RITM Laboratory Response During the 2009 Influenza H1N1 Pandemic

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RITM Pre-Pandemic Preparedness Plan

- Ongoing surveillance of circulating influenza subtypes through a project funded by CDC, USA
- Building up laboratory capacity of the National Influenza Center (VI, HI, PCR)
- Laboratory capability to shift detection of subtypes from seasonal to pandemic
Existing real-time PCR assay for detection of circulating H1, H3 and avian H5 subtypes

Participant in the WHO EQAP
# Influenza External Quality Assessment

Participation in the WHO EQAP for PCR Diagnosis of Human-Avian Influenza

<table>
<thead>
<tr>
<th>Panel</th>
<th>Release Date</th>
<th>RITM Performance</th>
<th>% EQAP participants scoring 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>01/2008</td>
<td>10/10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>07/2008</td>
<td>10/10</td>
<td>77% (N=109)</td>
</tr>
<tr>
<td>5</td>
<td>02/2009</td>
<td>10/10</td>
<td>84% (N=109)</td>
</tr>
<tr>
<td>6</td>
<td>07/2009</td>
<td>10/10</td>
<td>79% (N=128)</td>
</tr>
</tbody>
</table>
Countries able to perform PCR to diagnose influenza A (H1N1) virus infection in humans

5 May 2009 (Revision 3)
(first published on 2 May 2009)

Based on performance in the WHO external quality assessment project (EQAP)\(^1\), National Influenza Centres (NICs) of the WHO Global Influenza Surveillance Network (GISN)\(^2\) and national influenza reference laboratories (NIRLS) in countries without NICs, which fulfil the following criteria, have been identified as having PCR capacity, with the necessary laboratory facility and consumables, to detect the influenza A (H1N1) virus, which has recently emerged.

- Scoring 100% in the last two or more WHO external quality assurance programme panels (EQAP)

- OR Scoring 100% in the latest EQAP panel and a history of consistent correct results for earlier panels.
## Testing Strategy

NIC, The Philippines

<table>
<thead>
<tr>
<th>Philippines</th>
<th>Muntinlupa City</th>
<th>National Influenza Center, Research Institute for Tropical Medicine (RITM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portugal</td>
<td>Lisboa</td>
<td>National Institute of Health, National Influenza Centre</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>Seoul</td>
<td>National Institute of Health, Korea CDC, Division of Influenza and Respiratory Viruses</td>
</tr>
<tr>
<td>Romania</td>
<td>Bucharest</td>
<td>Cantacuzino Institute</td>
</tr>
</tbody>
</table>

Countries able to perform PCR to diagnose influenza A (H1N1) virus infection in humans

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Influenza A/(H1N1) Rapid Diagnosis

Rapid Diagnosis by Real-Time Reverse Transcription — Polymerase Chain Reaction

- Adopted the CDC Protocol made available through WHO
- Viral marker regions specific for Swine Flu A and Swine H1 are amplified from cDNA by Real-Time RT-PCR
Testing Strategy

NIC, The Philippines

1° Molecular Detection of Influenza A

+ Influenza A

2° Molecular Detection of Swine Flu A/H1

+ Swine Flu A/H1

- Swine Flu A

- Swine Flu A/H1

Report Result Within RITM

Send to WHO Reference Laboratory

Report Result
Novel Influenza A/(H1N1) Rapid Diagnosis

Sample Receipt and Processing and Releasing of Results at RITM

- Novel H1N1 suspect case
  - RITM in-patient
  - Referrals from other hospitals

  → Sample

- Sample aliquoting, routing and inactivation
  - RITM Special Pathogens Laboratory

  → Inactivated sample for molecular diagnosis

- Molecular diagnosis
  - RITM Molecular Biology Laboratory

  → Novel H1N1+

- Confirmation of Results
  - WHO Reference Laboratory

  → Results

Recipients of results within RITM

- Office of the Director
  - Office of the Assistant Director
  - RITM Pathologist
  - RITM Ward

  → Release of Official Results outside RITM

WHO Reference Laboratory

Confirmation of Results

Molecular diagnosis

Sample aliquoting, routing and inactivation

Sample

Novel H1N1 suspect case

RITM in-patient

Referrals from other hospitals
Turnaround Time

NIC, The Philippines

Sample receipt
Sample inactivation and RNA extraction
Molecular Detection of Influenza A
Molecular Detection of Swine Influenza A Swine A/H1
Release of results*

* H1-positive results need to be confirmed by a WHO Reference Laboratory.
Original Surge Capacity

NIC, The Philippines

**Equipment**

- RotorGene 6000 Real-Time PCR Machine (Corbett Research)
- 120 samples per day

**Manpower**

- Four staff for Influenza molecular detection assays
- Molecular Biology Laboratory staff trained on Influenza genomics and bioinformatics

**Reagents and Supplies**

- Stock reagents enough for 300 samples
Surge Capacity During the Pandemic

NIC, The Philippines

**Equipment**
- RotorGene 6000 Real-Time PCR Machine (Corbett Research)
- Bio-Rad CFX Real-Time PCR Machine
- 250-500 samples per 24 hour period

**Manpower**
- Seven staff for Influenza molecular detection assays
- Molecular Biology Laboratory staff trained on Influenza genomics and bioinformatics

**Reagents and Supplies**
- Stock reagents enough for 3000 samples
Samples Received by the NIC

Inclusive Dates

No. of Samples Received

- 0
- 500
- 1000
- 1500
- 2000
- 2500
Ave Samples Received and Tested Per Day

1. Number Received (Blue line)
2. Ave. Number Tested (Red line)
3. Lab Capacity (Green line)

The graph shows the average number of specimens per day received and tested, along with the lab capacity per day, from 18-Jun to 29-Jun.
Prioritization of Samples for Testing

- High-risk groups
  - elderly
  - very young
  - pregnant women
  - those with co-morbid conditions

- Representative samples from clusters of cases
Effect of RITM’s Lab Capacity on Public Health

Rapid and accurate testing helped in:

- Characterization of the clinical profile of pandemic A/H1N1 patients
- Shifting of strategy from containment to mitigation
- Prioritization of samples for testing
- Monitoring pandemic trends
Laboratory Capacity Building

Baguio General Hospital and Medical Center (Baguio City)

San Lazaro Hospital (Metro Manila)
Lung Center of the Philippines (Metro Manila)

Vicente Sotto Memorial Medical Center-AFRIMS (Cebu City)

Davao Medical Center (Davao City)
National Influenza Center’s Role

- Outbreak investigation
- Antiviral resistance studies
- Quality assurance of sub-national laboratories
- Detection of new strains
RITM staff trained on Novel H1N1 detection in China

The Government of Palau requested assistance in setting up their laboratory capability
Technology and infrastructure for modern laboratory methods have to be in place during the inter-pandemic stage so this can be easily adopted during pandemics.
Thank You