



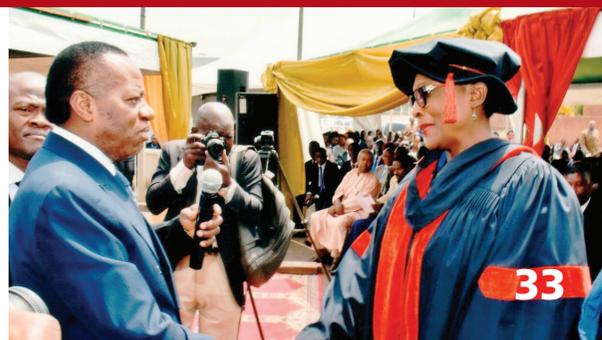
LAB CULTURE

ADVANCING THE LABORATORY PROFESSION AND NETWORKS IN AFRICA



Workforce development through communities of practice and learning networks





October 2019 | Issue 22

LAB CULTURE

ADVANCING THE LABORATORY PROFESSION AND NETWORKS IN AFRICA

FEATURED TOPIC

6 The Laboratory System Strengthening Community of Practice (LabCoP): Lessons learnt and plans for the future

by Pascale Ondo, ASLM, The Netherlands

10 The *Lancet* Commission on Diagnostics: No Care Without Diagnosis

by Devanshi Shah and Susan Horton, University of Waterloo, Canada; Kenneth A. Fleming, Oxford University, United Kingdom; Michael L. Wilson, Denver Health and University of Colorado School of Medicine, United States

14 Scaling Up Differentiated Service Delivery

by Miriam Rabkin, ICAP at Columbia University Mailman School of Public Health, United States and Peter Preko, ICAP at Columbia University Mailman School of Public Health, Eswatini

17 Virtual Communities of Practice Strengthen Public Health

by Jutta Lehmer and Bruce Struminger, University of New Mexico Health Sciences Center, United States

22 The Fleming Fund: Professional Fellowship Scheme

by Eileen Chappell and Toby Leslie, Mott MacDonald, United Kingdom

Q & A

31 What is a community of practice? How has ASLM's community of practice for viral load scale up, LabCoP, impacted programs and partners?

by David Lewin and Bethanie Rammer, ASLM, United States

LEADERS FROM THE BENCH

33 Professor Judith Torimiro

Chair and Associate Professor, Department of Biochemistry, University of Yaoundé I; Director of Laboratories & Senior Researcher for Health, Chantal Biva International Reference Centre for Research on Prevention and Management of HIV/AIDS (CIRCB), Yaoundé, Cameroon

DEPARTMENTS

3 From the editor

30 Global Laboratory News

Contribute to *Lab Culture*

ASLM is currently accepting article and photo submissions for upcoming issues of *Lab Culture*. We publish timely, informative, inspirational articles relevant to the unique challenges faced by laboratories in resource-limited settings. We are interested in articles on the critical aspects of laboratory medicine, best practices, success stories, leaders in the field, industry news, etc.

To submit article or photo proposals, please contact the Editor at newsletter@aslm.org.

Lab Culture. Established along with ASLM in 2011 as a member newsletter, *Lab Culture* relaunched in 2017 as ASLM's magazine for laboratory medicine in Africa. Dedicated to bringing timely, informative articles relevant to the unique challenges faced by African laboratories, *Lab Culture* seeks to be Africa's premiere resource for laboratory professionals and other stakeholders working on with the continent. Published six times a year as a digital edition, *Lab Culture* includes features on critical aspects of laboratory medicine and best practices in resource-limited settings, success stories from the continent, industry news, and more.

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Africa Collaborative to Advance Diagnostics – Partnering for the Africa We Want

Access to quality health services, including diagnostic services, is a challenge that Africa has had to contend with for decades. It is now apparent that these challenges can no longer be solved by one particular group. Partnership is the only way to solve the continent's diagnostic problems. I am pleased to say that progress is being made on that front.

The first consultative meeting of the Africa Collaborative to Advance Diagnostics (AFCAD) was held in Addis Ababa, Ethiopia, from 24–25 September 2019 and reenergized resolve for the continent to begin building institutions and systems

to increase access, motivate the manufacturing of diagnostics in Africa, and better coordinate and synergize efforts that align with the goals of the Africa Health Strategy 2016–2030. The meeting galvanized all key stakeholders, including policymakers, development and implementation partners, donors, ministries of health, manufacturers, and civil society organisations, to set a clear path on the continent for taking ownership of access to diagnostics. Attendees acknowledged the need to take bold steps in order to move forward and endorsed the following five commitments to establish:

An **Africa Centres for Disease Control and Prevention (CDC) expert committee** for expedited access to and update of diagnostics in Africa to meet its health strategy agenda. The Africa CDC Diagnostics Advisory Committee will provide guidance on the process of selection, evaluation, validation/verification and adoption of laboratory diagnostic technologies and facilitate data sharing across the entire continent.

A **standardized protocol** for evaluation of diagnostics, and criteria for selection and capacity building for Centres of Excellence



LAUNCH OF **AFRICA HIV VIRAL LOAD MOVEMENT**

in Africa. Africa CDC will identify five Centres of Excellence in line with its Regional Collaborating Centres and work with partners to build the capacity of the Centres for evaluating in vitro diagnostics.

Partnerships to serve as a blueprint for a revolving fund to accelerate **manufacturing of diagnostics in Africa**.

Continued on page 4

Consensus on a mechanism to **facilitate uptake of diagnostics in Africa.**

The launch of the **HIV Viral Load Movement** to increase uptake and access to viral load testing and meet programme targets.

The Movement will be a proof of concept of AFCAD and will consist of five pillars:

1) Mobilize the necessary domestic financing and resources to accelerate the scale up of viral load testing through tiered, integrated health systems and services, and networks. **2)** Facilitate the development of strategic partnerships with multiple stakeholders, including civil society, policymakers, donors and the private sector, to

address system-level challenges for viral load scale up at a reasonable cost per test. **3)**

Promote the use of innovative approaches including, but not limited to, integrated technologies (such as point-of-care tests), appropriate workforce development, access to commodities and supply chain management to facilitate access to viral load testing and return of results for optimal clinical management.

4) Strengthen national regulatory authorities, monitoring programmes, and continuous quality improvement of the viral load testing cascade at the national level to avoid emergence of HIV drug resistance.

5) Engage civil society organizations and other stakeholders to support robust demand for viral load testing and adequate utilization of test results for improved patient outcomes through differentiated HIV care delivery.

Expect to hear more about AFCAD and its activities in the months and years to come.



Nqobile Ndlovu
Chief Executive Officer,
African Society for
Laboratory Medicine



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ERRATA

Issue 21, page 5: The caption of the photo at the top of the page incorrectly identified the machine being used and should have read 'A healthcare worker operates a m-PIMA™ HIV-1/2, a point-of-care HIV device used for viral load testing.'

Issue 21, page 13: The heading of the second paragraph should have read 'Examples of Laboratory Network Optimization in Sub-Saharan Africa'.

The editors of *Lab Culture* sincerely apologise for these errors and any confusion that may have resulted.



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The Laboratory System Strengthening Community of Practice (LabCoP): Lessons learnt and plans for the future

Background

HIV viral load (VL) testing is key to achieving the third 90 of the UNAIDS 90-90-90 goals. Despite considerable investment in scaling up VL testing, dysfunctions along the VL testing cascade (Figure 1) translate into insufficient testing coverage, poor contributions of test results

to patient management, and multiple inefficiencies in HIV care delivery. Ensuring sustainable VL testing programs that yield fast public health outcomes requires a multidisciplinary approach at the national level. However, the identification, adoption and scale up of best practices at that level can be a lengthy process.

Some countries have successfully identified 'recipes' or enablers that facilitate the application of best practices for optimal scale up of VL testing services. Transforming these ideas from anecdotes to solutions that are implementable elsewhere could be achieved within a multi-country, multi-disciplinary forum, based on the idea that where one country has a gap, another country may have a strength that could be shared from peer to peer.

Against this background the African Society for Laboratory Medicine (ASLM), working with key partners and ministries of health, established the Laboratory System Strengthening Community

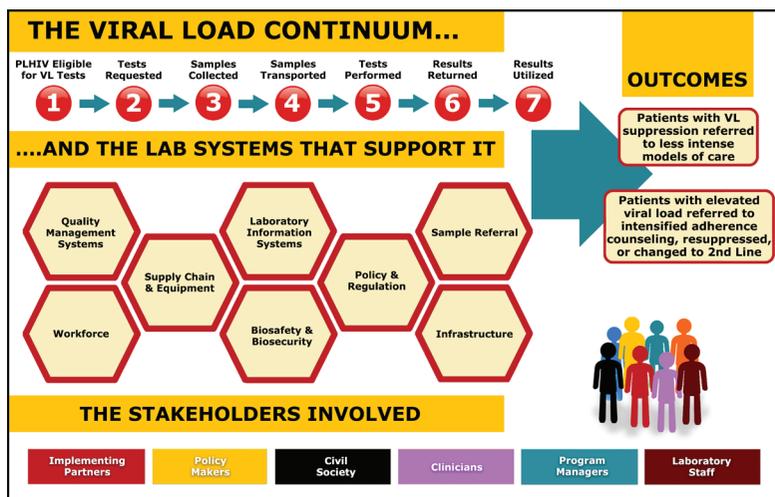


Figure 1: Steps in the viral load testing cascade and their relation with underlying laboratory systems and stakeholders.

of Practice (LabCoP) in October 2017. The overall aim of LabCoP is to support joint knowledge creation, and the quick adoption of ideas proven to work, to accelerate the scale up of VL testing and contribute to achieving the third 90.

LabCoP theory of action

During its initial 18 months, LabCoP set out to address three key challenges affecting the large

diffusion of best practices: 1) **lack of connection and exchange between various stakeholders** regarding best practices and solutions for the scale up of VL testing; 2) **poor access to practical resources** for scale up of VL testing; and 3) **difficulty of generating country-level evidence** on which to base prioritization of areas

of systemic weakness and plan interventions that are 'fundable'. LabCoP's implementation is centered on self-assessment of the national VL testing cascade. The project's theory of action (Figure 2) proposes to translate best practices and knowledge generated through structured discussion into action plans addressing the areas of weaknesses identified through the self-assessments. An important goal of LabCoP is to ensure that

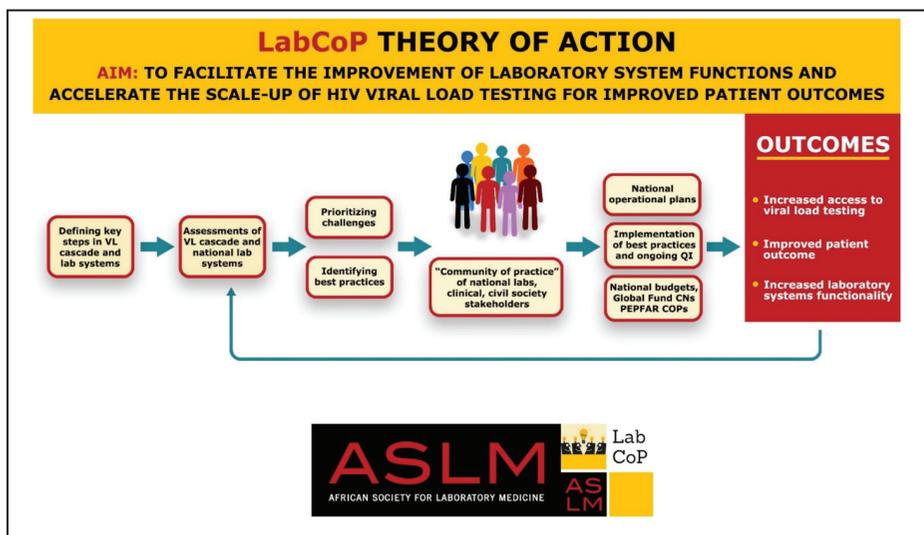


Figure 2: LabCoP's theory of action

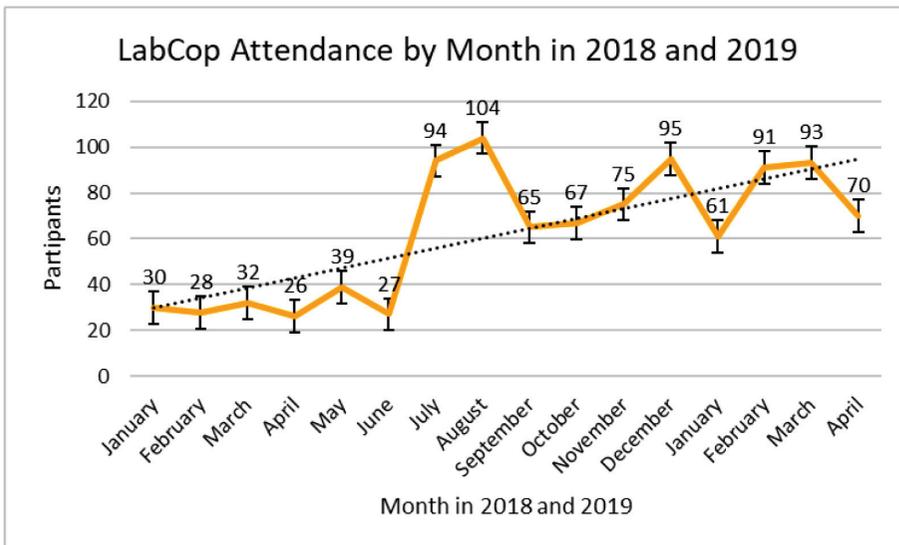


Figure 3: Participation in LabCoP ECHO sessions February 2018 – April 2019

these action plans be formulated to align to stakeholders’ and funders’ priority areas. Additionally, LabCoP proposes to link these national operational plans to existing funding opportunities and support countries to identify practical ways to quickly implement ‘cost-free’ interventions through a continuous quality improvement process.

An important strategy of LabCoP is to take advantage of new technology to support continuous, real-time dialogue across disciplines, expertise and national borders within the community of practice and without the need to travel.

Implementation

LabCoP partnered with the ECHO project of University of New Mexico and ICAP at Columbia University to establish an interactive platform for real-time communication between multi-disciplinary country groups (see article on ECHO in this issue for details on how sessions work and other ECHO implementations). Each country group includes national-level representatives from laboratories, clinical services and civil society. Whenever possible, the core groups are assisted by representatives from the country’s Ministry of Health, HIV program manager and implementing

or development partners. ECHO sessions are held once per month and are limited to one hour.

Participants from 11 countries, including Ethiopia, Kenya, Uganda, Tanzania, Malawi, Zambia, Zimbabwe, Sierra Leone, South Africa, the Democratic Republic of the Congo and South Sudan, continuously discuss ways to address inefficiencies along the entire VL testing cascade. LabCoP mobilizes an average of 80 participants at each monthly session (Figure 3). The vibrant discussions tease out perspectives from and key lessons confronting clinicians, laboratorians, patients, program managers and stakeholders. Requests are increasing for additional countries to participate in LabCoP, for more topics to be addressed and for support to establish similar platforms at a national level. Past ECHO sessions, lessons learnt, and various resources including the ‘LabCoP Cookbook’ of best practice ‘recipes’ are accessed by a 20 000 strong base of ALSM members, thereby substantially multiplying the outreach of LabCoP (Figure 4). Discussions initiated in the ECHO sessions frequently continue

African Society for Laboratory Medicine
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Highlight from April 2019 #LabCoP ECHO Session USAID Global Health

Laboratory Network Optimization Considerations for Successful VL/EID Scale up

USAID PEPFAR

Jesse Williams, Sr. Laboratory Advisor
OHASHISHLAD
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Highlight from April 2019 LabCoP ECHO Session

934 People Reached 39 Engagements

Zachary Mbuti, Mwaura Wa Wanjiku and 9 others

LabCoP QUARTERLY

African Society for Laboratory Medicine
March 2019
Volume 2, Issue 1

VL and Cascade Topics in this issue of LabCoP Quarterly

SEPTEMBER TO DECEMBER 2018 LabCoP ECHO SESSION SUMMARIES:
Sharing Best Practices along the HIV Viral Load Testing Cascade

Between September and December 2018, LabCoP's ECHO sessions covered a large part of the viral load (VL) testing cascade and underlying systems, from 'demand creation' to 'result utilization' up to 'management of biological waste'.

In September 2018, Solange Baptiste, Centres for Disease Control and Prevention (CDC) highlighted the different roles and responsibilities at the facility that support the timely response to non-suppressed VL results. These included: monitoring the return of VL results to the facility, flagging results that require action, entering result into patient charts, and communicating with

Lab CoP
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LabCoP Cookbook
of best practices

RECIPE #1: SAMPLE TRANSPORT SYSTEM

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Power Point presentation from an ECHO sessions

LabCoP Newsletter

LabCoP Cookbook Recipe

Figure 4: LabCoP knowledge products available from the ASLM website.

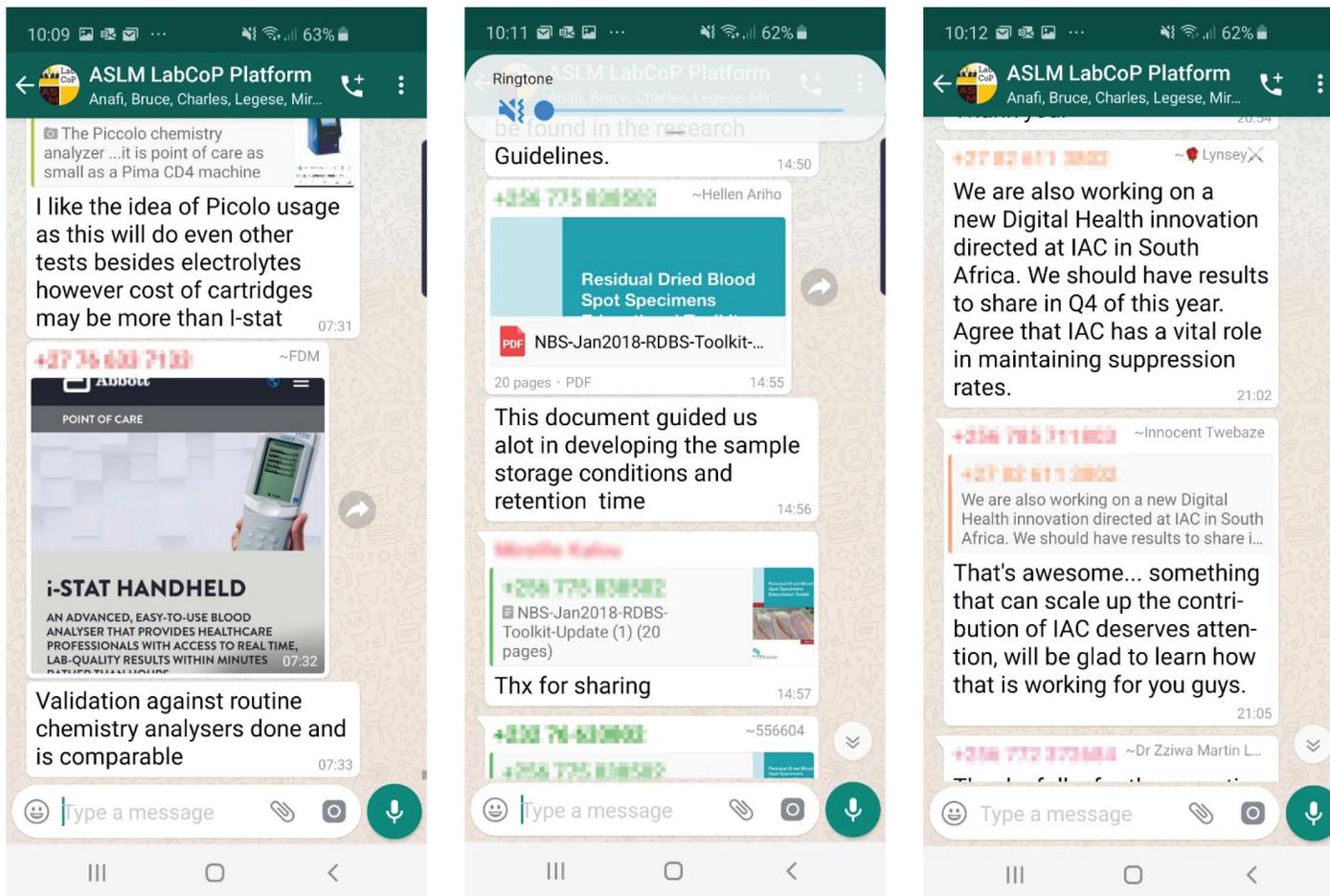


Figure 5: Snapshots of chats within the LabCoP WhatsApp platform

afterwards on the WhatsApp platform (Figure 5).

In addition to these exchanges, LabCoP has assisted countries to assess their own national VL testing cascade so that most critical systemic gaps can be identified, adequately addressed with progress being monitored over time. LabCoP also promotes South-to-South collaborations. Kenya, for instance had the opportunity to share its own experience with sample transportation and VL result utilization during virtual and face-to-face meetings. This created a demand from other countries to learn more from the Kenyan experience. Zambia and Uganda have visited Kenya to learn more about Kenya’s ‘viral load champion’ model, in support of the utilization of test results for patient management. Tanzania has visited Uganda to learn more about

Uganda’s sample transportation system, and Sierra Leone built its sample referral system based on the Ugandan model.

LabCoP achievements

LabCoP’s structured self-assessment helped countries to identify four common areas of weaknesses in countries’ respective national VL testing cascade: demand creation, result utilization, network optimization and waste management. The 11 countries developed well-informed action plans that prioritized demand creation and result utilization and that took advantage of the best practices shared within LabCoP. Upon intensive follow up and advocacy from LabCoP and its partners, eight action plans were successfully incorporated into PEPFAR country operational plans for 2019. LabCoP also successfully

created a country-owned ‘Plan-Do-Check-Act’ cycle for the scale up of VL testing at the national level.

Since the first ECHO session in February 2018, the number of people participating increased from less than 30 connections to an average of 80 connections per sessions (Figure 3). Despite the relatively substantial time commitment associated with regular attendance at ECHO sessions, most members continuously come back to attend them. LabCoP has delivered sessions on 18 topics (Table 1), many of which were proposed by stakeholders or countries themselves. The growing level of interest from a broad range of health professionals coming together to discuss best practices, innovative ideas and new approaches for VL testing observed within LabCoP is significant. It can be seen as a proxy for a wide range of diagnostic

testing needs and challenges across the continent and confirms the utility of sharing practical solutions to solve laboratory system issues at a national level.

A specific stream of discussion addressing waste management issues around laboratory testing in general and related to VL in particular has been created with support from the US Centers for Disease Control, international laboratory branch. This sub-community of practice contributed to providing situational analyses and developing concrete practical solutions to waste management issues in selected LabCoP participating countries. This very successful collaboration highlights how LabCoP can assist partners to advance the agenda on various cross-cutting issues of laboratory systems.

In addition to the recipes of best practices, LabCoP has developed a very useful VL testing cascade self-assessment scorecard and a strategic decision matrix for the selection of appropriate interventions for VL demand creation and result utilization.

Future steps

Moving forward, ASLM plans to further consolidate the concept of communities of practice by expanding LabCoP to other countries and addressing additional important issues related to laboratory diagnostics and system strengthening (e.g., early infant diagnosis, uptake of point-of-care testing, tuberculosis and hepatitis C virus diagnosis). In order to build sustainability and coverage, ASLM will continue to empower country members and African subject matter experts within LabCoP and will explore the possibility of franchising the LabCoP concept through engagement with regional stakeholders such as the

Title	VL cascade components *
<i>Uganda's Specimen and Hub Transport System</i>	3, 4
<i>Country experience in establishing Sample transportation system: Kenya and Tanzania</i>	3, 4
<i>Laboratory instrument Mapping and Optimization for Efficient VL Program</i>	5
<i>Country experiences for Laboratory capacity utilization for optimal Viral load testing coverage</i>	5
<i>Reaching the Third 90: Improving Utilization of HIV Viral Load Test Results</i>	5, 7
<i>Laboratory African Regional Collaborative LARC Overview</i>	5, 7
<i>Overview of VLT Assessment Tool</i>	1-7
<i>Point-of-Care HIV VL Testing for Targeted Populations</i>	
<i>You Can't Demand What You Don't Know! A model for community-driven demand creation for routine viral load testing</i> <i>Country Experiences in Creating Demand for Routine Viral Load Testing (RVLT)</i>	1, 2
<i>Management of Patients with non-suppressed viral load results</i>	7
<i>Introduction to Healthcare Related Waste Disposal for PEPFAR Countries</i>	5
<i>Management of Poor HIV Viral Load Suppression in Children and Adolescents in Uganda</i>	1, 2, 6, 7
<i>Innovative Public Private Partnerships for Global Laboratory systems Strengthening to Accelerate Epidemic Control</i>	
<i>Treatment Monitoring Considerations in the Era of Optimized ARVs</i>	1, 7
<i>Practical Considerations for Implementing Point of Care Testing for Early Infant Diagnosis of HIV</i>	1-7
<i>Laboratory Network Optimization for efficiency and cost-effectiveness</i>	4, 5

Table 1: List of topics presented at the LabCoP ECHO sessions, February 2018 – April 2019.

World Health Organization Regional Office for Africa or West African Health Organization. In the next phase of the project, ASLM plans to increase its advocacy activities towards empowering laboratories to contribute more to the achievement of the 90-90-90 targets and to reach out to end users of testing in civil society. LabCoP will offer more opportunities for building local capacity to implement focused interventions based on investment cases. Finally, LabCoP will work to

become a platform that partners can use to advance various aspects of the VL testing cascade through the adoption of their resources and tools via the community of practice.

To learn more about LabCoP, please visit: <http://www.aslm.org/labcop/>



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African Society for
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The *Lancet* Commission on Diagnostics: No Care Without Diagnosis

Introduction

Over the past few years, there has been increasing acknowledgment of the importance of diagnostics as part of improving health systems and especially in efforts to provide Universal Health Coverage (UHC).¹ Earlier this year, the *Lancet* introduced the formation of a new Commission, the *Lancet Commission on Diagnostics*.² For a *Lancet* Commission, a group of experts is convened to conduct 'a scientific review, inquiry, and response to an urgent, and perhaps neglected or understudied, health predicament'.³ A Commission is characterized by being science-led, includes international collaboration, is multidisciplinary, aims for (transformational) change and is especially focused on policy or political action.³ In this issue of *Lab Culture*, we introduce the new Commission, why it is needed, how the Commission will address its work, review the key objectives and timelines of the Commission, briefly describe how the Commission will interact with other major diagnostics initiatives, and discuss its relevance to the African Society for Laboratory Medicine (ASLM).

Why is the Commission needed?

Diagnosis is the core component of patient-centered clinical care. All aspects of treatment and management of the patient — effective treatment and care, reduced harm, and ensured safety — depend on having an accurate diagnosis. Clinical history and examination combine with pathology and laboratory medicine (PALM) and radiology to ensure timely and accurate diagnosis. Robust and reliable PALM and radiology are thus critical elements of a fully functioning health system.

However, most of the world's population lacks access to quality diagnostics, either because diagnostics are unavailable where they are needed or are unaffordable to those who need them. The problem is

particularly severe in sub-Saharan Africa, where the disease burden is among the highest in the world but there is a severe lack of access to diagnostic testing. As one example, the number of PALM professional per population in sub-Saharan Africa is less than 10% that of high-income countries; some countries do not have a single pathologist working in them.⁴ Although data regarding the number of radiologists working in sub-Saharan Africa is less complete, the available data suggest that radiology workforce capacity is just as limited as for pathologists. Limitations in workforce size and access to training result in slower turn-around times for test results and lower quality of testing. In addition to workforce capacity, many countries lack the regulatory and policy framework that is necessary to ensure high-quality testing.⁴ Many countries also lack the appropriate investment in physical infrastructure needed for diagnostics.⁴

The vision of the *Lancet Commission on Diagnostics* is to achieve the transformational step-change needed to ensure affordable access to optimal quality diagnostic services and their incorporation in UHC globally. However, to date, in the drive for UHC, there has been insufficient recognition of the centrality of diagnostic services within health systems. As envisioned, UHC cannot be achieved without access to accurate, affordable, and accessible diagnostic services, which underpin clinical decisions in health systems. By establishing a platform for experts from different disciplines, focused on this shared vision, the Commission will discuss how an essential package of diagnostic services can be accessible to all patients and fit into health systems.

A key message from the 2018 *Lancet Series on Pathology and Laboratory Medicine in Low-Income and Middle-Income Countries*⁴⁻⁶ is that access to PALM services in low- and middle-income countries is not only severely inadequate and inequitable



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Commissioners from First Meeting of the *Lancet Commission on Diagnostics* in Oxford, UK

currently, but that advancing technology and globalization are further widening existing gaps in access to PALM services between low-income and middle-income countries and high-income countries. One important area of consideration will be how to increase access to more complex and expensive testing without further widening existing inequities, especially between rural and urban areas.

A key focus of the Commission will be quality. The 2018 *Lancet Series* also highlighted that neither the Sustainable Development Goals nor the critical target for Sustainable Development Goal 3, UHC, can be achieved in the absence of quality PALM services. Along with the issue of equitable access, the Commission is keenly aware of the lack of quality in diagnostics in much of the world. Low-quality diagnostics lead to worse health outcomes and wasted resources. Another important area of

consideration will be defining ways to create the regulatory framework needed to ensure quality and that also enables quality systems to exist where they have to date been absent. ASLM's work on SLIPTA (Stepwise Laboratory Quality Improvement Process Towards Accreditation) is a great example of how to make progress in the area of quality.

Many of the issues regarding PALM services are also integral to provision of high-quality and affordable radiology services. Furthermore, a number of key infrastructural components are common to both disciplines. Given these similar challenges, it is likely that shared solutions for PALM and radiology will be beneficial by reducing silos, overcoming fragmentation, and creating synergies. In addition, many types of healthcare, particularly cancer care, but also care for tuberculosis and cardiovascular disease, require a multidisciplinary

approach that includes both PALM and radiology. The rapid emergence of new technology, especially in the arena of informatics such as augmented intelligence, is moving the disciplines closer together. For all these reasons, it makes sense to consider them together because, in many ways, they are inseparable in contemporary healthcare.

How will the Commission address its work?

The *Lancet Commission* is chaired by Dr Kenneth A. Fleming (Emeritus Fellow, Green Templeton College, Oxford University) with an Executive Group that includes Dr Rifat Atun (Professor, Harvard TH Chan School of Public Health), Dr Kristen Destigter (Department of Radiology, University of Vermont School of Medicine), Dr John Flanigan (Center for Global Health, National Cancer Institute, National Institutes of Health), Dr Susan Horton (School



Ultrasound screening being performed at a clinic in Gulu, Uganda [Photo Credit: Imaging the World]

of Public Health and Health Systems, University of Waterloo), Dr Shahin Sayed (Department of Pathology, Aga Khan University Hospital, Nairobi) and Dr Michael L. Wilson (Department of Pathology, University of Colorado School of Medicine). Another 18 Commissioners were selected so as to bring together a broad and diverse group of stakeholders with deep knowledge of their areas, but also experience of effectively working in multidisciplinary commissions to produce high quality products that have influenced policy and practices.² The geographic representation of the commissioners helps to address the contextual cultural, political, and structural indications that are vital to implementation and use of high quality, accessible diagnostics.

Key objectives of the Commission

The issues surrounding diagnostics

are not only present between countries (eg, due to different income levels) but also within countries due to the rural/urban divide. Most services are placed within high population settings, to the detriment of the availability of diagnostic services in more rural settings. Even in more urban settings, financial barriers can inhibit access to adequate diagnostic care. Women and men have some differing needs for diagnostics and differ in their ability to access finance and travel to meet these needs.

To address the large scope of issues and to develop scalable, sustainable solutions, the Commission has set up five Working Groups (WGs). Working groups have both commissioners and external 'technical experts' as members and, depending on the need of each WG to accomplish its work, will have a total of 5-10 members per WG. Each commissioner will be a member of at least one WG. The five WGs will

focus on the following topics:

- Workforce, Education, and Training
- Blue Sky Innovation
- Economic Case for Diagnostics
- Patient Level Health Systems Approach
- Macro Level Health Systems Approach

Each of these five topics will be explored from the perspectives of current status, possible solutions, scalability, and sustainability. Describing the current status will be done using literature review and, where necessary, collection of new data via surveys. Describing possible solutions will emphasize solutions that are accessible and affordable, especially those that are based on integrated tiered networks. Exploring the methodology for delivering solutions at scale will include financing, development of integrated tiered laboratory networks that function within larger healthcare systems and methodology to ensure quality. Last, we will define the policy requirements and financial conditions necessary for sustainability of services once they have been introduced and brought to scale.

Interaction with other initiatives

Interactions with other initiatives are essential to promote the case for improved accessibility to quality diagnostics. A coordinated effort amongst the Commission and multiple organizations is important to increasing dissemination and improving access. Existing initiatives with which the Commission will intersect include the newly established World Health Organization Essential Diagnostics List;⁷⁻⁸ country efforts to develop their own national Essential Diagnostics List (the first being from India); and the ASLM-Africa CDC initiative on diagnostics.

Lab Workers at Aga Khan
University Hospital in
Nairobi, Kenya



Another potential opportunity for interaction would be to collaborate with one of the ongoing initiatives around antimicrobial resistance. The detection and monitoring of antimicrobial resistance depends heavily upon access to quality microbiology diagnostics to generate the data need for initiatives such as the ASLM Mapping Antimicrobial Resistance and Antimicrobial Use Partnership (MAAP) project (<http://www.aslm.org/what-we-do/maap/>).

Before publication of our findings we plan to hold sessions at different professional society meetings to disseminate early findings and get input from different groups of professionals. Following publication of our findings in the *Lancet*, we plan to hold launch events in different countries to help build momentum for implementation.

The Commission will not promote any specific initiative, but rather to seek ways that different initiatives can interact with others where appropriate. This will enable the Commission to learn from the experience of others, find best practices and novel approaches for solving the many challenges in increasing access to diagnostics, and develop partnerships that will allow the Commission to continue its work following publication of the initial report. For those that would like to collaborate with the Commission, or have access to data that may help indicate the need for diagnostics globally, the information would be gratefully received.

Timeline and output

The Commission will convene a total of three in-person meetings of the Commissioners. The first was held in April 2019 in Oxford,

United Kingdom, at the start of the Commission. The second will be held January 2020 in Geneva, Switzerland, at the midway point of the Commission. The third is tentatively scheduled to take place in India towards the end of the process. The Commission will produce a report that will be peer-reviewed by and published in *The Lancet*. The intention is that this report will provide a reference point on diagnostics for all stakeholders involved in improving health systems, establish a framework for action aimed at enabling health systems to provide services that are efficient, cost-effective and commensurate with the burden of disease, and set milestones for future actions. The Commission also intends to improve advocacy for diagnostics and through that create actionable change in improving the accessibility of diagnostics for patients. In particular, given the enormity of the challenge, we hope that the joining of PALM and radiology into a single Commission, with shared goals, will serve as a model for all professionals working in diagnostics—pathologists, radiologists, laboratory scientists and others—to work more closely in the future. There is more than enough for everyone to do. Furthermore, presenting coordinated (as opposed

to discordant) messages is much more likely to positively influence the target audience of health policy makers and funders.

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Scaling Up Differentiated Service Delivery

ICAP Fosters South-to-South Learning Through Innovative HIV Learning Network

Background

The global scale-up of HIV treatment has been remarkably successful. By the end of 2018, more than 23 million people living with HIV were taking lifesaving antiretroviral therapy (ART). Countries are now setting their sights on HIV epidemic control, which will require even more people living with HIV to be diagnosed, linked to treatment, supported to attain viral suppression, and retained in care for a lifetime. Careful attention to issues of equity are also needed to ensure that HIV services are available to all.

In order to achieve these ambitious targets, new approaches are needed to improve the coverage, quality, and impact of HIV programs. In response, countries and communities have developed new models of care to better meet the needs of recipients of care and reduce unnecessary burdens on the health system. These approaches—collectively called ‘differentiated service delivery’ (DSD)—tailor the ‘what, where, who, and when’ of HIV services to different groups of people living with HIV.

Many countries have already moved to scale up less-intensive DSD models for people doing well on ART. For example, as of October 2018, the Ethiopia Ministry of Health estimated that 26% of eligible people on ART (117 000 people) were enrolled in its six-month appointment spacing model. Similarly, the Uganda Ministry of Health estimated that 21% of all people on ART (242 000 people) were enrolled in one of several, less-intensive differentiated ART models. Shifting from a ‘one-size-fits-all’ model is no easy task, however, as countries work to decide which DSD models to use;

to update their national policies, guidelines and health worker training materials; and to implement new approaches at scale.

CQUIN: An innovative learning network catalysing DSD scale up

Recognizing the benefits of a platform that brings countries together to share experiences and exchange best practices, the HIV Coverage, Quality, and Impact Network (CQUIN) was launched in 2017 to catalyze the scale-up of high-quality DSD services in sub-Saharan Africa. The network, which is funded by the Bill & Melinda Gates Foundation and led by ICAP at Columbia University, facilitates country-to-country knowledge exchange, provides demand-driven technical assistance, and supports catalytic projects and knowledge generation across 11 countries: Côte d’Ivoire, Eswatini, Ethiopia, Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zambia, Zimbabwe. Three additional countries, the Democratic Republic of Congo, Liberia and Sierra Leone, will join the network in November 2019.

Each country in the network joined at the ministry of health level, starting by submitting a formal letter of interest to CQUIN. Most member countries have engaged a core group in CQUIN activities, including representatives from the ministry of health, donors and development partners, implementing partners, and civil society. Recipients of care are also critical participants. After joining the network, each country

conducted a baseline self-assessment using the CQUIN staging dashboard, a tool that facilitates systematic assessment of a national DSD program’s maturity. Countries have since developed DSD-specific work plans, commitments and targets; conducted periodic follow-up self-assessments; and presented on progress at CQUIN annual meetings. CQUIN also offers a broad range of additional activities, including South-to-South learning visits, virtual communities of practice, webinars, implementation science research, and multi-country workshops.

For example, a delegation from Tanzania and Zambia visited Uganda in April 2019 to exchange knowledge

CQUIN: By the Numbers

- 14 member countries
- 13 South-to-South visits by 9 countries
- 5 multi-country workshops
- 4 virtual communities of practice
- 3 annual meetings

on the implementation of DSD models and the meaningful engagement of recipients of care in DSD scale-up. The delegation spent three days visiting with Uganda Ministry of Health staff and conducting field visits to see Uganda’s DSD models in action. Mathew Kawogo, Manager of Community Mobilization and Engagement for the National Council of People Living with HIV/AIDS in Tanzania explains, ‘We learned a lot during our visit to Uganda. For example, we learned about the indicators they use to monitor DSD and how those flow



Recent CQUIN workshop in Nairobi, where 165 experts from eleven countries were convened to discuss quality in differentiated service delivery. [Source: ICAP at Columbia University]

through the whole reporting system. They have separate indicators touching every aspect related to DSD at the community level. That was an important lesson and I was happy that I was with my colleagues from the government. It helped us to modify our data collection forms back home.'

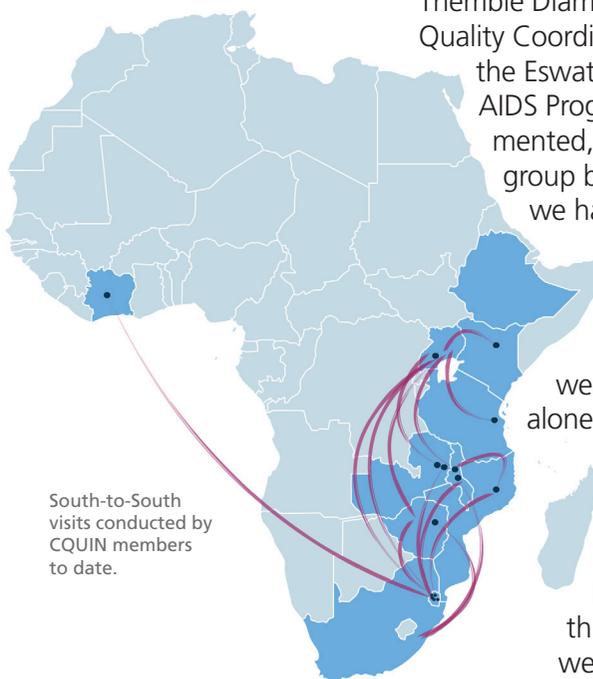
In June 2019, CQUIN convened a workshop in Nairobi, Kenya that focused on the issue of DSD quality. Attended by 165 representatives from all 11 CQUIN member countries, the hands-on workshop enabled participants to define DSD quality standards, monitor and evaluate DSD quality and implement contextually appropriate, DSD-specific quality improvement projects.

Thembe Dlamini, HIV Quality Coordinator for the Eswatini National AIDS Program, commented, 'From the group breakaways we had, I discovered that the problems we thought were ours alone are actually affecting a majority of the countries. Based on this meeting, we will be able

to go back and come up with good quality standards for DSD.'

Now in its third year, CQUIN has built a vibrant community of colleagues working to achieve epidemic control by scaling up less-intensive DSD models. Feedback from participants has been overwhelmingly positive: In a recent survey, 91% of participants from ministries of health agreed that participation in CQUIN activities had been very important in the scale-up of DSD services in their respective countries, and 89% said that CQUIN participation had improved DSD coverage and/or quality.

To learn more about CQUIN, visit <http://www.cquin.icap.columbia.edu>



South-to-South visits conducted by CQUIN members to date.



Eileen Chappell,
Mott MacDonald, United Kingdom



Toby Leslie, PhD,
Mott MacDonald, United Kingdom



Spotlight on CQUIN participant Nancy Zyongwe

Senior Advisor for Quality Assurance and Quality Improvement, Zambia Ministry of Health

Why is DSD important in the Zambian context?

Traditionally in Zambia, it has always been the provider who has called the shots. Now, for the first time, we have a service that is actually focused on the recipient of care. Now they tell you when they want to come, how often they want to come, who they want to see, and where they want to be seen. So DSD has actually broadened that choice for them.

And for us, we have also seen some spillover effects. We don't see too many people getting lost to follow-up, because now they are in the care that works for them. People used to travel long distances to access care, whereas now they can get it even in their homes, if they prefer. Also, our facilities used to be congested. We had facilities where a poor nurse would see 260 patients in a day and the clinic would finish way after hours and there would be no additional compensation for the nurses. Now, because people have been differentiated into different models of care, people are not coming as often as they used to. They smile when you get there, because now they have more time to focus on those who actually need their care.

What are some challenges you face related to DSD implementation?

For multi-month scripting, we are giving our clients either three months or six months of

their medication—this is now standard of care. In doing so, some facilities have challenges with commodities. It has put a big strain on smaller facilities that are used to ordering a small amount. They are having some challenges adjusting to ordering bigger amounts. At the national level, the drugs are available, our health workers just have to think about doing things in a different way. Also, in terms of documentation, we don't really know how many people are on DSD right now; we've only just incorporated those indicators in our forms.

How has being part of the HIV learning network impacted you and your colleagues in Zambia?

For me personally, I have learned a lot and interacted with a lot of people. There are things that I didn't really know were possible, but then you hear that other countries are doing it. For example, in Kenya, we know that they test almost 95% of their clients and screen them for tuberculosis. We don't do that and that has been quite a challenge for us. So through this network, we learn what is possible and how other countries have been able to do it. If you're struggling with something, it's the best place to learn. The environment is friendly and there's no competition, so you really get exposed to different ways of doing things.

Virtual Communities of Practice Strengthen Public Health

Using technology for mentoring and sharing of knowledge and best practices across Africa and beyond

Moses Nsubuga, aka Supercharger, is a global HIV peer educator from Uganda who almost died in 1998, because he didn't understand that stretching out his expensive HIV medication would lead to drug resistance. He tells his story of how HIV viral load testing led to a switch in medication and literally kept him out of a coffin already prepared for him. A group of laboratorians and clinicians from 11 African countries listen attentively and follow the visually powerful slides he shares.

The organizer invited Moses to their monthly laboratory community meeting as a civil society expert to emphasize the importance of demand creation and country action plans for HIV viral load testing. Every month, an average of 80 participants come together for one hour to share best practices and discuss



Moses Nsubuga aka Supercharger [Photo: Moses Nsubuga]

topics related to the HIV viral load cascade. A guest subject matter expert like Moses usually provides a mini lecture on a relevant topic, including latest research. In October, for example, a quality improvement adviser from ICAP at Columbia University reviewed the preparation

process for the second viral load country self-assessment, and the Zimbabwe Laboratory Services Manager shared best practices. The experts stay for further questions and discussion.

None of the 100+ participants in these sessions needed to travel to join and interact with their colleagues across Africa and meet these experts in real time. The session host simply started a video conference from his office in Uganda. He shared a link for the meeting via email and WhatsApp. Some participants join individually from their cell phones, others meet up in conference rooms as larger groups. Technology allows them to develop this vibrant community of practice across borders where they learn from experts and one another, gaining insights and ideas from peers

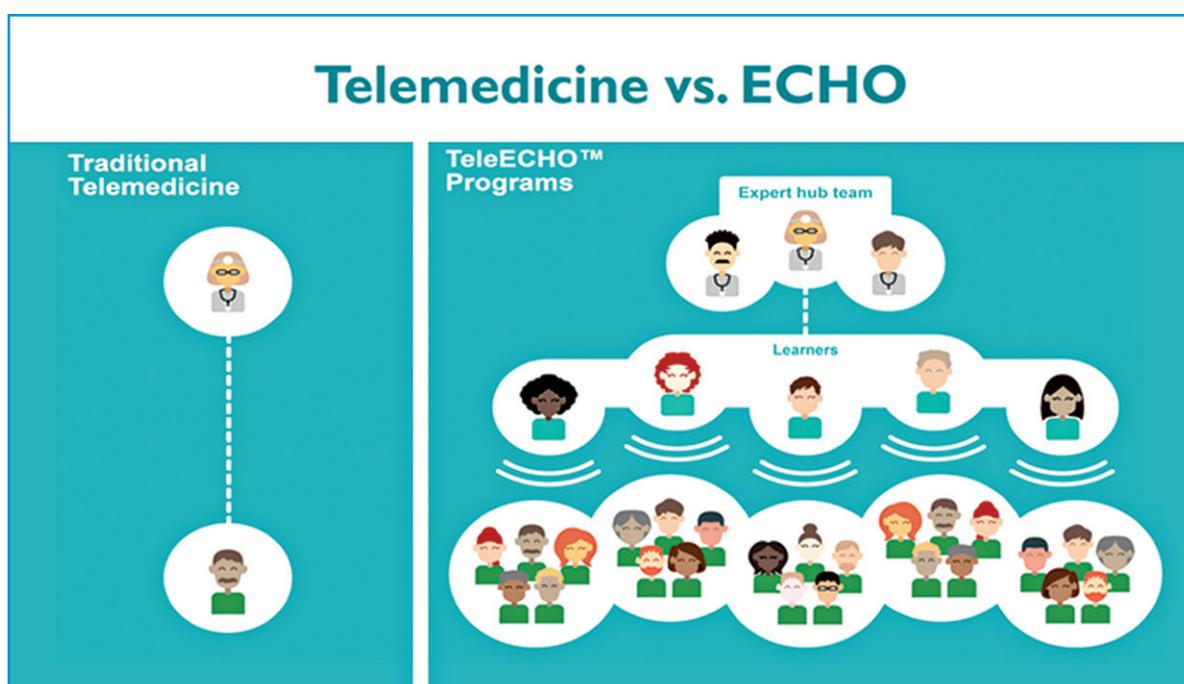


Figure 1. Schematic representation of communities of practice versus one-to-one telemedicine. [Image courtesy of Project ECHO]



Weekly videoconference sessions, or teleECHO[™], provide healthcare workers in rural and underserved areas with expert lectures on hepatitis C and patient cases presented by a multi-disciplinary team and peers. [Photo courtesy of Project ECHO]

on how to improve processes in their country through the power of South-to-South information sharing. This is Project ECHO[®] in action.

The African Society for Laboratory Medicine (ASLM) is just one of the organizations embracing the ECHO model[™] of telementoring (**Figure 1**) to create a virtual community of practice to improve knowledge sharing and dissemination of best practices among laboratorians for better public health outcomes. The ASLM LabCoP ECHO, led by Dr Charles Kiyaga, was one of the first efforts in Africa to connect multiple countries across the continent, and to create this network of public health laboratorians and public health officials. The Africa Centres for Disease Control and Prevention (CDC) simultaneously developed four regional multi-country ECHO networks, and now, individual countries in Africa also engage their public health officials in surveillance and emergency preparedness using the ECHO model.

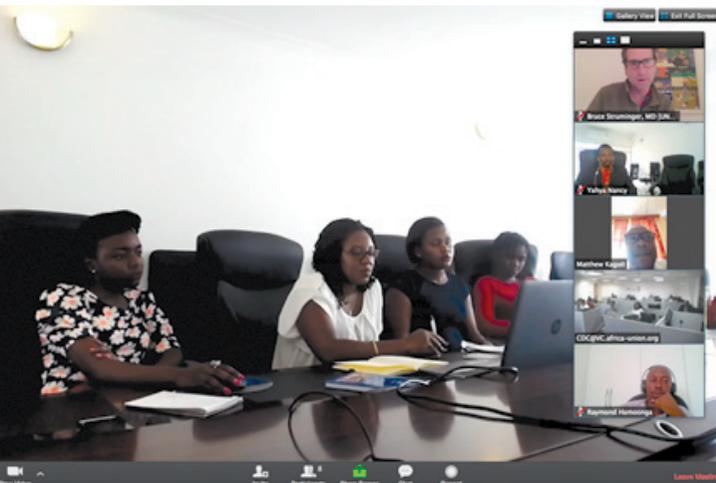
ECHO stands for Extension of Community Healthcare Outcomes. Professor Sanjeev Arora, a gastroenterologist at the University of New

Mexico Health Sciences Center, developed the concept in 2003 to build local capacity to treat patients with hepatitis C where they live. In weekly videoconference sessions, or teleECHO[™], providers in rural and underserved areas listen to expert lectures and present patient cases to Professor Arora, a multi-disciplinary expert team, and peers for guidance. In 2011, a study published in the *New England Journal of Medicine*¹ showed that rural providers had as much or more success treating their hepatitis C patients as the academic medical center at the University. Now, over 300 partners run more than 600 ECHO programs in 37 countries, addressing 70+ conditions. In Africa, about a dozen countries have implemented at least one ECHO program for HIV, tuberculosis, laboratory strengthening, global health security, chronic diseases, cancer or autism. Participants from about 40 countries across Africa regularly join the 30+ ECHO programs.

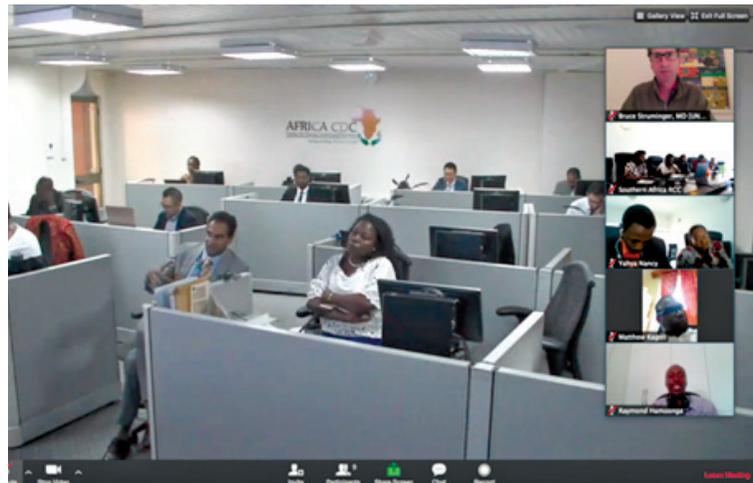
ASLM has conducted over 18 LabCoP teleECHO sessions since launching the initiative in January 2018, leading to a total attendance of far more than 1000 hours to date, from

participants belonging to about 30 different organizations. Experts come from Africa and other parts of the world. Sessions on laboratory waste management supplement the regular video calls this year. ASLM records the sessions to LabCoP's YouTube channel,² and shares the link via WhatsApp. Almost daily, members engage on the WhatsApp group, posting World Health Organization information, requesting advice on sample use on a specific platform, sharing articles on genetically modified mosquitoes, and holiday wishes or the loss of a colleague. Session host, Dr Kiyaga, has become comfortable on camera and mastered the technology of keeping noise distractions to a minimum, creating a relaxed and respectful learning environment with an all-teach-all-learn philosophy that considers everyone as an expert. Other ASLM experts support him in addressing important aspects of a topic. The team later distills the session content and learning in newsletters and a LabCoP Cookbook of Best Practices, including recipes for sample transport, test result utilisation, and demand creation for viral load testing.³

While the ECHO model started out to improve the lives of patients with hepatitis C in underserved areas by educating local providers, it has proven highly adaptable to many other contexts. Over the years, the ECHO Institute in New Mexico and other ECHO partners in the United States and globally



The Southern Regional Collaborative Centre hub team in Lusaka, Zambia, hosting one of the first ECHO sessions to address regional outbreaks connecting countries across Southern Africa. [Photo courtesy of Project ECHO]



Africa CDC situation room in Addis Ababa observing one of the first ECHO sessions run by the Southern Regional Collaborative Centre out of Lusaka, Zambia. [Photo courtesy of Project ECHO]

have experimented using the model in laboratory strengthening, public health, field epidemiology, One Health, education, and public safety. Laboratorians have a key role in public health, being the first to confirm potentially epidemic infections. Any effort improving laboratory work processes and increasing knowledge is likely to impact public health positively. ECHO virtual communities of practice enable collaborative learning³ and problem solving by bringing together learners and experts that often had no contact previously, because meeting in person was a barrier due to financial, time and geographic constraints.

The ECHO model is rooted in principles of adult learning.⁴ Adults want to be involved in their own learning and have input on what, when, and how they learn. Besides the short lectures for sharing best practices, case discussions – either clinical or systems cases – are a core element of teleECHO sessions, as relevant examples promote adult learning. ECHO implementers have come to realise that a case is in essence a problem or challenge that needs solving through collaborative wisdom and experience. For a patient case, that may mean understanding symptoms and adjusting medication. In public health, a case

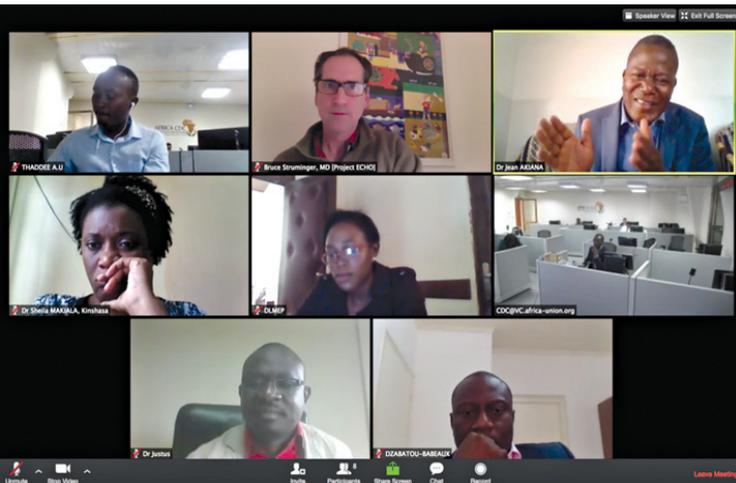
discussion might revolve around finding solutions to containing a cholera outbreak or learning from data to take appropriate action for population health.

Every ECHO program designs their curriculum with the learners in mind, gathering topic ideas from the community to include, and agree on a suitable time. Actual case discussions involve past experiences learners can draw from. Adults prefer to solve real-life problems and use reasoning as an approach to learning over memorizing information. The learning needs to be pragmatic and applicable to their life or work. In addition, adult learners with busy lives have limited attention span for lectures, with evidence showing attention wanes⁴ after about 15-20 minutes. Retention tends to be better for short content delivery. Participants appreciate a supportive environment. The interactive nature and ongoing community differentiates ECHO programs from often one-off or short-course webinars that are presenter dominated and generally passive experiences for the audience.

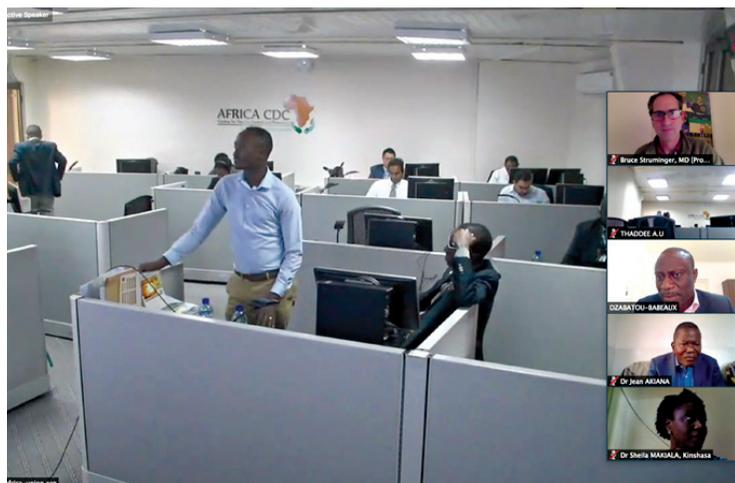
The social component of the ECHO virtual communities of practice promotes engagement and supports learning. For providers in remote

or underserved areas, participation in teleECHO sessions helps reduce professional isolation.⁵ The one- to two-hour format with a 15-20 minute mini-lecture and participant-led case presentations takes the attention span of adult learners into account. Interactive discussion and the use of polling keep learners engaged with what is relevant to them in a welcoming learning environment. The low dose, high frequency learning approach⁶ aids with better retention of the material than traditional high dose, low frequency trainings involving travel, and prolonged absence from work. The facilitation skills for ECHO programs emphasize a supportive, non-hierarchical, non-threatening atmosphere allowing participants to learn from mistakes.

The Africa CDC leadership recognized the potential of the ECHO model to support their mission to strengthen Africa's public health institutions, catalyse implementation of International Health Regulations, and detect and respond quickly and effectively to disease threats and outbreaks based on science, policy, and data-driven interventions and programs.⁷ In addition, the ECHO model could support their mandate to promote partnership and collaboration among member states to address emerging and endemic



Participants in one of the first Africa CDC ECHO sessions connecting the Central region. [Photo courtesy of Project ECHO]



Africa CDC situation room in Addis Ababa observing one of the first ECHO sessions connecting the Central region. [Photo courtesy of Project ECHO]

diseases and public health emergencies.⁵ Less than a year after launching its operation at the African Union, Africa CDC invited a team from the ECHO Institute for an ECHO Immersion training in Addis Ababa, Ethiopia, for the leaders of the Africa CDC Regional Collaborating Centres (RCCs) to become the hosts for regular teleECHO sessions with their respective member states.

As of May 2019, four out of the five African Union regions conduct regular teleECHO sessions with the focal points in their member states, mainly infectious disease epidemiologists and laboratorians working with ministries of health. They have addressed the Ebola outbreak in Congo, various cholera outbreaks in Zambia, Malawi, and Zimbabwe, and the importance of dealing with antimicrobial resistance in Africa. Zambia supported Malawi and Mozambique with practical help during cholera outbreaks as a result of these discussions. Didactics by experts include presentations on the use of drones for mapping bodies of water for cholera control and how to use tabletop exercises for better public health emergency preparedness. The Ethiopia-based Africa CDC team regularly joins the regional sessions of the Southern, Eastern, Central, and Western RCCs, which reach about 40

member states total. ECHO has helped create the platform for Africa CDC that facilitates communication, information sharing, and collaboration among member states; Africa CDC also intends to establish an ECHO community for the Northern region in the near future.

‘Africa CDC, being a continental public health institution, needs a reliable and cost-effective platform for timely interactions with member states and between member states in addressing public health issues; I am glad that ECHO has provided such a platform to our institution,’ says Dr Herilinda Temba, an epidemiologist at Africa CDC.

The many country-level HIV ECHO programs throughout Africa support laboratory and clinical health workforce capacity to reach the UNAIDS 90-90-90 goals towards HIV epidemic control. Uganda and Tanzania use the ECHO model to improve the quality of HIV rapid test results and proficiency testing. Laboratories are critical to all three parts of the 90-90-90 targets. Laboratories confirm HIV infection, so patients can be linked to care. They monitor the HIV viral load of patients on medication and confirm who is virally suppressed or not. Laboratorians also attend

HIV care and treatment teleECHO sessions as experts and learners. Tanzania is currently implementing a country-level HIV viral load ECHO session modelled after ASLM’s LabCoP to strengthen all of its laboratories conducting HIV viral load testing.

Ugandan peer educator, Moses Nsubuga (aka Supercharger), illustrated to the LabCoP country teams how life-changing their work is for patients. The power of technology and the ECHO model make it easy to bring together laboratory peers who struggle with the same problems.

‘New innovative tools are also shared so it helps us to stay on par with everyone else,’ says Norah Vere, the Laboratory Service Manager from the Zimbabwe country team.

‘ECHO is a great platform for knowledge sharing. It enables knowledge dissemination and peer-to-peer learning, without the costly, time consuming and risky travel, that hitherto was inevitable, if one had to learn new knowledge from colleagues beyond the horizon,’ says Charles Kiyaga, when describing the benefits of the platform.

The ECHO model provides health-care systems across Africa with a

cost-effective and time-efficient platform to build capacity now. The first HIV care and treatment ECHOs in Namibia and Kenya are going strong almost four years after launch. New programs such as the HIV ECHO in Zambia have scaled rapidly to include participants from more than 50 clinical sites. The leaders of the Namibia, Kenya, and South Africa programs launched an Africa MetaECHO collaborative this summer. They now bring together ECHO program leaders from all over Africa every three months using the videoconferencing technology so they can learn from one another to improve their programs and become aware of innovative ECHO activities on the continent contributing to better public health in Africa. As Leonard Bikinesi, Namibia's ECHO lead, wrote in his invitation: 'There is no doubt that Project ECHO has contributed immensely to building capacity and improving the quality of healthcare in Africa.'

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Link to YouTube recordings ASLM <https://www.youtube.com/user/ASLMnews/videos>

ECHO website <https://echo.unm.edu/>



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The Fleming Fund: Professional Fellowship Scheme

Introduction

In 2016 the United Kingdom Government Department for Health and Social Care established the Fleming Fund to provide funding over a five-year period for a One Health approach to improving the capacity of low- and middle-income countries to collect surveillance data on antimicrobial resistance (AMR). In 2017 Mott MacDonald Ltd was appointed as the Management Agent for a suite of Fleming Fund grants to facilitate the improvement of key institutions. The programme was designed over 2017-2018 to improve the infrastructure and support the learning of key personnel. This is delivered through a programme of sustainable improvement in a country's ability to obtain and analyse data on AMR. This will contribute to the local use and global sharing of data from human and animal populations in 24 low- and middle-income countries.

The Fleming Fund Country, Regional and Fellowship Grants

The Fleming Fellowship Scheme is part of a series of grants designed to build institutional and intellectual capacity in 24 countries in four regions: West Africa, East and Southern Africa, South Asia and South East Asia. **Figure 1** shows the three main funding streams managed by Mott MacDonald and the typical sequence of roll-out from left to right.

When Country Grants are placed, a series of scoping and positioning

activities are undertaken to identify critical gaps which then generates the Request for Proposals for the Country Grant and the terms of reference for the Fellowship Scheme. This includes:

- Political engagement with the target country resulting in a request for support from the Fleming Fund.
- Once the need for support is established, an assessment of institutional facilities and capabilities leads to the Request for Proposals being endorsed by the national focal point for AMR. The Request for Proposals also identifies institutions that will be offered a Fellowship that matches the needs.
- Terms of reference for the Fellowships are drafted and advertised at the relevant institution. There are typically 6-8 Fellowships offered per country.
- Applicants are required to complete the application form and are interviewed, with one candidate selected for each Fellowship.
- Fellows in each country attend a workshop to prepare an

individualised workplan based on the terms of reference for their Fellowship and a collaborative One Health project.

Country Grants invest in improving selected facilities to support surveillance in AMR and antimicrobial use across human health and veterinary medicine. Successive grants build on continued progress and address other parts of the system in response to AMR. The role of the Country Grantees, therefore, is to set up the systems and infrastructure necessary to improve the quality and breadth of the country's response to the threat to health in animals and humans from AMR. This includes, of course, training and capacity building for the workforce, delivered within the Country Grant.

Fellowship Scheme

The Fellowship Scheme takes a rather different approach to workforce training, by selecting a smaller cohort of 'Fellows' and providing longer term (and more advanced) training and mentorship. This enhances Fleming Fund investment in the country

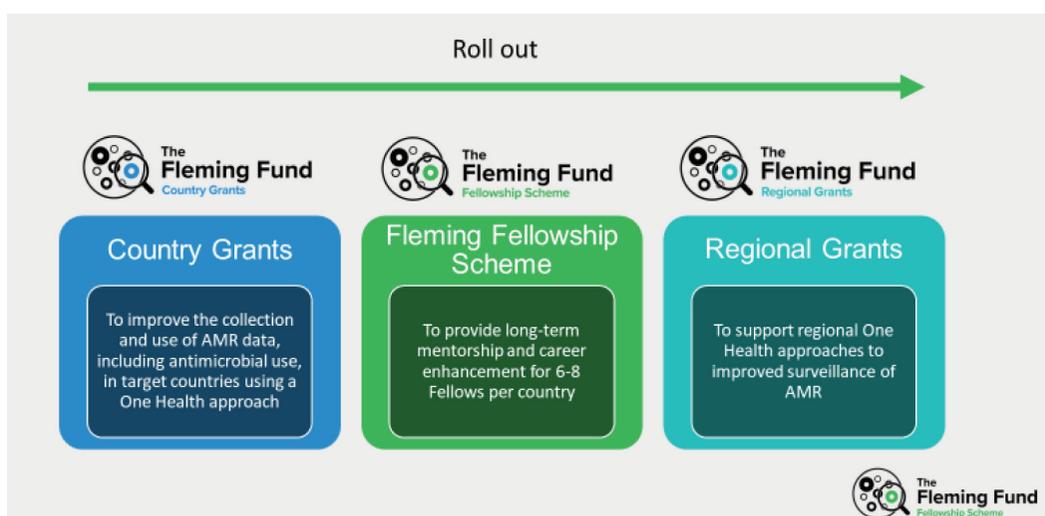


Figure 1: Fleming Fund grants programme showing the order of roll out.

by developing the skills and knowledge necessary to improve surveillance of AMR and antimicrobial use, and uses the Fellows to help develop capacity within their own institution. The institution benefits by providing a Fellow who is trained inside and outside their place of work, and who then passes that knowledge on. This is why they are referred to as Beneficiary Institutions.

A cohort of Fellows covers animal health, human health and, where relevant, aquaculture and the environment. Beneficiary Institutions are usually national reference or other key laboratories, hospitals or ministry departments that were identified during the country assessment. Each Beneficiary Institution is awarded one or more Fellowships to ensure that the investments from the Country Grant are maximised. There are generally between six and eight Fellowships per cohort. Although they focus on professional development, the Fellowships are not intended to cover basic training but rather to build advanced technical and leadership skills to promote the application of best practices in workplace settings. Nor are they primarily about research or academic qualifications but focus on the application of evidence, and in collecting and using surveillance data and uptake of data.

Process of Learning

The context of the Fleming Fellowships is designed to promote durable and context-relevant capacity development,



Select Fellows

The grant management agent, Mott MacDonald and the Host Institutions score the applications, interview candidates and select the Fellows.

- Applicants for each Fellowship must be employed by the relevant Beneficiary Institution in order to apply
- Each applicant must fulfil the eligibility criteria specific to that Fellowship to ensure that they have the relevant knowledge and/or experience to fully benefit from the activities
- Applicants must be fully endorsed by their institution to ensure they will have time to spend on the Fellowship if they are successful

- Host Institutions provide the technical and subject specialists that act as mentors to the successful applicants
- The workshop explores surveillance pathways in the country and the Fellow's role within their institution and within the AMR system nationally
- The workshop enables Fellows to start working together as a group, and provide support for each other, they also have the chance to learn more about antimicrobial resistance responses globally



Conduct opening workshop

Host Institutions and the Fellows are invited to an opening workshop to discuss training needs and network with relevant stakeholders.



Develop work plan

Host Institutions and the Fellows produce an 18-24 month work plan including a collaborative project that puts their learning into practice.

- The output from the opening workshop is a tailored programme of activities that address each Fellowship terms of reference
- Most Fellowships last 18 months and include a collaborative project with the other Fellows in their cohort
- Many Fellowships start with a course away from their place of work, usually at their Host institution
- Fellowships are part-time and therefore Fellows can put their learning into practice straight away

Figure 2 Part of the Fellowship Scheme process showing how Fellows are selected and brought together with their mentors to develop individualised workplans.

while the Fellowships themselves focus on learner needs and work simultaneously to strengthen the workplace. Terms of reference for each Fellowship are developed, reviewed by the Antimicrobial Resistance Coordinating Committee (AMRCC) and shared with the Beneficiary Institutions to advertise to their staff.

For each cohort of Fellows, one or more pre-approved international

institutions (called the Host Institutions) with experience in that country are contracted to provide support and training to the Fellows. Staff from these Host Institutions take part in the selection of Fellows and one or more are assigned to each Fellow as their mentor. **Figure 2** summarises the process from the selection of Fellows to the opening workshop. The workshop takes place in the Fellow's country with

the Host Institution mentors, and is facilitated by Mott MacDonald. This step is key to the success of the Fellowships and to engendering a collaborative, One Health approach. Other benefits of this process include:

- Fellowship activities are identified in the context of investment in their institution's development through the Country and Regional Grants of the Fleming Fund. This provides alignment between the funding streams.
- An understanding of the reality of how the AMR surveillance system in their country works for both human and animal health. By analysing what currently works and what doesn't, Fellows learn where to concentrate their efforts to improve the system. This helps promote a One Health approach.
- Learning the role of each Fellow and working collaboratively across activities strengthens the cohort's ability to develop individually and enables them to present changes to government and other authorities collectively, adding weight to their recommendations.
- A collaborative project at the end of the Fellowship is undertaken with the Host Institution mentors and Fellows, in collaboration with the beneficiary institution. This helps to put new-found skills into practice and aims to ensure a One Health approach in the field.

Additionally, the attendance at the workshop of the AMRCC Chair and/or other key national figures and ministers, Directors of the Beneficiary Institutions and leads of the Country and Regional Grants not only engages the Fellows in the national debate but reinforces national commitment to the Fellows and their role in helping to shape

AMR surveillance in their country.

Each Fellow's workplan is tailored to their needs in fulfilling the terms of reference and effectively conducting their daily work. Areas that the programme expects them to include are:

- Regular meetings between Fellows and mentors
- At least one visit to the Host Institution to attend advanced training and establish professional connections
- At least one visit from the mentor to the Beneficiary Institution including training other than to the Fellows
- Other training as appropriate including online courses
- Provide training to their colleagues within the Beneficiary Institution and further afield
- Attendance at one or more relevant international conferences or meetings
- Collaborative activities with other Fellows including regular meetings and One Health activities
- One or more collaborative projects with other fellows

The range of activities for each Fellow is designed around their work within the Beneficiary Institution and constitutes 'on-the-job' training. This approach ensures that the Fellow does not become a lost resource to their employer for the duration of the Fellowship. In fact, they should increase in effectiveness by putting their learning into practice and imparting new knowledge to others. The key benefits of this approach are:

- Fellows consolidate their knowledge and skills through teaching others
- The institution has more staff with specific technical skills and, therefore, has the potential to increase and improve its work on AMR surveillance
- Institutional staff and directors have a raised awareness of AMR
- The Fellow, their colleagues and institution directors have more informed knowledge about AMR to be able to raise awareness outside of the institution and therefore have more influence on the national response to AMR.

The importance of creating a cohort of Fellows in each country is that they provide a unified One Health voice within AMR surveillance backed by reliable data and generate a group of similarly trained individuals that will support one another and continue to expand their knowledge through a One Health approach. Lastly, networks developed during the Fellowship particularly with their mentors will continue to provide them with support, as well as create opportunities for future collaboration.



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Best practice for capillary blood sampling

Correct sampling techniques are essential to avoid inaccurate haemoglobin point-of-care testing results

Point-of-care (POC) testing is one of the fastest growing areas in laboratory medicine. Consequently, capillary blood (fingerstick) sampling is increasingly being used worldwide as POC testing becomes more readily available. Capillary blood sampling is also frequently used to obtain small volumes for laboratory testing as it minimises pain, is less invasive, and can be performed quickly and easily. Capillary blood samples, instead of venepuncture samples, are advised for paediatric, obese, older or anxious patients, as well as those with severe burns, thrombotic tendencies or superficial, inaccessible or fragile veins.¹

Anaemia, where the availability of haemoglobin falls below the body's physiologic needs, affects approximately 25% of the global population with a high prevalence in developing countries.² It has major health implications and is one of the leading causes of childhood morbidity and mortality worldwide, and also contributes to 20% of maternal deaths.³

Globally, the highest incidence of anaemia is found in preschool age children (47%) and the highest proportion of those affected live in Africa (67.6%).² Children have increasing haemoglobin needs to manage their growth. They may suffer from inherited haemoglobin malformations (e.g. sickle cell disease, thalassemias), parasitic infections, or poor nutrition.² However, iron deficiency anaemia, which affects around two billion people worldwide, can be addressed inexpensively and efficiently by increasing iron intake.³ This can be achieved by dietary diversification including iron-rich foods and enhancement of iron

absorption, food fortification, and iron supplementation.

POC haemoglobin testing

It is therefore not surprising that haemoglobin is the most frequently performed test in POC haematology.⁴ POC haemoglobin testing can deliver accurate results in settings where a benchtop laboratory haematology analyser is not practical. Such locations include field settings where mobility and simplicity are essential, or resource-poor locations where dedicated laboratories are not available. Notably, pharmacies are increasingly offering haemoglobin POC testing in such situations.

However, haemoglobin values are prone to being affected by pre-analytical errors, with incorrect capillary blood sampling being the most common reason leading to inaccurate POC haemoglobin results.⁵ Therefore, personnel drawing blood must adhere to strict and standardised blood sampling techniques to ensure accurate and consistent POC testing results that are comparable to laboratory techniques.

For this reason, detailed capillary sampling guidelines have been published by both the Clinical and Laboratory Standards Institute (CLSI) and the World Health Organization (WHO).^{1,6} This article provides an overview of best capillary sampling practices for haemoglobin testing from finger sticks.

Understanding common causes of pre-analytical errors

It is important to understand the common causes of pre-analytical errors and reduce their impact on

the haemoglobin result. Variability in reported haemoglobin values can be caused by a number of physiological factors, such as: gender, body position, dehydration, smoking, or altitude. As previously discussed, it can also be significantly affected by pre-analytical errors arising through incorrect capillary blood sampling technique.

The sidebar (next page) presents a general overview of capillary sampling technique best practice. Detailed below are some of the most common sources of error that healthcare workers should be aware of in order to appreciate the importance of adhering to standardised sampling procedures:

- **Lancet choice.** The lancet must make a sufficiently deep puncture to ensure an adequate flow of blood. 1.85 to 2.25mm is recommended for adults, depending on the thickness of the skin. For children aged younger than 8 years, the penetration depth should not exceed 1.5mm.⁶
- **Puncture site.** Selecting the correct finger and puncture site will ensure best chance of good consistent blood flow and minimise pain for the patient. The middle or ring finger should be used, ideally of the non-dominant hand, as they are generally less calloused and less sensitive to pain compared to the index finger or thumb. The thumb should also be avoided due to its pulse (arterial presence). In the fifth finger the distance between the skin surface and the bone is too small.⁶ The hand must be warm and relaxed. The patient must not wear a ring on the finger as this may obstruct the blood circulation.

The puncture should be slightly off centre from the central, fleshy portion of the fingertip — near the side where the skin is thinner with fewer nerve endings and less pain sensation, but not on the very side of the finger.

- **Cleaning, disinfection, and drying.** Cleaning and disinfection of the puncture site is essential to remove any potential contaminants that could affect the reading or jeopardise patient safety. The puncture site must also be dried completely, after cleaning, to remove any remnants of alcohol solution that will dilute the blood sample and cause false low readings.
- **Applying too much pressure around the puncture site.** The finger can be massaged gently before and after the puncture to stimulate blood circulation, but not going beyond the first knuckle. Maintaining a light pressure at the moment of puncture ensures effective penetration. Do note, the finger should not be pressed too hard as this will push fluid from the tissue into the blood and cause false low readings.

The importance of time and blood flow

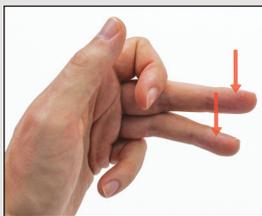
Another key factor that influences haemoglobin measurement is capillary flow. Typically for haemoglobin, the first 1-3 drops after puncture show a higher degree of variability of the haemoglobin concentration, independent of the analytical device used for the test. It is for this reason that these first few drops of blood should be wiped away.

The highest accuracy is generally reached from the 4th drop after puncture, with good capillary flow occurring for a period of 30-45 seconds. After this time, coagulation will occur where

BEST PRACTICE FOR CAPILLARY SAMPLING (FINGERSTICK)

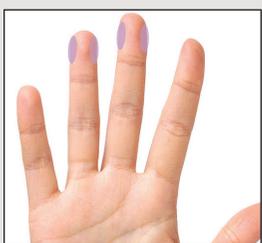
The following steps demonstrate how to take a proper capillary blood sample to ensure accurate POC haemoglobin measurements.

Make sure all items for capillary sampling and performing the test are available and close to hand.



Use the middle or ring finger, ideally of the non-dominant hand.

The patient must not wear a ring on the finger as this may obstruct the blood circulation. Ensure the patient's hand is warm and relaxed and ensure the patient is comfortably seated.



The puncture should be made slightly off centre from the fleshy portion near the side of the fingertip.



Disinfect and thoroughly dry the puncture site.

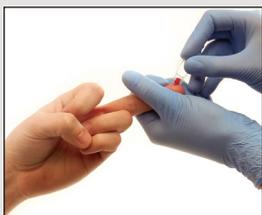


Gently massage the finger towards the tip to increase blood flow. Avoid going past the first knuckle.



Make the incision on the upward-facing side of the fingertip, so that the blood drop sits on top of the finger, to facilitate filling of the haemoglobin cuvette.

Apply only light pressure on the fingertip until a blood drop appears. Don't press or milk the finger! It may take a few seconds after the puncture until the blood flow starts.



Wipe away the first 2—3 drops and make sure there is a free blood flow before filling the cuvette. Release the grip on fingertip when wiping off a drop.

Be sure to have a sufficient sized blood drop to fill the cuvette. Fill the cuvette completely in one go. Do not refill and avoid air bubbles.

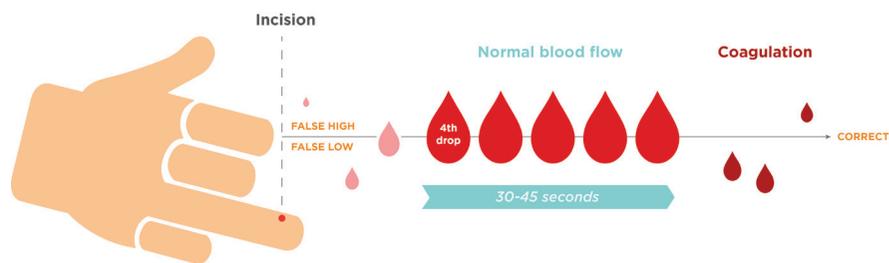


Figure 1. The effect of time and capillary blood flow on haemoglobin results.

blood clotting would lead to inaccurate haemoglobin results if blood is sampled then. **Figure 1** demonstrates the ideal capillary blood sampling window.

The most important factor to reduce pre-analytical errors is the presence of a free spontaneous blood flow, especially as neither the size of the drop nor the time of collection following the puncture is defined and manufacturers' recommendations on this subject vary.

Good operator training and practice

Best practice for capillary sampling can avoid the majority of pre-analytical errors.⁵ Therefore, in addition to following a standardised documented procedure, it is essential to ensure that all personnel taking blood samples are properly trained. Effective and continuous operator training and practice must be in place to eliminate pre-analytical errors and to obtain correct results for haemoglobin testing, especially from capillary sampling. Other aspects of operator training, particularly for safety reasons, should include an understanding of anatomy, awareness of the risks of blood exposure, and the consequences of poor infection prevention and control.⁶

POC test devices can support best practices

Easy-to-use sampling and POC testing devices are also necessary to support haemoglobin measurement best practice for accurate results

comparable to laboratory techniques. In addition to being small, portable and fast, key to the effectiveness of any POC analyser is simplicity. This will minimise opportunity for user error and need for retesting. An analyser that is straightforward to use also ensures minimal training requirements, again contributing to affordability.

Other considerations supporting best practice include the ability to minimise the number of steps in the pre-analytical procedure. This not only reduces opportunity for user error, but also helps to standardise any variation introduced by differing operators, particularly when pipetting is part of the sample application to the analyser system.

For example, some POC analysers utilise sampling devices that eliminate the need for pipetting, enabling blood samples to be drawn straight from the patient and inserted directly into the analyser (**Figure 2**). These include microcuvettes that can be filled completely by simply touching the tip to the capillary blood drop. Some of these cuvettes are specifically designed to ensure easy 'bubble-free' sample take-up; a quick visual check of the clear cuvette can ensure that the cavity is completely filled. Also, recent developments have led to the introduction of reagent-free cuvettes which can be stored at ambient temperatures, unaffected by humidity, for long time periods (up to 2.5 years).

Finally, and crucially, even if easy-to-use, POC devices must also be accurate and reliable, for which certification and quality control is essential. Most devices are factory calibrated against international reference methods and standards. This removes need for re-calibration and ensures a high correlation with standard reference and common laboratory methods. Integrated automatic self-checks between every measurement and the availability of ready-to-use control materials eliminate risk of incorrect result reporting.



Figure 2. Specifically designed reagent free cuvettes such as the DiaSpect Tm microcuvette (EKF Diagnostics, Cardiff, United Kingdom) can enable simple, bubble-free capillary blood sampling.

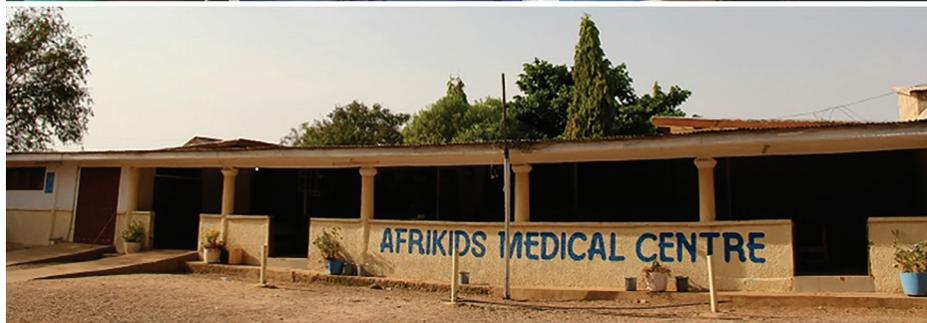
Given the growth in volume of POC testing, standards have been increasingly tightened by organisations such as The American Association for Clinical Chemistry (AACC). This has placed demands on developers to embark on a process of continual improvement to ensure that they can deliver data that withstands scrutiny. In turn, this removes barriers from POC testing's path to integration as a valuable extension of a laboratory's portfolio and also for enhanced patient care where not used in conjunction with a laboratory.

POC haemoglobin testing in action

In summer 2018, the Eleanor Mann School of Nursing at the University of Arkansas, in the United States, took 15 nursing students on a Study



Figure 3. POC haemoglobin testing for iron deficiency in Bolgatanga, Ghana.



Abroad Programme in Bolgatanga, Ghana (**Figure 3**). Working at small village clinics they established that anaemia is very common among women of childbearing age, sometimes leading to blood transfusions, but more commonly, death. Therefore, in addition to measuring haemoglobin using the DiaSpect Tm portable hand-held analyser (EKF Diagnostics, Cardiff, United Kingdom) and confirming the prevalence of anaemia, the team also provided vital nutritional education.

A total of 176 haemoglobin tests were undertaken with a 45% rate of tests below normal values; these results supported the pre-study desk research and hypothesis that iron-rich and high protein foods need to be increased in the women's diets. They also developed an educational program focused on which local foods were iron-rich or high protein and why it is important to include them in the diets of new mothers, pregnant women, and those of childbearing age.

Leading the nursing team and study program, Carol Agana, University of Arkansas, explained why they

chose to use DiaSpect Tm in Ghana, 'The point-of-care analyser had to be unaffected by high ambient temperatures, as well as being easy-to-use and even easier to carry. Battery life was also important for working in remote areas, so when charged up it could last a very long time, which is great when electricity is either unavailable or intermittent. Furthermore, having virtually instantaneous haemoglobin results meant that the participants didn't have to wait or return for these. Also ideal was the fact that DiaSpect's sampling cuvette requires such a tiny drop of blood from a standardised finger prick procedure.'

'EKF's contribution to our project really helped to reinforce the education, and women were so impressed that they could actually get their blood checked immediately. Even the local women working at the clinics asked to be tested, too. Our nursing staff also found DiaSpect great to work with, as the self-training video was easy to follow, and being hand-held and lightweight, it was very easily transported in its protective carry case. Overall, it was a very successful

programme and we look forward to returning in summer 2019,' concluded Carol. The results of the programme are detailed in a report.⁷

Conclusion

POC haemoglobin testing can deliver accurate results for haemoglobin testing in settings where using a benchtop laboratory analyser is not practical. With good operator training and best practice procedures in place, as well as physiological factors considered with the correct reference ranges applied, then haemoglobin testing can be very reliably undertaken in many different POC locations.

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FAST FACTS

Ebola Virus Disease (EVD)

1976

is the first year EVD appeared in 2 simultaneous outbreaks

2014–2016

saw the largest Ebola outbreak in West Africa since the virus was first discovered

50%

is the average fatality rate of EVD

25% to 90%

is the variation in range of fatality rates from past EVD outbreaks

2 to 21 days

is the time interval from infection with the Ebola virus to onset of symptoms

3 months

is the time male Ebola survivors should be offered semen testing after disease onset

12 months

is the time male Ebola survivors should practice safe sex after onset of Ebola symptoms

2 times

is the recommended number of negative semen tests male Ebola survivors should complete before having unprotected sex

Second Ebola vaccine to complement 'ring vaccination' given green light in DRC. Health authorities in the Democratic Republic of the Congo (DRC) have announced plans to introduce a second experimental Ebola vaccine, manufactured by Johnson & Johnson, mid-October. This vaccine, which is given as a two-dose course, 56 days apart, will be provided under approved protocols to targeted at-risk populations in areas that do not have active Ebola transmission as an additional tool to extend protection against the virus.

The Johnson & Johnson vaccine will complement the current vaccine (rVSV-ZEBOV-GP, manufactured by Merck), which has proven highly effective and safe, and which has helped protect thousands of lives. The Merck vaccine will continue to be provided to all people at high risk of Ebola infection including those who have been in contact with a person confirmed to have Ebola, all contacts of contacts, and others determined to be at high risk of contracting Ebola. To date over 223 000 people have received this vaccination during the current outbreak.

In May 2019, WHO's Strategic Advisory Group of Experts on Immunization (SAGE) reviewed use of vaccines in the ongoing Ebola outbreak and issued recommendations. These included adjusting the dose of the Merck vaccine, evaluating a second vaccine under appropriate protocols, changing strategies when insecurity makes it difficult to reach people—such as providing pop-up vaccination stations—and increasing the number of people vaccinated within communities with ongoing transmission, sometimes vaccinating whole villages.

New therapeutics and better use of treatment protocols have also saved many lives. The introduction of the second experimental vaccine is in line with the SAGE recommendations as are a number of other innovations.

The main vaccination strategy used with the rVSV-ZEBOV-GP vaccine is a 'ring strategy' where all people who have come into contact with someone with a confirmed case of Ebola are given the vaccine. Where people are stigmatized or feel under threat, pro-

tected, temporary 'pop-up', vaccination sites are set up, often at health posts, rather than near the homes of individuals infected with Ebola. This allows people to come for vaccination at a safe, more anonymous site, but also increases protection for vaccinators in areas where there is ongoing conflict and insecurity.

Another approach being used to offer vaccination for people at high risk of contracting Ebola is 'targeted geographic vaccination'. This strategy involves vaccinating everyone in the neighbourhood, or village, rather than vaccinating only the known contacts and contacts of contacts. Targeted geographic vaccination was used successfully when the outbreak spread to Chowe in South Kivu. Over 90% of people who are offered vaccination accept it. Since the start of the outbreak, WHO and partners have worked to recruit and train Congolese nationals from within Ebola-affected communities as vaccinators to increase community acceptance and also transfer skills to the region. Now, the majority of ring vaccination team members are trained healthcare workers, doctors and medical students from affected communities who speak local languages and understand community concerns.

There are enough vaccine doses on the ground to meet the current needs, with WHO logisticians ensuring a minimum supply of 10 000 doses at all times, and overall supplies of the vaccine are being constantly monitored. Considering the current number of cases being reported and the doses required to vaccinate around each case, the doses available of the rVSV-ZEBOV-GP vaccine are considered sufficient. Merck has provided WHO with 245 000 doses for DRC and neighbouring countries and built a stockpile of 190 000 doses that are ready to send to DRC. Merck also aims to release 650 000 doses over the next six to 18 months under its replenishment strategy. Under the current SAGE recommendations this means that there are 390 000 doses currently and additional 1.3 million doses will be available.

• SOURCE: <https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease>

What is a community of practice? How has ASLM's community of practice for viral load scale up, LabCoP, impacted programs and partners?

What is a community of practice?

The term 'community of practice' was coined by anthropologists studying learning models, such as apprenticeships.¹ They found that most learning in such models occurred not via an apprentice's relationship with a master but via relationships that apprentices had with journeymen and more advanced apprentices.¹ The term 'community of practice' thus focuses on this community, which 'acts as a living curriculum for the apprentice'.¹

Communities of practice have three distinguishing characteristics: the domain, the community, and the practice. The domain is the area of interest shared by the group members, and their commitment to it, which distinguishes members from other people. The community is members' engagement with each other through activities and/or discussions during which they share their knowledge and help and learn from each other. Finally, the concept of practice goes beyond a mere area of interest. As Wenger-Trayner explained, 'Members ... are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems — in short a shared practice...'¹

How has ASLM implemented the concept of communities of practice?

With funding from the Bill and Melinda Gates Foundation, ASLM launched a community of practice focused on the viral load testing cascade — the Laboratory System Strengthening Community of Practice Project (LabCoP).² You can read more about LabCoP's goals and achievements, and how it functions in the features in this issue.^{3,4}

Shortly after LabCoP celebrated its first year of existence, ASLM sat down with a few members of LabCoP's Oversight Committee, Trevor Peter, Lara Vojnov and Solange Baptiste, to discuss the accomplishments and their perspective on the first year of LabCoP.⁵ Below are some of their answers to our questions.[†]

ASLM: What if any impact do you see from LabCoP on laboratory systems strengthening through multi-stakeholder, multi-country discussion?

TP: The impact that I've seen most directly has been these ECHO sessions, which can get very large. In

fact, one forum that my team members presented at had close to 100 individual attendees from across the continent. I'm not seeing that level coming together in standard virtual meetings. This community has been established, it's large. You have people expressing their opinions and sharing inputs, so just the very existence of that community is important, and important topics are being discussed.

LV: I look at the WhatsApp conversations, and it's clear from the back and forth that countries very much appreciate this linkage and the LabCoP setup that supports it. Transferring knowledge, interventions and information from one country to another used to be burdensome, and often relied on partners or donors. One country visiting another is also financially challenging, and it's a difficult to take off days, whereas now, it's everyday conversations where Kenya is talking to Malawi, who is talking to Cameroon, etc and they're all having critical conversations, and being able to solve similar problems across borders in a really simplified and straightforward way.

SB: The The International Treatment Preparedness Coalition (ITPC) is a civil society organization that is about treatment access and advocacy, so we are not your typical scientist or lab group. I think most things are strengthened by a diversity of perspectives, so this cohort of lab scientists benefits from the community advocacy perspective by understanding community needs: What's the reality when things leave the lab? How do results get used or not used by the actual recipient of care at the site level? Sometimes when we bring our perspective to discussions, it's sort of mind-blowing, but it shouldn't be, because that's more the reality than the bubble of the lab. For example, when it comes to demand creation, I can talk about how recipients of care interact with labs, how their results are not getting to them in time, and not being used.

ASLM: Has being involved in LabCoP and interacting with the country teams benefitted or impacted your organization or given your team new ideas?

TP: The Clinton Health Access Initiative (CHAI) participates in an organization called the Innovative

Diagnosis Consortium. It's a collaboration between different organizations: global and some country, that tries to distill best practices for diagnostic test deployment and procurement systems. Listening in on some of the discussions at LabCoP, we've picked up a number of concerns about some ideas that are considered the prevailing wisdom at the global level. The natural, unfiltered feedback around what people think about these technologies and systems has helped to modulate how we position our ideas within this consortium. From that perspective, the LabCoP community has provided access to ideas from across the continent that otherwise we wouldn't have access to.

LV: WHO provides country support and dissemination of information, both normative guidance as well as best practices. Because ASLM and LabCoP are so well-positioned and well-structured, they have taken a key role in providing country support and providing lines of discourse, allowing us more of an opportunity to provide country support in other regions. ASLM and LabCoP are engaged in daily diagnostic discussions across countries, making them the leader and expert in several key areas. Collaborating and working closely with ASLM, we aim to better understand and generate key best practices to develop into global guidance. Ideally, that supports not just African countries, but all regions. We cannot develop that type of guidance by ourselves, and it's not guidance, quite frankly, that I think would be very easy to put together without the LabCoP structure in place.

ASLM: What are your hopes for the future of LabCoP?

TP: I think it has to continue to grow and expand. It should build a deep portfolio of topics to discuss, and topics that it comes back to. I think it can also franchise or become regional on the basis of geography or language, using some of the same principles. I

hope it grows, because the platform is something that people are quite comfortable connecting with.

SB: I would like to see how recipients of care can be less the tail-end beneficiary and be more included in coming up with solutions, whether it's from specimen collection, to transportation, to improvements in results turn-around time. Who is more invested in getting their viral load results than the actual person living with HIV? No one. Because they need it to understand their viral load. Not the clinician, not the lab person, not the nurse, not any of these people. I think if we continue to look for solutions with only one lens, or within only one space, we probably won't find it. I think these times that we live in require us to all put our heads together.

LV: I would like to see LabCoP and ASLM continue supporting these exchanges, but I think we can also start thinking about what else can be done, how else LabCoP and ASLM can support countries moving forward. The dialogue and information exchanges across countries may become challenging to continue without the LabCoP structure of support and encouragement. It's really powerful to continue that exchange, because without it, I think countries and the global network would be in a different place. My sense is that there's no better body to ensure that conversation than ASLM and LabCoP.

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†Edited for brevity and readability.

Meet Professor Judith Torimiro

Chair & Associate Professor, Department of Biochemistry, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I; Director of Laboratories & Senior Researcher for Health, Chantal Biva International Reference Centre for Research on Prevention and Management of HIV/AIDS (CIRCB), Yaoundé, Cameroon. Professor Torimiro holds a Bachelor's Degree in Chemistry from the University of Lagos and a Master's Degree in Chemical Pathology from the University of Ibadan in Nigeria, as well as a Master's Degree in Applied Molecular Biology of Infectious Diseases and a Ph.D. in Infectious Diseases from the London School of Hygiene and Tropical Medicine in the United Kingdom. She underwent post-doctoral training in molecular epidemiology at the Johns Hopkins Bloomberg School of Public Health, the National Cancer Institute (NCI), Food and Drug Administration (FDA), and New York University School of Medicine in the United States. She serves as the Laboratory Coordinator and Head of the Molecular Biology Laboratory at the Chantal Biya International Reference Centre for Research on Prevention and Management of HIV/AIDS (CIRCB). She is also the Chair of the Department of Biochemistry at the Faculty of Medicine and Biomedical Sciences and a member of the Pedagogic and Scientific Board of the Postgraduate School for Life Sciences at the University of Yaoundé I in Cameroon. In 1996 when still a research assistant, she received an award for Excellence in Women's Health from the Commonwealth Secretariat, in 2016 she received an award for Academic Excellence for Women from Cameroon's Ministry of Higher Education for outstanding academic competence and scientific expertise, and in 2019 the World Health Organization (WHO) recognized her with the 2019 Sasakawa Prize in Health.



Professor Judith Torimiro

Who is Professor Judith Torimiro? What key experiences led you to a career related to laboratory medicine?

I was born in a rural area in Cameroon where my father worked as a field research assistant at a research centre for agriculture. In 1975, I moved to secondary school in a small town with a strong motivation to study the sciences. However, in my secondary school, I never saw or touched a test tube or Bunsen burner. I used to say there were 'very few trees and no science laboratory in the city, but biology and science were an expression of nature'. Two unsuccessful attempts to get into the only medical school in Cameroon opened the way for me to study chemistry abroad in 1983. There, I missed the flora, trees and bush animals of the plantation in Cameroon where I grew up.

In graduate school in Nigeria, my mentor explained to me the importance of laboratory medicine

in patient management and medical research. This was the turning point in my training, because it made me confident that I would make a contribution to patient management and care as a clinical laboratory scientist. For example, understanding why there is excess glucose in urine and how

to quantify glucose in urine and blood is just as important for the patient as the treatment of diabetes. If I was giving a lecture, in this case, I would tell the students that there is wrong genetic information that is being transmitted during the process of glucose metabolism in this individual.



Professor Torimiro receiving a handshake from Cameroon's Minister of Higher Education during an award ceremony in 2016. [Photo courtesy of Judith Torimiro.]

Since then, my work has focused on infectious disease research of global importance, including HIV/AIDS, hepatitis B virus (HBV) and hepatitis C virus (HCV). Using cutting edge technology and methods such as the 'One Health' approach for basic medical research in laboratory medicine has shaped my research career niche. For example, studies of the origins of HIV serve as a blueprint for understanding zoonotic infections. Improving the quality of women's health is the drive of my current research on HBV in pregnancy.

How have your research interests evolved over the years? How was your work influenced by the educational and research opportunities that you undertook?

Overall, my research addresses the differential outcomes of viral infection in humans. Early on, I learnt from one of my mentors that 'viruses move with language'. In the field, he taught me that viruses can move from one mammal to another and cause disease (i.e., zoonosis). The springboard of my research career started in 1996 as Laboratory Coordinator and assistant researcher in a study on the natural

history of HIV infection in Cameroon, Senegal and Guinea. A few years later, while working with the Johns Hopkins Cameroon Project, our research contributed to knowledge on viral zoonotic infections of human T-lymphotropic virus and simian foamy virus in hunter-gatherer populations of Cameroon.

I developed an interest in learning more about factors that influence the transmission of viruses from mothers to children, which was built upon results we obtained from my first research grant in 1994 from the Union of African Population Studies (UAPS) to screen pregnant women for HIV, syphilis and gonorrhea. This led to questions such as: Why would an immunodeficiency virus cause disease in humans and not in monkeys or chimpanzees? Why the coincidence of broad genetic diversity of HIV Type 1 in the central African region, and non-human primates infected with simian immunodeficiency virus? Similar questions could be asked about why an HIV-, HBV- or HCV-positive pregnant woman who breastfeeds her baby would or would not transmit the virus to her baby?

As for influences on my work, while pursuing a Master's Degree in

Applied Molecular Biology of Infectious Diseases at the London School of Hygiene and Tropical Medicine of the University of London, I worked as a research assistant at the 'Institut de Recherche pour le Développement' (IRD) in Montpellier France in 1997. There, I learned molecular techniques (polymerase chain reaction and sequencing), a discipline uncommon in Cameroon at the time. Few experts and laboratories for molecular biology were available in Cameroon in the 1990s. I felt I had the opportunity, privilege and, of course, responsibility to build competencies in molecular biology through research and to contribute to building the next generation of biomedical scientists. With support from mentors at research institutions in Europe and the United States, I contributed as a laboratory scientist and researcher to the creation of four research centres in Cameroon and moved from single research projects to multi-country epidemiologic studies and clinical trials.

Thus, I have been involved in multicenter epidemiologic studies of viruses, clinical trials and capacity-building for diagnosis, quality control and strengthening of the health system. My research focus has moved from basic medical research to more translational research to advice policy. For example, in 2008, I participated in setting up the United States Centers for Disease Control and Prevention-sponsored Programme to Strengthen the Quality Control System for HIV diagnosis in Cameroon. This programme laid the groundwork a few years later for the implementation of the Stepwise Laboratory Accreditation Programme in Cameroon.

My training abroad and networking with senior colleagues in the United States and Europe are key in my teaching and research career. The opportunity to serve as Chair of the Department of Biochemistry is a



Prof Torimiro working as a Laboratory Coordinator with the Field Coordinator and other colleagues of the Johns Hopkins Cameroon Project conducted in Cameroon, Senegal and Guinea. [Photo courtesy of Judith Torimiro.]



Prof Judith Torimiro supervising students in the Laboratory at the Chantal Biya International Reference Centre for Research on Prevention and Management of HIV/AIDS (CIRCB) in Yaoundé, Cameroon. [Photo courtesy of Judith Torimiro.]

privilege as is coordinating two masters Programmes, Clinical Biochemistry and Molecular Biosciences, and a doctorate Programme in Clinical Biochemistry in the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I in Cameroon.

You are known for bringing world-class research capacity to Cameroon. For researchers and laboratory scientists in other African nations, what are the key steps that must be taken to build similar capacity in their countries?

The key steps to building capacity for a career in biomedical research and laboratory medicine include:

- Having the motivation to do research;
- Getting the right academic training;
- Building the right career profile for research;
- Connecting with mentor(s) and working hard to become an independent researcher;
- Developing a niche for your research and making yourself an expert in that field;
- Switching your research interests with current knowledge, events and questions;

- Networking with other scientists of different disciplines and promoting team work;
- Reading and publishing your findings;
- Applying for grants to support your research; and
- Practicing and promoting responsible conduct of research, rigour, hard work, diligence and patience.

What is your best advice for the next generation of African laboratory scientists? How can they best equip themselves and their communities for the challenges to come?

Apart from assisting doctors and nurses to choose the correct laboratory tests and ensuring proper collection of specimens, testing and reporting of results, the African laboratory scientist can be involved in research for health. This is the path that I took after basic training in clinical biochemistry and molecular biology. Just as laboratory medicine is an important pillar

in patient management, so it is in research for health.

A laboratory scientist can develop a career in teaching and research that leads to policy change in public health. Take the example of the Ebola, dengue and cholera outbreaks that seem to be the new normal in Africa. The response to these epidemics cannot be effective now or in the future without the clinical laboratory scientist.

I would advise the African laboratory scientist to get the right training and competencies, network with other African and foreign scientists, get mentor(s) and make a significant contribution to the development of Africa.



In the field with the Johns Hopkins Cameroon Project team. [Photo courtesy of JHCP.]