. The specimen referral system also works across both the public health and clinical laboratory networks. Burkina Faso has demonstrated that a small geographic pilot with one specimen type can be expanded and fully integrated if the MoH leads consensus building and sharing information with its stakeholders.
**TRACK 2: LABORATORY RESPONSE**

### PS-2.3b-054

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**Improveing Quality and Capacity of the Laboratory System in Côte d’Ivoire**

**Background:** Development of functional laboratory systems is a critical component of sustainable health systems. When laboratory quality is poor, evidence-based clinical practice suffers, quality of surveillance data becomes unreliable, and health policy may be misguided. In order to reach 80% saturation for HIV care and treatment in priority districts, I-TECH with CDC financial support, supported Côte d’Ivoire’s Ministry of Health and Public Hygiene (MHP) in improving the public hospital laboratory network. A critical initial step in this process was the assessment of 54 laboratories.

**Methods:** In collaboration with MHP, a local accreditation organization called CRESAC, I-TECH conducted a baseline assessment of laboratory services at 54 laboratories. Auditors received a refresher training on SLIPTA checklist as well as questionnaires assessing the laboratory network, training needs and electronic Laboratory Information System capabilities. Four teams lead by a certified auditor assessed 54 laboratories nationwide from November 2017 to March 2018, collected data using the SLIPTA checklist 2015, and key informant interviews questionnaires. A restitution was held in each site as well as with all national stakeholders to share audit results and agree on action plans to improve QMS.

**Results:** Audits results indicate that all but two (with 1 star) out of the 54 laboratories assessed obtained 0 stars. Average audit score was 88.39 out of a total of 275 points. Highest score was 159 and the lowest was 22 with a mean of 88/275. Facility and security was the section where most laboratories scored best on average 49.52%. Whereas the sections with the lowest scores were Internal Audits with a mean average of 3%, Management Review 4.9% and Corrective Action 10.6% of the total score. A similar assessment conducted in 2016 indicated that, of 25 laboratories assessed only 8 % obtained 3 stars, 4% obtained 4 and none obtained 5 stars.

**Conclusion:** Findings from this baseline assessment lead to develop strategies mentoring to strengthening the quality management system of laboratories according with ISO 15189 standards. Based on past audit conducted in 2016, there have been a regression in the level of QMS as corrective actions were not carried out systematically to alleviate the gaps.

### PS-2.3b-055

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**Optimisation of the Laboratory Information System (LIS) in Jamaica to Support the National HIV Care and Treatment Program**

**Background:** To ensure efficiency in the laboratory, data must be aligned with samples received and be traceable to results produced. An LIS facilitates the collection, storage, and reporting of data used for diagnostic decisions, to support patient care. It improves efficiency and provides a backup for vital data used in reporting, monitoring and evaluation.

**Methods:** An LIS was installed at the National Public Health Laboratory (NPHL) and two public hospitals in Jamaica. A review was conducted to determine whether expansion of system access to 26 district hospitals and clinics across the island would require additional infrastructure. The proposal was to provide two levels of accessibility: (1) Link access for users at 8 large sites to register samples (order entry) before dispatching to the NPHL, and (2) web access to only view results at all 26 sites.

**Results:** The expansion provided users with quick, easy online access to approved results, eliminating printing/delivering site reports that were previously produced. Link access sites are able to register demographic and test request information before dispatching samples. Once received, NPHL can now verify physical samples against the pre-populated list and print the barcodes. This has eliminated time spent entering sample data and has improved workflow.

**Conclusion:** LIS users at the district hospitals and clinics have reported a shorter turnaround time for receiving results, to within 24 hours of release by the lab. Additional work has electronically linked the LIS and national HIV treatment database, which has resulted in clinical data being automatically updated and a reduced chance of data entry errors. The next stage will be to expand access to remaining sites and to create a consolidated central database to support clinical cascade analysis. This will enable the National HIV/AIDS program to generate a more complete HIV Continuum of care cascade to inform public health interventions.
## PS-2.3b-056

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**Using a lab Weekly Monitoring Tool to Improve Access to Viral Load in Cote d’Ivoire**

**Background:** Viral load (VL) is key to reach the third 90. Therefore, laboratories need to develop and implement strategies to increase access to VL, reduce sample turnaround time (TAT) and improve communication with clinics to support patients on ART. In Cote d’Ivoire VL access has increased from 14% in 2015 to 61% in 2017.

**Methods:** We implemented a VL weekly monitoring tool to monitor six quality indicators in 15 laboratories. The following information was collected and analyzed to improve access to VL: Number of samples received, tested and pending; number of samples rejected and rejection causes; number of days of reagent stock-out and equipment breakdowns and sample TAT. All these data were compiled in a spreadsheet and median, mean and trends were calculated to assess the tool impact on laboratories’ performances from April to December 2017.

**Results:** From April to December 2017, VL tests demand increased from 6311 to 11887 and we observed a decrease in sample rejection rates from 1.2% to 0.5% representing 0.7% of sample received. Electricity failure (33%), inadequate quality of samples 42% (hemolysis, blood clots and insufficient plasma level), and misidentification of blood collection tubes (25%) were the most common rejection causes. The median TAT decreases from 24 [48-4] days to 7 [35-2] days. The number of days of equipment breakdown varies from 0 to 30 days. The pending 12,000 samples due to reagent stock-out at national level (April to June 2017), were tested within the following 3 months.

**Conclusion:** The use of the described tool was efficient in monitoring the laboratories’ performances. It helped reduce TAT, sample rejection rates, and better monitor equipment breakdowns. During stock out period, it helped identify labs with important samples backload in order to develop targeted strategies to address this issue based on abilities of each laboratory.

## PS-2.3b-057

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**Implementation of Balanced Scorecard as a Quality Improvement Tool in College of Medicine University of Lagos ART (CMUL – ART) Laboratory with Support from APIN Public Health Initiatives**

**Background:** Continuous Quality Improvement is a critical aspect of Laboratory Quality Management system. SLMTA curriculum defined the concept of Balanced Scorecard (BSC) as a tool to monitor Laboratory performance with Quality indicators. This study reports on the Balanced scorecard of CMUL–ART Laboratory from April 2017 till March 2018.

**Methods:** Three quality indicators namely specimen rejection rates, Turn Around Time (TAT) and Test Statistics with target set as <3%, >85% and 100% respectively were selected, tracked and reported on quarterly basis for a period of 12 months on workstations identified with opportunities for improvement. Acceptable Year To Date performance was set at three out of four quarters to meet targets.

**Results:** The BSC showed acceptable performance for all indicators at the end of the study. However, Specimen rejection target was not achieved in Q1 (May, June), TAT was also less than target levels in Q1 (April, May, June) while Test statistics were less than target levels in April and May of Q1.

**Conclusion:** Selection, tracking and monitoring of quality indicators is important to maintain Continuous Quality Improvement. The balanced scorecard is a visual presentation of Laboratory performance that efficiently and effectively identifies areas of improvement and shows trends of selected Quality indicators.
Geographic Patterns of Referral for TB Evaluation with Introduction of Xpert MTB/RIF at Regional Referral Hospitals in Uganda: Evidence for Country Wide Roll Out

**Background:** Xpert MTB/RIF is an automated cartridge-based nucleic acid amplification test that has demonstrated its potential to detect tuberculosis and rifampicin resistance with high accuracy. To support roll out and deployment, a records review with emphasis on patient address data before and after Xpert MTB/RIF installation was conducted at 5 regional referral hospitals (Arua, Mbale, Mbarara, Lacor and Mulago).

**Methods:** Parish address data of the TB patients was obtained from hospital records and thereafter spatial data on the hospitals and the parishes in which TB patients lived in was obtained. In ArcGIS, we determined the geographic centroid of each parish polygon. In order to determine distance in kilometers from the geographic centroid of a parish to the hospital for each patient, we used the point distance function in ArcGIS. We calculated the average distance overall (stratified by hospital), and pre- and post-Xpert MTB/RIF installation at the hospitals.

**Results:** Overall, the mean distance was 75.5 km (95% CI: 73.2-77.8). There was a significant difference in distance based on study hospital, with the shortest distance observed for Arua (48.2 km) and the largest distances observed for Mbarara (94.8 km) and Mbale (93.9 km). Prior to Xpert TB/RIF installation at the hospitals, average and median distances were 60 km and 14.7 km, respectively. After Xpert MTB/RIF installation, average and median distances were 83.2 km and 44 km respectively. Univariate tests indicated this difference in distance was statistically significant, and multivariate adjusted models supported the univariate analyses. Specifically, Xpert MTB/RIF installation at the hospitals was associated with a 19.5% increase in distance between parish centroid and hospital for the TB patients.

**Conclusion:** Results on geographical referral patterns highlight the need to further decentralize Xpert MTB/RIF testing due to increased demand for the tests from the community and health facilities.

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**LIMS Verification Procedures and Data Quality Checks for a HIV Program in Jos, Nigeria**

**Background:** LIMS is designed to make the management of samples and associated data including workflow in the laboratory efficient. LIMS was set up at PLASVIREC in 2016 funded by Clinton Health Access Initiative (CHAI) in collaboration with the government of Nigeria. This was a step to upgrade laboratory systems and provide a platform to maintain a national dashboard that displayed data on the HIV program. The team at PLASVIREC came up with a procedure to verify the LIMS and perform quality control as part of its quality management system.

**Methods:** The data team with the molecular virology team performed verification on 20 randomly selected HIV Viral Load and EID request forms received in the lab previously and accepted for testing. The team designed a Source Document Verification (SDV) form used to capture information on the accuracy and completeness of the LIMS database during the verification exercise. As part of routine quality checks, the data manager checks the LIMS database daily after every batch entry done, to ensure all information captured on the request forms are properly entered. The database is also backed up weekly on a dedicated server.

**Results:** A total of 20 HIV VL and EID request forms were used for the verification exercise. Out of these, 4 (20%) dataset were found to have errors with regards to age interpretation. LIMS entries had 0% errors while 0.8% (p=0.1702 [95% CI 0.00-18.27]) error in the database was attributed to the LIMS software age calculation factor from when age of infant is written in months.

**Conclusion:** LIMS is a powerful tool for a modern day laboratory especially for laboratories that are planning for international accreditation. It is crucial and highly recommended to perform a verification to ensure the LIMS selected for the laboratory is working efficiently. Routine quality checks ensure maintaining an error free database.
Assessing the Performance of TB Laboratories in Smear Microscopy Using External Quality Assessment in Three provinces of Zambia: A Cross Sectional Study

Background: In Zambia, tuberculosis diagnosis mainly relies on sputum smear microscopy, which has low sensitivity as compared to other TB diagnostic tests and often read by personnel inadequately trained in TB diagnosis. Capacity building through External Quality Assessment (EQA) is crucial in such settings. In 2018, the USAID Eradicate TB Project (ETB) and the Ministry of Health conducted EQA in three provinces of Zambia: Muchinga, Copperbelt and North-Western. The objective of this exercise was to assess the performance of TB laboratories in AFB smear microscopy.

Methods: The method used for EQA was blinded rechecking and was conducted in all the TB diagnostic health facilities and comprised 9 general hospital, 16 district hospital and 53 health center laboratories. The EQA coordinator from the supervising team assigned one team member to sample 15 slides from the previous quarter, based on the Lot Quality Assurance Sampling (LQAS), and then another team member rechecks the sampled slides (first controller). The EQA coordinator compiled the results from the facility and the first controller. In cases where there were discordant results, the discordant slides were given to another person to reread slides (second controller/umpire). The results from the second controller were final. Data from this exercise was analyzed using SPSS version 17.0.

Results: A total of 78 facilities included in this study: 9(12%) general hospitals, 16(21%) district hospitals, and 53(68%) health center laboratories. Nearly half (49%) of the facilities assessed performed unsatisfactorily. The frequently observed errors were false negatives (62%) and false positive (34%). The highest number of errors were recorded at district hospitals (68.8%), followed by general hospitals (44.4%) and health centers (43.4%). These differences were however not statistically significant (p-value > 0.05).

Conclusion: The performance of the facilities included in the smear microscopy assessment was below standard. Intensification of EQA, onsite training and mentorship activities is recommended.

Evaluation of the Completeness of Laboratory Request Forms (LRF) Received by Our Lady of Apostle Hospital (OLAH) Laboratory, Jos; A Laboratory Supported by APIN Public Health Initiatives

Background: The Laboratory Request Form serves as a documentation of service agreement between the Laboratory and her clients as defined by ISO 15189:2012 standard. It is therefore imperative that LRF should be properly filled by requesting clinicians to enable the Laboratory have adequate information for reporting and interpretation of test results. The Laboratory often had to deal with incomplete, inconsistent and inaccurate data capturing on LRF received in the Laboratory. Here we report on the extent of completeness of information from 3458 LRFs received on Haematology and Chemistry bench from January – June 2018.

Methods: A retrospective evaluation of LRFs received was carried out. Six LRF elements were evaluated for completeness: Patient Name, Age, Sex, specimen type, provisional diagnosis and Name of Requesting clinician. Individual LRF was evaluated for completeness based on the six indicators. Findings were collated on a table and simple percentage analysis done for each category of findings.

Results: Of the 3458 LRFs evaluated, 1875 (54.2%) were filled completely. All (100%) the forms had patient names filled. Age and sex were not captured on ten (0.3%) and seven (0.2%) forms respectively. Type of specimen was not indicated on 91 (2.6%) forms, while name of the requesting clinician were not captured on 175 (5.1%) forms. 428 (12.4%) of the forms had no information on the provisional diagnosis

Conclusion: The rate of completeness of LRFs in the Laboratory is suboptimal based on the evaluation of received LRFs. The highest missing data was observed with provisional diagnosis. There is need for improved advocacy and clients education on the importance of filling LRFs completely.
Assessment of the National Tuberculosis Gene-Xpert Proficiency Testing Program Performance as an Indicator for Quality of Diagnostic Services in Kenya

**Background:** The Xpert MTB/RIF assay is a highly sensitive, specific and timely tool for diagnosing Mycobacterium tuberculosis (MTB) and rifampicin (RIF) resistance (RR). To ensure quality in tuberculosis (TB) testing services, Kenya has implemented Xpert MTB/RIF assay proficiency testing (PT). This analysis documents national performance of the PT program for December 2017.

**Methods:** The national tuberculosis reference laboratory (NTRL) enrolled (94%) 148 facilities, each receiving five samples labelled 2017_C;1-5. Participating facilities upon sample receipt, tested, reported the results in a PT submission form and returned the results to NTRL. At the same time, NTRL established a tool for monitoring implementation of the PT program. The NTRL tracked facility response rate, completeness of PT result submission forms, ability to identify MTB and RR, concordance rate, machine calibration status and type of error codes experienced in the preceding quarter. PT results were analyzed to determine program performance.

**Results:** The response rate was 95% (140/148) due to equipment breakdown, loss of PT in transit, and power interruptions. The data completeness on PT results submission form for MTB and RR detection was 100% and 87% respectively. In-status machine calibration was 56% (79/140), out-of-calibration status 39% (54), while 5% (7) did not report on calibration. Concordance for MTB detection was 100%, 100%, 100%, 99% and 100% for sample 1 to 5 respectively, while that of rifampicin resistance was 97%, 100%, 98%, 99%, and 100% respectively. Operator-related errors accounted for 40% (100) of the 252 error codes reported by 112 facilities; E5007 was 65/152(26%), E5006 20/252(8%) and E2008 15/252(6%).

**Conclusion:** This analysis demonstrated high competency in the detection of MTB/RIF. Gaps identified include lack of machine calibration, operator related errors and incomplete PT results. Refresher training, continuous mentorship and streamlining machine calibration and addressing machine errors are recommended.

Improvement of Quality Practices within HIV Point-of-Care testing (POCT) Sites in Côte d’Ivoire Through Implementation of the Rapid Test Continuous Quality Improvement (RTCQI)

**Background:** Côte d’Ivoire currently implements the test-and-start approach to break the chain of HIV transmission and the CDC-designed Rapid Test Continuous Quality Improvement program (RTCQI) is a strategy intended to ensure reliable and accurate testing at the >3000 POCT nationwide.

**Methods:** From May 2016, I-TECH and its partners conducted 3 foundational activities to support RTCQI that included: development and validation of a national POCT site certification manual, training of key personnel for the certification program, and initial assessment of approximately 41 POCT sites in key districts. This past year the program was expanded to include other pillars such as logbook data analysis, support in corrective actions after rounds of proficiency testing and finalization of post marketing surveillance protocol for new HIV tests kit lots.

**Results:** We successfully generated a framework to implement RTCQI at POCT sites. 25 auditors and 25 supervisors were trained and resumed their activities at key districts. Initial assessments at 41 POCT sites revealed that the average performance level at those sites was under 60%, below minimum quality standards of 90% for HIV testing sites.

**Conclusion:** High-level stakeholder engagement in the development phase is critical to the implementation of new healthcare initiatives such as the RTCQI. Results from the initial POCT site audits highlighted critical challenges and the urgent need to implement interventions that ensure quality at every testing site. Because of this foundational work, a cadre of trained personnel have begun to implement the certification program for nationwide scale-up.
Identifying Quality-related Rapid HIV Testing Gaps Through the Kenya National HIV Proficiency Testing Scheme

Background: UNAIDS have set ambitious targets to end AIDS by 2030 through the 95-95-95 strategy, the first target indicates 95% of people living with HIV knowing their status. Rapid tests are the choice diagnostic assay for HIV diagnosis, enabling more people to be tested. HIV testing is carried out through various strategies: including Home-Based-Testing (HBT), Prevention of Mother-to-Child Transmission (PMTCT) and Voluntary and Provider-Initiated Counselling and Testing (VCT and PITC). To support HIV testing, Kenya has established a comprehensive national proficiency testing (PT) scheme. We describe the performance of PT in the various program settings over the last 3 years.

Methods: The National Public Health Laboratory’s External Quality Assurance (NPHL-EQA) program provides PT panels, each consisting of six blinded samples, to individual HIV-testing service providers (HSP). Between 2016 and 2018, three cycles of PT panels were distributed. Results were evaluated by NPHL and feedback provided. County laboratory coordinators, in collaboration with implementing partners, instituted corrective actions after each PT cycle.

Results: In 2015, 90% (2083) of HSP from HBT, Laboratory and VCT, 81% (1801) from PITC and 72% (1538) from PMTCT correctly identified their PT panels in 2017. PMTCT had the highest rate of false-negative misclassification at 5% in 2015, gradually reducing to 3% in 2016 and 2% in 2017. False positive misclassification ranged between 0-1% for all the other programs over this period.

Conclusion: The overall good performance in PT is an indication of the quality of HIV testing services offered in the county. The PMTCT program, known for multitasking, had lower performance rates, but targeted interventions resulted in performance at par with the other programs. A robust quality assurance program minimizes the risk of incorrect test results and identifies and corrects misdiagnoses if they occur.

Implementation of Data Management System for HIV Testing Program Monitoring in Ethiopia

Background: Real time and accurate laboratory data is essential for measuring Ethiopia’s progress towards achieving UNAIDS’ 90-90-90 targets. Ethiopia has significantly implemented HIV Viral Load and Early Infant Diagnosis data capturing systems installed at decentralized regional testing sites, capturing data in off-line mode, later on synchronized to a national server to give firsthand (real-time) information usable for decision making to the Ministry of Health, its organs and partners.

Methods: Clinton Health Access Initiative (CHAI) in collaboration with the Ethiopian Public Health Institute (EPHI), designed and implemented database systems for HIV Viral Load and Early Infant Diagnosis tests. Usage of the database systems has been scaled up to 19 EID/VL testing sites in collaboration with Centers for Disease Control and Prevention (CDC) and regional health bureaus. Following the country’s effort to expand EID tests at the point of care level using GeneXpert devices, an already implemented data reporting system for TB, Aspect (formerly called GxAlert) and hosted in country, has been upgraded to capture data of EID and Viral load tests performed on the devices being used.

Results: All EID/VL testing sites are capturing data in offline mode, synchronization phase of project is implemented to enable automatic streaming of data and at present 85% of database instances are connected to the national server. 27 out 52 GeneXpert EID scale up sites are connected to GxAlert dashboard. Different kinds of reports incorporated into the system are usable for MOH and all other stakeholders supporting the HIV program.

Conclusion: Significant improvement is observed on availability of data on EID and Viral load tests done both on conventional and GeneXpert devices. The different databases will continue to be expanded to new EID and VL testing facilities and integration of these tools to facility level Electronic Medical Record is under consideration.
From Two Star to Four-star Rating; an Account of SLMTA Journey at College of Medicine University of Lagos ART Laboratory, a Facility Supported by APIN Public Health Initiatives

**Background:** Strengthening Laboratory Management Toward Accreditation (SLMTA) program was launched in 2009 by USCDC and other partners to achieve immediate and continual improvement of Quality services toward Accreditation. The program has been implemented in over 1100 Laboratories in Africa, Asia, Latin America and the Caribbeans. CMUL – ART Laboratory is among the pilot SLMTA Laboratories in Nigeria when the programme started in 2010. SLMTA in country, present the Laboratories that successfully complete the SLMTA program for external audits toward certification and recognition by WHO - AFRO. Here we provide a brief account of CMUL – ART Laboratory from SLMTA baseline audit to WHO AFRO recognition.

**Methods:** Laboratory Audits were conducted at planned frequency including SLMTA baseline audit, SLMTA exit audit and ASLM / SLIPTA audit using the WHO AFRO SLIPTA audit checklist. In between the audits, Laboratory staff were supported to attend the three SLMTA workshop and additional trainings on QMS topics as recommended in SLMTA roadmap. Gaps identified during each audits were investigated and addressed properly with the help of assigned mentors. Audit scores were classified according to WHO AFRO star rating system from zero to five stars.

**Results:** The lab scored 68% (2 star) during baseline audit and improved during the SLMTA exit audit with a score of 78% (3 star). During the first audit by external ASLM / SLIPTA auditor, the laboratory had a score of 84% (3 star) and two years later the second ASLM audit visit, the Lab improved and obtained a score of 85%, which is equivalent to 4 star rating.

**Conclusion:** Implementation of the SLMTA program has contributed a lot to evidence-based Quality improvement in the Laboratories. The official recognition by WHO AFRO after the programme gives a sense of achievement to the Laboratories and a motivating factor to sustain Continuous Quality improvement.

**Use of Quality Indicators to Evaluate Performance in Laboratories Preparing for ISO 15189-2012 Accreditation in Kenya**

**Background:** ISO 15189-2012 defines quality indicator (QI) as a measure of the degree to which a set of inherent characteristics fulfils requirements. The standard requires laboratories to establish QIs to evaluate their performance as a requirement of accreditation. However, if not properly designed and implemented, QIs would results in little useful information and wastage. Highlighting the approaches used by laboratories in selection and implementing QIs is key in identifying hindrances to quality improvement.

**Methods:** Data was obtained through a questionnaire from 20 laboratories preparing for accreditation in Kenya between January and June 2018. The questionnaire focused on selection of QIs, the processes monitored, targets and methods, actions and improvements, challenges and methods. The quality indicators were classified into 4 categories; system, pre-examination, examination and post examination

**Results:** Seventeen QIs (mean=5 per laboratory) were monitored. More than 50% of the laboratories monitored External Quality Assessments (EQA), Turnaround time (TAT) and specimen rejection. Analytical phase had most QIs monitored (41%) with the least being in pre-analytical (6%). Most laboratories (89%) monitored the same QIs over 2 consecutive years. Only 25% of laboratories had criteria for selection of QIs. The lowest performance was observed in TAT, EQA, customer satisfaction and critical results reporting where laboratories (>40%) did not achieve targets. Knowledge gap and lack of resources were identified by 45% of laboratories as challenges hindering implementation of actions for improvement. Six laboratories (30%) had not set any targets for the monitored QIs and did not take any corrective actions. These laboratories indicated they needed help with selection of QIs, target setting and corrective actions.

**Conclusion:** QI monitoring may not yield meaningful continuous quality improvement for significant number of laboratories preparing for accreditation. This is attributed to knowledge gap leading to poor selection, implementation, target setting, improvement actions and repeated measurement of same QIs.
Lessons Learnt from the Helpdesk: Managing a Web-based Database for Proficiency Testing

Background: The National Public Health Laboratory (NPHL) in Kenya operates an individual-focused proficiency-testing PT scheme, where all HIV-testing service providers (HSP) are expected to participate. With over 20,000 HSP, running this PT scheme is a complex and challenging process that uses manual processes to register participants, receive PT results for evaluation and sending back feedback reports to HSP. In March 2018, the NPHL launched an automated web-based system, which supports a number of phases in the PT cycle. To support its implementation more efficiently, an online helpdesk was established to deal with issues in real-time during the system’s roll out. We describe how integrating a helpdesk to support the web-based system for PT management informed common best-practices and successful implementation of the system.

Methods: During and following the rollout of the PT web-based system (April-July 2018), the Helpdesk was the initial single point of contact for all PT incidents, problems and service requests. HSP having challenges in accessing or utilizing the HIV PT system posted their queries and a team was tasked to respond to them.

Results: The helpdesk effectively helped in resolving many incidents that were reported by users resulting in an increased use of the system. Queries raised ranged from basic computer-user issues to more complex ones that helped the programmers to improve the system. During the roll-out period, 23,602 HSP were registered into the system, an increase from the previous 21,000. User details were updated real time with minimal errors. Duplicate data entries, which were a big issue in the manual system were also eliminated.

Conclusion: Adoption of the helpdesk led to the successful roll out of the web-based system for PT management. Lessons learnt could be replicated by other users interested in running a PT web-based system.

Improving Knowledge of Quality Management Systems: The Quality Initiative Website

Background: Implementing a quality management system (QMS) is a key step to improve the quality of laboratory testing in clinical laboratories. It is also a requirement for countries to comply with international health regulations and the Global Health approach. Moreover, putting in place a QMS ensures that laboratories will deliver rapid, accurate and reliable test results. Today in developing countries, however, many laboratories lack a sound understanding of quality management and the associated standard of compliance, ISO 15189. To address this challenge, the Quality Initiative (QI) was introduced by the Mérieux Foundation, an independent family foundation. Launched in 2014, the QI is designed to improve the skills of lab personnel for ensuring the reliability and quality of laboratory results.

Methods: Within the scope of the QI, the Mérieux Foundation decided to create a website in order to provide access to QMS training courses and documents. The website is intended for laboratory professionals and is designed to help share knowledge about QMS. Training materials were developed and are now accessible via this dedicated website, which was launched on January 1, 2018: http://qualite.globe-network.org/. The website features a responsive design so that users can access the site on a computer, tablet or mobile phone. E-learning courses on Quality Management as well as videos of lectures filmed at Les Pensieres Conference Center are available on a Youtube channel. Information is provided in French and English.

Results: From January 1, 2018 to July 30, 2018, the following developing countries connected to the site most often: Cameroon, Algeria, Burkina Faso, Morocco and Guinea. The top four courses viewed on the YouTube channel were as follows: ‘Managing Non-Compliant Events in the Laboratory’, 307 views; ‘Internal Quality Audits and How to Make Them Effective’, 274 views; ‘How to Conduct a Risk Assessment’, 268 views; and ‘How To Prepare and Conduct a Management Review’, 252 views.

Conclusion: The Quality Initiative website was created to improve access to international standards for laboratory professionals in developing countries. It supports the Foundation’s goal of building the capacities of local partners so that they will be able to provide quality services to local populations. It also contributes to improving clinical diagnostics and disease surveillance and monitoring in these countries.
The Importance of Reporting Individual Laboratory Turn-Around-Time (TAT) Performance Weekly to Identify Outliers and Ensure Timely Intervention to Prevent Delays in Patient Results

**Background:** Turn-around-time (TAT) data is reported for National Health Laboratory Service (NHLS) to assess laboratory performance. Total TAT is reported as the median and 75th percentile, and the percentage of samples within target (i.e. 90% within 40 hours for CD4). The aim is to show the critical role of laboratory level TAT performance for root cause analyses.

**Methods:** CD4-TAT data was extracted from April-2016 to March-2017. The median, 75th percentile, % within 40-hour TAT target, total TAT and inter-quartile ranges (IQR) and 95% confidence intervals (CI) were calculated. Total TAT was reported nationally, per province and laboratory. Component TAT analyses was reported nationally: (i) LAB-TO-LAB (inter-laboratory referral), (ii) REG-TO-TST (registration to results captured) and (iii) TST-TO-REV (results capture to review).

**Results:** The national TAT analysis reported a mean of 18.8±14.08 hours, 23 hours at the 75th percentile and 92% within the target TAT (n= 3 332 599). The national TAT component analysis reported a 75th percentile of 10, 22 and 0.2 hours respectively (LAB-TO-LAB, REG-TO-TST AND TST-TO-RW). Provincial TAT analysis indicated that 2/8 provinces did not meet the 90% within target TAT (82% and 87% respectively). Laboratory level TAT analysis indicated that 13/51 (25%) laboratories failed to meet the 90% within target TAT, ranging from 75-89%.

**Conclusion:** When assessing programmatic TAT performance for a network of laboratories, it is important to report sample level per laboratory as well as at the national and provincial levels to unmask underlying challenges. The LAB-TO-LAB TAT component analysis can identify pre-analytical challenges. The data can also be collated with maintenance and downtime information to understand poor performance. The weekly reports provide laboratory management with an interactive ‘real-time TAT reporting’ tool for timely intervention.

**Laboratory Continuous Quality Improvement: Implications for Scaling Up of HIV Viral Load and Early Infant Diagnosis in Kenya**

**Background:** Continuous Quality Improvement (CQI) contributions to viral load (VL) scale-up and early infant diagnosis (EID) have been important towards the UNAIDS “90-90-90” efforts in Kenya. Kenya’s VL/EID testing network is comprised of 38 conventional instruments in 10 reference laboratories, eight of which are ISO 15189 accredited, with an annual capacity of 1,548,288 tests. In 2017, the testing network performed over one million VL and EID tests. However, coordination, monitoring, and timely implementation of corrective actions remains paramount in achieving reliable services. We evaluated this network’s performance on CQI indicators.

**Methods:** We assessed laboratory-based CQI indicators from VL and EID tests from 10 laboratories uploaded during April 2017–March 2018. The indicators assessed included specimen types, test volumes, equipment performance, within-laboratory turnaround time (TAT), and specimen rejections. The chi-square and t-test were used discrete and continuous variables respectively.

**Results:** During April 2017–March 2018, 1,217,517 (1,090,551 [%] VL and 126,966 [%] EID) tests were done. All EID specimen were dried blood spots (DBS), while VL were plasma (66%) and DBS (33). The mean TATs was 5 (VL) and 5 (EID) days. The average rejection rates were 0.4% (VL) and 0.9% (EID) for VL . VL DBS and plasma rejection rates did not differ (0.4%). The average equipment downtime was 19 days with Abbott M2000 contributing 365/700 (52%) of cumulative days down with 22.5% of its incidents attributed to tube handling errors. Backlogs were rare (two labs had 1month each). Higher specimen numbers caused an increase in VL-TAT (P= 0.001). Significant increases in EID tests/year (41%) with no change in TAT (5 days) between this and the previous year were attributable to VL scale-up.

**Conclusion:** Monitoring of CQI indicators in the 10 laboratories provided evidence of good programmatic performance. This was demonstrated by the low TATs and rejection rates, alongside the high test volumes achieved.
Use of Improved Panel Randomization as Quality Control in a Large Scale HIV Serology Proficiency Testing Scheme: Best Practices In Kenya

**Background:** National Public Health Laboratory adopted dried tube specimen technology in 2007 to monitor the quality of rapid HIV testing in the country. The scheme initially targeted health facilities offering HIV testing services, with 24 facilities receiving six blinded proficiency testing (PT) samples, and then shifted to providing HIV-testing service providers (HSP) individual-based PT nationally in 2009. PT reference results were based on HIV testing strategies (such as Laboratory, voluntary counseling and testing - (VCT), where all participants testing under a particular strategy received the same PT panels. Feedback from county supervisors explained that PT panels were tested communally with many participants copying their colleagues’ results without performing the test. Data analyses on a number of cycles revealed trends of incorrect results emerging from participants from the same program areas. This compelled the need to change strategy for PT evaluation.

**Methods:** In 2016, the national strategy for PT-panel result evaluation changed from the previous testing strategy-based system to PT samples reference results being randomized based on participants’ unique identification numbers (ID). Microsoft Excel was used to randomize participants’ IDs and allocate them PT panels. Participants testing under the same strategy would therefore receive PT panels with different reference results. The strategy was assessed over two PT cycles. County laboratory officers’ in-charge of quality HIV testing and implementing partners sensitized HSP on the need to treat PT samples as patient’s samples with testing discretion.

**Results:** When the switch was made, 11% of 16,298 HSP incorrectly identified at least one of the six panels tested. During the subsequent cycle, 8.7% of 21,370 HSP got an incorrect result for at least one of the 6 panels.

**Conclusion:** The new strategy improved the quality in testing. More than one set of reference results can be used to evaluate participants in a single proficiency testing cycle.
Laboratory Audit of Prolonged Turnaround Time of Urgent Full Blood Count Requests at the University Teaching Hospital, Lusaka, Zambia

**Background:** Laboratory turnaround time (TAT) plays a major role in patient management and is often used as an indicator of laboratory performance. Analysis of our full blood count (FBC) TAT over a six-month period showed that the target of 120 minutes for urgent requests was not achieved. The total TAT was calculated from the time the specimen was registered to the time results were dispatched. We investigated the prolonged TAT for urgent requests by evaluating the contribution of different laboratory phases in the FBC path of workflow to total TAT.

**Methods:** TAT data for urgent FBC requests was retrieved from our laboratory information management system DISA*LAB® and exported to Microsoft Excel® for analysis. The analysis covered the period of January 2018 to June 2018. Time points were divided into three phases: (a) from specimen registration at the central reception to delivery in haematology section for analysis; (b) from delivery of specimens in haematology to analysis; and (c) from analysis to authorization and release of results. The percentage of urgent FBC results released within the established turnaround time of 120 minutes was calculated.

**Results:** A total of 13,021 requests was analyzed spanning the period of January 2018 to June 2018. Of these requests, only 4481 (34.4%) were authorized and dispatched within the established TAT. The average total TAT for the six-month period was 196 minutes, exceeding the defined 120 minutes. The time lapse from specimen registration at the central reception to delivery in haematology section for analysis was 136 minutes. The time from delivery of specimens in haematology to analysis was 29 minutes while from analysis to authorization and release of results was 32 minutes.

**Conclusion:** Specimen registration and transportation for analysis accounted for the prolonged TAT of urgent FBC requests. Improvement efforts should be directed in this area.

Managing Improved Change; Lessons Learnt from Sustaining Laboratory Quality Management Systems After Accreditation of Migori County Referral Hospital, Kenya

**Background:** The purpose of implementing quality management systems in laboratories is to improve and provide laboratory testing services that meet international standard. In many resource limited settings, however, this improvement is continuously challenged by factors beyond the laboratory’s technical control such as management support, providing corrective action and equipment management. We describe how successfully managed these challenges at Migori County Hospital post-accreditation.

**Methods:** Following the award of International Organization for Standardization (ISO) 15189:2012 accreditation to the laboratory, we implemented strategies to maintain functional Quality Systems Essentials (QSEs) and sustain the accreditation status. We conducted priority trainings aimed at continuous quality improvement (CQI). We also engaged the management level staff for continuous advocacy. We also extended this advocacy to the regional level. As part of the routine internal audits, we reviewed performance of QSEs on need basis. We conducted half yearly surveys to gauge staff attitude towards type and quality of laboratory services since accreditation. We also used 2 successive surveillance assessments conducted by Kenya Accreditation Services (KENAS) at the laboratory as a means to gauge status of the laboratory.

**Results:** Implementing and sustaining the QSEs enabled the laboratory to meet KENAS assessment requirements for two successive times within a period of eighteen months. Management both at hospital and the County level have consistently supported the laboratory to ensure uninterrupted service delivery over the same period. Staff attitude to the laboratory services was positive and supportive. The laboratory staff in particular were motivated in sustaining the QSEs at the various departments. Internal audits and surveillance audits confirmed an embedded culture of CQI in the laboratory.

**Conclusion:** Sustaining ISO 15189:2012 accreditation in resource limited settings is positive but requires commitment to a culture of CQI and support from staff and top level managements.
ISO 15189 Accreditation: The Experience of a Teaching Hospital Laboratory in Lusaka, Zambia

Background: Laboratory investigations influence an estimated 70% of all decisions affecting diagnosis and patient management. ISO 15189 accreditation affords an opportunity for a laboratory to have its technical competence independently verified through a process of inspection and comparison against international standards. The University Teaching Hospital Laboratory (UTH) has recently been recommended for accreditation to ISO 15189:2012 by the Southern African Development Community Accreditation Services (SADCAS). We present a summary of our laboratory’s accreditation roadmap.

Methods: Laboratory staff were trained in quality management system based on ISO 15189 standard. In 2014 the laboratory adopted a stepwise approach to quality improvement by tackling three sections of the Stepwise Laboratory Improvement Process Toward Accreditation (SLIPTA) checklist per quarter. The Ministry of Health in collaboration with partners such as the Centers for Diseases Control and Prevention (CDC) engaged mentors from African Society for Laboratory Medicine (ASLM), American Society for Microbiology (ASM) and Clinical and Laboratory Standards Institute (CLSI) to work with staff at the laboratory. In August 2017 the laboratory applied for accreditation for three sections namely, TB, haematology and molecular biology.

Results: The TB section underwent a SLIPTA audit and scored 5 stars in early 2018 while the other two sections relied on internal audits. Assessors from Southern Africa Development Community Accreditation Service (SADCAS) audited the laboratory in June 2018. Thirteen nonconformances were identified and the laboratory was recommended for accreditation. The scope included full blood count, TB smear microscopy, TB culture, TB drug susceptibility Testing, Gene Xpert for TB and viral load. The laboratory is implementing corrective actions for the nonconformities detected in the audit and sending to SADCAS for final verification, with certification expected by December 2018.

Conclusion: The laboratory has been recommended for accreditation to ISO 15189:2012. With a right approach and collaboration among implementing partners, laboratory quality improvement to the level of international accreditation is possible in resource-limited settings.

From SLMTA to Accreditation: The Journey of Three Medical Laboratories Supported by APIN Public Health Initiatives (APIN) in Nigeria

Background: WHO Regional Office for Africa (WHO AFRO) in collaboration with US Centers for Disease Control and Prevention (US CDC) and other stakeholders launched a Quality improvement program in 2009 known as Strengthening Laboratory Management Toward Accreditation (SLMTA). Fifty Two countries including Nigeria are implementing this program. Eight out of the Twenty-three labs enrolled in SLMTA Nigeria cohort 1 were supported by APIN with funding from US CDC. Here we present the accreditation journey of these laboratories.

Methods: Baseline Laboratory audits were conducted by SLMTA National team using the WHO AFRO Stepwise Laboratory Quality Improvement Process Toward Accreditation (SLIPTA) checklist. Lab managers and QA officers were trained in a series of short courses and work based improvement projects. Documents required by ISO 15189 standard were developed with the support from APIN technical officers. Follow up audits were conducted using the SLIPTA audit checklist and the labs were audited for recognition by African Society for Laboratory Medicine (ASLM) certified auditors (on behalf of WHO AFRO). Laboratories with 4 – star rating during the ASLM / SLIPTA audit received additional trainings and mentorship and were presented to SANAS for ISO 15189 Accreditation.

Results: Seven out of the eight Labs supported for this process attained a 4 – star rating, the eighth Lab was rated 2 – star according to WHO AFRO recognition system. There was an increased awareness on the culture of Quality among the Laboratory staff as a direct result of the various capacity building activities. Three out of the seven Labs (Nigerian Institute of Medical Research – Lagos, Jos University Teaching Hospital and University College Hospital Ibadan) presented for Accreditation were all accredited by SANAS to ISO 15189:2012 between 2017 and 2018.

Conclusion: The use of SLMTA as a training and mentoring tool is effective for preparing Laboratories for Accreditation.
Ten Million and More Rapid HIV Tests Annually – Managing the Quality of Rapid HIV Testing in Kenya through Phased Implementation of Continuous Quality Improvement Program

**Background:** Kenya has the 4th largest HIV epidemic globally, with an estimated prevalence of 4.8%, 1.5 million people living with HIV and over 53,000 new HIV infections annually. In 2017, over 15 million individuals were tested using rapid diagnostic kits (RDTs). The Kenya Ministry of Health adopted innovative strategies aimed at scaling up efforts for comprehensive implementation of Quality Assurance (QA) in Rapid HIV Testing (RHT). Implementation entailed a pilot phase in 2016 and establishment of a Continuous Quality Improvement (RT-CQI) program in 2018.

**Methods:** 210 RHT sites were selected in the RT-CQI pilot phase in 2016. Elements assessed in RHT sites included: training, physical facility, safety, pre-testing, testing and post-testing phases, documentation, and external quality assessment. Using an electronic checklist, baseline and quarterly assessments were conducted to identify existing deficiencies followed by, sustained corrective interventions. The checklist was configured to allocate sites’ scores, from Level “0” (<40%) to Level “4” (>90%) depending on overall scores obtained. Data from assessments were analyzed quarterly using Excel and improvements monitored.

**Results:** There was improvement in all of eight quality areas with each subsequent assessment. The highest improvement rates were observed in the following areas:- Testing-phase - 40 to 85.5%; EQA-60.7 to 90.8%; safety-65.2 to 94.9%. The proportion of sites in level four (QA elements full implementation) increased from 9% to 81%. All sites at levels “0” (needed improvement in all Quality areas) and “1” (needed improvement in specific areas) had improved to levels 2 to 4. Based on the success of the pilot phase, program coverage was scaled up by increasing sites enrollment from 3.5% (210/6,000) to 22.5% (1,350/6200).

**Conclusion:** Comprehensive implementation of QA with sustained corrective interventions results in overall improvement of HTS. Scaling up of RT-CQI program to cover all HTS sites can lead country-wide improvement of HTS.

Performance Evaluation of the HBV Quantitative DNA PCR Using Venous Plasma Samples On Exsitation Universal Molecular Diagnostic System (Bioneer)

**Background:** The Bioneer system is a molecular diagnostic platform able to detect tiny copies of Viruses owing to built in quality control system. The HBV quantitative DNA PCR method provides a prospect of a relatively HBV viral load. The HBV Quantitative DNA PCR kit was assessed for analytical and clinical performance.

**Methods:** The WHO guidelines on evaluation of Nucleic acid technologies were followed. Precision and accuracy was evaluated using replicates of nominal concentration panels prepared through serial dilution. Robustness/carryover was evaluated using 20 HBV positive and negative remnant plasma samples Plasma samples from consented patients were analyzed on both Bioneer assays and the Abbott M2000sp HIV-1RNA platform. The Abbott M2000sp HIV-1RNA platform was used as the reference method.

**Results:** Inter assay and total assay SD at all HBV serial dilutions was less than 0.25 log copies/ml. The correlation between the recovered/measured HBV viral load result and the dilution/expected using the Bioneer machines was 0.99. This means that 99% of the observations lie along the mean value. Analysis of negative HBV plasma with high copies HBV plasma showed no carry over. Specificity and sensitivity of the assay was above 95% with a misclassification rate of 1.7% .The correlation of plasma samples on Bioneer using Abbott m2000 as the reference was 0.94 with a bias of 0.481.

**Conclusion:** Results indicate that the HBV Quantitative DNA PCR test on Bioneer has a good performance and can be used for HBV DNA quantification in clinical laboratories.
Monitoring of HIV-1 Viral Load Turn Around Time in a molecular Laboratory at Central Public Health Laboratories, Uganda

**Background:** Uganda started HIV-1 viral load monitoring for patients on ART in 2014 following WHO recommendations. Centralized testing was using high throughput technology serving over 1,967 health facilities. Viral load molecular laboratory has implemented a vibrant quality management system and is internationally accredited against ISO 15189 by South African National Accreditation System (M0589). It a is high volume laboratory testing an average of 100,000 tests monthly. Turn Around Time (TAT) is one of the key quality indicators that is routinely monitored. An occurrence of high TAT, was recorded in 2017 and 2018. Root cause analysis and corrective actions were affected. Continuous Improvement Projected was implemented.

**Methods:** Retrospective data from January 2017 to July 2018 was acquired from Laboratory information management system. TAT was computed from sample reception to results dispatch. TAT was further stratified at sample approval, data entry, laboratory processing and result printing.

**Results:** In January 2017, median TAT was 10 days, n= 55,807. And in April 2017, median TAT was 4 days, n=71,665. There was a significant reduction. Median TAT was steadily maintained at a median of 5 days from May 2017, n=74,138 to September 2017, n=90,159. In January 2018, the median TAT was 14 days, n=73,063. And in March 2018, median TAT was 5 days, n=98,646. Strategies implemented include Establishment of a 24-hour working schedule. Human resource work in shifts of 8 hours across the 28 hours to maximize daily output per machine. A robust Laboratory Information management system has enabled Health facilities with internet to access viral load test results instantly. Optimization of the workflow from pre to post analytical processes.

**Conclusion:** In a centralized high volume laboratory, implementation of work shifts, robust and integrated Laboratory Information Management systems, and optimization of workflow can effectively maintain TAT to 4 days.

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Using Rapid HIV Proficiency Testing Data to Monitor the Performance of Kenya’s National Rapid HIV Testing Algorithm

**Background:** The Kenya HIV Testing Services (HTS) program employs a two rapid test serial algorithm characterized by use of Alere DetermineTM HIV-1/2 screening and First Response HIV 1-2.O confirmatory tests. Test kits are centrally procured and distributed to over 6000 HTS sites. The national quality guidance requires monitoring of the performance of the national algorithm. A national proficiency testing (PT) scheme monitors the quality of rapid HIV testing systems, including testing commodities.

**Methods:** A set of six blinded HIV positive and negative samples were tested by all HTS providers participating in PT in Kenya; 2015 (7,534), 2016 (15,768) and 2017 (15,431). Testing was done using the approved national algorithm. Results obtained from each sample were recorded against the test used on standard forms and submitted to National Public Health Laboratories for data processing and evaluation. The data were used to calculate overall concordance rates for Determine (Test 1) and First Response(Test 2) using the formula: (Total Test 2 positive + Total Test 1 negative) / (Total Test 1 positive + Total Test 1 negative results) X 100. Invalidity rates for Determine and First Response were calculated using the formula: Total invalid results / (Total Test 2 positive + Total Test 1 negative results) X 100.

**Results:** Overall concordance rates for the screening and confirmatory tests for the three years were: 2015-99%, 2016-99%, 2017-100%. Invalidity rates were: Alere DetermineTM HIV-1/2: 2015-0.09%, 2016-0.24%, 2017-0.10%; First Response HIV 1-2.O: 2015-0.03%, 2016-0.11%, and 2017-0.10%.

**Conclusion:** The national rapid HIV testing algorithm was verified as suitable for use in diagnosis of HIV infection (overall concordance rate >98%). DetermineTM HIV-1/2 and First Response HIV 1-2.O tests have negligible levels of results invalidity (<1%).
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PS-2.3b-083

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Background: Nigeria has been conducting Post Market Validation of HIV rapid test kits since 2016. This was not happening with our GeneXpert/MTB RIF cartridges until March 2018. Post market validation (PMV) is a component of evaluation process where continued surveillance of GeneXpert MTB RIF cartridges is carried out. Post market validation is recommended to ensure product’s safety, quality and performance and to provide answers to questions that cannot be answered in the pre-market stage or issues that may arise after the product is marketed.

Methods: We used the sampling assessment form and standard operation procedure (SOP) at the General Health Logistics International Limited’s (GHLI-L) warehouse to randomly select 0.2% (170 of 82,500) of the procured cartridges in March 2018. Cartridge’s conditions were assessed by visual inspection by all sampling team members present. Control panel of 9 specimens comprising of 3 MTB not detected (ND), 3 MTB Detected RIF resistance not detected (RS) and 3 MTB Detected RIF resistance detected (RR) were used. Characterized non-tuberculosis isolates (NTMs) were used as ND and characterized MTB detected RIF sensitive and resistant isolates were used as MTB RS and MTB RR respectively were tested at the National Reference Laboratory, Nigeria Center for Disease Control Laboratory Gadau Abuja Nigeria.

Results: All the 153 (9 of 10 from each of the 17 boxes) cartridges, from 9 different lots, tested against the characterized panels in triplicate, (3 ND panels, 3 MTB Detected RIF sensitive, and 3 RS panels of MTB Detected RIF resistant) recorded 100% concordance with the characterized positive cultures of the dried tube panels.

Conclusion: The nine validated Xpert MTB/RIF cartridges lots have passed based on the set criteria and were recommended for use at all testing sites in Nigeria, making the test results on this platform reliable.

PS-2.3b-084

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Impacto da Mentoria na Implementação do Sistema de Gestão de Qualidade no Laboratório de Análises Clínicas do Hospital Geral de Mavalane

Background: A implementação do Sistema de Gestão de Qualidade (SGQ) no Laboratório de Análises Clínicas do Hospital Geral de Mavalane (LACHGM) usando a ferramenta FOGEAL, iniciou em 2012. Durante este percurso, o laboratório participou em 3 rondas de implementação sem alcançar pelo menos 1 estrela. Com objectivo de alavancar a implementação do SGQ foi alocado um mentor.

Methods: Foi definida a lista de verificação do SLIPTA com 117 perguntas para 275 pontos para medição do impacto do processo e fez-se uma auditoria de base para elaboração de um plano preliminar de actividades e levantamento das reais necessidades de intervenção. Para seguimento das actividades os planos de acção são monitorizados e revistos com a equipa do laboratório no final de cada mês para seguimento das não conformidades, posteriormente são apresentados à Direcção do Hospital. Para avaliar a melhoria e seguimento dos planos foi definida a realização de auditorias a cada 3 meses e monitorização dos indicadores de qualidade (IQ) periodicamente.

Results: Durante 9 meses de mentoria, foram conduzidas 4 auditorias com os seguintes resultados: avaliação de base 99(36%) pontos; primeira auditoria de seguimento 114(41%) pontos, segunda auditoria 157(56%) e terceira auditoria 188(68%) pontos. 15 IQ foram gradualmente reintroduzidos, 6 no mês de Agosto, 4 no mês de Outubro, 2 em Novembro e 3 em Dezembro. Com a mentoria houve aumento na pontuação, assim como o número de IQ recomendados pelo FOGEAL.

Conclusion: A mentoria tem impulsionado o processo de reimplantação do SGQ no LACHGM, através da partilha de dados com a equipa que permite visualizar os avanços, necessidades de replanificação e melhorias propiciando uma tomada de medidas correctivas atempadamente. Por outro lado, fortaece a troca de experiências entre o mentor e mentorandos através do trabalho lado a lado implantando desta forma a cultura de qualidade.
Addressing Non Conformities Results in an Incremental Quality Management System Improvement: Lessons from the Capstone Project

**Background:** The Tropical Diseases Research Centre (TDRC) implements a quality management system following the International Organisation of Standards (ISO) 15189: 2012 guidelines. As part of a continual improvement process, the laboratory implemented the Capstone project through the University of Washington’s Laboratory Leadership and Management program. The project objectives were to address gaps in the management of Non-conformances, as the laboratory had scored 4/19 in this section during the baseline Ministry of Health Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) audit, which impacted negatively in overall scores.

**Methods:** The laboratory developed a tool to collect information to identify gaps in critical areas of Non-conformance reporting and management. Following an assessment of gaps, interventions were instituted which included laboratory mentoring, quality improvement projects and presentations.

**Results:** The laboratory recorded an overall improvement in performance in the SLIPTA audit scores, increasing from two stars (70%) at baseline, to five stars (96%) at reassessment. The most significant improvement was recorded in the management of Non-conformances, from 4/19 at baseline, to 19/19 at reassessment (78.9% improvement). Several gaps in reporting and management of Non-conformances were observed including; missing information on the Non-conformance number, the root cause analyses, and corrective action undertaken and its review. Addressing non-conformances improved compliance in other areas of the laboratory.

**Conclusion:** Implementing the Capstone project was effective in realizing marked improvements in the recording and management of Non-conformities for the TDRC laboratory and was effective in addressing gaps observed in the initial (baseline) SLIPTA audit. This resulted in overall progress in quality management system implementation in the laboratory.

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Strategies for Assuring the Quality of HIV Testing in Nigerian Military Facilities

**Background:** The US Department of Defense and Nigeria Ministry of Defense (NMOD) formed a partnership in 2005 to implement HIV programs and has expanded support to 46 facilities to provide HIV testing, comprehensive care and treatment services to Nigerian military and civilian populations. With decentralization of HIV testing outside the laboratory, non-laboratory health workers have been trained to perform testing, but there is no national system to oversee quality of HIV services. We developed the Defense External Quality Assessment Scheme (DEQAS) to monitor and improve quality and accuracy of HIV results and the competency of testers in the NMOD.

**Methods:** Prior to implementation, a QA policy was drafted and endorsed by the NMOD. Utilizing a Stepwise Process for Improving the Quality of HIV Rapid Testing (SP-RT) checklist to identify gaps in HIV services, baseline assessment of facilities was carried out and action plans developed for remediation. Training on Rapid Test Quality Improvement Initiative (RTQII) was conducted for Military counsellor-testers and laboratory staff. Proficiency testing panels for HIV were prepared and distributed to testing points to assess tester competency. HIV testing points were assessed based on PT performance, personnel competency, adequate physical facility for testing, safety, activities in pre-testing, testing and post-testing phases.

**Results:** Quality of HIV testing services at NMOD facilities improved following training and institution of DEQAS. High facility participation and engagement in HIV quality assurance and quality improvement activities was also key to these achievements.

**Conclusion:** DEQAS has demonstrated the utility of proficiency testing and RTQII for monitoring and improving quality of HIV services within Nigerian military facilities. The scope of DEQAS can be expanded to include other point of care and laboratory tests.
Successful Implementation of SLMTA and Challenges on the Road to Accreditation of the National Public Health Reference Laboratory in Post-Ebola Liberia

Background: In the aftermath of the 2014-2016 Ebola outbreak, the National Public Health Institute of Liberia (NPHIL) prioritized laboratory quality-management system implementation, following the findings of the 2016 Joint External Evaluation. In early 2017, NPHIL adopted the SLMTA program (Strengthening Laboratory Management Toward Accreditation) to strengthen key public health laboratories, including the National Public Health Reference Laboratory (NPHRL).

Methods: The SLMTA program included: 1) Serial external audits using the Stepwise Laboratory Quality Improvement Towards Accreditation (SLIPTA) checklist; 2) SLMTA training package: three one-week sessions at quarterly intervals with assignment of quality improvement projects; 3) Mentorship consisting of an embedded quality officer (onsite 80%), plus scheduled quarterly visits by a senior SLMTA mentor; 4) training of SLIPTA auditors; and 5) SLIPTA-based checklist task tracking-system was developed to monitor progress in each of the 12 quality system essentials. With involvement of senior management, every quarterly audit was followed by a debriefing session; gap analysis and work plan development and implementation.

Results: The NPHRL's baseline SLIPTA checklist score was 67/275 points (24%, 0-star), increasing to 215/275 points (79%, 3-star) at one year. Lowest scores at baseline included: client management, evaluation and audits, management of non-conformities and process improvement (all at 0%). Largest gains at one year were observed in client management (0%-90%), management review (7%-85%), and organization and personnel (9%-91%). Remaining challenges at one year include: evaluation and audits (0%-47%), management of non-conformities (0%-58%) and process control (31%-66%).

Conclusion: In the challenging post-Ebola outbreak context in Liberia, over one year, a comprehensive SLMTA implementation model, with a SLIPTA checklist-based task-tracking system, was successful in improving adherence to ISO 15189 standards, effectively addressing a major weakness in Liberia’s public health response. A 400% increase in SLIPTA checklist scores allowed the NPHRL to reach a solid 3-star rating, paving the path to international accreditation.
Implementation of a Comprehensive Model of Quality Management System at County Referral Hospital Laboratories in Liberia during the Ebola Aftermath

Methods: The SLMTA implementation model included five components: 1) serial audits, using the Stepwise Laboratory Quality Improvement Towards Accreditation (SLIPTA) checklist; 2) SLMTA training package to the county diagnostic officers and laboratory supervisors: three one-week sessions at quarterly intervals, with follow-up quality improvement projects; 3) embedded mentorship on-site at scheduled quarterly visits, with remote support in-between visits, using a social media platform; 4) training of SLIPTA auditors; and 5) a SLIPTA checklist task-tracking-system to monitor progress in each of the 12 quality-system essentials. Every quarterly audit was followed by a debriefing session, gap analysis and work plan development and implementation, with active participation of senior management of the institution.

Results: County hospital laboratories face significant challenges in staffing (only 39% were laboratory technicians, the rest were laboratory assistants or aides), supply chain management, and equipment maintenance. Average baseline audit SLIPTA scores were 50/269 (19%, range 10%-30%). Quality essentials with the lowest average scores included evaluation and audits (0%) and management review (2%), whereas facilities and biosafety and information management had the highest average baseline scores (37% and 42%, respectively). From baseline to follow up at four months there was an almost twofold increase in average scores to 89/269 (33%).

Conclusion: The SLMTA implementation model was effective in improving laboratory services in a resource-limited setting with significant structural challenges; however, it requires continuous support and systems improvements in human resource training, supply chain management and biomedical engineering.

A Comprehensive Implementation Model of ISO15189-based Quality Management System: A Case Study of Tappita Regional Referral Laboratory in Post Ebola Liberia

Methods: Between March 2017 and July 2018, the SLMTA implementation model included five components: 1) serial audits using the Stepwise Laboratory Quality Improvement towards Accreditation (SLIPTA) checklist; 2) SLMTA training package for the laboratory leadership: three one-week sessions at quarterly intervals, with follow-up quality improvement projects; 3) on-site mentorship during scheduled quarterly visits, by an embedded quality officer, with remote support in-between visits; 4) training of SLIPTA auditors; and 5) a SLIPTA checklist task tracking-system to monitor progress in each of the 12 quality-system essentials. Every quarterly audit was followed by a debriefing session; gap analysis and work plan development and implementation, with active participation of facility senior management.

Results: TRRL’s SLIPTA checklist scores increased threefold over a 15-month period, from 67/267 to 191/275 points (23% to 69% = two-star rating). Areas of significant improvement at 15 months included: customer service (0%à100%), document and records (14%à86%), and process improvement (0%à58%). Remaining challenges primarily relate to evaluation and audits (0%à20%), management review (0%à43%) and corrective and preventive action (0%à53%). A significant challenge has been staff attrition, causing setbacks in audit scores. Mentorship and equitable delegation of tasks considerably improved staff attitudes and commitment to quality.

Conclusion: Despite major structural challenges related to the impact of the Ebola outbreak, a comprehensive SLMTA implementation model, including quarterly audits, SLMTA program training, embedded mentorship, auditor training and use of a SLIPTA-based task tracker can be effective in accelerating progress towards accreditation in a resource-limited setting.
Antimicrobial Resistance in Food Producing Animals and Environment in Nigeria

Background: In response to the global commitment to contain antimicrobial resistance (AMR), the Nigeria CDC has embarked on comprehensive review of AMR in Nigeria using a “One Health approach”. Anecdotal evidence suggests that animal health and production in Nigeria relies on antimicrobials; there is therefore a need to understand AMR in food producing animals and the environment. This study reviewed previous studies and evaluated their contributions of the animal health system to the burden of AMR in Nigeria.

Methods: A systematic review of published studies and reports of AMR in food producing animals and environment (2000-2017) in Nigeria was carried out using a Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol and searching online databases and institutional repositories in Nigeria.

Results: AMR studies in food producing animals and the environment carried out in Nigeria between 2000 until 2017 fell into 3 categories viz: antimicrobial resistance, antimicrobial residues and antiseptics/disinfectants studies. Only one of 48 antimicrobial studies did not report multidrug resistance. All the 16 studies focused on antimicrobial residues reported high prevalences and high levels of residual drug in food products. Fourteen (14) different resistotypes were found in certain popular Nigeria antiseptics and disinfectants. High levels of residues and AMR were found in food animals destined for the human food chain. High levels of residues and antimicrobials discharged into environments sustain the AMR pool.

Conclusion: Several patterns of multidrug resistance have been established for various antimicrobials and chemicals commonly used in Nigeria for prophylactic and therapeutics control of pathogens in human and veterinary medicine. These had evolved into potential public health challenges that need attention. These findings constitute public health threats for Nigeria’s teeming population and require attention. Therefore, carefully planned multi-sectoral surveillance activities, promotion of good practices and antimicrobial stewardship should be designed and enforced by the government with the cooperation of all stakeholders.
Antimicrobial Resistance of Escherichia coli
Isolated from Household Water in Municipal Ibadan, Oyo State, Nigeria

Background: Multidisciplinary and holistic approaches are needed to understand how antimicrobial-resistant organisms, and genes, disseminate through and beyond human populations. In Nigeria, potable water supplies do not meet need and households often utilize surface and underground water of unknown microbial quality as alternate source. This study evaluated the microbiological quality of domestic water in municipal Ibadan, a large Nigerian city. We additionally investigated and mapped antimicrobial resistance rates and patterns of Escherichia coli from household water.

Methods: We aseptically collected 250 water samples from randomly designated and mapped households within Ibadan’s five municipal local government areas (LGAs). Total aerobic bacteria and coliform counts were determined. E. coli were selected on eosin methylene blue agar, confirmed by standard biochemical tests and subjected to susceptibility testing by disc-diffusion against six antimicrobials.

Results: A total of 130 (52%) of the households studied used well water. Other samples evaluated came from boreholes (91 (36.4%)), stored tanks (27 (10.8%)) and streams (2 (0.8%)). Total aerobic counts above 500 colony-forming units per mL were recorded for 223 (89.2%) samples and coliforms were detected in 176 (70.4%). E. coli were recovered from over a fifth of the water samples from four of the five LGAs sampled. From 76 E. coli isolates characterized, 36 (47.4%), 18 (23.7%), 17 (22.4%), 15 (19.7%), 11 (14.5%) and 6 (7.9%) were resistant to nalidixic acid, ciprofloxacin, gentamicin, cefotaxime, cefazidime and meropenem respectively. Multiple drug resistance (MDR) was exhibited by 11 (14.5%) of the isolates, 72.7% of these were from Ibadan southwest, 18.2% Ibadan northeast and 9.1% Ibadan southeast LGAs.

Conclusion: This study revealed worrisome occurrence of E. coli, including MDR strains, in domestic water and suggests that Ibadan’s inhabitants are at high risk of faeco-orally transmitted bacteria. Spatial distribution of resistant strains is uneven across municipal Ibadan pointing to the existence of exacerbating environmental factors for resistance.

Bacteria Flora of Some Vegetables Sold in Major Markets in Ado–Ekiti, Nigeria

Background: Consumption of vegetables contaminated with pathogens pre-harvest and post-harvest is a common source of infection. This study investigated bacterial contamination of vegetables sold in major markets in Ado–Ekiti, Nigeria.

Methods: Twenty (20) samples each of Brassica oleracea, Cochoro olitorius, and Amaranthus hybridus were collected aseptically from two major markets in Ado–Ekiti for investigation. Bacteriological procedures were followed in the inoculation of nutrient and selenite F broth with swabs from the vegetables and isolation of microorganisms from solid media. Isolates were identified using biochemical tests. Antimicrobial susceptibility of the isolates was done using the disk diffusion method.

Results: Sixty six (66) bacteria were isolated from 60 samples of vegetables. Of these isolates, Salmonella spp recorded 43.3%, followed by Citrobacter freundii 18.3%, Klebsiella spp 15.0%, Enterobacter spp 11.7%, Proteus spp and Alcaligenes spp 5.0% each, Escherichia coli and Providencia spp 3.3% each and Vibrio spp 1.7%. The prevalence of the isolates on 20 samples of Brassica oleracea increased in the order of Salmonella species 55.0%, Citrobacter species 20.0%, Alcaligenes species 10%, Pseudomonas aeruginosa, Enterococcus species, Escherichia coli, Proteus mirabilis and Providentia species 5% each. The most frequent bacteria isolated on 20 samples of Cochoro olitorius was Salmonella species 50.0%, followed by Citrobacter species 15.0%. Vibrio species and Alcaligenes species recorded 5.0% each. Enterobacter species recorded the highest frequency 30.0% on the 20 samples of Amaranthus hybridus, followed by Salmonella species and Klebsiella species 25.0% each, Citrobacter species 20.0%, Pseudomonas aeruginosa and Escherichia coli 5.0% each. All isolates were resistant to augmentin, ampicillin and cefuroxime.

Conclusion: Sixty six (66) bacteria in varying percentages were isolated from the 60 samples. It is essential to control the sources of contamination associated with vegetables to minimize risk of infections especially in vegetables consumed raw. It is important to balance preservation of vitamins in vegetables with the risk of microbial infections.
Ticks (Acari: Ixodidae) Infesting Cattle in Selected Districts of Uganda, 2017

Background: Ticks are important vectors for many infectious agents that affect both animals and humans. Due to the global threat of emerging and reemerging zoonoses, the public health importance of ticks has increased over the last few years. Currently, there is limited information on tick diversity in Uganda. This study investigated the species of ticks that infest cattle in 5 purposively selected districts based on the mapping of the Ugandan agro-ecological zones and the broad direction of the cattle corridor.

Methods: In this cross-sectional study, 50 herds of cattle were randomly selected from each of the districts of Kasese, Hoima, Gulu, Soroti and Moroto. Once an animal was identified from the herd, all visible adult ticks were handpicked and transported alive to Uganda Virus Research Institute, Entebbe, Uganda. Ticks were identified based on morphological characters according to specific keys. A proportion of ticks from each of the identified species was sent to the Swedish University of Agricultural Sciences, Uppsala, Sweden, and the Bundeswehr Institute of Microbiology, Munich, Germany, for validation.

Results: In total, 500 cattle were included in the study from which a total of 4,317 ticks were collected. Preliminary results from the species morphology of 3,842 (89.0%) ticks, indicate ticks from the following three genera: Rhipicephalus (6 species), Amblyomma (2 species) and Hyalomma (2 species). Rhipicephalus appendiculatus was the commonest species (2,067/3,842; 53.8%), followed by Amblyomma lepidum (700/3,842; 18.5%) and Amblyomma variegatum (563/3,842; 14.7%). Whereas species diversity was highest in Moroto district, regional predominance by specific ticks was observed. One Amblyomma lepidum female, collected in Moroto district displayed gynandromorphism, a rare phenotypic abnormality.

Conclusion: Cattle keeping remains a major socio-economic activity for many Ugandans. This study demonstrated that cattle are infested by multiple tick species and are potentially a significant source of many tick-borne pathogens.

PS-3.2-097

Improved Upper Management Support for Sustainable Laboratory Improvement: Lodwar County Referral Hospital (LCRH), Kenya Experience

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Background: In cognizant of Resolution AFR/RC58/R2 (2008) and Maputo Declaration that emphasizes strengthening of laboratory system, the top management in LCRH resolved to implement and bolster this noble course by enrolling LCRH laboratory in Strengthening Laboratory Toward Accreditation (SLMTA) process. Since 2015, the top-level management through the office of the director zealously committed itself to successfully compete at the international level of performance. It knew without management commitment, laboratory involvement and practice, the effort would be stymied and abortive. This study is aimed at demystifying the massive support the management has accorded the laboratory for continual and sustainable improvement.

Methods: Before the SLMTA process commenced in LCRH, the management was brought on board and sensitized about the entire process by the experts with an aim of fostering commitment and buy-in. This was fundamental in enlightening the management on how the process will provide a controlled and efficient high level of technical competence and quality service to its customers. All the departmental heads that were directly or indirectly linked to the laboratory were involved which included but not limited to Nursing head, clinician, laboratory staff, and maintenance staff—towards the mission of sustainable quality practices. The laboratory staffs were supported by Elizabeth Glaser Pediatric Aids Foundation, AMREF health Africa, Aids Healthcare Foundation, and County Government for benchmarking and exchange programme to the laboratories which have already implemented SLMTA process courtesy of the push of the top management.

Results: The Laboratory moved from zero to three stars. Currently earmarked for accreditation. There was an overhaul renovation, extension, and reorganization of laboratory floor plan for optimal workflow. Equipment was put on the service contract and a reduced equipment downtime from 30% to 2% due to controlled temperature and periodic preventive maintenance. The management engaged in resource mobilization and advocacy which increased staff level from 8 to 15, participation in external quality assurance schemes, a budget for commodities, training and mentorship.

Conclusion: Management commitment and laboratory staff teamwork is an impetus in continual and sustainable laboratory quality management system.
**TRACK 3: SYNERGIZING PARTNERSHIPS**

**PS-3.2-098**

**Biobanking and Me: A Speaking Book to Engage Communities on the Value of Biobanks**

**Background:** During the past 6 years, centralized biobanks have been established across Africa. Biobank guidelines are slowly starting to emerge as a way of harmonizing or standardizing operational management processes. Yet, the success of much needed biospecimen repositories in Africa relies on donors who are willing to provide these biospecimens. They are valuable stakeholders and, as articulated by Moodley and Singh, authentic community engagement will help to build trust and understanding.

**Methods:** In our project we set out to develop an audio book to communicate concepts related to biobanking namely; the need and benefits of biobanks, definitions for genetic research and inheritance, storage of biospecimens, informed consent, and the impact of research for future generations.

**Results:** This book was developed as a bilingual book targeting languages commonly spoken in the Western Cape region, namely English, Xhosa and Afrikaans. The concepts were laid out as short paragraphs (3 sentences per page) covering 16 pages. Each paragraph was accompanied by a graphical illustration and includes an audio version of the text. The audio boxes, graphic artwork and text were assembled into a colourful and user-friendly speaking book. The impact of the book on user perspective of biobanking and research was assessed through a participatory approach (qualitative and quantitative approach).

**Conclusion:** Participant understanding of storage of biological samples and need for research using these samples was assessed. The impact of potential second language acquisition was highlighted. This health intervention tool provides a means to communicate infectious disease information to communities - building trust in the role of research to improve livelihoods. This tool could be adapted to include additional information to create awareness of, and responses too, pandemic threats.

**PS-3.2-099**

**GS Sahel Biosafety Network: Successes and Challenges**

**Background:** The Sahel region faces many complex and interconnected challenges including food crisis, poverty, and political instability as well as recurring epidemics. Recently, the region has been affected by outbreaks of Ebola (Mali), Rift Valley Fever (Mauritania/Niger), Dengue (Burkina Faso/Mali), and Hepatitis E (Chad/Niger). In addition the region is threatened by terrorism, including the potential risk of bioterrorism. In order to mitigate natural and intentional biological threats in the region, the development of a G5 Sahel biosecurity network seemed essential.

In 2014, as part of the response to the Ebola outbreak, Germany had provided a mobile laboratory and trained a local team in Mali. This mobile laboratory, hosted by the Charles Mérieux Infectiology Center (CICM), now belongs to the Malian Ministry of Health. Since mid-2016, Germany has extended its initiative to the other G5 Sahel (GSS) countries. In November 2017, a biosecurity network was established between GSS public health institutions, which is currently chaired by CICM. It aims to strengthen cooperation between the GSS countries in the areas of biosafety and biobiosecurity by capacity building for the diagnosis of dangerous pathogens.

**Methods:** Network activities include: i) workshops between heads of institutions; (ii) theoretical and practical training of biologists and use of the mobile laboratory; (iii) internships in Germany and (iv) mobile laboratory field exercises.

**Results:** Up to now, more than ten biologists from all GSS countries participated in trainings and field exercises, including the identification of haemorrhagic fever viruses and other infectious viral and bacterial agents. An initial response capability for outbreaks of dangerous pathogens is now available within the Sahel region.

**Conclusion:** Maintaining skills in the GSS Mobile Lab Network is critical and procedures for deploying and tools for its cross-border functionality need to be developed. The official recognition of the Network by the GSS Permanent Secretariat is expected.
The Role of the International Research Center of Excellence in Building Research Capacity for Infectious and Non-Infectious Diseases Research in Nigeria: A South-Driven North-South Collaborative Approach in West Africa

Background: The Institute of Human Virology, Nigeria (IHVN) is committed to addressing the public health needs of Nigerians and West Africans through facilitating accessible evidence-based care. To effectively achieve this, IHVN established two centers: The Center for Public Health Implementation and the International Research Centre of Excellence (IRCE) in 2016 to engage internal and external public health research experts to train and mentor trainees from IHVN and other Nigerian NGOs, universities and government institutions in collaboration with the University of Maryland, Baltimore, USA.

Methods: One of IRCE’s key objectives is to develop new investigators in its mentorship program, where early researchers have been linked to suitable mentors and exposed to training and fellowship opportunities in relevant areas including HIV, Tuberculosis, Malaria, Cancer and other non-Communicable Diseases. Six focused trainings were conducted between August 1st 2017 and June 6th 2018.

Results: A total of 184 participants were trained as follows: The use of mendeley in reference management (22/184; 12.0%); Introduction to statistical methods using STATA (73/184; 39.7%); Introduction to grants-writing (57/184; 30.9%) and introduction to qualitative research methods (32/184; 27%). Prior to the statistical methods course, 95.1% of participants had little/no experience using STATA; afterwards, 96% felt confident in using STATA. Furthermore, 60% (44/73) felt the STATA training was very helpful and relevant to their job/research studies. Also, 59.6% (34/57) of grants-writing trainees felt extremely confident with the basics of grant-writing and 35.1% (20/57) indicated that they would respond to grant opportunities by December 2018. So far in 2018, five early-career mentored investigators applied for and successfully received short and medium-term international fellowship grant opportunities.

Conclusion: IRCE is committed to increasing the capacity of young Nigerian investigators to write and implement successful grant applications, conduct high quality clinical and laboratory research and establish multi-site collaborative research studies relevant to local health challenges. We are very encouraged by the success of trained investigators in obtaining grant fellowships following the trainings.

I-Lab: Connecting Clinical Laboratories to Infectious Diseases Surveillance Systems in Senegal

Background: Improving systems for epidemiological surveillance of infectious diseases in West Africa is a well-recognized priority for global health. The quality and relevance of the paper-based monthly reports common in the region are often compromised by incomplete reports, lack of timely submission, and the human error and time lag inherent in manual data entry. These factors make paper-based reports poorly suited for timely surveillance systems. The District Health Information Software (DHIS2) is an open-source software platform for reporting, analysis and dissemination of data.

Methods: In 2014, Senegal’s Ministry of Health (MoH) identified 11 notifiable diseases to be included in pilot implementation of the DHIS2 electronic surveillance system. Training on DHIS2 reporting done by Laboratory Directorate was initiated in 118 of 120 targeted clinical laboratories, operating at all levels of the health care system. Laboratory personnel were trained to use the system autonomously, and two representatives from the MoH were designated as coordinators.

Results: As of December 2017, 118 laboratories have been trained in the use of the tool, and 91 (87%) laboratories utilized the software to transmit complete weekly reports. Among those laboratories transmitting complete data, 94 (80%) were doing so without any external prompting or support. The weekly reports comprise information on clinically suspected cases as well as diagnostic methods used for confirmation/elimination. Approximately 35 laboratories have capacity for microbial culture, and 24 of these conduct routine antimicrobial susceptibility testing; culture results and resistance profiles are systematically captured in DHIS2 when available with a dedicated monthly report.

Conclusion: Thanks to these e-health tools, the frequency and reliability of laboratory-based surveillance data has greatly increased, and enabled improved reporting on disease trends to the MoH. Ongoing challenges for implementation include ensuring sustained internet access from all sites, and meeting continued training needs to address frequent turnover of laboratory personnel. Based on this tool, a comprehensive mapping of laboratory resources in the network, including inventories of equipment, numbers of trained personnel, and diagnostic capacity has been developed and is used today by the MoH to define the national laboratory strategy.
Ministry of Health Led Development of a Sustainable Laboratory Equipment Management Program: the Kenyan Experience

**Background:** Laboratory equipment management in resource limited settings is compromised due to inadequate budgetary allocation, lack of necessary tools and skills for biomedical engineers and laboratory personnel. Leading to a dearth of service contracts, routine preventative maintenance, and calibration with consequent negative impact on quality of results. This impact is further exacerbated by an increased shift to automation and increased demand by laboratories enrolled into the Stepwise Laboratory (quality) Improvement process towards accreditation. In response MoH collaborating with CDC and implementing partners, developed a sustainable equipment management program.

**Methods:** The multi-pronged strategy, began with formation of a technical working group. A centre of excellence (COE) for servicing, calibration and training was established at the NPHL campus to provide services. A 4 week refresher training curriculum was developed on maintenance of 11 auxiliary equipment that included a joint session on equipment management aspects of planned preventive maintenance schedules, inventory and management software. Training on Biosafety Cabinets (BSC) certification and maintenance of GeneXpert tuberculosis equipment. Hands-on mentorship and provision of engineering tool kits and calibration equipment ensued. Followed by deployment of trainees to maintain equipment in counties. Local trainers of trainers (TOTs) were nurtured.

**Results:** 72 engineers, 23 laboratory managers, and 12 TOTs were trained on auxiliary equipment. Additional 10 engineers on BSC, 24 on Genexpert and 12 on refrigeration. Tool kits were procured for 50 facilities. Regional training for 22 engineers and 14 laboratory managers from Uganda, Burundi, Ethiopia and Tanzania was held at the COE. Service and calibration was performed on 1,000 pieces of equipment, 800 pipettes, and over 300 BSC from 100 laboratories in Kenya, Ethiopia and Burundi.

**Conclusion:** This high impact, sustainable, scalable solution for equipment management in a resource limited setting demonstrates that it is possible to mainstream equipment management programs by leveraging on existing resources.

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Developing a Sustainable National Laboratory Equipment Calibration Center in Nairobi, Kenya

**Background:** Equipment management is a significant factor in high-quality clinical testing, managing patients, and achieving accreditation. To maintain laboratory equipment, many African countries use external service contracts, which often are neither cost effective nor sustainable. The purpose of this study was to describe the efforts of the Kenya Ministry of Health (MoH), the Association of Public Health Laboratories, and the American International Health Alliance to establish a national laboratory equipment calibration center in Nairobi, Kenya.

**Methods:** In 2016, a building was renovated at the National Public Health Laboratory (NPHL) facility to house a calibration center (operational in 2017). Professional biomedical toolkits were procured, and biomedical engineers were trained to repair, maintain, and calibrate auxiliary laboratory equipment. The calibration center team also received supplemental calibration training.

**Results:** By June 2018, five calibration center staff members received training in foundation calibration, measuring uncertainty calculations for temperature, pressure, volume, mass, and speed at the Kenya Bureau of Standards (KEBS). Three pipette calibrators were procured, installed, and calibrated at the center with traceability to KEBS. Between August 2017 and May 2018, 1,233 pipettes, 498 thermometers, and 147 timers from county hospital laboratories were shipped to the center for calibration. Of the shipped items, 92% of the pipettes, 80% of the thermometers, and 71% of the timers passed calibration parameter and were issued certificates. This translates to a cost savings of $50,000.

**Conclusion:** Establishing the NPHL laboratory equipment calibration center has met the need for equipment calibration in MoH facilities in Kenya. Engaging MoH staff and using existing infrastructure are key to ensure sustainability.
**PS-3.2-104**  

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**Improvement of Quality Management System through partnerships in Botswana**

**Background:** Quality management systems (QMS) improve organizational performance. Unfortunately, this is often limited by resource constraints. In 2014, the Botswana Institute for Clinical Laboratory Professionals (BICLP) and the Botswana Ministry of Health partnered with the African Society for Laboratory Medicine (ASLM) and Center for Disease Control (CDC) to establish a QMS mentorship program in districts with high HIV prevalence.

**Methods:** Twenty-four laboratories were audited using the Site Improvement and Monitoring System (SIMS) tool. Mentors with training and experience in Quality Management Standards (ISO15189, ISO17025, ISO9001 or GCLP) were then assigned to each laboratory to assist in closing the identified gaps from March 2016 to June 2017. In addition, each laboratory was assessed using the SLIPTA Checklist Version 2:2015 to identify additional non-conformities and to establish a baseline star rating. Each laboratory then received three visits of 4-5 days each with an intervening period of remote assistance. At the closure of the mentorship, an exit audit was conducted by independent auditors selected by the Ministry of Health and Wellness. Results were compared to the baseline audit.

**Results:** During the mentorship period, quality documents were developed, reviewed or adapted. These included development of 376 Standard Operating Procedures, 57 Manuals and 461 Forms. At baseline, 19 laboratories were rated at zero (0) stars while 5 scored 1 star. At the close of the mentorship, 3 laboratories were rated 0 stars, 9 attained 1 star, 9 more attained 2 stars, 2 achieved 3 stars and one was rated 4 stars. Eighty one percent of SIMS non-conformities were closed.

**Conclusion:** The mentorship project significantly improved medical laboratory QMS and enhanced capacity building within BICLP. Non-conformities that could not be closed were largely due to resource constraints.

**PS-3.2-096**  

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**Innovations and Medical Laboratory Practice in the Digital Economy Era: The Quintessential Role of Platforms**

**Background:** Innovations are redefining how we produce, distribute, market and consume products and services, as activities traditionally associated with commerce are being disrupted and transformed. From AI to 3D printing, the pace of innovations being experienced in the healthcare industry has seen the landscape changing exponentially, with its business model challenged. Digital platform for connected healthcare for patients and providers both in hospitals and at home is one such innovation. Built on shared infrastructure and marked by multiple user interactions, they bring together people, processes, policies and networked technology to create a holistic system. This paper aims to highlight opportunities inherent in medical laboratories leveraging the platform economy to go digital in tandem with modern consumer behaviors, and the potential threats in laying back from these tech innovations, rather than evolve with it.

**Methods:** We conducted a literature search to explore what the platform economy means for healthcare. An observational outlook at the introduction of laboratory automation which despite bringing about improvements in productivity, with decreased operational cost and turnaround-time for results availability, but met with cold-feet in deployment by many indigenous laboratories a few decades back, was performed. Similarly, we experimented with the creation of a proprietary diagnostic tech platform for integrating digitalization into diagnostic services.

**Results:** Present trends indicate customers have developed an insatiable demand for speed, convenience, and on-demand access. Findings from our work (PreDiagn platform) shows that platforms can be leveraged to improve accessibility, efficiency and better use of existing healthcare facilities. Integration of digital into diagnostic services opens up enormous opportunities for diagnostic laboratories, it shows.

**Conclusion:** Digital platforms transform the way individuals, businesses, and governments interact. As evidenced by our project, it allows laboratories to collaborate and transact on a global scale. For diagnostic laboratories, a repositioning towards efficient patient-centric service delivery, operational efficiency, and better health outcome is recommended.
Optimization of Laboratory and Sample Referral Networks: A Critical Step to Adequate and Cost-Efficient Commodity and Procurement Management

Background: A thorough understanding of laboratory network components, like equipment placement, laboratory staff training on equipment operation, delivery of reagents and consumables, infrastructure improvements, and sample transport methods to testing laboratories, is critical for informed strategic procurement and ensuring uninterrupted supplies of laboratory commodities. Equipment and commodity acquisitions are usually undertaken by various stakeholders without adequate coordination, which often leads to overcapacity and underutilization. In collaboration with other major partners, GHSC-PSM is leading the implementation of the Laboratory Efficiency and Quality Improvement Planning (LabEQIP) tool and protocols/processes to assess, map, and optimize national networks in countries. These tools assist countries in identifying the proper number and mix of instruments (conventional, low and high throughput, and POC), geographic distribution of the epidemic, and optimal routes for sample referral to testing laboratories.

Methods: After stakeholders collect data using a template and attend training workshops, they use the LabEQIP tool to run various modeled instrument optimization scenarios that aid country leadership in making informed laboratory network decisions that best meet their programmatic goals.

Results: Seven countries attended the 1st GHSC-PSM regional workshop in October 2017 and one received an in-country training. Implementation of LabEQIP has begun in two countries. A full network modeling exercise was completed in two additional countries leading to cost-savings derived from reducing the number of laboratories required to meet national needs, and to the development of an integrated multi-disease sample referral network, with an increased number of samples referred and reduced turnaround time.

Conclusion: Laboratory and sample referral network optimization is critical to ensuring all platforms in the country are considered and placed for optimal coverage. This facilitates strategic leveraging of POC technologies and opportunities to multiplex their usage to supplement conventional platforms. LabEQIP is a planning tool that encourages a unified multi-stakeholder, informed decision-making process to achieve cost efficient national service implementation.

US - Nigeria Military to Military Partnership: A Key Strategy for Ownership and Sustainability of PEPFAR Investment

Background: Nigerian Ministry of Defence-US Military HIV Research Program was established in 2004. The Program started with 7 facilities but expanded to 46 sites over the years. The aim of the program is to provide comprehensive HIV care and treatment to Nigerian military and civilian populations. Here we discuss how the partnership started, with counterpart funding from Nigerian government and financial support from President’s Emergency Plan for AIDS Relief (PEPFAR). The partnership demonstrates key strategy for ownership and sustainability of PEPFAR investments.

Methods: In 2004 a letter of request to establish HIV/AIDS program for the Nigerian Armed Forces was sent to the US Congress through the US Military by the Nigerian Hon Minister of State for Defense. Sequel to the approval of the US Congress to establish the program, a steering committee was formed, with Hon Minister of State for Defense as Chair of the Steering Committee and US Ambassador to Nigeria as Co-Chair. Government of Nigeria approved the release of counterpart funding and employed 100 full time staff to kick off the program. A liaison office for the Nigerian military HIV/AIDS program, known as Nigerian Ministry of Defense Health Implementation Program (NMODHIP) was created.

Results: With dwindling financial support from donors, NMODHIP is gradually taking over the financial support of HIV/AIDS activities. All the 46 sites are located within military barracks and HIV services are integrated into routine work. In 2010, the partnership built a reference laboratory in Abuja, and equipped it with state of the art equipment to coordinate quality assurance activities of Nigerian military medical laboratories. In 2014, the program was the first in Africa to record five star laboratory.

Conclusion: The program is a model framework for international military health partnership based on the principles of shared responsibility, country ownership and goal attainment.
Tele-mentoring to Improve Laboratory Capacity to Detect AMR in Kenya

Background: Kenya’s 2016 Situation Analysis on antimicrobial use and resistance identified a lack of capacity to detect and report antimicrobial resistance (AMR), including gaps in medical laboratory technicians’ and technologists’ (MLTs) training. Factors limiting laboratory training opportunities included time, cost, distance, and access to mentors. We initiated a virtual microbiology and susceptibility training program to address some of these barriers.

Methods: The Kenya National Public Health Laboratory (NPHL) adapted the ECHO (Extension of Community Healthcare Outcomes) tele-mentoring model™, which uses video-conferencing technology and case-based learning, to train MLTs on antimicrobial susceptibility testing. Two sites from different regions joined in December 2017 Sessions began on January 10, 2018 and are ongoing. Prior to joining, participants took a pre-test, and the laboratories underwent a baseline capacity evaluation using a CDC assessment tool. Twenty biweekly one-hour sessions were developed that included a brief didactic and discussion of a site-driven case presentation with an option for live demonstrations. All MLTs at the sites were invited to participate.

Results: Of 24 eligible MLTs, 23 took a pre-test; average score was 51%. Suboptimal antimicrobial susceptibility testing and quality assurance practices were found on the evaluation. 79% of eligible MLTs participated in at least one of the first 10 sessions; mean MLT attendance rate was 4.1 sessions/attendee. An average of 9 staff, 6 eligible MLTs, and 3 hospital staff attended each session. 83% of the planned didactic sessions and 58% of the planned case presentations were completed. Program costs included video conferencing equipment for the sites, curriculum development and NPHL staff time to deliver the training.

Conclusion: The ECHO model has provided much-needed access to clinical bacteriology training to the majority of MLTs at the two sites. Additional experience moving forward may demonstrate improved knowledge and practices; expansion to four additional sites could inform scalability of this training model.
**Building Capacity for TB Data Analytics in Low- and Middle-income Countries**

**Background:** Molecular diagnostic technologies, e.g. the GeneXpert, produce vast amounts of rich, electronic diagnostic and operational data. This data is being collected by connectivity platforms such as GxAlert (SystemOne) and if analysed, provide an untapped wealth of information into burden of disease and effectiveness of TB programs. The expertise/tools required to understand this data however, are lacking in low- and middle-income countries. An initiative between SystemOne, Management Sciences for Health and the Tableau Foundation was launched in July 2018 to build the foundation for sustainable, in-country capacity to enhance the translation of diagnostic data into improved healthcare delivery and patient impact. We describe goals and outputs of the first pilot.

**Methods:** The TB Data Fellowship consists of 2 components; (a)5-days, hands-on training in South Africa (b)12-months remote training/mentorship. Training focusses on skills development in Tableau software, a powerful data visualisation tool, followed by training in analysis/exploration/interpretation of GxAlert TB data. The main outcome is to inform impact of diagnostic tools on patient management. Data Fellows from the National TB program (NTP) and Ministry of Health (MoH) were selected via a competitive application process from a subset of countries using GxAlert.

**Results:** Data Fellows (n=8) from five countries are participating in the first program (Bangladesh, Ethiopia, Ghana, Malawi, Mozambique). Achievements following classroom training: Data Fellows are able to (1) connect to their own country’s National TB data; (2) explore, identify challenges, develop insights into program performance, disease burden, quality of program; (3) improve understanding/interpretation of data and translate this into recommendations to improve performance; (4) identify missing data to improve reporting. Remote training continues until June 2019.

**Conclusion:** The TB Data Fellowship empowers local MoH/NTP/NRL staff to discover and fix critical inefficiencies, provide high-level technical and operational support to the TB program and provides a platform for continued sharing of insights and best practice between countries.

**Accessibility of Early Infant Diagnostic Services by Under-5 Years and HIV Exposed Children in Muheza District, North-East Tanzania**

**Background:** Early infant diagnosis (EID) of HIV provides an opportunity for early detection of infection and timely access to treatment among HIV exposed children. We assessed predictors for accessing HIV diagnostic services among under 5 children exposed to HIV infection in Muheza district.

**Methods:** A cross sectional facility-based study among mother/guardian-child pairs of HIV exposed children was conducted from June 2015 to June 2016. Using a structured questionnaire, we collected information on HIV status, socio-demographic characteristics and other relevant data. Multiple regression analyses were used to investigate associations of potential predictors of accessing EID services.

**Results:** A total of 576 children with their respective mothers/guardians were recruited. Of the 576 mothers/guardians, 549 (95.3%) were the biological mothers. Out of 576, a total of 251 (43.6%) children were born to mothers with unknown HIV status at conception. Only 329 (57.1%) children accessed EID between 4 and 6 weeks of age. Children born to mothers with unknown HIV status at conception (AOR=0.6, 95%CI 0.4–0.8) and those with ages 13–59 months (AOR=0.4, 95%CI 0.2–0.6) were the significant predictors of missed opportunity to access EID. Children living with the head of household with at least a high education level had higher chances of accessing EID (AOR=1.8, 95%CI 1.1–3.3). Their chances of accessing EID services was three-fold higher among mothers/guardians with good knowledge of HIV infection prevention of mother to child transmission (PMTCT) (AOR=3.2, 95%CI 2.0–5.2) than those with poor knowledge. Mothers/guardians living in rural areas had poorer knowledge of PMTCT (AOR=0.6, 95%CI 0.4–0.9) than those living in urban areas.

**Conclusion:** Accessibility of EID services among children below 5 years exposed to HIV infection in Muheza is low. These findings stress the need for continued HIV education and outreach services, particularly in rural areas in order to improve maternal and child health.
The Role of the Private Health Sector for Tuberculosis Control in Debre Markos Town, Northwest Ethiopia

**Background:** Tuberculosis has been declared to be a global epidemic and there is an increasingly global and local effort to control tuberculosis. Despite all the effort, only less than half the annual estimated cases are reported by health authorities to the WHO. This could be due to poor Coverage and or due to poor reporting from the private sector. In Ethiopia, tuberculosis has also been considered a major public health problem as far back as 40 years ago. The aim of this study was to assess the role of the private health sector in tuberculosis control in Debre Markos Town, East Gojjam, Amhara Regional State, 2017.

**Methods:** An institution based cross-sectional descriptive study was carried out in private health facilities in Debre Markos town. A total of 260 tuberculosis suspects attending the private clinics during the study period were interviewed. Focus group discussion, Checklist & Structured questionnaire were used to collect the necessary data.

**Results:** Majority of the private clinics were less equipped, poorly regulated and owned by health workers who were self-employed on a part-time basis. It was found that 34.6% of the study subjects opted for a private provider on their first consultation for their current illness. This study also revealed a significant patient delay before starting anti-tuberculosis treatment, the mean patient delay being 5.7 months. Moreover, provider delay of 4 and more months was significantly associated higher likelihood of turning to a private provider (OR=2.70, 95% CI=1.20, 6.08).

**Conclusion:** There is significant delay among tuberculosis patients. Moreover, there is poor regulation of the private health sector by public health authorities. The involvement of the private sector in tuberculosis control in the study, under the prevailing scenario, should be limited to the identification and referral of tuberculosis cases and suspects.

A proactive Approach to Maximize Resources When Providing Technical Assistance for HIV Testing Services

**Background:** World Health Organization (WHO) is working to support countries to adapt and implement WHO guidance on HIV testing Services (HTS). To identify gaps and prioritise country needs, WHO started a comprehensive mapping focusing on implementation of WHO recommendations related to quality of HTS, post-market surveillance (PMS) and procurement of in vitro diagnostics (IVDs).

**Methods:** A set of 16 standardized questions related to PMS and procurement practices were circulated via email to 18 low- and middle-income countries (LMICs) . If no response, focal points were re-contacted by email on two more occasions. If there was no reply after three attempts, the country was deemed a non-responder.

**Results:** Thirteen of 18 countries submitted responses, of these 46% (6/13) reported existence of a PMS policy for IVDs. However, only two reported implementation of the PMS policy. Main reasons for absence and/or delayed implementation of the PMS policy were due to lack of financial and trained human resources. Furthermore, 54% (7/13) reported having a complaint handling procedure in place; but of these, only three reported implementing compliant handling procedures. Similar reasons were given for absence of procedure and/or lack of implementation: lack of personnel and training, and of IVD complaint forms. Country cycles for validating HIV testing algorithms were heterogeneous with no set policy other than to re-validate when problems arise. Frequency of HIV IVDs tenders varied greatly across countries, ranging from every 6 months to every 3 years, and to procurement as needed.

**Conclusion:** The majority of the LMICs included in this survey had either not developed or not implemented PMS procedures which means poor quality HTS will be more difficult to detect, and therefore act on. Efforts are needed to support LMICs and to address identified barriers related to lack of personnel, training and resources.
Scaling up Viral Load Monitoring Using Technical Assistance from ASLM, Sierra Leone's Experience

**Background:** The World Health Organization (WHO) consolidated guidelines of 2013 recommend viral load (VL) as the preferred monitoring tool and confirming HIV treatment failure. However, access to viral load testing in Western and Central Africa region is severely constricted by lack of proper systems, and governance. Unless something is done differently, most countries in this region may not be able to reach the 3rd 90 of the UNAIDS 90,90,90, targets by 2020.

**Methods:** Sierra Leone, decided to acquire TA from ASLM through their GF grant. The TA involved development of training materials, data collection tools and job aids, and adopting them to the national context. This was followed by training of trainers who cascaded the training under the supervision of the consultants. An integrated sample transport system was developed and the central lab team trained and a database for VL developed, which enabled the lab to print individual patient results for the first time.

**Results:** Looking at the volume of tests per quarter before and after the TA, only 169 VL samples were received in the lab a quarter before the TA, the 1st quarter after the TA it was 3429 samples, 2nd quarter 3210, 3rd quarter 1118 and 4th quarter 1836. Overall, a total of 9,593 VL samples were received in the lab during the 1 year since the start of the TA. The non-suppression rate is at 41%.

**Conclusion:** Overall, the TA has had a great impact jump-starting the program, to such a turn around in a short time. The VL sample numbers kept fluctuating mainly due to logistical challenges. The quality of services provided need improvement seeing the high non-suppression rate. A lot still needs to be done to ensure that all the non-suppressed clients receive intensive adherence counseling and are retested to switch those that need switching to another regiment.

**Antiretroviral Therapy (ART) as a Public Health Strategy for the Prevention of Mother to Child Transmission (PMTCT) of HIV in Kenya**

**Background:** Kenya has adopted the Treatment as Prevention (TasP) strategy towards effective suppression of HIV replication in at least 90% of patients on antiretroviral therapy and prevent onward transmission of the virus. We sought to evaluate the National AIDS & STI Control Program (NASOP) supported TasP strategy by measuring the association between viral suppression rates among pregnant HIV positive women on ART and HIV transmission rates in HIV exposed infants (HEI).

**Methods:** A retrospective observational study was conducted by abstracting longitudinal data on viral load (VL) and Early Infant Diagnosis (EID) outcomes from the NASCOP database at www.nascop.org. The absolute number of HIV positive pregnant women with suppressed VL in 2016 and 2017 were exported from the database on a Microsoft excel sheet under the VL tab. The monthly prevalence of positive initial PCR results for the HEI was similarly abstracted under the EID tab. The monthly prevalence of positive initial PCR results for the HEI was similarly abstracted under the EID tab. These were then merged and analysed using SPSS version 25. The association between the viral suppression rates and HIV transmission rates was established using Pearson product moment correlation.

**Results:** In 2016, 3575 VL tests were conducted for HIV positive pregnant women receiving care in Kenya, out of which 81.4% had results below 1000 cp/ml and were considered suppressed with 7753 tests in 2017 and a suppression of 82%. The average prevalence of positivity for initial PCR tests for the HEI in 2016 was 5.23%, 95% CI (4.73-5.73), median 5.45% (IQR=1.5) while 2017 had an average of 3.87%, 95% CI (3.19 – 4.54) median 4.0 (IQR=2.1). A significant negative correlation was found between viral suppression among the pregnant women and initial PCR positivity among the HEI ($r = -0.4383$, $p= 0.017$)

**Conclusion:** We show that an increase in the rate of viral suppression among pregnant HIV positive women in Kenya is associated with a corresponding reduction in the rate of transmission of the virus to HIV exposed infants. This inverse relationship provides evidence that antiretroviral treatment to reduce viral load is an effective public health intervention to prevent the onward transmission of HIV and lends credence to the TasP strategy.
Developing a National Action Plan on AMR for Nigeria

**Background:** Nigeria lacked coordinated and appropriate response to the growing threat of antimicrobial resistance (AMR) partly due to inadequate regulatory policy and data paucity. In November 2016, the Honourable Minister of Health mandated the Nigeria Centre for Disease Control (NCDC) to develop a National Action Plan (NAP) for AMR containment, with support from other stakeholders.

**Methods:** An AMR Technical Working Group inaugurated in January 2017 comprised stakeholders from human health, animal health, and environment sectors. The working group compiled baseline studies, performed gap analysis, and facilitated effective multi-stakeholder participation. Extensive desk review with virtual networking was followed by two stakeholders meetings; one to develop a draft of the NAP document in March 2017 and a finalization meeting in April 2017 to validate the document.

**Results:** A situation analysis was compiled and published and a 5-year NAP document, with firm commitment to implement coordinated AMR prevention and control activities, was developed. The objectives for the NAP were derived from recommendations made from a strength-weakness-threat-opportunity (SWOT) analysis of the national AMR situation. Priority gaps identified from the situation analysis in Nigeria included poor public awareness, weak coordination of AMR awareness activities by government, no national surveillance program related topics, creating an AMR surveillance system, strengthening infection prevention and control in the tripartite sector, promoting rational access to and use of antibiotics and investing in research to develop new antimicrobials and AMR diagnostics.

**Conclusion:** The plan incorporated the one health approach and aimed at implementing proposed actions by strengthening and utilizing existing national systems to prevent and control AMR more effectively. This five-year plan will guide efforts aimed at reducing the emergence and impact of antimicrobial resistance on human, animal and environmental health in Nigeria.