Rapid Response Brief

April 2020

What can research evidence tell us about:

Strengthening district laboratory systems: Scaling up the response for the COVID-19 outbreak in Uganda

Key messages

The ability to strengthen national laboratory system and networks is informed by the number of resources available, stage of the outbreak and availability of innovative diagnostics, e.g. Gene Xpert modules or rapid diagnostic tests.

The following actions facilitate a scale-up:

- Mobilise a significant amount of resources including financial resources, trained and motivated personnel and physical infrastructure.
- Review the national laboratory policy for a long term plan.
- Conduct a risk assessment of the biosecurity and biosafety practices of the personnel and infrastructure.
- Assess and strengthen the capacity of the specimen transportation network and laboratories.
- Train ALL personnel and include biosecurity and biosafety practices
- Ensure the presence of- and compliance to standardised protocols that comply with IHR 2005 and for the pathogens.
- Review the communication channels between the care points and laboratories and ensure these encourage open and transparent information sharing.
- Provide continuous technical assistance, monitoring and supervision.
- Ensure there are robust quality control measures according to national policies and standards.
- Consider public-private partnerships to increase testing capabi
- Facilitate partnerships and cooperation between laboratories.

Where did this Rapid Response come from?

This document was created in response to a specific question from a policy maker in Uganda in 2019.

It was prepared by the Center for Rapid Evidence Synthesis (ACRES), at the Uganda country node of the Regional East African Community Health (REACH) Policy Initiative

Included:

- Key findings from research
- Considerations about the relevance of this research for health system decisions in Uganda

Not included:

- Recommendations
- Detailed descriptions

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Short summary

Background:
Probable cases of Covid-19 with in districts have to be refered or transported to designated facilities to collect samples amidst an on-going country wide lockdown. This is increasingly becoming a challenge as the number of people refered is increasing and the resources available to facilitate transport are redcuing. This is further compounded by an increase in the turnaround time currently reported at at least five days for results to return from the central testing laboratory. These coupled have increased anxiety in the commnity and a loss of trust in the system, affecting government efforts of Covid-19 case detection. The DHOs therefore seek evidence to contribute to on-going discussions with the national task force on the scale-up of the response to the covid-19 outbreak in Uganda. for example how to leverage available laboratory networks within districts to scale-up the frequency of testing.

Question:
What are the considerations for strengthening districts laboratory systems and networks in the scale-up of response for COVID-19 in Uganda?

Findings:
The on-going COVID-19 outbreak has a high rate of transmissibility and impact on communities and the health system. Therefore, all countries will, at some point, need to scale up the frequency of testing samples. To strengthen national laboratory systems and networks, nations use information on the available resources, stage of the outbreak and availability of innovative diagnostics, e.g. rapid diagnostic tests and Gene Xpert modules.

From previous experiences of past outbreaks such as Ebola, countries can consider taking the following actions to facilitate a scale-up of their response:

- Mobilise a significant amount of resources, including trained and well-motivated personnel and physical infrastructure and guided by capable management and leadership.
- Review of the national laboratory policy and ensure this fits in the long term plans to strengthen laboratory systems.
- Conduct a risk assessment of the existing laboratory infrastructure, personnel and practices. The assessment ensures consistency with the updated international health regulations 2005 (IHR) for biosafety and biosecurity.
- Assess and strengthen the capacity of the specimen transportation networks and ensure this maintains biosafety and biosecurity guidelines; confidentiality and privacy of individuals.
- Build capacity of ALL the personnel in good laboratory practices, biosafety and biosecurity practices. Ensure that personal protective equipment are available and used all the time.
- Ensure availability of standardised protocols to comply with IHR 2005 and for the pathogens to be tested at the laboratory
- Provide continuous technical assistance, supervision and monitoring of the peripheral laboratories.
- Review communication channels between the care and laboratories and ensure that there is an open, transparent and available mechanism for communication and information transfer.
- Ensure there is a robust quality control system according to national policies and standards.
- Facilitate partnerships and cooperation between laboratories.

Conclusion: Governments, especially those of low-income countries, need to scale up the testing and identification of probable cases of Covid-19 in situations where clusters or community transmissions have been confirmed. Scaling up laboratory systems will involve mobilising a significant amount of resources, reviewing national policies for laboratory systems, building the capacity of all personnel and transportation networks and taking advantage of innovative diagnostics made available to improve testing.

Background

In just four months, the new severe acute respiratory syndrome- Coronavirus 2 (SARS-Cov2) has infected over 1.9million people and killed over 110,000 in a pandemic that has gripped the world [1]. The disease has had debilitating effects among many people especially the elderly progressing to the severe form of Covid-19, acute respiratory distress, requiring mechanical ventilation which severely strains health systems in countries [2]. In response, countries have had to scale up their screening and identification of cases and contacts through the strengthening of their laboratory systems and protocols. Uganda has currently confirmed 54 cases, tested 5,025 individuals and continues to follow up to 476 travellers [3].

How this Rapid Response was prepared

After clarifying the question being asked, we searched for systematic reviews, local or national evidence from Uganda, and other relevant research. The methods used by the SURE Rapid Response Service to find, select and assess research evidence are described here: www.evipnet.org/sure/rr/methods

Uganda's national response is partially decentralized, with teams set up at the district level to perform screening and contact tracing of individuals within the communities. Probable cases are referred or transported to designated facilities: Mulago hospital, Naguru hospital, Adjumani and Hoima hospitals where samples are collected and transported to the central testing facility at the Uganda virus research institute (UVRI).

District health officers (DHOs) have noted that the number of individuals requiring a diagnostic test in the communities has increased exponentially. Still, the probable cases have to either be referred or transported to, and fro the designated centres which present numerous challenges, for example increased opportunities for transmission when transporting patients as a group and loss to follow up [4]. Also, there are reports of increased the turnaround time estimated at "five" or more days and increased anxiety and loss of trust within the communities due to the delays.

The DHOs have also cited that at the moment, there is only one national reference laboratory at Uganda Virus Research Institute (UVRI) testing all samples and this is overwhelmed. In addition, the need to transport patients as causes more delays in turn around time estimated at "five" or more days from the time the sample is collected. These have led the DHOs to seek evidence to contribute to the on-going discussions with the national task force of how to scale up the response for Covid-19 in Uganda.

Rapid response question

What are the considerations for strengthening districts laboratory systems and networks to scale up the response for Covid-19 in Uganda?

Summary of findings

In this summary, we present evidence on how countries can strengthen their national laboratory systems and scale-up the frequency of testing for Covid-19 disease in the communities. It should be noted that many countries like Uganda have centralised testing for pathogens in outbreaks and how these are scaled up depends on the progress and extent of the outbreaks, available resources and presence of rapid diagnostics such as antibody tests or Cepheid Gene Xpert modules [5]. In most countries, a national reference laboratory or external laboratory (In Uganda, this is at the UVRI) is used for the diagnosis of the pathogen during the initial phase of the outbreak. The evidence on how low-income countries can scale up their response to increase the testing of population mostly comes from experience from previous outbreaks like the 2013-15 Ebola Virus disease outbreak in West Africa.

The high level of transmissibility and associated morbidity caused by the SARS-COV2 means that countries need to be ready to increase their laboratory capacities. Although Uganda has manages to test at least 150 samples per day compared to the samples that are potentially collected across the country [3]. With an increase in number of individuals requiring to be tested, the country should have plans to strengthen the capacity of national laboratory system to handle and increase the frequency of testing within the advised turnaround time of 24 hours [6].

Uganda has a tiered integrated national laboratory system and networks that utilise the hub-spoke model. Laboratories at peripheral health facilities, e.g. Health Center III refer samples that cannot be processed at the facility to more equipped laboratories at higher health facilities and where necessary to national reference laboratories, e.g. Uganda Virus Research Institute (UVRI) for testing [5].. Samples and results are transported using pre-determined transportation modes such as motorcycles within the districts and postal service to national laboratories following a predetermined schedule. This model has been useful in early infant diagnosis for HIV/AIDs, Multi-drug Tuberculosis and surveillance against emerging pathogens and epidemics [5]. Actions that can be taken to inform the scale-up of laboratory services in response to the Covid-19 outbreak include:

i. Mobilise a significant amount of resources to strengthen the laboratory systems and capacity of the country to scale up testing of the pathogen. There is need for a capable management and leadership, national laboratory policies, trained and motivated personnel, physical infrastructure of the laboratory, a consistent supply of electricity and water, refrigeration and well-coordinated procurement and supply chain system [7, 8].
ii. Review of the current national laboratory policy and ensure any intervention fits in the long term plans to strengthen laboratory systems including physical infrastructure, equipment, level of testing, laboratory networks, sample transport [9].
iii. Conduct a risk assessment exercise of the existing national laboratory system and ensure these are consistent with the updated international health regulations (IHR) 2005 [10]. Laboratories should also assess the biosafety and biosecurity practices of their personnel and determine the type of organisms they can handle depending on their availability of appropriate techniques for the specimen preparation, collection, analytical and post-analytical stages in the laboratory [11].
iv. The specimen transport system even for samples within the laboratory should be strengthened to ensure their safe and secure transfer [11]. The main concerns at specimen preparation, collection and

storage are potential infections of healthcare workers handling COVID-19 patient samples and leakages in the containers, especially during transfer [12]. The laboratories should also consider the following:

- The capacity of the transport network or transfer mechanisms to handle highly infectious agents.
- Project the volume of samples collected, the number of collection and receiving points [12].
- Use full personal protective equipment (PPE) while collecting and processing the samples [6].
- Process samples in appropriate biosafety enclosure, e.g. use a class 2 biosafety cabinet [11].
    - Transport COVID-19 samples within leak proof appropriate triple packaging. The packaging includes the first inner one called a “primary receptacle”, the second one which is made of watertight and leakproof material and a third one to prevent physical damage to the secondary packaging.
    - There should a dedicated, regular and well-resourced mechanism to ensure safe and secure transportation of specimen and quick return of the results. The networks might leverage on existing networks but with a dedicated and committed team to avoid competing priorities and disruption of services related to Covid-19 or any other [12].
- Determine how confidentiality and privacy will be assured throughout the process [6, 12].

v. Train all the personnel involved in the specimen collection, handling, transportation and processing in good laboratory practices and biosafety and biosecurity measures. The accuracy of diagnostic tests has been shown to be reduced by poor specimen collection and processing techniques, so it is essential that personnel are trained in these techniques [10]. There should also be efforts to alter factors that might increase errors or de-incentivise of the staff, e.g. reduce long working hours, ensure PPE are available, continuous professional development with daily drills have been shown to increase the confidence of staff to observe infection control measures [10].

vi. Ensure availability of relevant standardised protocols and be able to comply with the IHR 2005. The protocols should consider all aspects including specimen collection, processing, transportation, use of PPEs and places within the laboratories that might increase the risk of transmission of infections within the laboratory [11, 13, 14].

vii. Assess the capacity of the laboratories and networks to handle certain types of and a higher volume of samples. The laboratories should have in place the right infrastructure and design to handle highly infectious biological samples in addition to the right equipment [15]. Currently, the preferred diagnostic method of choice for COVID-19 is the real-time Polymerase chain reaction (RT PCR) which gives fairly high accuracy [6]. There are also efforts to develop rapid diagnostics, and these will be very important in the implementation of point-of-care testing in the communities and facilities where the on-going screening and isolation of probable cases and their contacts is done [11].

viii. The national laboratories should provide continuous technical assistance, supervision and monitoring to the peripheral laboratories to ensure the right standards are achieved and maintained [6].

ix. Review the information and communication channels and systems used in the response, such as the district health information system-2, Short messaging services (SMS) and web-services between the clinicians and levels of laboratories [6, 7]. It is advisable that there is an open communication where personnel at the collection or screening points communicate regularly with the testing and care facilities to facilitate better preparations and care for patients [16]. This is important to understand the hiccups in the process and institute corrective measures to reduce the turnaround time—the number of probable cases, challenges in specimen transportation, expectations and reasons for delays and results.

The National guidelines stipulate the use of SMS and web-based services to relay results back to the peripheral laboratories as one of the strategies that might significantly reduce the turnaround time [17].

x. Ensure there are robust quality assurance control measures according to the country's policies and regulations [6, 10]. The components of a quality system in health facility laboratories include Management commitment and quality control policy, standardisation of equipment, Quality standards and adoption of standards-based accreditation system [10].
   - Training of human resource
   - Documentation and its control
   - Assessment and accreditation of the laboratories according to national and international regulations.

xi. Promote partnerships between laboratories to ensure mentoring and continuous learning through sharing information and subsequently improving the quality [10]. The partnerships might be done through budding personnel in different laboratories, scheduling regular conference calls and national meetings [8].

Conclusion

Covid 19 disease has had a wide impact because its high rate of transmissibility in the communities and, therefore, countries should have in place plans to increase their capacity to test and identify cases in situations where clusters or community transmissions have been confirmed. Scaling up laboratory systems will involve mobilising a significant amount of resources, reviewing national policies for laboratory systems and taking advantage of innovative diagnostics made available to improve testing.

*Judgements made by the authors of this response based on the findings of the research and consultation with others (see acknowledgements). For additional details about how these judgements were made see: www.evipnet.org/sure

References

1. WHO. *Coronavirus disease (COVID-19) Pandemic*. 2020 [cited 2020 April 08, 2020]; Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019.
2. Zhou, M., X. Zhang, and J. Qu, *Coronavirus disease 2019 (COVID-19): a clinical update.* Front Med, 2020.

What is Rapid Response?

Rapid Responses address the needs of policymakers and managers for research evidence that has been appraised and contextualised in a matter of hours or days, if it is going to be of value to them. The Responses address questions about arrangements for organising, financing and governing health systems, and strategies for implementing changes.

ACRES – The Center for Rapid Evidence Synthesis (ACRES) is a center of excellence at Makerere University- in delivering timely evidence, building capacity and improving the understanding the effective, efficient and sustainable use of the rapid evidence syntheses for policy making in Africa. ACRES builds on and supports the Evidence-Informed Policy Network (EVIPNet) in Africa and the Regional East African Community Health (REACH) Policy Initiative (see back page). ACRES is funded by the Hewlett and Flora foundation.
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EVIPnet

Glossary

of terms used in this report:
www.evipnet.org/sure/rr/glossary

3. Ministry of Health. *MoH Uganda: COVID-19 Information Portal*. 2020 2020 [cited 2020 April 08, 2020]; Available from: https://covid19.gou.go.ug/.
4. Liew, M.F., et al., *Safe patient transport for COVID-19.* Crit Care, 2020. **24**(1): p. 94.
5. Tang, Y.W., et al., *The Laboratory Diagnosis of COVID-19 Infection: Current Issues and Challenges.* J Clin Microbiol, 2020.
6. WHO, *Laboratory testing strategy recommendations for COVID-19*. 2020, World Health Organization Geneva, Switzerland.
7. Olmsted, S.S., et al., *Strengthening Laboratory Systems in Resource-Limited Settings.* American Journal of Clinical Pathology, 2010. **134**(3): p. 374-380.
8. Raftery, P., et al., *Establishing Ebola Virus Disease (EVD) diagnostics using GeneXpert technology at a mobile laboratory in Liberia: Impact on outbreak response, case management and laboratory systems strengthening.* PLOS Neglected Tropical Diseases, 2018. **12**(1): p. e0006135.
9. WHO, *National capacities review tool for a novel coronavirus (nCoV)*. 2020, World Health Organization: Geneva, Switzerland.
10. WHO, *Asia Pacific Strategy for Strengthening Health Laboratory Services (2010-2015)*. 2010, World Health Organization Geneva, Switzerland.
11. Tan, S.S., et al., *Practical laboratory considerations amidst the COVID-19 outbreak: early experience from Singapore.* J Clin Pathol, 2020.
12. USAID. *Specimen Transportation A How-To Guide*. [cited 2020; Available from: https://www.challengetb.org/publications/Challenge_TB_Specimen_Transport_HowTo.pdf.
13. Mangal, N.C. and L. Maryogo-Robinson, *Leveraging the Laboratory Response Network model for the Global health security Agenda.* Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science, 2014. **12**(5): p. 274-283.
14. Who/Searo/Wpro, *Asia pacific strategy for strengthening health laboratory services, 2010-2015*. 2010, New Delhi: WHO Regional Office for South-East Asia.
15. *Humanity tested.* Nature Biomedical Engineering, 2020.
16. WHO. *Critical elements of laboratory support to outbreak detection and investigation: background paper*. [cited 2020; Available from: https://www.who.int/csr/labepidemiology/ihr_lab_background_en.pdf.
17. Ministry of Health, *Guidelines for the Uganda National Health Laboratory Hub and Sample Transport Networ*. 2017, Ministry of Health,: Kampala.

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Conflicts of interest

None known.

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