Testing Strategies for SARS-CoV-2 In Rwanda

Prof Leon Mutesa
2 March 2021
Content

I. Background – Global and Country overview

II. Rwanda’s SARS-CoV-2 Testing Approach

III. Testing in low prevalence settings
   ▪ Optimizing SARS-CoV-2 Pooled Testing
   ▪ Use of Antigen for SARS-CoV-2 Testing

IV. Conclusion
I. Background

COVID-19 Global Overview

Globally, as of 4:03pm CET, 1 March 2021, there have been 113820168 confirmed cases of COVID-19, including 2527891 deaths, reported to WHO.
I. Background

Rwanda COVID-19: Current Situation

Last 11 months

Last 11 months

Cumulative Tests 1,009,041
II. Rwanda’s SARS-CoV-2 Testing Approach

1. **Q1 2020**
   Centralized NAT testing was used to respond to initial cases across the country.

2. **Q2/Q3 2020**
   Decentralized NAT testing and pooled testing strategy used to respond to sporadic/clusters of cases in low prevalence setting.
II. Rwanda’s SARS-CoV-2 Testing Approach

Q1 2020
Centralized NAT testing responded to initial cases across the country.

Q2 2020
Decentralized NAT testing responded to sporadic/clusters of cases.

Q4 2020 – present
Additional testing capacity made available through antigen-RDT deployment to all districts; responding to community transmission.
III. Testing in low prevalence setting – pooled testing strategy

**nature**

**Accelerated Article Preview**

**A pooled testing strategy for identifying SARS-CoV-2 at low prevalence**


Received: 13 May 2020
Accepted: 12 October 2020
Accelerated Article Preview Published online 21 October 2020


This is a PDF file of a peer-reviewed paper that has been accepted for publication. Although unedited, the content has been subjected to preliminary formatting. Nature is providing this early version of the typeset paper as a service to our authors and
III. SARS-CoV-2 Pooled Testing Benefits

- Pooled testing has double benefits: **minimising the total number of tests to reduce costs** and **maximising the speed of the testing process to reduce viral spread**.

- Increasing the sample volume in RT-PCR machines to enable pooled testing of larger group sizes could enable **even greater cost savings at lower prevalence**.

- Although mass testing is initially costly, maintaining a low prevalence and, indeed, eliminating COVID-19 will, with the implementation of group testing, become progressively more affordable.

- **Targets:** markets, arrival airport passengers*, banks, public institutions, schools.

*Need to present a 72-hour RT-PCR negative result
III. Testing in low prevalence setting

From Clusters to Community Transmission:
- Contact tracing (difficult)

Increasing positivity rates posed a challenge for pooled testing approach

Increase of backlog of samples

Turn-Around-Time increased

Each day shows new cases reported since the previous day. Updated less than 2 days ago.
Source: JHU CSSE COVID-19 Data · About this data
III. Testing in low prevalence setting – antigen testing
III. Testing in low prevalence setting – antigen testing

Following validations and need to quickly increase testing capacity in country, Rwanda was swift to adopt antigen testing within the SARS-CoV-2 diagnostic response.
RDT Testing prioritization: WHO Case Definition

Who should be tested?

Symptomatic cases:
- Cough
- Fever
- Sore throat
- Etc.
- 1st week of infection

Comorbidities: diabetes, ...

Priority group (RDT)

Frontliners

Elderly population
Testing prioritization for antigen testing

Additional groups: use of Antigen considering WHO Case Definition

Markets

Private Clinics: OPD with high suspicion

Cross-borders

Schools

Prisons

Truck-drivers

Refugees
(N=1,009,041)

Daily Medians
Positive Cases=20
Tests Conducted=2,608
Tests Conducted per Case=100
Percentage Positive=1.0%

§Specimen=OP swab; Screening RT-PCR tests=Daan Gene nCoV (N gene, ORF1ab gene), Abbott m2000 (N gene, RdRp gene), Roche Cobas 6800 (E gene, ORF1ab gene), Tib Molbiol LightMix SARS-CoV (E gene, RdRp gene); SD Biosensor Standard Q COVID-19 Antigen Test (rapid chromatographic immunoassay) specimen=NP swab (SARS-CoV-2 antigen targets not disclosed)

WHO Benchmarks for Adequate Testing Coverage

- High: ≥5,500 tests/day (7-day: ≥3.0 tests/1,000 population)
- Moderate: 1,900–5,499 (7-day: 1.01–3.0)
- Low: 950–1,899 (7-day: 0.51–1.0)
- Minimal: <950 (7-day: <0.51)

*Total tests conducted per million population (tests conducted per positive case)=77,905 (54) Selected African Countries: South Africa=150,176 (6); Kenya=23,675 (12); Uganda=19,077 (22); Ethiopia=18,183 (14)

*Select African Countries Percentage Positive: South Africa=17%; Kenya=8%; Ethiopia=7%; Uganda=5%; Rwanda=2%; estimations unreliable due to lack of reporting: DRC, Tanzania, Burundi

¥ Daily tests conducted not reported until April 7; total number of tests conducted prior to April 7, n=5,751; number of daily tests conducted prior to April 7 are estimations

Kigali Lockdown and Expanded Testing (day 1)
Kigali Lockdown Relaxed (day 1)
Kigali Lockdown Relaxed Further (day 15)
### PCR vs Antigen RDT: Cost Effectiveness

**Trend of tests done by category:** April 2020-Feb 2021

<table>
<thead>
<tr>
<th>Number of tests</th>
<th>Expected expenditure</th>
<th>Total spent</th>
<th>Cost benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,009,041</td>
<td>50,452,050</td>
<td>42,989,970</td>
<td>7,462,080 (15%)</td>
</tr>
</tbody>
</table>
V. Conclusion

- Successful implementation of various SARS-CoV-2 Testing approaches allowed control COVID-19 in Rwanda
- Use of Pooled Testing Approach reduced the cost & TAT
- Use of Antigen RDTs: in hospitals, schools, airport,...
  - Efficient and timely diagnosis
  - Cost reduction vs RT-PCR
  - Limitation:

In pipeline:

**RDT using nasal sample** (e.g. Lumira Dg,...) vs SD Biosensor NP
Thank you!