Laboratory surveillance of seasonal and potential pandemic influenza viruses: Role of the WHO Collaborating Center

SARI-net Laboratory Network Meeting
Virtual meeting, 28–30 October 2020

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WHO Global Influenza Surveillance and Response System

1 June 2020

National Influenza Centre 147 (126 Countries)
- WHO Collaborating Centre for Reference and Research on Influenza 4
- WHO Collaborating Centre for the Surveillance, Epidemiology and Control of Influenza 1
- WHO Collaborating Centre for Studies on the Ecology of Influenza in Animals 1
- WHO Essential Regulatory Laboratory 4
- WHO H5 Reference Laboratory 12

Not applicable
Global Influenza Surveillance and Response System (GISRS)

GLOBAL INFLUENZA SURVEILLANCE NETWORK (GISN) BEGINS

Five years after establishment of the Global Influenza Programme (GIP), WHO’s Executive Board decided that a flu surveillance system was needed for: “collection, correlation, and distribution of information regarding occurrence, epidemiology and laboratory findings...Such information is needed to provide the bases upon which methods for prevention and control of influenza may be developed.” In that year, the Global Influenza Surveillance Network was born.

GISN BECOMES GISRS

The Global Influenza Surveillance Network (GISN) was renamed as the Global Influenza Surveillance and Response System (GISRS) following the adoption of the Pandemic Influenza Preparedness (PIP) Framework in May 2011.

Samples of throat-washings were flown to the World Influenza Centre, London, as soon as an outbreak of influenza occurred in any part of the World. [Credit: WHO, Tibor Farkas]

Screenshot of GISRS webpage. [Credit: WHO]
WHO APPROVES WORLD INFLUENZA CENTRE IN LONDON

WHO approved the establishment and funding of a World Influenza Centre (WIC) at the National Institute for Medical Research (NIMR) in London. The primary tasks of the WIC were to collect and characterize influenza viruses, develop methods for the laboratory diagnosis of influenza virus infections, establish a network of laboratories, and disseminate information on the data accumulated from their investigations.
WHO Collaborating Centers

WHO CC UNITED STATES OF AMERICA (ATLANTA)

The WHO Collaborating Centre for Surveillance, Epidemiology & Control of Influenza (WHO CC) in Atlanta, USA was designated in 1956. Since then, it has played a leading role in the global network.

WHO CC UNITED STATES OF AMERICA (MEMPHIS)

The WHO Collaborating Centre for Studies on the Ecology of Influenza in Animals (WHO CC) in Memphis, USA was designated in 1975.
WHO CC AUSTRALIA (MELBOURNE)
The WHO Collaborating Centre for Reference and Research on Influenza (WHO CC) in Melbourne, Australia was designated in 1992.

WHO CC JAPAN (TOKYO)
The WHO Collaborating Centre for Reference and Research on Influenza (WHO CC) in Tokyo, Japan was designated in 1993.

WHO CC CHINA (BEIJING)
The WHO Collaborating Centre for Reference and Research on Influenza (WHO CC) in Beijing, China was designated in 2010.
Role of the WHO Collaborating Center in laboratory surveillance of seasonal and potential pandemic influenza viruses

- Conduct national and international virologic and disease surveillance for influenza, contribute data to WHO/GISRS for influenza vaccine virus selection

- Provide technical assistance to the WHO GISRS by conducting laboratory and epidemiologic training as well as provide resource for capacity building to strengthen and expand the WHO GISRS

- Develop, evaluate and standardize laboratory diagnostic, virologic and immunologic tests

- Produce and supply epidemic and pandemic vaccine reference strains and diagnostic reagents for members of the WHO/GISRS and other institutions

- Evaluate the impact and burden of disease for influenza
- Risk assessment studies for influenza viruses
- Evaluate the effectiveness of influenza vaccines and new vaccine strategy
- Adhere to TORs specified in the ANNEX 5 of PIP Framework
Virologic surveillance is the groundwork of influenza control efforts
  • Identify changes in circulating strains
    • Future vaccine strain selection
    • Identify novel viruses with pandemic potential

  • Establish seasonality
    • Timing of active surveillance
    • Timing of influenza control activities
Virus Characterization at WHOCC CDC

Diagnostic samples

Respiratory Specimens

Next Generation Sequencing (NGS)

Antigenic Characterization

Virus Neutralization Assays

Hemagglutination Inhibition test

Genetic analysis

Phylogeny

Molecular

Submit to GISAID

Antiviral Susceptibility Analysis

Phenotypic-NAI

Genotypic
Laboratory assessment, trainings and provide resource for capacity building

• Provide bilateral financial and technical support to countries
  4 cooperative agreements with PAHO countries
• Regular laboratory and surveillance assessment reviews
  Laboratory and surveillance assessment for 4 PAHO countries,
  provided feedback and recommendations for improvement
• Laboratory trainings and workshops

<table>
<thead>
<tr>
<th>Training</th>
<th>Dates</th>
<th>City</th>
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<tbody>
<tr>
<td>PAHO Influenza Virus Genetic Sequencing International Training</td>
<td>05/13/2019 - 05/17/2019</td>
<td>Rio De Janeiro, Brazil</td>
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<tr>
<td>PAHO/WHO International Influenza Diagnostic Course</td>
<td>08/06/2018 - 08/10/2018</td>
<td>Mexico City, Mexico</td>
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<td>CDC/PAHO Training on Advanced Molecular Detection of Influenza</td>
<td>05/28/2018 - 05/30/2018</td>
<td>Bogota, Columbia</td>
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<td>Training on Next Generation Sequencing of Influenza for staff of the</td>
<td>04/15/2018 - 04/21/2018</td>
<td>Santiago, Chile</td>
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<td>Institutode Salud Publica de Chile, TH EWHO NIC for Chile.</td>
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<tr>
<td>PAHO/WHO Instructor in the Influenza Viral Isolation Training Workshop</td>
<td>07/25/2015 - 08/01/2015</td>
<td>Panama</td>
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Develop, evaluate and standardize laboratory diagnostic, virologic and immunologic tests

CDC Influenza Virus Real-time RT-PCR Reagent Kits

CDC Influenza SARS-CoV-2 (Flu SC2) Multiplex Assay

CDC Influenza Reagent Kits
Produce and supply epidemic and pandemic vaccine reference strains and diagnostic reagents

• Provide reference viruses (including candidate vaccine viruses), antisera and reagents to domestic and international partners

Recommended composition of influenza virus vaccines for use in the 2021 southern hemisphere influenza season (25 September 2020)

**Egg-based Vaccines**
- an A/Victoria/2570/2019 (H1N1)pdm09-like virus;
- an A/Hong Kong/2671/2019 (H3N2)-like virus;
- a B/Washington/02/2019 (B/Victoria lineage)-like virus; and
- a B/Phuket/3073/2013 (B/Yamagata lineage)-like virus.

**Cell- or recombinant-based Vaccines**
- an A/Wisconsin/588/2019 (H1N1)pdm09-like virus;
- an A/Hong Kong/45/2019 (H3N2)-like virus;
- a B/Washington/02/2019 (B/Victoria lineage)-like virus; and
- a B/Phuket/3073/2013 (B/Yamagata lineage)-like virus.

• Develop and distribute influenza reagents including reagents for molecular diagnosis and for conventional virologic and proficiency tests.

**IRR Website**
[www.internationalreagentresource.org](http://www.internationalreagentresource.org)
Global Influenza Surveillance and Response System (GISRS)

**National Influenza Centers**
(147 Laboratories in 126 Countries)
- Collect specimens from ILI cases
- Identify influenza viruses
- Send viruses to a WHOOcc
- Collect epidemiologic information

**WHO Collaborating Centers**
(Atlanta, London, Melbourne, Tokyo & Beijing)
- Analyze influenza specimen received
- Provide data for bi-annual vaccine recommendations
- Prepare and distribute candidate vaccine viruses
- Technical support to GISRS

**World Health Organization**
(Geneva)
- Collect information via the FluNet & FluID and provide weekly update
- Make strategic guidance
- Convene vaccine selection meetings & make bi-annual vaccine recommendations

**Vaccine Producers**
(Global)
Summary

- WHOCCs played a scientific leading role in global virologic surveillance for seasonal and pandemic potential influenza viruses
- WHOCCs contribute essential information for influenza vaccine virus selections
- WHOCCs provide technical supports and trainings to strengthen and expand the GISRS
- WHOCCs develop, evaluate and standardize laboratory diagnostic, virologic and immunologic tests to establish new approaches for virologic surveillance and vaccine selection
- WHOCCs produce and supply epidemic and pandemic vaccine candidate viruses as well as diagnostic reagents to the GISRS and other institutions for the control of influenza
Questions?

Thank you!

Influenza Division
Virology, Surveillance and Diagnosis Branch

US PHLs
National Influenza Centers
WHO Collaborating Centers
GISRS