

LAB CULTURE

The ASLM Newsletter for
Laboratory Professionals
Across Africa

August 2014, Issue 11

A View of the Ebola Outbreak: Laboratory Workers as Key Partners in Outbreak Response

In This Issue:

- UNAIDS, ASLM and Partners Launch Diagnostics Access Initiative
- An Interview with Mr. Sagie Pillay, Co-Chair of ASLM2014
- Improving HIV Diagnoses through a Volunteer Quality Corps
- Profile of Medical Research Advocate Prof. Souleymane Mboup

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Ebola Virus: The Facts

General Information

Ebola describes a group of five virus species (Bundibugyo, Reston, Sudan, Tai Forest and Zaire ebolaviruses); of these, only the Bundibugyo, Zaire and Sudan strains have caused outbreaks resulting in human illness or death.¹ The current Ebola virus disease outbreak in West Africa is believed to be caused by the Zaire strain of Ebola, which can kill up to 90% of people infected.² Ebola is considered a viral haemorrhagic fever, in reference to a group of illnesses characterised by injury to multiple organs including the blood circulatory system, often associated with haemorrhaging or bleeding.³

Transmission

Animal-human contact: Transmitted through close contact with the blood, secretions, and other bodily fluids of infected animals such as apes and monkeys, fruit bats, antelope, etc.⁴

Human-human contact: Transmitted through broken skin or mucous membranes, resulting from direct contact with blood, secretions, or other bodily fluids. Also transmitted through indirect contact with contaminated environments.⁵

Symptoms

Symptoms may appear between two and 21 days after exposure; an incubation period of eight to 10 days is most common.⁶

Early signs: Sudden onset of fever, weakness, muscle pain, poor appetite, headache, sore throat (in early stages, may be mistaken for malaria, cholera or other diseases).

Later symptoms: Vomiting, diarrhoea, rash, poor kidney and liver function, internal/ external bleeding (in some cases).⁷

Diagnosis

Laboratory Tests: ELISA, antigen detection test, serum neutralisation test, RT-PCR assay, electron microscopy, virus isolation by cell culture.

Treatment

No specific drug therapies have been approved for use against Ebola, though untested experimental treatments exist.⁸ Current treatments include supportive care, including oral or intravenous rehydration.

Vaccination

None currently available.

Prevention

In the absence of effective treatment and vaccine, public education and promotion of protective measures is essential to controlling the spread of Ebola. Those caring for patients should wear personal protective equipment and practice frequent hand-washing.

¹ Ebola virus disease. (2014, April 1). Retrieved from <http://www.who.int/mediacentre/factsheets/fs103/en/>

² Cullinane, S., & Park, M. (2014, August 8). Ebola virus: Nine things to know about the killer disease. Retrieved from <http://www.cnn.com/2014/08/07/world/ebola-virus-q-and-a/>

⁴ Ebola virus disease. (2014, April 1). Retrieved from <http://www.who.int/mediacentre/factsheets/fs103/en/>

⁵ Ebola virus disease. (2014, April 1). Retrieved from <http://www.who.int/mediacentre/factsheets/fs103/en/>

⁶ Ebola Hemorrhagic Fever: Signs and Symptoms. (2014, August 5). Retrieved from <http://www.cdc.gov/vhf/ebola/symptoms/index.html>

⁷ Ebola virus disease. (2014, April 1). Retrieved from <http://www.who.int/mediacentre/factsheets/fs103/en/>

⁸ Questions and Answers on Experimental Treatments and Vaccines for Ebola. (2014, August 8). Retrieved from: <http://www.cdc.gov/vhf/ebola/outbreaks/guinea/qa-experimental-treatments.html>

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Advancing Laboratory Medicine Through Collaboration and Partnership

Over the months since the publication of the May issue of the ASLM newsletter, much has happened in terms of Society events and developments in African laboratory medicine. Issue 11 of Lab Culture covers these latest developments, featuring programmatic news from the Society, partner activities, ASLM2014 international conference updates, and a Feature article on emerging infectious diseases with an emphasis on the current Ebola outbreak in West Africa.



In June, ASLM co-hosted two important meetings on HIV diagnostic testing: “Towards a Final Target for HIV Treatment: The Role of Laboratory Medicine”, in Geneva, Switzerland, and “Improving Access and Increasing Quality of HIV Testing in Africa”, in Dar es Salaam, Tanzania. Both meetings convened partner organisations, Ministries of Health and other key stakeholders to advance efforts to improve the quality of and access to HIV-related diagnostic testing in resource-limited settings.

Furthermore, in July, at the AIDS 2014 conference in Melbourne, Australia, ASLM co-launched the Diagnostics Access Initiative with partners. This new initiative stresses the importance of developing new, affordable viral load and early infant diagnostics for HIV.

ASLM recently became a member of the Core Group for the Global Laboratory Initiative (GLI), helping to develop essential tools and guidance frameworks to strengthen laboratory systems. On behalf of ASLM, I am currently the interim Chair of GLI for the African Region (GLI-AFR), a GLI working group whose goal is to help African countries improve laboratory services for tuberculosis. Furthermore, ASLM recently became a member of the International Federation of Biosafety Associations, an international NGO whose mission is to improve and strengthen laboratory biosafety worldwide.

As well as taking part in the aforementioned meetings and initiatives, we at ASLM have been busy developing technical documentation to help laboratories prepare for and respond to Ebola, in addition to facilitating laboratory trainings and preparing for the ASLM2014 international conference. At ASLM2014—themed “Innovation and Integration of Laboratory and Clinical Services: Shaping the Future of HIV, TB, Malaria, Flu, Neglected Tropical Diseases and Emerging Pathogens in Africa”—we will continue to build on the gains made at ASLM2012, providing a platform for the advancement of scientific innovation. I encourage you to learn more by visiting www.ASLM2014.org.

This issue’s Feature article, “Effective Response to Emerging Infectious Disease Outbreaks: Laboratory Workers as Key Partners”, available on page 2, discusses the key players of an outbreak response, drawing on examples from current Ebola response efforts.

We hope you enjoy this issue of Lab Culture. Thank you for reading.

Dr. Tsehaynesh Messele, CEO, ASLM

A VIEW OF THE EBOLA OUTBREAK

Effective Response to Emerging Infectious Disease Outbreaks: Laboratory Workers as Key Partners

An elaborately packaged blood sample arrives in the laboratory under tense circumstances. Laboratory technicians record the patient data and decontaminate the outer envelope before introducing it to a negatively pressurized glove box. Only after the sample is inside, they prepare the whole blood for RNA extraction and quantitative PCR—all of which are carried out in the biosafety compartment. Such extensive precautions for a blood sample from a patient with a fever, muscular weakness and flu-like symptoms have become imperative for healthcare workers.

It is likely that this patient lies in an isolation ward, and the healthcare providers practice universal precautions, in which the precise and deliberate donning of personal protective equipment (PPE) must be strictly observed to avoid being contaminated. During an Ebola virus outbreak, such care must be used in all suspected cases of infection.

The laboratory itself did not always exist in this location. It is a mobile laboratory, set up in a tent or spare room in the hospital, dedicated to performing molecular diagnostics for Ebola infection.

Within four hours of receiving the sample, results are returned: either the patient is infected with Ebola virus and must stay in the isolation ward; or has another illness and a much better prognosis.

The role of laboratory professionals during an infectious disease outbreak is fraught with risk and complications. This is especially true for Ebola virus disease (EVD), a highly infectious and politicised disease that has no cure, of which a recent outbreak has already claimed the lives of many community members and healthcare workers.

An important aspect of outbreak response is coordination; laboratory workers must effectively operate collaboratively with key partners to support the broader response effort, which includes providing universal access to diagnostic testing and other supportive services. Strong partnership amongst local, regional and international stakeholders—including the Ministries of Health (MOHs), the World Health Organization (WHO), implementing partners and community members—is vital; without this, the operational needs of laboratory workers, and the benefit they bring to the outbreak response effort, cannot be properly understood.



Rendering of a microscope image of ebolavirus.

How do laboratories in Ebola-affected areas deliver and sustain their vital services while navigating these multifaceted partnerships? This article will discuss the various key players with whom laboratory workers collaborate during an outbreak response, how mobile laboratories operate within such a coordinated effort and the essential integrated role of the community.

For centuries, infectious diseases have greatly strained health systems, infrastructure and communities, and have been deemed a “perpetual challenge”.^a Whether they are emerging or re-emerging infectious diseases, they can extend to epidemic levels in the absence of proper response preparedness. The current Ebola outbreak is causing health, emotional and economic damage in West Africa, and has reached emergency proportions, with many healthcare workers functioning heroically on round-the-clock operations.



Map of the spread of Ebola in West Africa, as of 14 August 2014. Information sources: <http://www.cdc.gov/vhf/ebola/resources/distribution-map-guinea-outbreak.html> and <http://healthmap.org/ebola/>. “Emerging infections: a perpetual challenge”. (November 2008). In *Lancet Infectious Diseases*, Vol. 8, No. 11.^a

Need for a Coordinated Response

During an outbreak, such as the current Ebola crisis in West Africa, the MOH functions as the voice of a country, offering leadership to bring the situation under control. Health ministers interact closely with and through the WHO, and rely on the support of a large network of partners who function together to implement results-driven infection control programmes. With so many groups working together, coordination requires purposeful effort, in order to reduce miscommunication, redundancy and missed opportunity in the implementation of control efforts. At a regional and global level, the WHO's representation at outbreak sites is meant to "ensure that all the teams that are sent to the ground are working in a coordinated and sustainable manner so that we can have good results," described Dr. Jean-Bosco Ndiokubwayo, Programme Manager for the WHO Regional Office for Africa, (WHO-AFRO), whose current role involves assisting the government of Guinea to control the Ebola outbreak. Bolstering the work of the WHO and MOHs, the Global Outbreak Alert and Response Network (GOARN)⁹ established in 2000 in collaboration with WHO and other health agencies, aims to provide rapid multi-disciplinary assistance to outbreak sites. GOARN works with partners to deploy laboratory, clinical, field epidemiological, infection control, logistics and social mobilisation experts to assess the situation, and to implement a plan of action to address the local needs of the community and country affected by an outbreak.¹⁰ GOARN, along with WHO, maintains operational coordination of partners through regular meetings, teleconferences and situational report updates that are created by key partners.¹¹ ASLM also has on-going activities for strengthening laboratory systems for improved early disease detection, surveillance and outbreak investigation. As such, the organisation is developing technical guidance on laboratory preparedness and response to the Ebola outbreak, and driving the establishment of an African Public Health Laboratories Network (APHLN).

Numerous partners came together in a WHO-sponsored emergency meeting in Accra to discuss the need for a rigorous multi-country response plan for the current Ebola outbreak, from 2-3 July 2014. The meeting brought together Ministers of Health from across the region, UN and WHO representatives, CDC, and partners involved in epidemic control to identify critical challenges, adopt inter-organisational strategies and mobilise experts as quickly and efficiently as possible. The meeting also served to reemphasise and announce strong institutional support to the public, as a reassuring effort. The two-day emergency meeting called for movement on critical clinical, epidemiological and cross-border collaboration logistics, and outlined roles for MOHs, the WHO and implementing partners in the infection control effort. Additionally, the meeting committee highlighted the need for increased support for laboratory operations, such as better diagnostics for improved case management, surveillance, contact tracing and research.¹²

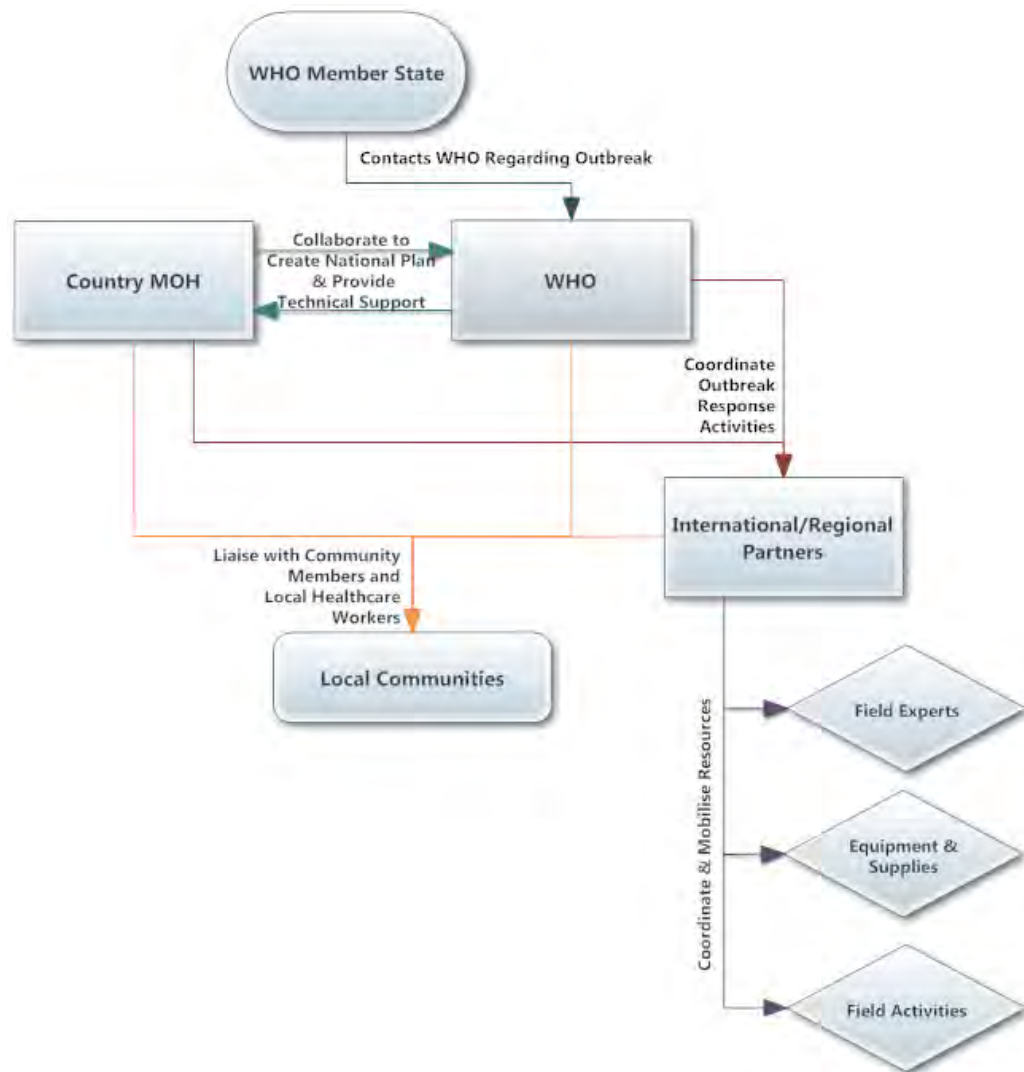
⁹ Global outbreak and response network- GOARN. WHO Media Centre. Retrieved from: <http://www.who.int/csr/outbreaknetwork/goarnenglish.pdf>

¹⁰ Ebola virus update, West Africa." (1 July 2014). WHO Regional Office for Africa. Retrieved from: <http://www.afro.who.int/en/clusters-a-programmes/dpc/epidemic-a-pandemic-alert-and-response/outbreak-news/4214-ebola-virus-disease-west-africa-1-july-2014.html>

¹¹ WHO strategic action plan for Ebola outbreak response in West Africa. (31 July 2014). WHO Global Alert and Response. Retrieved from: <http://www.who.int/csr/disease/ebola/outbreak-response-plan/en/>

¹² Communiqué. (3 July 2014). In WHO Regional Office for Africa. Retrieved from: http://www.afro.who.int/index.php?option=com_docman&task=doc_download&gid=9331&Itemid=2593

Just days after the Accra meeting adjourned, The Lancet published a statement from a group of researchers working in Sierra Leone outlining critical action items for containing the ongoing Ebola outbreak, which mirrored the directives of the Accra meeting. Similar to the international policy makers, the clinical researchers identified a need for better access of diagnostics to the general population; improving data sharing capacity for surveillance; increasing support for healthcare workers; and engaging the public in the creation and realisation of public health programmes.¹³



Interaction between country MOH, the WHO, partners and the local communities during an outbreak response.

¹³ Ebola in Sierra Leone: a call for action. (5 July 2014). The Lancet, Vol. 384, No. 9940.

Shaping the Future of Public Health in Africa

The multifaceted, collaborative nature of public health services, policy and research relies on generating, sharing and debating evidence-based practices to improve disease prevention, diagnosis, treatment, monitoring and containment. In order to be properly prepared for public health challenges such as emerging infectious diseases, we must advocate for open communication and information dissemination. Meetings and conferences not only allow the free exchange of ideas, they also facilitate the adoption of health policies that positively impact laboratory and treatment services, outbreak response, disease surveillance and, ultimately, patient care.

Convening international leaders in healthcare and laboratory medicine with the aim of exchanging ideas and addressing critical public health issues, the ASLM2014 international conference is an important venture for the improvement of public health in Africa and beyond.

By setting the agenda on issues such as emerging infectious diseases including the current Ebola outbreak, ASLM2014 will allow great minds across healthcare to increase awareness of issues of public health importance, disseminate information on innovations in diagnosis and treatment, gain buy-in from industry members and donors, and facilitate collaboration and partnerships.

For more information about ASLM2014 conference, Innovation and Integration of Laboratory and Clinical Systems, please visit www.aslm2014.org.

Mobile Laboratories: An Outbreak Response Tactic

The importance of rapid, accurate diagnoses is acknowledged by both international and local partners. Increasingly, outbreak response experts have sought to find alternatives for laboratory testing sites for providing such diagnoses. During outbreaks, concerns including transportation of specimens, the rapidly-changing nature of the outbreak, poor infrastructure, and the danger of transmission require alternatives, especially as some outbreaks occur many kilometres from where complex diagnostic testing can occur.

Accordingly, GOARN has facilitated mobile field laboratory operations and the provision of technical laboratory experts to detect early cases during an outbreak, including the current Ebola outbreak. According to Dr. Antonino Di Caro, who is working with the European Mobile Laboratory Consortium (EMLab), a partner in Ebola response funded by the European Union, the mobile laboratories are “deployed in the framework of GOARN to provide laboratory support to the Ebola outbreak response in the field.” During a recent interview, Dr. Di Caro noted that several European research and public health institutions and African partners are involved in the EMLab project and that WHO and Médecins Sans Frontières (MSF) have provided essential logistical support. Various

groups are brought together within the EMLab Consortium to help countries with limited capacity to identify epidemics early.¹⁴ Institut Pasteur Dakar, the National Public Health Agency of Canada and the National Institute of Communicable Diseases (NICD) of South Africa are amongst a select group of other organisations that have mobile laboratory capacity for use in outbreak response.

Since March 2014, rotating teams of EMLab scientists have been deployed to the bustling city of Guéckédou, Guinea, helping to bridge physical barriers to diagnostic access and to improve community awareness of the disease. By providing PCR testing, the presence of Ebola RNA as well as viral burden can be determined within a few hours of sample requisition. Mobile laboratories, such as the ones utilised by EMLab, are easily deployable to resource-limited settings and are complete with test kits both for Ebola diagnosis and other diseases, centrifuge, glove box, computer and analyser; trained staff are also deployed.¹⁵

“The best approach to bridge the ever-widening gap is through collaboration between African institutions, scientists and their peers.”- Mr. Rashid Ansumana, Research Director, Mercy Hospital Research Laboratory (MRHL), Sierra Leone ”

Mobile laboratories help increase access to diagnostics by minimising the distance between sample collection and testing site. According to Dr. Di Caro, mobile laboratories “can provide results in a few hours directly to the treatment centres and local public health authorities, supporting both isolation and contact tracing procedures.” The ability to provide prompt information on patients’ disease status allows uninfected patients to be released from isolation and safely integrated back into the community. On the other hand, if a patient is infected, staff can quickly begin tracing his or her contacts to reduce transmission in the community. Faster diagnosis can also provide critical information to families of the deceased such that timely burials can be conducted where possible without fear of spreading the virus.

A common difficulty in Ebola virus identification in West Africa is the differential clinical diagnosis between Lassa fever virus (LAFV), which is endemic in the region, or other pathogens. A study published in Emerging Infectious Diseases journal in July 2014 found that 30-40% of suspected Lassa cases from Kenema hospital in Sierra Leone (2006-2008) were confirmed as LAFV, while the remainder of suspected LAFV cases were caused by Chikungunya, Dengue, West Nile, Yellow Fever, Ebola, Marburg, and Rift Valley Fever viruses.¹⁶ Mobile laboratories offer the ability for differential diagnosis, thus improving clinical management support in real-time, and providing additional health services to the affected community. Some mobile laboratories have the capacity to conduct broad-spectrum diagnostics, such as multiplex quantitative real-time PCR (Q-RT-PCR) with fluorescently

¹⁴ Establishment of mobile laboratories for pathogens up to risk group 4 in sub-Saharan Africa. (2014). European Mobile Laboratory Project. Retrieved from: <http://www.emlab.eu/resources.html>

¹⁵ The mobile laboratory units. (2014). EMLab. Retrieved from: <http://www.emlab.eu/units.html>.

¹⁶ Undiagnosed acute viral febrile illnesses, Sierra Leone. (July 2014). Emerging Infectious Diseases Journal, Vol. 20, No. 7.

tagged probes, which allows for the testing of multiple pathogens in one patient sample in one run.¹⁷ Moreover, lateral flow rapid tests for malaria have been regularly performed in EMLab's mobile laboratories during the current Ebola outbreak. Researchers in mobile laboratories have also developed dry chemistry tests that do not require cold chain and that can be used to test for risk group 3 infectious agents.¹⁸ The ability for differential diagnosis by laboratories during a disease outbreak can serve as a great benefit to the community.

National Public Health Reference Laboratories in the region support mobile health laboratories and structured surveillance efforts. In many countries, these National Reference Laboratories are responsible for activities beyond sample testing, including surveillance, training and research coordination of the laboratory system, in order to translate surveillance data into tangible informed public health programmes. The Institut Pasteur of Dakar Unit of Arboviruses and Viral Haemorrhagic Fevers serves as a regional reference laboratory, testing suspected Ebola samples from Angola, Gambia, the Ivory Coast, Mali and Senegal. Experts from the laboratory have contributed to the setup of a mobile laboratory in Guinea to help strengthen monitoring capacity of the Ebola outbreak, and perform contact tracing and training of technicians.¹⁹ According to WHO, the Lassa Fever Reference Laboratory in Sierra Leone opened an Ebola testing centre in the earlier days of the current outbreak.²⁰

laboratories also play an integral role in Ebola outbreak response, and this kind of work can support improved collaboration with the MOH and other partners. Mr. Rashid Ansumana, Research Director at Mercy Hospital Research Laboratory (MRHL) in Kulanda Town, Bo, Sierra Leone, runs one such laboratory. When samples were run from a field site in Manjama, where Ebola had been found, Mr. Ansumana's laboratory detected other pathogens not related to the Ebola virus: "We detected a [different] bio-threat pathogen in one subject and reported that to the District Health Management Team (DHMT). The DHMT is aware of what we have and we have offered to help whenever our services are needed." This finding might have escaped a mobile laboratory if the pathogen in question were outside its diagnostic scope. Additionally, surveillance and monitoring can be done in research laboratories. At the MRHL, says Mr. Ansumana, "we map out study areas, conduct household demographic and health surveys, and examine the incidence and prevalence of various health conditions using cross-sectional and longitudinal cohort studies, laboratory and environmental testing and a variety of surveillance methods."



Healthcare workers in Sierra Leone wearing personal protective equipment. Image reproduced with the kind permission of Mr. Rashid Ansumana.

¹⁷ Flexibility of mobile laboratory unit in support of patient management during the 2007 Ebola-Zaire outbreak in the Democratic Republic of Congo. (September 2012). *Zoonoses Public Health Journal*, issue 59, supplement 2.

¹⁸ Oldach, L. (20 July 2014). Written interview with Antonino Di Caro.

¹⁹ Ebola Virus and Institut Pasteur. (30 July 2014). Pasteur Foundation. Retrieved from: <http://www.pasteurfoundation.org/news-article/ebola-virus-and-institut-pasteur>

²⁰ Sierra Leone Trains Health Workers on Ebola. (30 April 2014). Retrieved from: <http://www.afro.who.int/en/sierra-leone/press-materials/item/6532-sierra-leone-trains-health-workers-on-ebola.html>

While mobile laboratories can be used as part of a strategy that facilitates diagnostic access, there are limitations and challenges. For one, mobile laboratories are expensive, and require significant resources to run effectively. Concerns about biosafety measures for healthcare workers have also been raised. However, with careful collaboration and broad international support for addressing EID outbreaks, such limitations can be mitigated. With increased partnership, mobile laboratory directors can more easily attain resources needed from local partners, such as space for their facilities, transport within the country and security support to perform their jobs with maximal positive impact to the community.

Communities: Key Partners for Laboratory Workers in Outbreak Response

Of equal importance to infection control and outbreak response programmes is community engagement through social mobilisation. According to Dr. Ndiokubwayo, social mobilisation is “a very important part of Ebola outbreak management, because the population has to have the right information and take the appropriate measures to protect themselves and to collaborate with healthcare workers and other stakeholders to put in place Ebola control measures.” For example, home treatment of febrile illness caused by Ebola virus has been a major factor in the spread of the current outbreak. If communities in affected areas can be encouraged to seek medical care earlier, the prognosis for individual patients improves and the spread of infection can be hindered.

Emphasis on community engagement is not a new concept; during earlier Ebola outbreaks, community engagement was identified as a critical piece of the response effort. In the WHO/US Centers for Disease Control and Prevention (CDC) manual “Infection Control for Haemorrhagic Fevers in the African Health Care Setting,” the authors called for “mobilising community resources and conducting community education” to help guide the community in disease prevention and control.²¹ Currently, WHO is supporting MOHs in Ebola-affected countries to conduct training sessions whereby community leaders learn key information about Ebola which they can then pass on to community members.²²

However, despite community engagement efforts, some communities are sceptical of healthcare workers, including laboratory professionals. Laboratory work is, by its nature, bound by strict procedures, and in the case of Ebola requires special precautions such as the use of protective clothing. Thus, what goes on inside laboratories can easily be misconstrued by community members. Laboratory activities sometimes result in local rumours and hesitancy on the part of community members to comply with infection control processes or research activities²³ ; this can have

²¹ Infection control for haemorrhagic fevers in the African health care setting. (December 1998). Retrieved from: <http://www.who.int/csr/resources/publications/ebola/whoemcesr982sec1-4.pdf>

²² WHO supports Ministry of Health community education to contain Ebola in Liberia. (24 July 2014). In WHO Media Centre. Retrieved from: <http://www.who.int/features/2014/orientation-contain-ebola/en/>

²³ Doctors and vampires in Sub-Saharan Africa: Ethical challenges in clinical trial research. (12 May 2014). American Journal of Tropical Medicine and Hygiene. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/24821846>

devastating consequences on outbreak response efforts. According to a recent survey conducted by the non-profit organisation Samaritan's Purse, 92% of 1,000 people surveyed in Liberia said they do not believe Ebola exists.²⁴ Therefore, in some places a critical step to addressing Ebola may involve confronting social constraints to Ebola outbreak control.

Accordingly, adapting an outbreak response effort to align with the community's needs can be productive. "Local populations have the knowledge, cultural logic and practices that arguably can and should be integrated into [outbreak] responses," says Dr. Melissa Leach, Director at the Institute of Development Studies in Sussex, England, who has been closely involved in medical anthropology in Africa for 25 years.²⁵ While some pieces of an outbreak response – following protocols, for example – cannot change, the approach to explaining the procedures to local populations can.

“
Social mobilisation is a very important part of Ebola outbreak management, because the population has to have the right information and take the appropriate measures to protect themselves and to collaborate with healthcare workers and other stakeholders to put in place Ebola control measures.” - Dr. Jean-Bosco Ndiokubwayo, WHO-AFRO Programme Manager
”

Mr. Rashid Ansumana, Research Director at Mercy Hospital Research Laboratory (MRHL) in Kailahun Town, Bo, Sierra Leone, describes the community engagement efforts his institution has undertaken during this recent Ebola outbreak, stating, "We have done quite a lot including training of some healthcare workers, religious leaders from across the country, and orphans in key orphanages, on prevention practices."

Social science research can also help inform future outbreak response. In the first sociocultural study of an outbreak of Ebola conducted in Uganda, authors showed that while some cultural beliefs may be in opposition to the actions needed to curb an outbreak, the local community has a lot of knowledge about surviving epidemics, which could be useful for outbreak control efforts by international players.²⁶ Awareness and sensitivity surrounding such beliefs can help healthcare workers disseminate clear messages in accordance with the cultural norms of the setting.

All healthcare workers, including laboratory professionals, have an obligation to work in partnership with key partners and organisations to create positive narratives and facilitate an understanding within the community about laboratory diagnostics and outbreak response. Dr. Ndiokubwayo, describing the multi-coordinated efforts that have been undertaken, said "teams in Sierra Leone,

²⁴ Death and denial in the hotzone. (28 July 2014). Retrieved from: http://www.foreignpolicy.com/articles/2014/07/28/death_and_denial_in_the_hot_zone_west_africa_ebola_hoax

²⁵ Time to put Ebola in context. (July 2010). Bulletin of the World Health Organization. Retrieved from: <http://www.who.int/bulletin/volumes/88/7/10-030710/en/>

²⁶ Cultural contexts of Ebola in Northern Uganda. (October 2003). Emerging Infectious Diseases Journal, CDC. Vol. 9, No. 10.

teams in Liberia, [are] working closely with teams in Guinea, sharing information and sharing samples.” It is with great hope that these principles can be strengthened, replicated and circulated amongst agencies and across cultural divides to curb the damage done by the Ebola virus outbreak and ultimately save human lives.

The entire ASLM family would like to offer our deepest condolences and sympathies to those affected by the Ebola outbreak.

The current outbreak, the worst in human history, has now taken the lives of over 1,500 people in Guinea, Liberia, Nigeria and Sierra Leone. The virus poses serious risk to the communities affected, as well as to the brave health workers who are working to contain the spread of the disease.

The number of Ebola cases and deaths continues to rise, and there are grave concerns surrounding cross-border disease transmission. A robust, comprehensive response is needed to halt Ebola’s spread.

To confront this epidemic, we must look to African MOHs and the WHO for guidance. We call on country leaders, civil society, international partners, and the public to join hands in addressing this public health emergency. Thank you.

For more information about the current Ebola outbreak, please visit www.who.int/csr/disease/ebola/en.

Disclaimer: *The views and perspectives expressed by this article’s contributors consist of personal opinions and do not necessarily reflect the official policy or position of any agency.*

By: Michele Merkel, MS (Editorial Team); Contributors: Rashid Ansumana (MHRL, Sierra Leone), Antonino Di Caro, MD (National Institute for Infectious Diseases, Italy), Jean-Bosco Ndiokubwayo, MD, MSc, MPH (WHO-AFRO); Editor: Laurel Oldach (Editorial Team)

UNAIDS Sets New Targets for HIV Treatment and Testing

From 16-17 June 2014, in Geneva, Switzerland, ASLM co-hosted a consultative meeting, “Towards a Final Target for HIV Treatment: The Role of Laboratory Medicine,” in collaboration with the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO). The meeting convened over 100 stakeholders to review the current status of HIV diagnosis and monitoring, share country experiences and innovations in laboratory monitoring, and set the foundation for more accessible and efficient laboratory systems, particularly in low- and middle-income settings. At the meeting, participants led presentations and group discussions on the HIV diagnostics technology pipeline, the expansion of access to HIV viral load, the current capacity-

A month later, building on the principles established in the June meeting, ASLM helped to launch the Diagnostics Access Initiative at the AIDS 2014 international conference in Melbourne, Australia, in partnership with UNAIDS, WHO, the Clinton Health Access Initiative (CHAI), the United Nations Children’s Fund (UNICEF), and the US President’s Emergency Plan for AIDS Relief (PEPFAR). The initiative calls for the improvement of laboratory capacity to ensure that people living with HIV are connected to effective, high-quality HIV diagnostic and treatment services, with the specific goal of assuring that 90% of all people living with HIV know their HIV status, 90% of all people with diagnosed HIV infection receive sustained antiretroviral therapy, and 90% of all people receiving antiretroviral therapy have achieved durable viral suppression.. The initiative also aims to improve early infant diagnosis and guarantee that people on HIV treatment have access to tests monitoring their viral levels.



Participants of the ASLM/UNAIDS/WHO Consultative Meeting on the Role of Laboratory Medicine in HIV/AIDS Treatment.

It is important to monitor HIV viral load as it provides important information about how the virus is progressing and how the body is responding to treatment. Likewise, early infant diagnosis is of paramount importance because HIV progresses much more quickly in young children than in adults, and early initiation of treatment is essential to reducing mortality among infants with HIV.²⁷

²⁷ WHO. Antiretroviral therapy of HIV infection in infants and children: towards universal access. Recommendations for a public health approach – 2010 revision. World Health Organization. Geneva, Switzerland. Available from: http://whqlibdoc.who.int/publications/2010/9789241599801_eng.pdf

Knowledge of HIV Status Worldwide



Worldwide, it is estimated that just over 45% of individuals with HIV are aware of their HIV status.²⁸

Goal Knowledge of HIV Status



One of the Diagnostic Access Initiative's goals is to achieve awareness of HIV status for 90% of all individuals living with HIV.

"The Diagnostics Access Initiative focuses urgent attention on the importance of developing new, affordable viral load and infant diagnosis technologies,"²⁹ says ASLM CEO Dr. Tsehaynesh Messele. She adds that better use of prevailing and emergent technologies for viral load and early infant diagnosis "will demand substantially stronger laboratory capacity as well as strategic planning."³⁰

Founders of the new initiative will advocate for greater subsidies for laboratory services and new diagnostic tools, work to close access gaps, and establish new and harmonised public health partnerships to achieve the initiative's goals.

By: Rachel Crane (Editorial Team); Contributor: Corey White, MPA (Editorial Team); Editor: Aaron Krol (Editorial Team)

²⁸ UNAIDS, ASLM and Partners Launch Initiative to Improve HIV Diagnostics. (2014, July 23). Retrieved July 23, 2014, from http://www.aslm.org/stay-informed/press-room/press-releases/unaid-aslm-and-partners-launch-initiative-to-improve-hiv-diagnostics/?utm_source=Press+Release%3A+Launch+of+DAI&utm_campaign=DAI+press+release&utm_medium=email

²⁹ UNAIDS, ASLM and Partners Launch Initiative to Improve HIV Diagnostics. (2014, July 23). Retrieved July 23, 2014, from http://www.aslm.org/stay-informed/press-room/press-releases/unaid-aslm-and-partners-launch-initiative-to-improve-hiv-diagnostics/?utm_source=Press+Release%3A+Launch+of+DAI&utm_campaign=DAI+press+release&utm_medium=email

³⁰ UNAIDS, ASLM and Partners Launch Initiative to Improve HIV Diagnostics. (2014, July 23). Retrieved July 23, 2014, from http://www.aslm.org/stay-informed/press-room/press-releases/unaid-aslm-and-partners-launch-initiative-to-improve-hiv-diagnostics/?utm_source=Press+Release%3A+Launch+of+DAI&utm_campaign=DAI+press+release&utm_medium=email

An Interview with Mr. Sagie Pillay, Co-Chair of ASLM2014

Sagie Pillay of the National Health Laboratory Service (NHLS), South Africa, recently spoke with us about his roles in NHLS and ASLM2014, the collaboration between NHLS and ASLM, and his hopes for the future of African laboratory medicine.

Mr. Pillay has extensive experience in national and international hospital and laboratory leadership and management, and possesses both a master's degree in business administration (University of Liverpool, UK) and a master's degree in health management, policy and planning, and health economics (University of Leeds, UK).

Can you tell us a little about your professional background and current projects?

I am currently the CEO of the NHLS and also serve on a few NGO Boards. As CEO of NHLS, a government-owned entity, I help run the largest diagnostic pathology laboratory service in South Africa. NHLS serves the entire South African public health system, as well as Correctional Services and the Military Health Services. Servicing about 80% of the South African population, NHLS has a staff of over 6,500 people in 349 laboratories across the country.

The three mandates of NHLS include laboratory services, production of all pathologists for the country, and the undertaking of relevant research to inform service innovation and affordability. In the next five years, NHLS is placing a strategic focus on reviewing and re-engineering the healthcare service model, making services more affordable, developing human resource norms to inform the service model, and creating a human resources plan for the country's diagnostic laboratory services.

What would you say have been the major highlights of your career so far?

Together with the NHLS team, we launched the largest HIV and TB testing programme in the world. Under my leadership, NHLS has established technology available for AIDS monitoring, introduced a CD4 programme, reduced the cost of providing CD4 tests, and achieved four million CD4 tests in 2012 alone. We are currently exploring more affordable solutions for diagnostics, performing a study on lowering CD4 count in children, rolling out the GeneXpert diagnostic platform in-country, launching TB programmes in South African mines in collaboration with partners, and working to improve turnaround times for diagnostic results.



Mr. Sagie Pillay

Please tell us a little about your role in the ASLM2014 conference. How did you become involved in this role, and what are your expectations of the conference?

I am currently the co-chairperson for this much awaited ASLM2014 conference. NHLS is a founding member of ASLM and we have representation on the Board. I was extremely excited by the vision of ASLM and by our involvement with the other partners. Laboratory medicine is seriously undervalued on the African continent, even though it is at the centre of the health system. Having worked in East Africa previously, I knew getting involved with ASLM was the right thing to do. I was compelled to action by the idea of Africans collectively taking the lead to build a pan-African movement to raise the profile of laboratory medicine, mobilise resources, lobby Ministers of Health to place laboratory medicine on the health system strengthening agenda, and develop programmes to train laboratory professionals.

“ I was compelled to action by the idea of Africans collectively taking the lead to build a pan-African movement to raise the profile of laboratory medicine ”

Wherever you go in Africa, people are talking about the upcoming ASLM2014 conference and looking forward to attending. The ASLM leadership has kept the momentum going between the 2012 and 2014 conference. In my experience, many of us have engaged with various committees, and attended workshops and planning sessions to give tangible expression to the 2012 Ministerial Call for Action.

What was your involvement in ASLM2012? What did you enjoy most about the 2012 conference, and what can be improved upon in 2014? What would you like ASLM to accomplish in the coming years to support African laboratory scientists?

NHLS provided behind-the-scenes support for this landmark conference. It was a huge privilege for the first conference to be held in South Africa and for the NHLS to be part of the organising committee. The 2012 conference was well attended, made up of eminent African academics, the continent's leading laboratory professionals, heads of laboratory services and healthcare organisations, managers, senior representatives from other countries, NGOs and others.

“ Wherever you go in Africa, people are talking about the upcoming conference and looking forward to attending. ”

Other highlights from the conference included networking and collaboration opportunities, relevant and interesting workshops, the presentation of balanced information on the diagnostic technology pipeline for Africa, and the signing of the Ministerial Call for Action. It was also inspiring to realise that we all share similar challenges and can learn from each other's successes and experiences.

My personal outcome for the ASLM2012 conference was getting support from country representation, and assessing the need for ASLM. An equally important outcome was getting political commitment through calls of action. The energy and excitement throughout the conference was palpable. More than nine Ministers demonstrated strong political support for laboratory strengthening, and the conference exceeded expectations.

My expectation for the ASLM2014 conference is to receive an update on progress since the last meeting, to perform a gap analysis of our goals versus our actual achievements, and to discuss remaining gaps in the achievement of our objectives. Furthermore, I look forward to hearing about latest country experiences on HIV/TB programme implementation and discussing new and upcoming technological solutions for the scale-up of HIV/TB interventions.



Mr. Pillay presenting at the ASLM2012 international conference in Cape Town, South Africa.

How can ASLM and NHLS further collaborate to advance laboratory medicine and public health in Africa?

ASLM and NHLS have established a good relationship dating back to ASLM's launch. There are already four areas on which NHLS and ASLM are collaborating. These include establishing the Pan African Harmonization Working Party (PAHWP) to improve regulatory harmonisation for diagnostics within economic zones; establishing an international network of proficiency testing providers to support SLIPTA (the Stepwise Laboratory Quality Improvement Process Towards Accreditation) and other quality improvement and accreditation programmes; fostering the establishment of an African Network of Public Health Laboratories; and strengthening evidence-based health policy development in Africa.

Do you have anything else to add?

Diagnostic tests provide the gateway to HIV care and enable clinicians to monitor treatment outcomes to determine treatment success. Improving access to tests and strengthening laboratory health systems must become a key imperative in the efforts to strengthen health systems across the continent. ASLM must expand its influence by building on its partnerships with UNAIDS, WHO and donors, to mobilise for increased resources for laboratory medicine. Concurrently, ASLM should

continue lobbying Ministries of Health to promote country ownership by setting targets for higher health budgets. A portion of health budgets should be dedicated to investments in laboratory infrastructure, the training of laboratory professionals, and investment in other laboratory health systems strengthening initiatives. This way, we will be able to enhance the ability of laboratory medicine to contribute to rapid treatment scale-up and support for the rest of the testing needs of clinicians and patients. Appropriate use of diagnostic laboratory services should not be seen as a cost driver, but rather as a cost saver for the overall health system.

ASLM is an African organisation led by Africans. Let the Africans take the African agenda into their hands. Africa's future is in our hands. An HIV-free tomorrow is within our reach, and as Africans we must collectively take the lead and deliver this future under the banner of ASLM.

Contributor: Andrew Mukanya (NHLS, South Africa); **Editor:** Rachel Crane (Editorial Team)

Leveraging Collaboration to Improve HIV Diagnostic Quality and Expand Testing in Africa



Participants of the “Consultative Meeting on Improving Access and Increasing Quality of HIV Testing in Africa”.

From 23-25 June 2014, in Dar es Salaam, Tanzania, ASLM hosted the “Consultative Meeting on Improving Access and Increasing Quality of HIV Testing in Africa”, in collaboration with the Joint United Nations Programme for HIV/AIDS (UNAIDS), World Health Organization Regional Office for Africa (WHO-AFRO), the US President’s Emergency Plan for AIDS Relief (PEPFAR), USAID and the US Centers for Disease Control and Prevention (CDC). The meeting convened about 80 participants from partner organisations and Ministries of Health, who gathered to exchange experiences and provide structured feedback on current efforts to improve the quality of and

access to HIV-related diagnostic testing, particularly at the point-of-care in resource-limited settings.

The meeting consisted of eight sessions, and included presentations and discussions on the following:

- Partner perspectives on the achievement of coverage and uptake of quality-assured HIV rapid testing;
- Field experiences from initiatives to increase access to HIV testing;
- Strategies for implementing an HIV Rapid Testing Quality Assurance Initiative;
- Means of assuring accuracy and reliability of HIV point-of-care testing (POCT);
- Benefits and challenges of community-based approaches such as HIV self-testing;
- Development of a policy framework to implement high-quality HIV POCT;
- Next steps and way forward.

Globally, only about half of people living with HIV know they are infected. Sub-optimal use of high-quality HIV diagnostic tools is one factor preventing adequate antiretroviral coverage and viral suppression. Thus, assuring access to high-quality HIV diagnostics is essential to ending the AIDS epidemic. Moving forward in the fight against HIV/AIDS, countries and partners are establishing new targets for diagnosis, antiretroviral treatment and monitoring. To optimise and extend HIV diagnostic and treatment capacity across Africa, stakeholders must invest in and strengthen technologies, laboratory networks, quality management systems and human resources.

ASLM CEO Dr. Tsehaynesh Messele represented the Society at the meeting, stressing the importance of the ASLM2012 Ministerial Call for Action and the ASLM2020 strategic vision. The ASLM2020 vision comprises four strategic areas including laboratory accreditation, national and regional regulatory environments, a network of National Public Health Laboratories, and laboratory workforce development. Dr. Messele expressed her hope that the consultative meeting would result in the adoption of new HIV testing guidance documents and policies, in addition to allowing participants to build consensus on innovations and best practices in HIV diagnostic technologies.

The meeting report for the Dar es Salaam “Consultative Meeting on Improving Access and Increasing Quality of HIV Testing in Africa” will soon be available on the ASLM website, www.ASLM.org.

Contributor: Rachel Crane (GSSHealth); **Contributors:** Corey White, MPA (Editorial Team) and Ruth Girma (ASLM)

ASLM Joins GLI Core Group

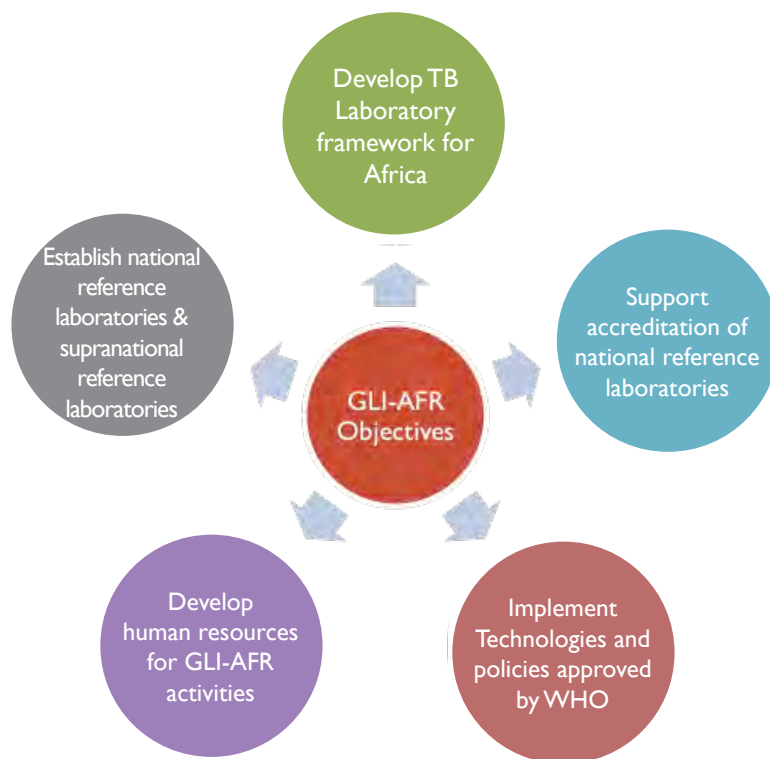
ASLM is pleased to announce that CEO Dr. Tsehaynesh Messele was recently elected a member of the Core Group of the Global Laboratory Initiative (GLI) and presented at a GLI partners meeting. GLI is a working group of the Stop TB partnership dedicated to expanding access to quality assured laboratory services in response to the challenges of diagnosing and monitoring tuberculosis. Dr. Messele represents ASLM on the GLI Core Group.

Since 2008, GLI has developed essential tools and guidance frameworks to strengthen laboratory systems, particularly in TB-endemic countries. The GLI Core Group, whose membership is drawn from organisations involved in laboratory services at the national and international levels, serves as an independent advisory group that evaluates and facilitates GLI activities. Dr. Messele and six other new members were elected to serve as 2014-2015 Core Group members from a pool of over 50 applicants.

From 30 April-2 May 2014, Dr. Messele participated in the 6th GLI partners meeting in Geneva, Switzerland, which convened key stakeholders to discuss GLI achievements, experiences, lessons learned and future plans. On Day 1 of the meeting, Dr. Messele gave a presentation on the Global Laboratory Initiative for the African Region (GLI-AFR), a GLI working group launched in 2013 in Addis Ababa, Ethiopia, with the goal of supporting African countries in the achievement of quality-assured and accessible TB laboratory services. Dr. Messele is currently the interim Chair of the GLI-AFR Core Group.

In her presentation, Dr. Messele spoke about current limits to TB diagnostic capacity in Africa; the structure, objectives and strategic activities of GLI-AFR; and the role and importance of partnership in advancing the goals of GLI-AFR. To support the improvement of laboratory services for TB control in Africa, GLI-AFR will strive to achieve the following:

- Develop a TB laboratory framework for the African region;
- Develop human resources for GLI-AFR activities;
- Facilitate the establishment of national reference laboratories and supranational reference laboratories;
- Support the accreditation of national reference laboratories;
- Introduce and implement technologies and policies approved by the World Health Organization (WHO).



GLI-AFR will work towards its objectives through partner support activities, such as consolidating existing TB control efforts, pooling resources to scale up activities, promoting results-oriented collaboration, and engaging partners outside of the laboratory medicine sector.

For more information on the work of GLI, please visit: <http://www.stoptb.org/wg/gli/default.asp>.

By: Rachel Crane (Editorial Team); Contributors: Tsehaynesh Messele, PhD (Editorial Team) and Corey White, MPA (Editorial Team); Editor: Aaron Krol, MFA (Editorial Team)

There Is No Place Out Of Reach: Daktari Develops Quality Products Geared Toward Remote Settings



Daktari Diagnostics is the Strategic Partner Sponsor for the ASLM2014 conference, and played an integral role in the original corporate sponsorship team for ASLM's first international conference in 2012. A developer of diagnostic products that address the most pressing challenges in global health, Daktari has built its business around accurate, affordable and portable diagnostics that can be deployed in any setting.

Why did you decide to partner and support ASLM, and specifically the ASLM2014 conference?

Our main goal here at Daktari Diagnostics is to meet the diagnostic needs of African health systems, and it is vital that our endeavours align with laboratory medicine needs throughout Africa. Being involved with ASLM is a great way to ensure that we are on track to meet the needs of our target market, while also allowing us to communicate with and learn from our peers in the global health community.

After attending one of the early ASLM strategy sessions in Addis, we fully realised the organisation's great potential to address some of Africa's most pressing public health issues. Daktari Diagnostics had the opportunity to be an Inaugural Corporate Sponsor at the ASLM2012 conference, after which we were excited to explore additional opportunities to support and be a part of the innovative and forward-thinking ASLM community. This year's conference theme, "Innovation and Integration of Laboratory and Clinical Systems: Reshaping the Future of HIV, TB, Malaria, Flu and Neglected Tropical Disease and Emerging Pathogens in Africa," captures the essence of Daktari's mission. Through innovative point-of-care (POC) technologies, Daktari hopes to change the way healthcare systems address these diseases.

What are your areas of diagnostic expertise, and how does this help address diagnostic challenges in Africa? How is Daktari helping to solve such challenges?

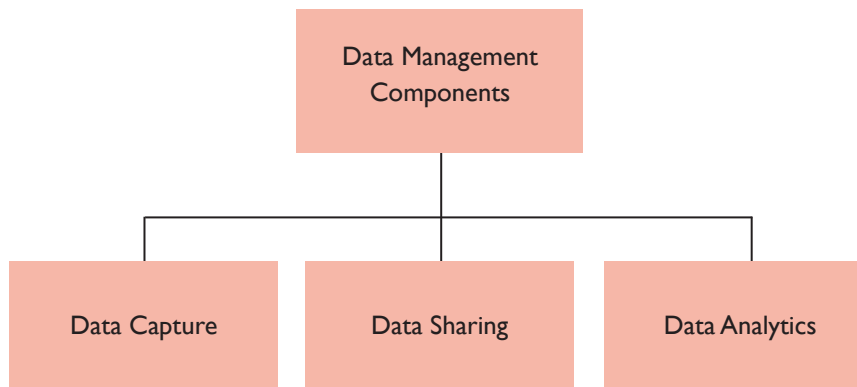
Daktari's diagnostic expertise is in developing and commercialising POC technology. Currently, we are focusing our efforts on launching a CD4 count test for people living with HIV, as well as

developing a viral load test for both HIV and HCV. The traditional CD4 testing process using a flow cytometer can be time-consuming, because a sample collected at a local clinic must often be shipped to a central laboratory hundreds of miles away. Many times, this long trip results in a spoiled sample that cannot be tested. Ultimately, this means that a patient cannot be properly staged and placed on treatment in a reasonable or safe amount of time.

A POC CD4 test, which is efficient, portable and connected, allows the patient to receive a diagnosis and CD4 count in one 15-minute session, virtually anywhere. This allows for immediate enrolment in an ART programme. POC tests also decrease loss to follow-up, as the patient can determine his or her CD4 count on the spot, and be immediately counselled and educated about treatment options. It is our hope that Daktari can utilise innovative technologies in our first POC test—designed specifically for hard-to-reach locations in Africa—to create diagnostics to address other pressing conditions.

You emphasise the importance of data management systems in diagnostics. Why is that, and how does that help patients get optimal care?

Efficient data management systems are vital to providing the highest quality healthcare to patients, especially to those living with HIV and other chronic diseases. Three data management functionalities help patients get optimal care: data capture, data sharing and data analytics, all of which were considered when we developed Daktari's data management system, Daktari InSight.



With regard to data capture, we have found that the current system of keeping written patient records in large ledgers is not entirely effective. After leaving clinics, these ledgers are typically sent from one hospital tier to another; if and when the records reach the Ministry of Health, they are likely outdated, leading to inaccurate projections of the burden of disease, medication, equipment, and consumables needed for the following year(s). Daktari InSight allows care providers to input patient information at the point of care and integrate this information with the patient's clinical result. This information is then printed and/or transmitted wirelessly over secure cellular networks, integrating seamlessly into already existing Electronic Medical Record (EMR) Systems or Laboratory Information Systems (LIS). Captured data and additional analytics can also be viewed easily via the secure Daktari InSight website.

Data sharing is simplified using Daktari InSight; CD4 test results can be automatically communicated directly to the EMR system and/or LIS of choice, allowing the programme manager and healthcare provider to see the results instantaneously. This allows the provider to process results and get the patient on treatment quickly, which is essential for patients with very low CD4 counts.

Daktari InSight also allows for careful data analysis by providing rapid access to clinical data, inventory levels, equipment and staff performance, and geo-location information from where the CD4 tests are being conducted. This information allows programme managers to have a real-time view of quality metrics and the health of their patients, programme, staff, equipment, inventory, and more. With the ability to track this information easily and generate reports of aggregated clinical and logistical information over time, one can monitor and conveniently share trends in patient care, inventory management, programme performance, and more.

What opportunities do you see in Africa to expand POC diagnostics?

Over the past few years, we have invested time and resources to develop a platform technology that can now be applied to some of the world's most pressing global health issues, starting with CD4 enumeration for patients living with HIV. Daktari is currently developing POC viral load tests for patients living with HIV and Hepatitis C. We are also exploring opportunities to address HIV drug adherence, full blood counts, tuberculosis, and some of the leading causes of maternal mortality. We believe that the technology we've developed can be used to address many of these unmet needs and we plan to leverage the infrastructure we are putting into place to improve the delivery of life-saving diagnostics throughout Africa.

Data communication of diagnostics requires robust ICT infrastructures in remote parts of the world including rural Africa. How do you tackle such challenges?

Like much of Africa, Daktari has gone mobile. Well over 70% of patients now have access to cellular phones in Africa. The Daktari CD4 and Daktari InSight have been designed to leverage existing infrastructure and create a seamless experience for the patient, operator, and programme manager. The Daktari CD4 has an embedded global machine-to-machine SIM to transmit CD4 count results and performance data to a central database using Daktari's InSight technology. The global SIM prevents the need for Daktari CD4 users to enter into contract agreements with local network providers. We've elected to utilise short messaging service (SMS) functionality, which is the most reliable method of transmission as long as a cellular signal is within reach. Daktari will continue to support endeavours made by Google, local cellular network providers, and other interested parties to improve cellular connectivity throughout Africa, which will ultimately improve data management for all.

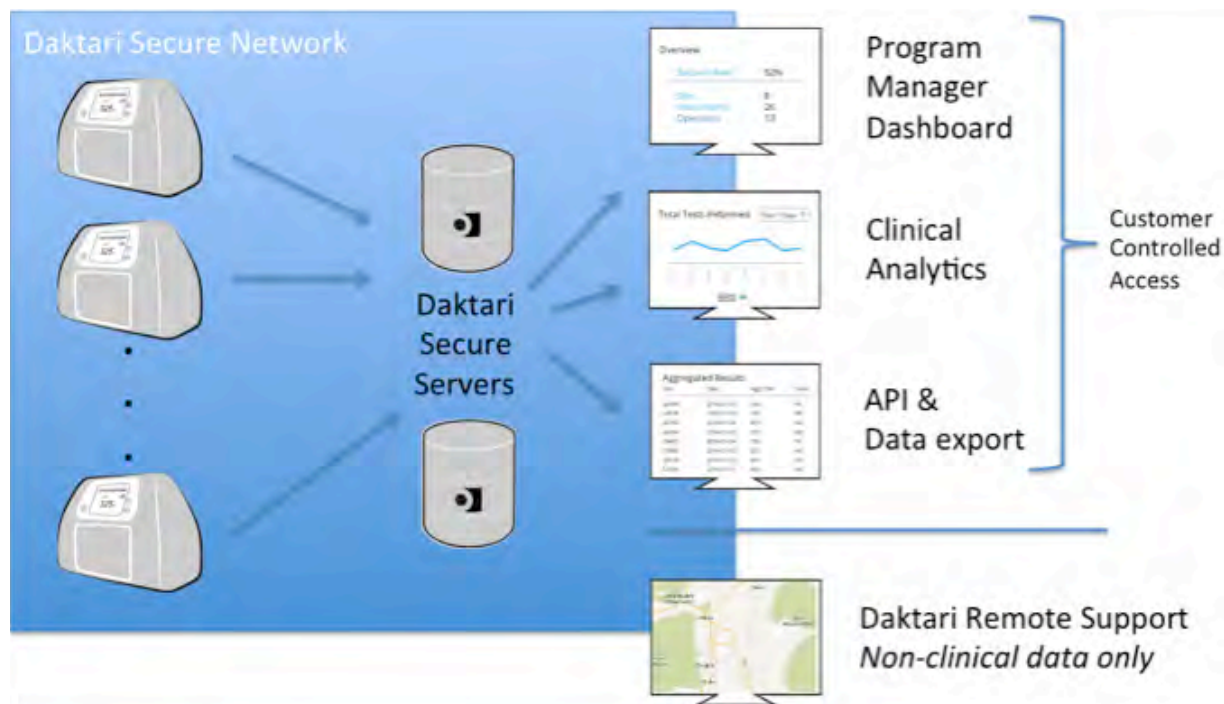


Image reproduced with the kind permission of Daktari Diagnostics.

Tell us a bit more about Daktari. Why did Daktari focus on a CD4 test for its first product?

Daktari Diagnostics is a global health technology company dedicated to solving the world's greatest health challenges. Daktari's founder and CEO, Bill Rodriguez, MD, an Infectious Disease Physician who specialised in HIV medicine, was the first Chief Medical Officer of the Clinton Foundation. Thanks to his international experiences, Dr. Rodriguez is well-versed in the challenges that low-resource environments face in providing access to healthcare services.

During his time with the Clinton Foundation, Dr. Rodriguez ran into different issues impacting Africa's healthcare systems, one of the most significant being the general lack of basic blood tests used to monitor health. Rodriguez and fellow Daktari founders decided to take on the challenge of creating simple, portable diagnostic devices, and concluded that the most critical test was a CD4 count.

Daktari experts have been involved in the development of new testing technologies, one of which appears in the December 2013 issue of Science Translational Medicine. Tell us more about such initiatives at Daktari.

When we began brainstorming as to the greatest medical and diagnostic needs for rural Africa and other low-resource settings, we thought first of the medical need. What were the biggest areas of difficulty for healthcare practitioners in the field? What information or tools did they need? Once

it became clear that CD4 counts were one of the biggest needs, we then focused on creating the technologies that would make a POC device possible, including microfluidics and electrochemical sensing. Daktari's sample preparation technology, known as microfluidic cell chromatography, isolates cells and other particles in a miniature sensing chamber without pipetting, labels or reagents.

A second innovation, electrochemical sensing, or lysate impedance spectroscopy, uses a simple sensor that counts the captured CD4 cells by measuring their internal contents electrically. In short, we developed a technology without optics and lasers, in order to create a simple and robust solution for use by anyone, anywhere. As described in the feature cover story in *Science Translational Medicine*, the new sensor technology developed at the University of Illinois and with collaborators at Daktari could lead to an inexpensive, easy-to-use diagnostic for white blood cell counts. Based on Daktari technology, the new device uses a miniaturised chip designed to process fluids and sense cells electronically. The Daktari technology can detect sub-populations of white blood cells, such as CD4+ and CD8+ T cells, and the new sensor technology can count all white blood cells as well as lymphocytes, monocytes, and granulocytes--known in medicine as a "three-part differential"—just as accurately as more time-consuming approaches that require larger volumes of blood and complex instruments. Currently, the group is working on miniaturising the setup to make the technology handheld, as well as designing a cartridge that can be mass-produced. This is one of many tests in the development pipeline at Daktari.

Daktari is also very keen to leverage the infrastructure being put into place to deliver, support, and service the Daktari CD4 and bring other critical tests to the communities in which we are working and to assist in the commercial development, data management, and roll out of these novel POC technologies.

Contributor: Betsy Wonderly (Daktari Diagnostics), Caitlin Cumming (Daktari Diagnostics) and Brooke Chateaufneuf (Daktari Diagnostics); **Editor:** Laurel Oldach (Editorial Team)

35 million people are living with HIV.
70% of them are in remote areas where access to care has been limited.

Until now.



Bring everyone the care they need
with the ultra-portable, wireless, battery-powered

DAKTARI CD4



Be Efficient

Start up and begin testing in one minute, delivering results while the patient is on-site.



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Run 50 tests per battery charge and spend more time where it matters most: with patients.



Be Connected

Securely transmit your results in real time to monitor performance, inventory, and patients remotely.

Profile of a Medical Research Advocate in Senegal: Prof. Souleymane Mboup



Prof. Souleymane Mboup

Could you tell us a little about your role at Cheikh Anta Diop University in Dakar?

At the university level, I'm the Head of the Bacteriology-Virology Laboratory at le Dantec Hospital in Dakar, which is a teaching hospital of Cheikh Anta Diop University. The Bacteriology-Virology Laboratory is Senegal's reference laboratory, and here we perform research on HIV/AIDS and sexually transmitted diseases. I teach at the hospital laboratory, as well as perform medical research.

I coordinate many activities, including at the national level with disease surveillance and monitoring programmes, and at the regional level where I coordinate regional health networks. Regionally, I work with the West African Network of Excellence for TB, AIDS and Malaria (WANETAM) and am the coordinator for HIV research and prevention efforts of the West African Platform for HIV Intervention Research (WAPHIR) and the Canadian HIV Vaccine Initiative (CHVI). WANETAM is a collaborating centre for both UNITAID and ASLM, so I am also involved in coordinating cooperative efforts.

I also engage in surveillance, education and capacity-building efforts. Capacity building is very important, as is surveillance, at the national and regional levels. At the university, we offer a specialised degree in biological retrovirology.

What are your principal research efforts at Cheikh Anta Diop University?

We are medical microbiologists, so we do a lot of research on infectious diseases. Much of our work has been on HIV, particularly because we co-discovered HIV-2 in collaboration with Harvard University and the Universities of Tours and Limoges in France. We do a lot of research on HIV in general, but also on the issue of HIV drug-resistance. We also research tuberculosis and the potential for a TB vaccine. In addition, we perform research on malaria with the Harvard School of Public Health and are conducting research projects on drug-resistant malaria. So, for the most part our work focuses on the big three diseases: HIV, TB and malaria.

Are you currently working on any particularly interesting research projects that you would like to discuss?

We are engaged in many interesting projects on HIV, examining the interaction between HIV-1 and HIV-2, looking into vaccines, and studying the genetic diversity of HIV and its development of drug resistance. With TB, we are doing work on the TB vaccine candidate MVA85A, which was developed by Oxford, looking at the vaccine's efficacy in adults. Furthermore, we are researching malaria and malaria drug resistance, as I mentioned before.

In addition to research, our laboratory is working with the US Centers for Disease Control and Prevention (CDC) to assure the quality of laboratory services through proficiency testing (PT). We provide quality assurance services to nearly 400 laboratories in Africa, making sure that laboratory products and services are accurate. Furthermore, we're active in promoting scientific training and leadership, demonstrating African leadership in education, research, PT and capacity building.

What are the greatest challenges to laboratory services and research in Africa, in your opinion?

The biggest challenge is a lack of means. Laboratories need equipment and resources to function correctly, and unfortunately laboratories are the least prioritised aspect of the healthcare system. Many laboratories are underequipped and underfinanced, and thus lack the capacity to achieve international quality standards.

Inadequate resources are also an issue in African research laboratories, which often lack the means to perform good research and build up strong research teams. That's why laboratory development initiatives offered through organisations such as ASLM are so important, as they stress quality improvement activities and strengthen laboratory safety. The new Diagnostics Access Initiative, launched by the World Health Organisation (WHO), the Joint United Nations Programme on HIV/AIDS (UNAIDS), CDC, ASLM, the Clinton Health Access Initiative (CHAI), and others, is very important for developing laboratory medicine; without the laboratory, quality healthcare cannot exist.

“Laboratory development initiatives offered through organisations such as ASLM are so important, as they stress quality improvement activities and strengthen laboratory safety.”

How have diagnostic and research laboratories evolved over the past 10-15 years?

There have been different programmes spearheaded by organisations like WHO and CDC, which have aided laboratory development in certain African countries. Programmes supporting laboratory accreditation, such as SLIPTA (Stepwise Laboratory Quality Improvement Process Towards Accreditation) and SLMTA (Strengthening Laboratory Management Toward Accreditation),

have helped increase the number of internationally accredited laboratories on the continent. Unfortunately, because many national laboratory development programmes are supported by outside organisations, major improvements have been observed only in specific countries and do not apply to the continent as a whole.

What is your role in ASLM and in ASLM2014?

I am a member of the ASLM Board of Directors, which makes major decisions about the goals and activities of the Society. I am also on the ASLM2014 Scientific Committee, which is responsible for planning and organising the conference's scientific programme. Furthermore, I am a Senior Editor for the African Journal of Laboratory Medicine (AJLM), and I help support the journal's publication. In my roles in ASLM, I strive to boost involvement of the francophone African laboratory community, as I believe that francophone African leadership is essential. I also try to mobilise stakeholders at the political and scientific levels to participate in the ASLM2014 conference.

What are your hopes and expectations for the ASLM2014 conference?

The ASLM2012 conference was a great success and offered many different perspectives. The conference was good for the visibility of ASLM and of the laboratory medicine field, convening different scientific specialists and providing great networking opportunities. My hope for ASLM2014 is that it builds upon the last conference's scientific expertise and opportunities for collaboration. ASLM needs to maintain the momentum created during ASLM2012 by showing conference participants that the Society continues to be a success and continues to advance laboratory medicine. I also hope that ASLM2014 garners the participation of many different countries and represents the interests and needs of Africa's many cultures and languages.

Editors: Rachel Crane (Editorial Team) and Michele Merkel, MS (Editorial Team)

Supercharge Your Career at ASLM2014: A Participatory Workshop Series for Professionals



Promoting the individuals who form Africa's laboratory medicine workforce by cultivating professional development is pivotal to advancing the laboratory profession. Based on this belief, ASLM and the editors of the African Journal of Laboratory Medicine (AJLM, ASLM's peer-reviewed journal) are offering Supercharge Your Career workshops at ASLM2014, aimed to provide laboratory professionals a unique forum to expand their skills. At these sessions, experts will encourage active and hands-on participation in course topics such as scientific and news writing, oral and poster presentations, data analysis, CV writing and more. A lunch with high-level leaders in laboratory medicine will also be held, in which leaders will meet small groups of 15-20 participants to share their experiences and discuss career opportunities. All conference registrants are invited to attend these activities at no additional cost.

Such career development venues allow attendees to build upon existing skills, such as: presenting findings and case studies to colleagues at local conferences; fine-tuning skills to analyse and present laboratory data for meaningful interpretation; and attaining confidence to submit strong abstracts and manuscripts for presentation or publication. These workshops will also highlight key professional development approaches that have emerged in this global community, by providing an opportunity to network with and learn from new and seasoned colleagues, as well as seeking out online informational learning forums for continued education.

Unique to this training series is its support of professionals in developing an actionable framework that can be incorporated into their daily work environment. ASLM2014 promises to be a seminal event, in which hundreds of laboratory and health practitioners around the world will unite to discuss ideas, share successes and challenges in laboratory medicine, forge partnerships with key players and participate in discussions about unique research findings and case studies regarding clinical diagnostics in the African context.

For more information about the exciting professional development workshop series of ASLM2014, please visit: www.aslm2014.org/ehome/index.php?eventid=65245&tabid=185378. We look forward to seeing you at ASLM2014!

By: Michele Merkel, MS (Editorial Team); Editor: Rachel Crane (Editorial Team)

In Cameroon, Improving HIV Diagnoses through a Volunteer Quality Corps

Cameroon has an HIV prevalence rate of 4.3% in adults,³³ one of the highest in West and Central Africa, with an average of 34,754 new HIV infections annually.³⁴ Despite increasing access to antiretroviral drugs, Cameroon is not on track to meet the Millennium Development Goal of halting and reversing the spread of HIV/AIDS by 2015.³⁵ While health education and treatment are essential, access to reliable, accurate HIV rapid tests is also critical. False positive and false negative results can have a detrimental impact on treatment options and the spread of the virus, raising significant public health concerns.

Global Health Systems Solutions (GHSS), an NGO based in Cameroon, has attempted to address the recurrence of inaccurate HIV rapid test results in the country. Though GHSS implemented measures to conquer this problem of inaccuracy, it discovered a central obstacle to its goal: a lack of human resources. To ensure the generation of high-quality test results, it is necessary to strengthen the capacity of clinical laboratories. With inspiration from the principles of the American Peace Corps, including working with communities to develop sustainable practices to address specific problems, Quality Corps (Q-Corps) was developed. According to Q-Corps volunteer Nzang Frankline Ajoeh, “Training a body of individuals to work and be closely followed by the GHSS is just one big step toward [addressing] the human resource problem affecting the full realisation of quality HIV testing.”

“Q-Corps is just one big step toward [addressing] the human resource problem affecting the full realisation of quality HIV testing.”

Q-Corps currently operates in the South West region of Cameroon and is committed to improving the quality of HIV rapid tests and treatment centres. The organisation evaluates the country’s HIV testing sites to close any gaps in quality assurance through its HIV Rapid Testing Quality Improvement Initiative (HIVRTQ-II). The initiative, a collaboration between the US Centers for Disease Control and Prevention (CDC) and GHSS, was launched in Cameroon on 13 May 2014. The CDC provided a Training-of-Trainers workshop for seven GHSS staff members. At the conclusion of the workshop, after a competency assessment on HIV testing, all trainees earned a two-year certification as master trainers on the Quality Improvement Initiative (QII). Following this training, the newly certified GHSS staff worked with staff from the CDC to train 30 Q-Corps members and stakeholders.

³³ Cameroon. (2013, January 1). Retrieved from: <http://www.unaids.org/en/regionscountries/countries/cameroon/>

³⁴ Cameroon Operational Plan Report FY 2013. (2014, January 14). Retrieved from: <http://www.pepfar.gov/documents/organization/222156.pdf>

³⁵ National Report: Cameroon. (2013, January 1). Retrieved from: [http://www.commonwealthfoundation.com/sites/cwf/files/downloads/MDG Reports Cameroon_FINAL_1.pdf](http://www.commonwealthfoundation.com/sites/cwf/files/downloads/MDG%20Reports%20Cameroon_FINAL_1.pdf)

Q-Corps is staffed by Ministry of Health personnel (MCQs) who supervise community volunteers (VCQs). Q-Corps members work closely with GHSS. MCQs and VCQs are trained in quality assurance, including use of proficiency testing (PT) panels and quality assurance logbooks. VCQs serve as intermediaries to reduce the turnaround time between distribution of PT panels and the arrival of results at GHSS. They provide logbooks to clinic staff for data collection, and then Q-Corps members enter the data into a central database and analyse it. The Corps uses both the baseline checklist and the Stepwise Process for Improving the Quality of HIV-Related Point of Care (SPI-POCT) checklist in evaluating clinics, a task completed by the VCQs. The MCQs use the information gleaned from these evaluations to identify nonconformities and aid clinic staff in preparing and implementing corrective actions. To monitor improvements, Q-Corps conducts periodic site visits to locations implementing corrective actions.

In its pilot field implementation initiative, Q-Corps included 75 facilities for site visits, with 25 of these sites serving as controls. Q-Corps staff was divided into six groups based on educational backgrounds and performances during the QII training. Each group was tasked with visiting an average of 13 sites.

The Q-Corps members show true commitment and initiative. They are selected by GHSS based on academic qualifications, experience and location. Additionally, laboratory staff members working in some of the facilities enrolled in the PT programme have been selected as MCQs based on their laboratories' HIV PT performance and their location. Ajoeh has described his experience with the Corps as “exciting, adventurous [and] motivating, with so many interesting challenges”, and as providing “the opportunity to share knowledge and experience with others.” Another Q-Corps volunteer, Ewoukap Maccollins, whose role entails improving HIV diagnoses, joined the Corps after seeing a GHSS advertisement. He was inspired to participate when he learned of the organisation's aim to improve HIV testing in remote areas. He was drawn to Q-Corps by “the idea of saving [lives]” and the opportunity to gain knowledge that will allow him to have a positive impact in his local community.

Q-Corps' mission is to improve the quality of rapid HIV testing and hence client satisfaction, and to reduce the occurrence of false HIV rapid test results to zero and thereby diminish the impact of misdiagnosis on treatment decisions. Though the Corps is still young, the implementation of activities to achieve its well-defined aims has so far been successful in spite of challenges encountered when working with remote sites, such as poor network facilities for communication and a lack of electricity. As the Corps continues to work successfully in South west region of Cameroon, it is making plans to expand to other regions of the country. Its expansion will provide inspired and committed individuals with opportunities to improve the quality of testing and treatment in their communities, a significant step in the reduction of HIV incidence in Africa.

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ASLM Facilitates Workshops in Partnership with CLSI and NHLS

From 23-27 June 2014, ASLM leaders co-facilitated two training workshops on mentorship and SLIPTA auditing. The trainings took place in Windhoek, Namibia and Johannesburg, South Africa, respectively.

The Namibia-based workshop, which was jointly facilitated by Clinical and Laboratory Standards Institute (CLSI), focused on mentorship training designed to prepare local laboratory professionals to serve as mentors to other professionals. The workshop convened 20 laboratory personnel to learn about the ISO 15189 standard on medical laboratories, the World Health Organization Regional Office for Africa (WHO-AFRO) Stepwise Laboratory Quality Improvement Process (SLIPTA) checklist, and the attributes of mentorship. The five-day workshop was attended by participants from the National Institute of Pathology, the Namibian Ministry of Health and Social Services and the Centers for Disease Control and Prevention, who received certificates upon completion of the training.



Participants of the June ASLM/CLSI Mentorship Training Workshop.

On the same dates, in Johannesburg, ASLM facilitated a WHO-AFRO SLIPTA Auditor Training workshop in collaboration with the National Health Laboratory Services (NHLS) of South Africa. The course material included an overview of the SLIPTA programme, a description of the SLIPTA audit process, review and discussion of the SLIPTA checklist, and completion of a mock laboratory audit using the SLIPTA checklist. Twenty-two participants completed the training, four of whom received their certifications as ASLM SLIPTA Auditors for having completed all certification requirements including field practicums.



Participants of the June ASLM/NHLS WHO-AFRO SLIPTA Auditor Training.

ASLM and partners continue to demonstrate their commitment to advancing laboratory workforce development through skills training and capacity building exercises. ASLM instructs and certifies training participants in various subjects—including SLIPTA, abstract-writing, grant-writing, mentoring and more—with the goal of ensuring a robust, self-sustaining medical laboratory sector.

By: Rachel Crane (Editorial Team); Contributors: Talkmore Maruta, MPH (ASLM) and Teferi Mekonen, MSc, MPH (ASLM)



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AFRICAN SOCIETY FOR LABORATORY MEDICINE

2014

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Late Breaker Abstract Submission Closes	10-Sep-2014
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Empowering Through Knowledge

How Environmentally Friendly Is Your Laboratory?

In these times of climate change, being environmentally conscious is essential for the health of our planet. The March 2014 Intergovernmental Panel on Climate Change (IPCC) report outlined the risks and consequences of climate change if we do not change our current lifestyle of over-consumption of resources and over-production of waste.³⁶

The medical laboratory workforce has an important role to play in ensuring that laboratories minimise their environmental footprint. Laboratories can consume a large amount of electricity, especially those that utilise high-powered equipment that are left on 24 hours per day, seven days per week, and that may also produce large amounts of hazardous and biomedical waste. Promoting energy savings and proper waste management are two key areas in which laboratories can focus their efforts to be environmentally friendly, the result of which being the reduction of harmful waste in the environment. While there are resources for waste management regulation in many countries,³⁷ it is mostly up to the individual laboratory to comply with these national guidelines, and laboratories are responsible for managing their waste by themselves due to the lack of national or private waste management services in some African countries.

The initiation and implementation of programmes to reduce and recycle laboratory waste can be feasibly implemented in laboratories throughout in Africa. The following sections outline areas for action.

Alternatives to the use of consumables in the laboratory

While most laboratories rely on disposable materials to perform laboratory tests, laboratories could adopt alternatives such as oxo-biodegradable products. These products introduce organic agents inside plastics to accelerate their oxidation (by air and heat) and their degradation (by the microorganisms present in soil).³⁸ When such consumables are collected, they can be recycled, composted or incinerated; if they are not collected, they degrade and disappear in a short period. These products have properties to ensure that the materials meet the laboratory specifications that are required, and have the added advantage of having very little impact on the environment.

If laboratories cannot afford to buy oxo-biodegradable products, they have to think 'recycling' and 'good environmental practices', by avoiding over-consumption and wastefulness in the laboratory. Laboratory managers could choose as suppliers companies offering recycling schemes on their products to minimise the impact of ever-growing waste in laboratories. For example, pipetting, one of the most common laboratory activities, generates a large amount of waste, with considerable environmental consequences. Tip refill systems are a good alternative, existing for standard pipettes and multichannel pipettes.

³⁶ 5th Intergovernmental Panel on Climate Change (IPCC) report. (2014). Retrieved from: <http://www.ipcc.ch/report/ar5/>

³⁷ Medical Waste. (2014). Retrieved from: http://www.who.int/topics/medical_waste/en/

³⁸ Scott G. Oxobiodegradable plastic. (2009). Retrieved from: http://www.bioplasticsmagazine.com/bioplasticsmagazine-wAssets/docs/article/0905_p30_bioplasticsMAGAZINE.pdf

Equipment energy saving practices

Purchasing new equipment can be an opportunity for laboratories to reduce operating costs and even save energy. Before buying a biological safety cabinet, a haematology analyser or other biomedical equipment, laboratory staff should consider the electrical usage and power consumption of the units. Some equipment must be left on all the time, even when it is not in use. As such, laboratory staff can purchase equipment that can be set to a standby or hibernation mode to decrease power consumption. Another way to reduce costs is to be aware of preventive maintenance procedures and to purchase a service contract for all biomedical and cold chain equipment, such as freezers and refrigerators. Frequent maintenance (such as cleaning filters and performing service checks) can extend the life of equipment while reducing the unnecessary disposal of equipment. It is also important to develop a laboratory culture of energy saving that includes switching off lights, equipment and air-conditioners when it is not necessary to have them turned on.

Chemicals and chemical waste management

Another important aspect to consider when initiating environmentally friendly programmes in the laboratory is management of chemical and biomedical waste. Staff should abide by best practices³⁹ and try to recycle and improve the disposal of chemical and liquid waste, using incinerators or land disposal, when applicable. For example, when the protocol allows, chemicals such as acetone or methanol can be reused in certain instances. Importantly, universities or large institutions can introduce a chemical management programme comprising a chemical surplus recycling programme. Such programmes can save money (through bulk chemical purchases) and help minimise chemical waste (by sharing common chemicals). For the disposal of chemical waste, there are clear notifications on national standards or governmental decrees in most African countries, but in the absence of such guidelines, laboratory management could follow World Health Organization (WHO) guidelines or recommendations.^{40,41}

Identifying appropriate non-hazardous alternative chemicals, and replacing hazardous chemicals with the non-hazardous alternative, is a very important aspect environmental friendliness. Common chemical alternatives include: Nancy 520 and the SYBR® Gold as a non-carcinogenic alternative to ethidium bromide (EtBr); propidium iodide, also a non-carcinogenic alternative to EtBr, which is mostly used for flow cytometry; or one of many alternatives to mercury filled-thermometers.⁴² These alternatives could increase the level of safety in the laboratory, and in some cases, decrease the cost of waste management.

³⁹ Medical Waste. (2014). Retrieved from:
http://www.who.int/topics/medical_waste/en/

⁴⁰ Medical Waste. (2014). Retrieved from:
http://www.who.int/topics/medical_waste/en/

⁴¹ WHO Laboratory Safety Manual, 3rd edition. (2004). Retrieved from:
http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/

Adopting First In, First Out (FIFO) practices for chemical management is an effective method for improving inventory systems. The benefit of such a system can be to prevent the purchase of chemicals in large quantities, allowing reductions in waste and costs while increasing the safety of the laboratory by storing a smaller volume of hazardous chemicals. When considering chemicals, less is better for laboratory staff, the community and the environment.

Biomedical waste management

Within laboratories, biomedical waste refers to potentially infectious waste generated from laboratory activities. All laboratories should implement a biomedical waste management programme, to ensure maximum reduction of the risk of contamination. In fact, poor biomedical waste management exposes laboratory staff, patients, waste collection/disposal staff, and the entire community to infection and injuries, in addition to exposing the environment to pollution. The risk could be high for people, as many diseases could be carried by biomedical waste from a laboratory: HIV, viral hepatitis, brucellosis and Q fever (from blood from patients infected by these diseases), tuberculosis, poliomyelitis and rabies (from respiratory tract secretions), typhoid fever, enteritis and cholera (from faeces).⁴³ Microbiological cultures used to identify pathogens are highly infectious and have to be managed with great caution. For the environment, the most dangerous waste from laboratories includes materials with highly toxic heavy metal, solvents and radioactive waste, which can contaminate soil and underground waters.

The three key elements to consider to manage effectively biomedical waste are the minimisation of waste, the separation of different types of waste (non-contaminated waste, regular medical waste and hazardous waste), and the frequent removal of accumulated waste from the laboratory. Biomedical waste should not be kept in a storage place for more than 24 hours. There are three solutions for waste disposal: 1) incineration, 2) treatment to reduce the risk of infection and disposition with non-contaminated waste, and 3) off-site treatment. In all cases, the responsibility for waste disposal belongs to the laboratory, and this responsibility should be provided for in the operating budget. The second edition of *Safe management of wastes from healthcare activities*, published by WHO in June 2014, provides much information on the regulation, planning, minimisation, recycling, handling, storage and transportation of waste.⁴⁴

⁴² Phase-Out of Mercury Thermometers Used in Industrial and Laboratory Settings. (n.d.). EPA. Retrieved from: <http://www.epa.gov/hg/thermometer.htm>

⁴³ Fundamentals of health-care waste management. Retrieved from: http://www.who.int/water_sanitation_health/medicalwaste/en/guidancemanual1.pdf

⁴⁴ *Safe management of wastes from healthcare activities - Second edition*. (2014, June 1). WHO. Retrieved from: http://www.who.int/water_sanitation_health/medicalwaste/wastemanag/en/

Paperless solutions

Last but not least, it is time to seriously consider going paperless. Excessive amounts of paper are used every day in the laboratory, and while it may be necessary to capture abundant information, this could be done electronically. Even though electronic Laboratory Information Systems (LIS) and Electronic Laboratory Notebooks (ELN) are expensive, laboratories can capitalise upon existing electronic systems and modify them to meet their needs. However, for laboratories that do not have the capability to obtain electronic systems, it is still possible to establish practices that reduce the use of paper to minimise waste, such as two-sided printing, changing print settings to condense document size, and eliminating unnecessary printing.

Making an eco-friendly laboratory a reality is, in part, a matter of changing the mind-set and culture of a setting. With creativity, this process does not necessarily have to be more expensive than current practices. Laboratory staff has a key role in educating and sensitising people who are often misinformed about the environmental impact of the laboratory. Laboratory leaders can promote proper practices in environmental responsibility within the laboratory to encourage laboratory members to change and improve laboratory practices.

By: Nicolas Bouchet, PhD (CNRFP - Burkina Faso); **Editor:** Michele Merkel, MS (Editorial Team)

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