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MINISTRY OF HEALTH

# EAPHLN Uganda Bulletin

EAST AFRICA PUBLIC HEALTH LABORATORY NETWORKING PROJECT



## How EAPHLN is Boosting Diagnostic capacity at Mbarara Regional Referral Hospital

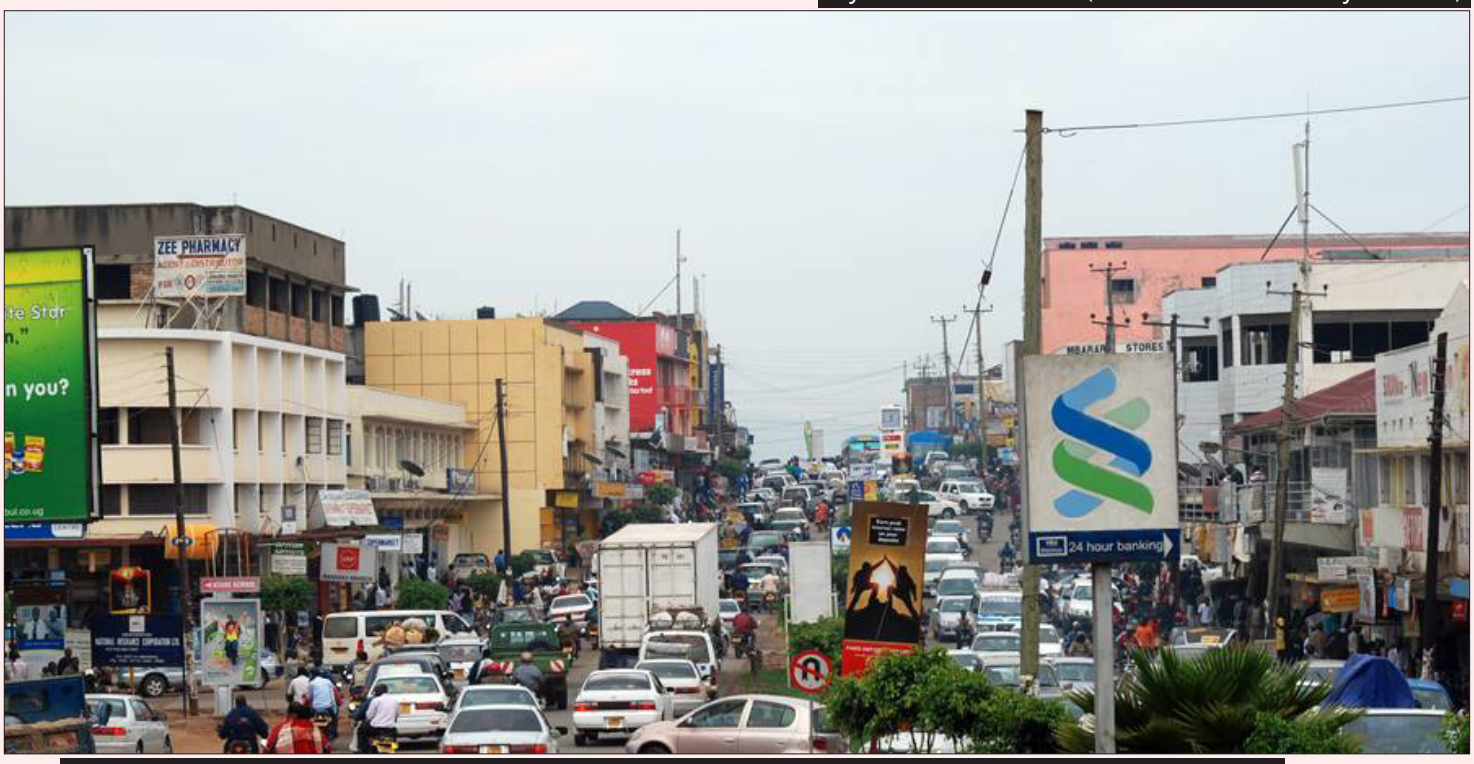
LOOK OUT FOR:




Edition 4 Issue 1

# How EAPHLN is Boosting Diagnostic Capacity at Mbarara Regional Referral Hospital

By Patrick Ademun (EAPHLN Laboratory Mentor)




Human and vehicular traffic on the main street in Mbarara Municipality.

Mbarara Regional Referral Hospital is home to one of seven of Uganda's public health satellite laboratories under the World Bank-funded EAPHLN Project.

The hospital, commonly known as Mbarara Hospital is situated in the heart of Mbarara Municipality and is a hub for health services for the locals.

Mbarara Municipality itself, situated in south-western Uganda and about 295 kilometers from Kampala the capital city, is strategically located right at the tip of Uganda's cattle corridor.

The abundance of land, favorable climate and the presence of the Mbarara University of Science and Technology (MUST) have jointly led to an industrial boom.

In specific terms, the boom is based on the proliferation of educational services, tourism as well as agricultural activities like dairy processing, beverages and breweries.

The municipality has been identified as one of Africa's fastest growing towns as it serves as a collection point for goods originating from other major agricultural towns like Ibanda, Kabale and even the Democratic Republic of Congo and the Republics of Rwanda and Burundi.

The EAPHLN project has tapped into the existing opportunities arising from the movement of people, goods and livestock through the cattle corridor.

This has been achieved by the establishment of a collaborative partnership between the Ministry of Health through EAPHLN and the hospital.

This partnership, instituted in 2010, primarily aims to improve the access to health serives for the vulnerable groups in the region. In addition, the partnership aims to improve upon the overall quality of the diagnostic services in the laboratory for the treatment of tuberculosis and other communicable and non-communicable diseases.

The hospital has been designated by MOH as a regional referral hospital and serves the districts of Buhweju, Kiruhura, Mitooma, Rubirizi, Sheema, Bushenyi, Ntungamo, Ibanda, Isingiro as well as Mbarara district itself.

It also serves as a teaching hospital for both Mbarara University of Science and Technology (MUST) and Bishop Stuart University.

Healthcare services are largely

free at the hospital which has a bed-capacity of 600.

In January 2011, President Yoweri Museveni, laid a foundation stone at the hospital, to mark the renovation, rehabilitation and expansion of the hospital.

This infrastructural expansion, it is hoped, would gradually transform it into a National Referral Hospital. In order to boost the infrastructural expansion initiated by other partners and players, the EAPHLN Project has fast-tracked plans to refurbish the main laboratory in the hospital.

On the sidelines, awaiting the refurbishment to commence, significant gains have been achieved through; on-job training and re-training of laboratory cadres; intensification of laboratory mentorship; the supply of critical laboratory equipment as well as outbreak and disease management in the cross-border areas served by the hospital.

## Training

The EAPHLN Project has focused on training laboratory staff in the aspects of documentation, biosafety and the laboratory auditing process.

The ultimate aim of the training is to improve quality management systems so as to attain international accreditation.

Regarding documentation; Prior to the commencement of the EAPHLN Project, a lot of benchwork, procedures and processes in the laboratory were not being documented. As a result of training in this area, laboratory staff realized indeed that 'what is not documented has not been done'.

To date, all necessary files and their corresponding documents have been well prepared and can be accessed for reference at any time with ease.

Regarding biosafety and biorisk Management; The project organized a flagship six-day biosafety and bio-risk Management course at Entebbe Imperial Botanical Beach Hotel for key satellite laboratory staff in 2015.

This training empowered the participants, particularly those from Mbarara, with the skills involved in the principles of bio-risk management.

## Mentorship

The EAPHLN Project has been a key player in institutionalizing laboratory quality management systems in the East African Community (EAC) in general and Uganda in particular.

At Mbarara Regional Referral Hospital, the designated resident laboratory mentor, Ademun Patrick, has exhibited diligence in mentorship support to the laboratory.

## Outbreak & Disease Management

The hospital director has been instrumental in the establishment and work of cross-border disease surveillance committees with Tanzania and Rwanda. This work is being done in collaboration with the ESD department of MOH.

Laboratory staff also actively participated during the regional Ebola Table Top Simulation that was held in Mbarara District in 2014.

Laboratory technologists and HMIS/Data Management staff of the hospital discuss how to get better laboratory data.

*A pharmaceutical refrigerator, Panasonic - MPR-1014*

*A Mindray, BC-5600, Automated Hematology Analyzer*

*A Gfl Water Distiller*

*A Panasonic MLS-3781L, Digital Sterilizer*

*Eppendorf, Thirty Bucket Digital Centrifuge*

*A Binder Incubator*

## Supply of Equipment

The first batch of equipment received from the EAPHLN Project at the hospital was the Gene X-pert which dramatically improved the diagnosis of multi-drug resistant mycobacterium tuberculosis (MDR-TB). Other pieces of critical laboratory equipment supplied by the project include: a pharmaceutical refrigerator, a thirty bucket digital centrifuge, a water distiller, a Mindray BC-5600, automated hematology analyzer, a Panasonic MLS-3781L digital sterilizer, an incubator, a rotamixer, a magnetic stirrer, thermometers and automated micro pipettes.

The above listed equipment have markedly improved the performance and quality within the laboratory.

Additional Financing for EAPHLN: Members of Parliament meet staff of MOH (from UVRI and EAPHLN to discuss possibilities for additional financing in August 2015.

# Cancer: Africa's Silent Killer

By Miriam Schneidman, EAPHLN Project Task Team Leader

Walking through wards of public sector hospitals in Africa, the beds that were filled with AIDS patients in the early 2000s, are now occupied by those afflicted with cancers and other non-communicable diseases (NCDs).

In early 2000s, NCDs were referred to as "diseases of life styles" and were regarded as problems exclusively associated with the well-off.

Worldwide, roughly 75% of deaths from NCDs occur in low- and middle-income countries (LMICs). In Africa, NCDs are projected to account for roughly 40% of the disease burden by 2030. The costly, complex and, or chronic nature of many of these diseases will fuel the rise in health care costs, and especially catastrophic health expenditures, underscoring the importance of taking action now.

NCDs are the silent killers with insidious debilitating complications and premature deaths. In 2012, approximately 645,000 new cancer cases and 456,000 cancer deaths occurred in Africa. Due to limited knowledge and awareness, most patients reach health facilities with advanced stage of the disease, with prognosis and survival prospects drastically diminished.

Catastrophic health spending on cancer, after travelling long distances, make huge financial sacrifices to confirm a condition without affordable cure are a major concern.

The capacity of public sector facilities in Africa to provide treatment outstrips the demand for these specialized services, and care at private facilities is beyond the means of most families. Given that the majority of LMICs have only a handful of cancer specialists (oncologists, radiotherapists and pathologists), yet access to costly medications, technologies and diagnostics is a major bottleneck.

The situation is not all doom and gloom. First, the recently published second volume of the Disease Control Priorities, 3rd edition series, makes a compelling case for stepping up cancer control efforts and provides sound evidence on the most preventable cancers and the highly curable ones when diagnosed early. Second, lessons from HIV/AIDS can be brought to bear.

The global community demonstrated how millions of lives could be saved by mobilizing financial resources, adopting task shifting, and negotiating reductions in the price of drugs and diagnostics.

Third, important lessons and promising experiences are emerging from countries that have initiated cancer control efforts in Africa.

A World Bank Group South-South Knowledge Exchange recently brought together stakeholders from Africa to share experiences, lessons, and good practices. One noteworthy outcome of this knowledge exchange is a proposed pilot to strengthen surveillance and pathology services for cancer under the Bank-funded East Africa Public Health Laboratory Networking Project, leveraging existing investments and promoting use of multi-platform technologies, which focused initially on communicable diseases.

At the dawn of a new year, health experts working in Africa should consider new priorities for preventing and treating cancer: 1) ensuring that cost-effective cancer interventions are progressively incorporated into universal health care coverage packages (UHC); 2) leveraging existing platforms and investments for cancer care and treatment; and 3) exploring how to better tap the capacity of the private sector.

We need to ensure that access to cancer care and treatment does not hinge on one's socio-economic status. Just like AIDS, a cancer diagnosis should not be tantamount to a death sentence.

*Follow the World Bank health team on Twitter: @WBG_Health*

# The enduring role of the Haematological Peripheral Blood Film (PBF) report for patients

By Bengo Derrick (Senior Laboratory Technologist, Haematology, Mulago Hospital and Complex)

A laboratory technologist at Arua Regional Referral Hospital at work in the haematology laboratory.

Have you ever wondered why most if not all automated complete blood cell counter results report or CBC Auto Analyzers results report have got a manual differential count table just below the white blood cell scatter plots, platelet (PLT) and red blood cell (RBC) histograms?

Have you also noticed that the WBC, RBC and PLT IP Messages, "flags" or CBC Auto Analyzer comments have question marks on them? Or ever noticed the presence of marks like (*) on the numerical values of WBC and PLT?

Now, I possibly have your much needed attention. Laboratory medicine practices are generally concerned with ultimate diagnosis or follow up investigations for prognostic purposes using viable specific specimens.

Specimen delivered to the clinical laboratories for haematological investigations include E.D.T.A whole blood.

Auto analyzers for CBC tests are a major finding in most haematology and blood transfusion laboratories for the purposes of performing timely and accurate blood cell counts.

They also give a summative report on the morphology of the blood cells which one would call a peripheral blood film (PBF) report if done manually through film making, staining and microscopically examining the films.

Technological advancement in laboratory medicine has taken root over the last few decades and most haematologists feel that it's much of a relief in terms of efficiency and effectiveness as machines are able to perform most of the previously manual techniques with good precision and accuracy.

However, every good invention comes with its flaws as the proverbial saying goes that; "You win some, you lose some." This brings us back to where I started off by highlighting some of the indicators or "flags" or marks on a CBC report that haematology auto analyzers give on their print out in circumstances of underlying pathology in the patient's blood sample.

Haematology laboratory CBC automation is a brilliant idea but

still has limitations especially in the area of morphological identification of blood cells in the event that abnormal or atypical or young blood cells are present however sophisticated the instrument is.

These CBC indicators or "flags" act as clues for one to go ahead and confirm the probable underlying pathology by examining a thin blood film microscopically to identify the flagged cells as either being normal or abnormal.

Are blasts being seen in Leukaemias or not? Could they be atypical lymphocytic cells (for example as a reactive response to viral infections)?

This brings us to the crucial point that the manual differential count table at the bottom of the CBC printed out results hereby requires the laboratory personnel to repeat the WBC differential count manually on a PBF using a microscope.

This would correct the unreliable auto analyzer WBC differential count usually represented by an (*) on the respective numerical values given so that the final corrected-manually derived results are truly representative of the underlying pathology in the patient's blood sample.

I confirmed this when I underwent training at some of the best hospitals in the west that house some of the best Medical Schools like Massachusetts General Hospital, Harvard Medical School in U.S.A and Vellero Christian Medical College in India. All facilities had one feature in common irrespective of their modern state of the art instruments; they performed manual haematological techniques like traditional light microscopy to quality control CBC auto analyzers and other automated haematological investigations.

Peripheral blood film examination is both manual and automated depending on the context of practice but traditional light microscopy is still a gold standard especially in Africa where automation is still a dream to many and not yet sustainable.

It is manual in the sense that it involves making thin films of blood followed by fixation and staining using dyes and finally examining them under a light microscope.

The blood cell morphologies are then described for diagnostic purposes and correlated with the red blood cell indices namely; MCV, MCHC and MCH for appropriate anaemia-typing morphologically.

The patients' clinical notes in instances of pathogenetic or aetiological typing are also considered. This is very important because laboratory diagnosis should never be independent of the differential clinical diagnosis.

The diagnosis should be used correlatively and collectively to come up with a precise diagnosis to guide specific treatment or to act as a guide to a more conclusive diagnosis like for example bone marrow aspirate examination.

Some of the main purposes of performing a PBF examination are but not limited to the following:

- To type anaemias,
- To type haemoparasites and giving their developmental stages,
- To perform manual differential WBC counts,
- To perform provisional screening and typing of haematological malignancies like Leukaemias e.t.c.
- Correlative investigative screening of bleeding disorders like Glanzmann's disease
- Screening for red blood cell inclusion bodies like basophilic stippling e.t.c.

In conclusion, I am recommending that while we embrace technology, let us equally hone and maintain our manual haematological techniques like traditional light microscopy that is so much needed in the areas of teaching and quality control.

In addition, I beseech all health care providers to utilize the PBF both in diagnosis and follow up stages of patient care and most importantly to the Haematology health tutors, mentors and lecturers.

I also urge them to put more emphasis on hands on skills training for learners to appropriately link theory with good laboratory practice in PBF preparation, examination and reporting that is clinically useful in diagnosis work up, patient care and follow up.

To be a good laboratory Haematologist takes hard work, patience and practice. Always remember that practice of a technique is very important in mastering the skill of morphological description of blood cells, it's not easy but it can be done!

# Levy Jennings Graphs and West Guard Rules simplified

*By Grace Kushemererwa (Laboratory Quality Assurance Officer CPHL)*


Supportive Supervision to the Blood Transfusion staff at Mbale Regional Referral Hospital.

Quality requirements (ISO:15189) for specialized reference laboratories and expectations are very high for instance the Early Infant Diagnosis of HIV and HIV Viral Load laboratories at the Central Public Health Laboraories in Uganda.

These requirements have major implications for the tested individuals, relatives, clinicians involved in case treatment and care for patients as well as government.

The two main technical requirements, namely verification of examination procedures and monitoring Internal Quality Controls (IQC) pose challenges across reference laboratories in Uganda. Given this background, this article will address this area of IQC based on the CPHL-EID/VL experience.

IQC is an internal verification mechanism instituted to measure consistent results day after day. This yield measures how precise the equipment or method is by the plotting and analysis of graphs The yield does not necessarily take into account the accuracy of the equipment or method.

Results obtained are deemed to meet quality standards if they are accurate. This accuracy of results can be determined by monitoring IQC trends.

IQC trends are monitored using a graphical method called Levy Jennings (LJ Graphs) to determine what controls are statistically in or out of range. West Guard rules are the recommended rules used to interpret IQC trends in medical laboratories.

Laboratory staff should make use of Westguard rules in monitoring IQC trends. It is good clinical laboratory practice for the controls to be plotted every day before release of patient results to determine if the equipment or method are accurate.

The daily plotting of controls and interpretation (using West Guard rules) therefore requires that every clinical laboratory has a quality assurance officer (QO) that is able to plot and interprete the trends of the LJ graphs for the tests and methods used in the lab.

The EID/VL laboratory at CPHL has been able to overcome this challenge by training staff on

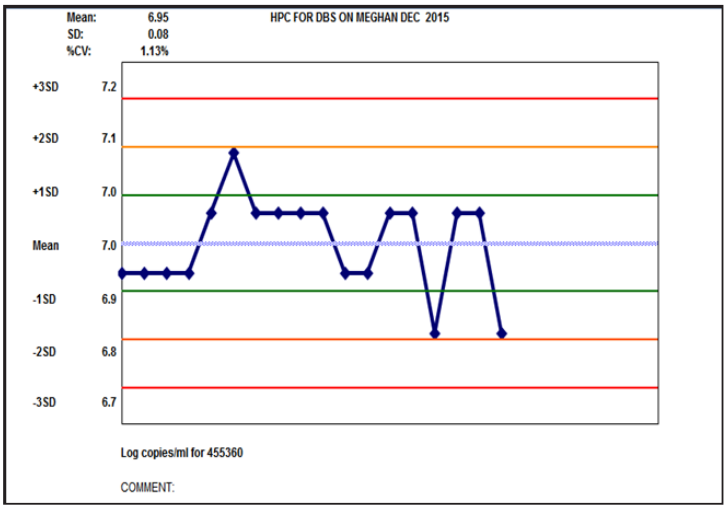
West Guard rules using scenarios created in the laboratory.

Doing this has elevated the prospects of sustainability and ease of implementation for the quality management system of the EID/VL laboratory.

West guard rules include 1:2S, 2:2S, R:4s, 4:1S and 10X. The EID/VL laboratory uses 1:2S, 2:2S, R:4S, 4:1S and 10 x rules. Laboratoriess can choose either 8X, 10X or 12X.

In this article we will use the LJ graph for the Abbott m2000rt for period of December 2015 and will derive scenarios for each for the Westguard rules.

**Figure1:Example of a well performing control at the CPHL-EID/VL laboratory: LJ graph for High Positive Control for DBS 1ml Protocol on Meghan Abbott Machine December 2015.**




The above LJ shows you a well performing control. None of the 6 of the 10X rules were violated.

**1:2S Rule (Warning Rule)**

This serves as a warning indicator to the technologist. If any control run is above +/- 2 SD, the technologist must identify possible problems. Although a single occurrence of this doesn't call for run rejection.

**1:3s Rule**

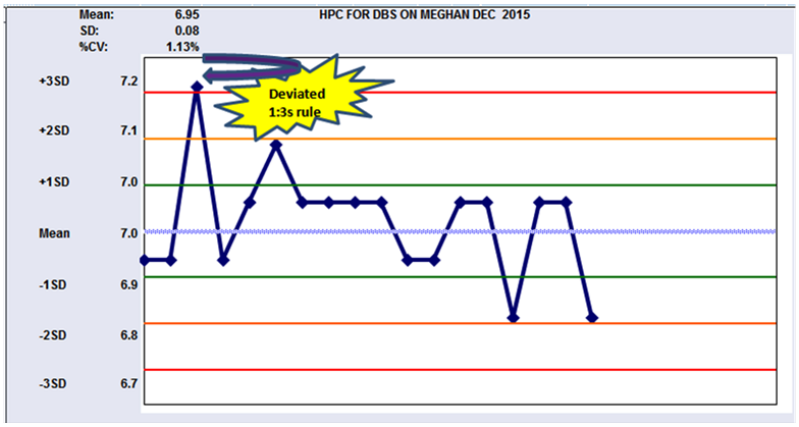
This rule requires that a run is rejected if any of the Controls exceeds the +/-3 SD. If on any given day a control is plotted and the point exceeds the +/-3 SD level, the technologist must not run samples on that machine nor release results for those patient samples and tests that had been run alongside those controls.

Root cause analysis must be conducted and documented-done to iron out the possible problem. Corrective action must be done and Controls re-run.

The re-run controls are plotted and reviewd, being within acceptable levels before samples are run.

Major causes of this error are random which result from poor laboratory practice such as poor pipetting, lack of preventive maintenance of equipment, poor storage of control materials etc.

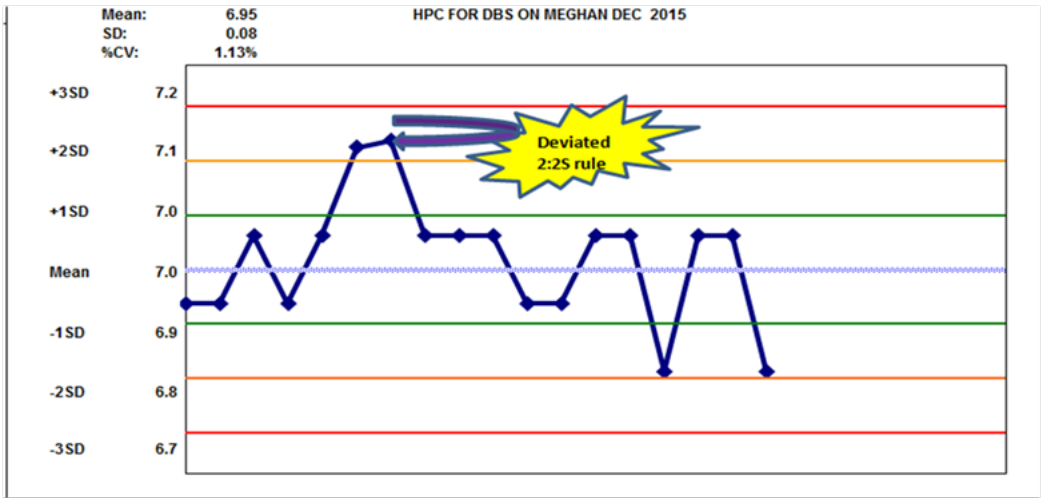
**Figure2: Example of Deviation of 1:3SD Rule**



## 2:2S Rule

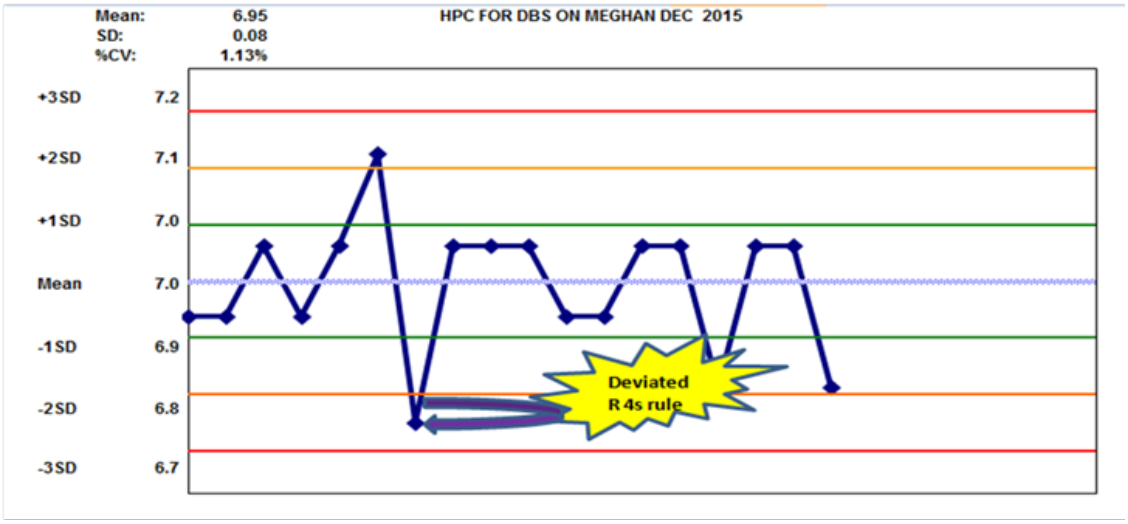
This rule requires data from a previous run. If a control is run on any given day and its plot lies above the 2SD, the warning rule must be applied at the time although laboratory personnel can go on and release patient results. If the next day a control is run and the plot exceeds the same side of the mean above the 2SD, that run must be rejected and root cause analysis must be performed and corrective action executed before patient samples are re-run. Main cause of deviation of 2:2s Rule are systematic errors that could be caused by unskilled staff or the use of none calibrated pipettes.

**Figure 3 : Example of Deviation of 2:2S rule**




## R: 4s Rule

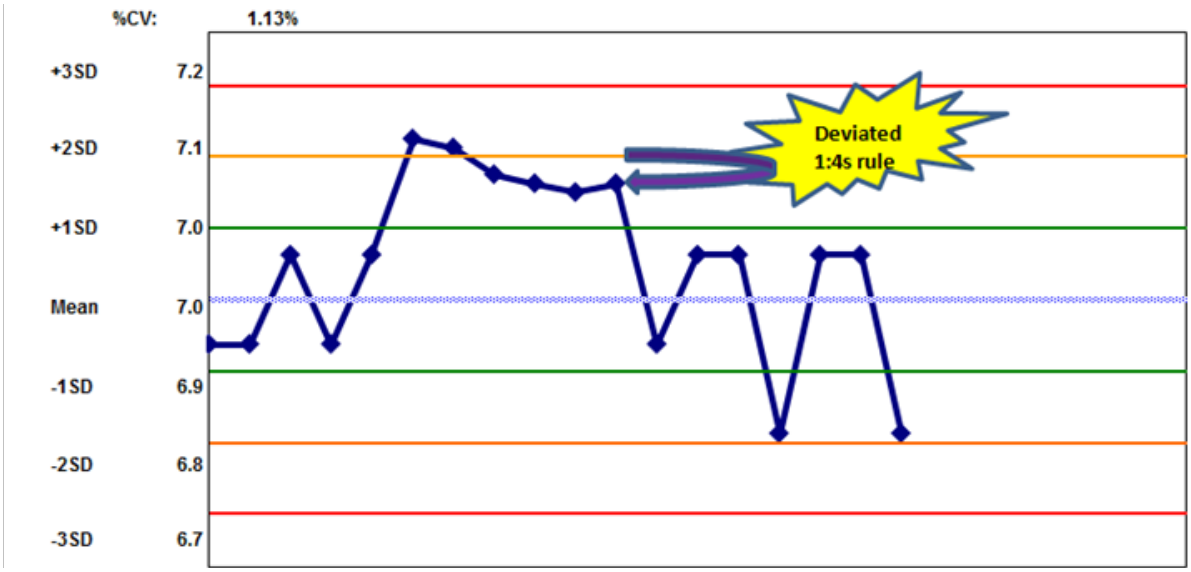
This rule requires data from previous runs and only applies if controls are tested in duplicate and one control exceeds the mean by +2SD and the other exceeds the mean by -2SD. The run must be rejected, root cause analysis done and corrective action executed before release of patient results. Main cause of this is random errors.




## 4:1s Rule

This also requires data from previous rule. Reject run if 4th consecutive control measurement exceeds +1SD or -1SD. Main cause is systematic error as was highlighted earlier.

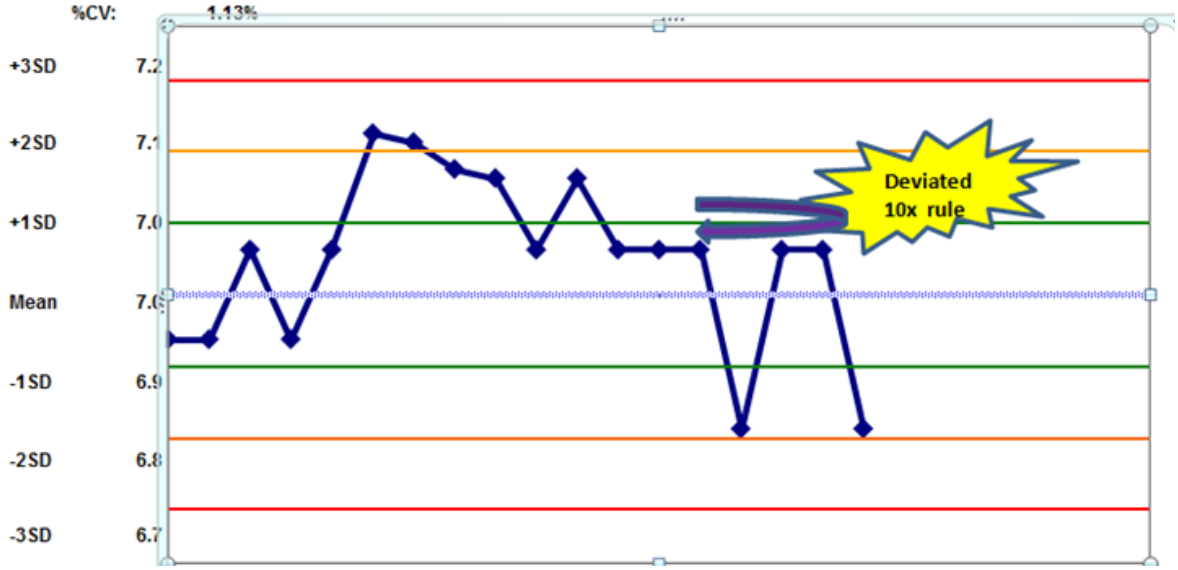
## Figure 4: Example of Deviation of 1:4s rule




### 10 X rule

This rule requires data from previous runs too. If the 10th consecutive control measure of one level of control are on the same side of the mean reject the run.

## Figure 5: Example of deviation of 10X Rule




## Conclusion

There is only one warning rule 1:2S. The rest are Rejection rules meaning control runs are out of range. When a rejection rule is violated the following must be done before releasing patient results

1. Stop testing
2. Initiate a non conformity and do root cause analysis to find problem.
3. Perform corrective action
4. Re-Run controls to find out if they irange.
5. Only test patient samples if controls are back in control(in range).

# Operational Research Studies Update: Enteric Pathogens Involved in Diarrhoea among Children Study

By Dr. Henry Kajumbula (Head Microbiology Dept. School of Public Health, College of Health Sciences, Makerere University / Technical Advisor CPHL)

The enteric pathogens study is one the three operational research studies under the East Africa Public Health Laboratory Networking Project. The study aims at determining the prevalence and antimicrobial susceptibility profiles of the major enteric bacterial pathogens associated with diarrhoea among children in the five East African countries participating in the project.

The study is being undertaken because diarrhoea remains the second most common infectious cause of childhood deaths worldwide after lower respiratory tract infections. The etiology of the diarrhea is not well characterized in the East African Countries including Uganda making interventions such as empirical antimicrobial therapy difficult.

The rapidly changing patterns of susceptibility of organisms like Shigella and Vibrio cholera for which antibiotics are indicated further complicates empirical antibiotic therapy. Information generated from this study shall guide empirical treatment for diarrhoea among the East African population. The recent upsurge in efforts to develop and introduce new vaccines into global child health programs also requires information about prevalent strains of the major etiologic agents. As such, this study shall inform the introduction of vaccines like rotavirus into national immunization programs and point to possible priority vaccines for development.

In Uganda, the study is being conducted in 3 sites namely: Mulago National Referral Hospital, Mbale Regional Hospital and St. Mary's Hospital Lacor. The specific objectives of the study for Uganda include:

1. To determine the prevalence of the major enteric bacterial pathogens associated with diarrhea in 3 Hospitals including Mulago, Mbale, and Lacor

2. To describe the antimicrobial susceptibility profiles of the Shigella spp, V. cholera, Salmonella spp and pathogenic E.coli strains to commonly used antibiotics

An additional objective is to build capacity of the microbiology laboratories at each of the three study sites.

The study is overseen by Dr. Henry Kajumbula as the PI with Dr. Eric Wobudeya as Co-PI and site coordinator for Mulago, while Dr. Julain Abeso and Dr. Richard Nyeko are site co-investigators for Mbale and Lacor respectively.

The A total of 800 children aged between 6 months and 12 years presenting with acute diarrhoea (less than 2 weeks) duration are being recruited into the study.

Recruitment started in October for Mulago and Mbale and in November 2015 for Lacor Hospitals.

As of 11th March, at total of 33 7 patients had been recruited including 240 from Mulago, 107 from Mbale and 90 from Lacor. A total of 3 Salmonella spp, 2 Shigella spp and 12 Vibrio cholerae have been isolated, all from the Mbale site. Numerous E.coli have also been isolated but these are yet to undergo molecular typing to determine whether they are enteric pathogens or commensals.

Given the very low rates of isolation, we plan to do molecular detection for the pathogens on stored stool specimens.

A major challenge to implementation of the project was the fact that the study had to work by building capacity of the existing facility laboratories. In some of these, microbiological culture is not a primary responsibility of the laboratories and is often considered an added load to the routine.

## MALARIA DRUG RESISTANCE IN UGANDA

**By Dr. Adoke Yeka**, Assistant Lecturer, Department of Disease Control and Environmental Health, School of Public Health, College of Health Sciences, Makerere University

In recent years threats of drug resistance to Artemisinin based combination therapy (ACTs) have been a concern of many actors involved in malaria control. In 2015 the World Health Organization was able to confirm signs of malaria parasite becoming resistant to some ACTs in South-east Asian countries.

Antimalarial drug resistance – the ability of the malaria parasite to survive drugs is caused by several factors such as poor adherence to the drugs prescribed, patients taking only a few tablets and when they feel better they stop using the tablets altogether, poor quality medication (counterfeit medication) and widespread availability of poor quality single drugs.

There are, however, some main reasons why resistant parasites develop. In 2013 researchers identified a particular molecular maker which was associated with the delayed parasite clearance, it was known as the K13. This K13 assists as a means to map and monitor the resistance pattern.

WHO launched a Global plan for artemisinin resistance containment. The framework among other things urges endemic countries to routinely monitor antimalarial drug treatment efficacy. Uganda with support from the World Bank through the East Africa Public Health Laboratory Network (EAPHLN) Project is conducting a series of therapeutic efficacy studies in three study sites (Arua, Mbarara and Tororo hospitals).

The main objective of the study is to evaluate the efficacy and safety of two ACTs namely Artemether-Lumefantrine (AL) and Dihydroartemisinin – Piperaquine (DP) for treatment of uncomplicated malaria in children in Uganda so as to inform stakeholders in the region of the current level of efficacy of AL and DP.

About 200 patients with symptomatic malaria are recruited per site and 100 are randomised to each of the treatment arms. Patients are given directly observed treatment for three days and parasite clearance is assessed every six hours until two consecutive negative slides are obtained.

Patients are followed up for 42 days to monitor for new infection or recurrence of infection and occurrence of adverse events. We have completed patient recruitment in Arua and are due to start the studies at the remaining sites.

We have also recognized that the only way to protect Ugandans is to ensure that we minimize the number of people who contract malaria or become infected with malaria.

It is therefore necessary to increase the scaling up of activities to manage and control malaria. This calls for sustained increased funding and commitment among all actors and players and cooperation of the population at risk to adherence to medication and prevention methods.

# How is Uganda Performing on the EAPHLN Project Indicators?

*By Dr. Simon Kalyesubula (EAPHLN M & E Specialist)*

| PROJECT OUTCOME INDICATORS (POI) | TARGETS YR6 2015/16 | ACTUAL JUL-DEC 2015 | EXPLANATIONS OF VARIANCES |
|---|---|---|---|
| POI# 1. Average turn-around time for TB GeneXpert test (hrs) | 24 | 24 | Actual TAT ranges from 12 hours at satellite sites to 10 days at NTRL. Delays at NTRL due to courier services of sample referral system. |
| POI# 2. Satellite laboratories awarded at least three star status under regional accreditation program based on WHO/AFRO accreditation approach (cumulative number, percent). | 4 (57%) | 4 (57%) | Arua scored 2 Stars which falls short of revised target of 3 Stars, while Moroto and Fort portal though enrolled on national SLMTA, have not been assessed by regional peers. |
| POI# 3. Number of beneficiaries (out of which x% female). | 300,000 (40) | 313,156 | Annual target has been exceeded by 6 months already. |

NTRL at Butabika is 85% complete.

| | | | |
|---|---|---|---|
| POI# 4. People receiving TB drug susceptibility tests among DOTS treated TB cases not responding to treatment (number, percent). | 2,400 (80) | 5,673 | Annual target has been superseded by 6 months already. |
| POI# 5. Proportion of reported communicable disease outbreaks having laboratory confirmation of etiological agent (percent). | 40% | 87.5% | Only Mumps outbreak that clustered in one class of at a primary school in Kampala was not investigated in the Lab. |
| POI# 6. Proportion of outbreaks in cross border areas that joint investigations were done (both in country joint investigations and inter-country joint investigations) | 50% | 66.7% | Though International Cross border investigations were conducted but intra-Country but inter-district were conducted for 4 of the 6 outbreaks reported. |
| **INTERMEDIATE OUTCOME INDICATORS** | **YR6** | **ACHIEVED JULY-DEC** | **EXPLANATIONS OF VARIANCES** |
| IOI# 3. Satellite laboratories reporting stock-outs of tracer reagent for stools culture (percent). | 43% | 20% | Mbarara still lacks capacity and hence supplies for stool culture. |
| Laboratories Constructed | 0 | 1 | NTRL is about 85% completed. |


Patient care outside the TB ward at Arua Regional Referral Hospital.

| | | | | |
|---|---|---|---|---|
| Laboratories Renovated | | 0 | 0 | Preparing contract documents Lacor- Gulu |
| IOI# 4. Number of Health facilities | Equipped | 5 | 6 | All sites in previous phase received critical laboratory equipment ( LOT1 &2) |
| IOI #5. Share of national and satellite laboratories that comply with Biomedical Waste Management requirements (cumulative number, percent) | | 4 (57%) | 4 (66.7%) | Mbarara acquired an incinerator but yet to install, while<br>incinerator at Mbale is functional its performance does not comply with standards. |
| IOI# 7. Health personnel receiving training (number). | | 100 | 190 | 3 Regional, 3 National and several cascaded trainings, with 14, 85 and 91 participants respectively. |
| IOI#9. Operational Research studies | developed and approved by a recognized IRB | 1 | 3 | All 3 protocols had IRB approved renewed in July 2015 |
| | completed with results disseminated | 0 | 0 | All 3 protocols started data collection in October 2015 |

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| INTERMEDIATE OUTCOME INDICATORS (IOI) | TARGETS YR6 2015/16 | ACTUAL JUL-DEC 2015 | EXPLANATIONS OF VARIANCES |
|---|---|---|---|
| Offshoot proposals developed for short term operational studies. | 0 | 0 | Offshoot proposals developed for short term operational studies. |
| IOI#10. Number of GeneXpert tests performed per quarter; | 17,280 | 5,693 | Some laboratories performed sub-optimally due to maintenance glitches of the machines beyond the in-country capacity for resolution. |
| IOI#11. Number of laboratory tests performed per quarter | 150,000 | 457,272 | Annual target has been exceeded by 6 months already. |

EAPHLN Project Coordination Unit and management of the Entebbe VHF Isolation unit explain to MPs proposed refurbishments to the facility to be done with additional financing from the World Bank.

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