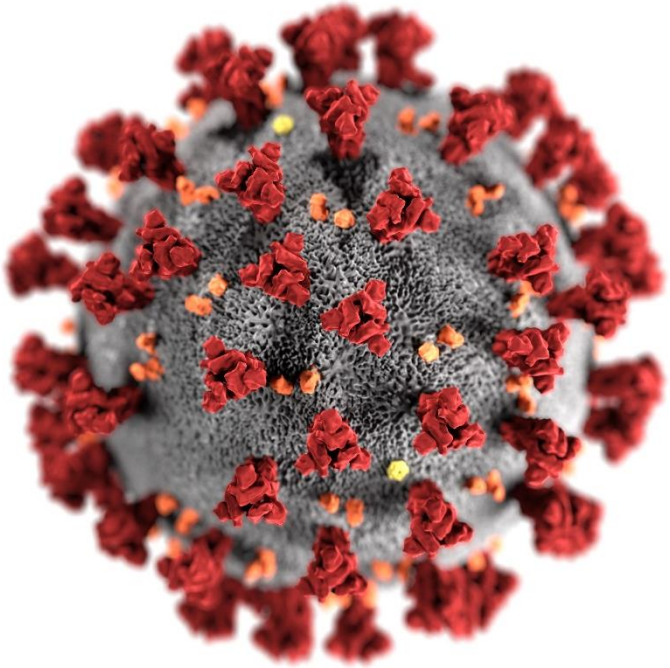
COVID-19 Surveillance Webinar

Sentinel Surveillance Laboratory Testing and WHO Global Influenza Surveillance and Response System Reporting



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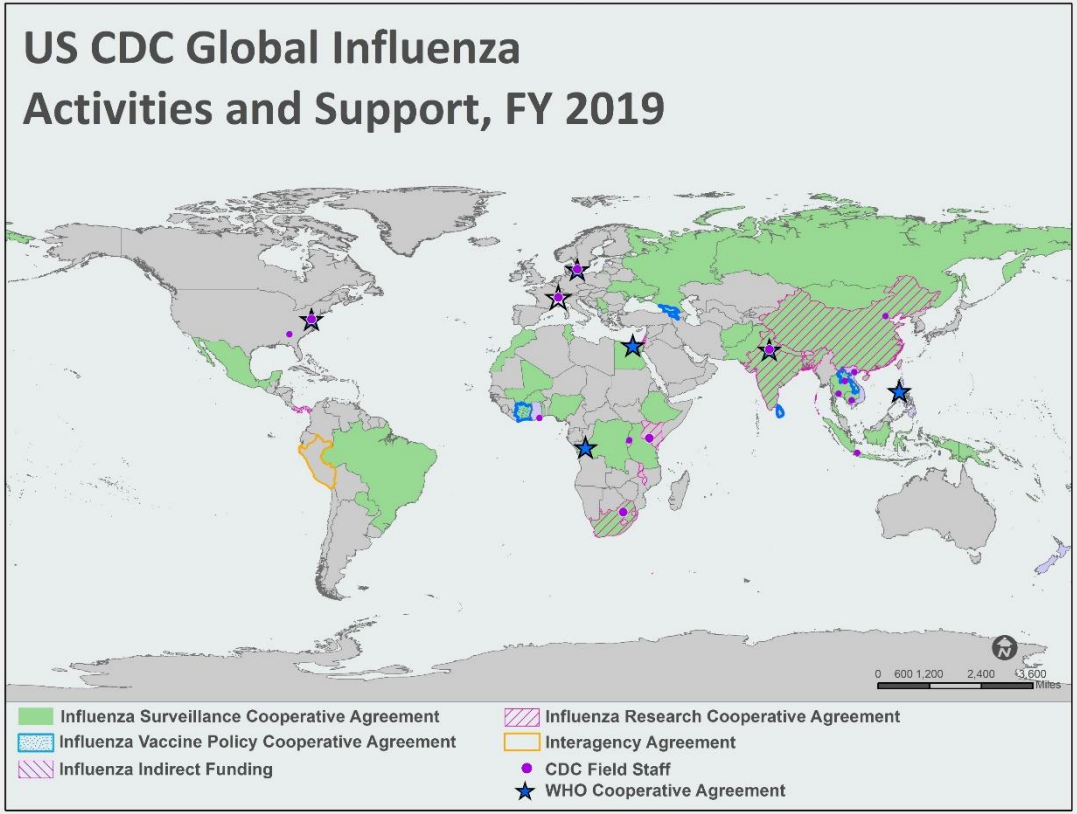
Friday May 22, 2020

For more information: **www.cdc.gov/COVID19**

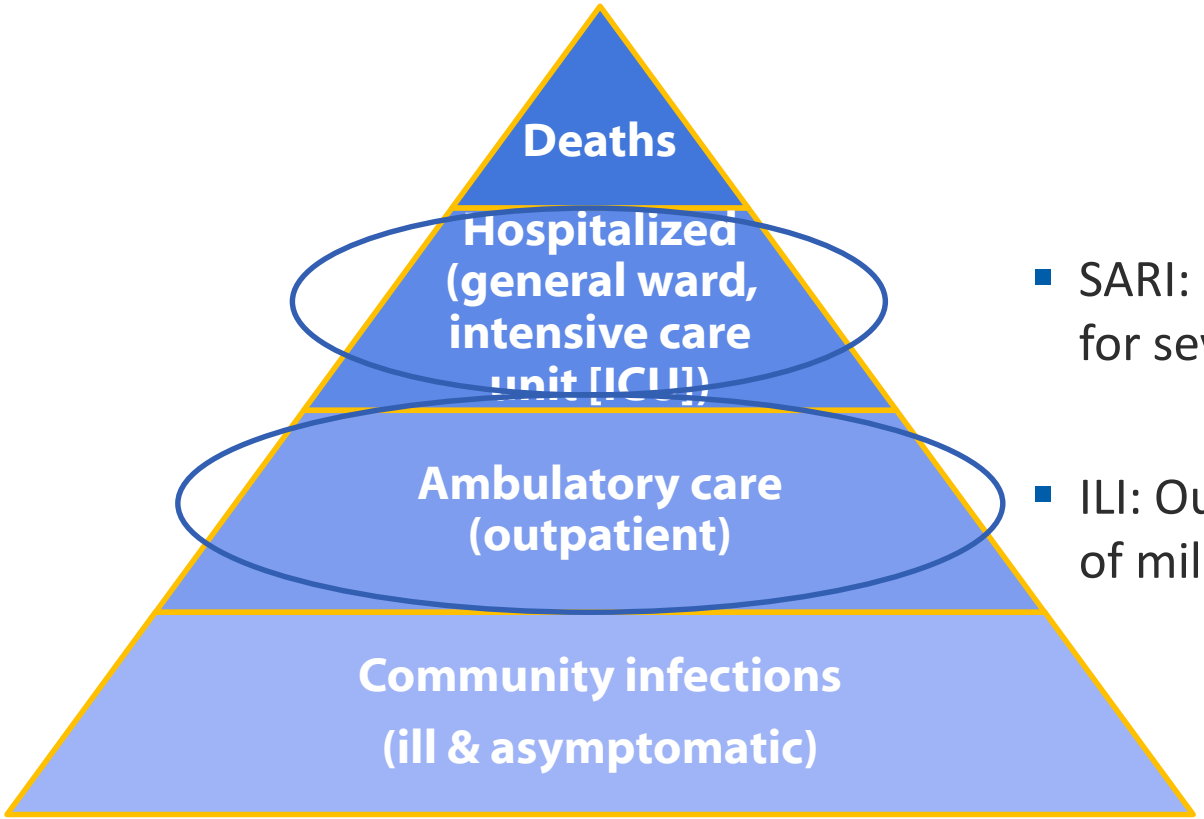
Integration of COVID-19 into Influenza Sentinel Surveillance Systems

Influenza Sentinel Surveillance

- Health facility-based respiratory disease surveillance (severe acute respiratory infection [SARI] & influenza-like illness [ILI])
- Monitor virus activity, novel viruses, burden of disease and determine risk factors for severe disease
- Weekly reporting of aggregate & case-based data



Sentinel ILI & SARI Surveillance



- SARI: Hospital-based surveillance for severe respiratory illness
- ILI: Outpatient facility surveillance of mild to moderate illness

Why use ILI & SARI Surveillance for COVID-19?

- Similar presentation, case definition, specimen type & testing platform
- Efficient, leverages existing infrastructure and staff capacity → long term capacity
- Long time series against which to compare syndromic activity
- Differentiate pathogens causing respiratory illness
- Track the progress of epidemic

Symptom	COVID-19	Influenza
Fever	Most frequent symptoms	Most frequent symptoms
Cough	Most frequent symptoms	Most frequent symptoms
Fatigue	Most frequent symptoms	Most frequent symptoms
Shortness of breath	Most frequent symptoms	
Chills	Secondary symptoms	
Headache	Secondary symptoms	Most frequent symptoms
Repeated shaking with chills	Secondary symptoms	
Runny or stuffy nose	Secondary symptoms	Secondary symptoms
Nausea or diarrhea	Secondary symptoms	Secondary symptoms
Sore throat	Secondary symptoms	Secondary symptoms
Loss of taste or smell	Secondary symptoms	

Most frequent symptoms
Secondary symptoms

Key Questions Answered

- Proportion of in- and out-patient respiratory visits due to COVID-19
- Weekly number of new confirmed cases of COVID-19 from surveillance sites
- Proportion of ILI/SARI patients positive for SARS-CoV-2
- Prevalence of underlying conditions among SARS-CoV-2 positive mild, moderate and severe cases; sometimes deaths
- Trends by age group, sex

Considerations

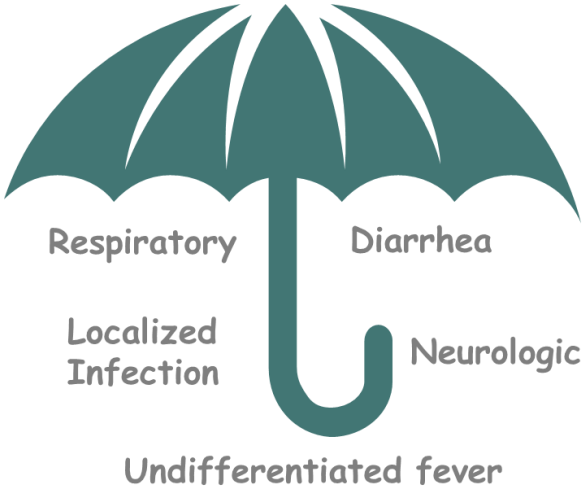
- Do objectives & expected outcomes match?
- ILI/SARI may remain a backbone for long-term surveillance as objectives change with the course of the pandemic
- Impact on continuity of seasonal influenza testing & surveillance
- Need for equipment upgrades, staff training, updates to forms

Integration of COVID-19 in Existing Acute Febrile Illness (AFI) Surveillance Systems

What is Acute Febrile Illness (AFI)?

AFI is a common manifestation of a variety of treatable and vaccine-preventable infectious diseases across many parts of the world

- Viral, bacterial & parasitic diseases
- Includes emerging diseases and diseases of pandemic potential
- Varies by population, geographic region, season, age, etc.



Why use AFI Surveillance for COVID-19?

- AFI can envelop a sub-set of the surveillance population which presenting with influenza-like illness (ILI) or severe acute respiratory infection (SARI)

- Complement, not replace, ongoing ILI and SARI or COVID-19 surveillance activities.
- Leverage existing AFI surveillance systems for efficient and cost-effective implementation of COVID-19 surveillance.
- Support emergency and high-priority investigations through the sharing of available staff, material, supplies, reagents or testing processes.

Objectives

- Short term
  - Monitor community spread and intensity of COVID-19 activity
  - Understand COVID-19 disease severity and spectrum of illness
  - Understand risk factors for severe disease and transmission
- Long term
  - Assess the proportion of febrile patients without respiratory symptoms who test positive for SARS-CoV-2 virus
  - Conduct future studies including serologic investigations to assess immune response to SARS-CoV-2 infection
  - Evaluate new SARS-CoV-2 diagnostic or serologic tests

Considerations

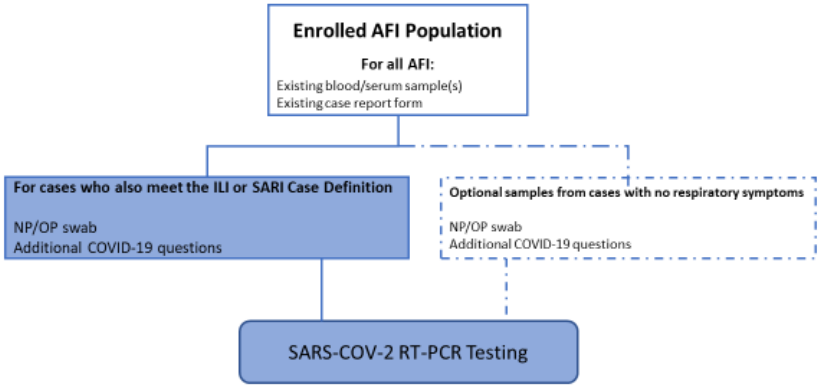
- Effect on ongoing AFI surveillance activities
- Specimens to be collected
  - Sampling procedures
  - Specimen collection, packaging, and transport
- Laboratory testing
- Epidemiological data collection
- Weekly aggregate reporting
- Return of results

Adaptation of Specimen Collection Procedures

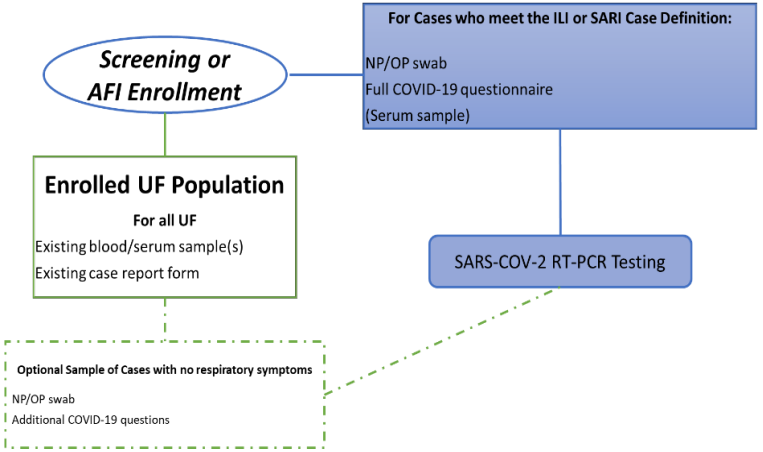
- **Samples are already being collected**
  - Collection CONTINUES and samples can form the basis of the SARS-CoV-2 reverse transcription polymerase chain reaction (RT-PCR) testing

- **Samples are not being collected**
  - System enrolls and tests AFI cases on the basis of a broad AFI case definition
    - Samples from the subset of enrolled AFI cases meeting the ILI or SARI case definitions
  - System enrolls and tests AFI cases on the basis of a undifferentiated fever case definition
    - Patients meeting the ILI or SARI case definitions should be identified upstream during screening
    - Samples collected from those individuals

System enrolls and tests AFI cases on the basis of a broad AFI case definition



System enrolls and tests AFI cases on the basis of a UF case definition



Where do we start?

- Review of objectives to determine what is feasible or not
- Review of existing surveillance protocol to determine if changes are needed to accommodate:
  - Incorporation of new specimen collection procedures
    - Packaging and transport
  - Sampling procedures
  - Laboratory testing
  - Modification of case investigation forms (if needed)
- Review reporting requirements

We are here for you!

- Guidance will continue to be refined as more is learned about COVID-19 and SARS-CoV-2.
- The ITF and the Epidemiology, Informatics, Surveillance, and Laboratory Branch in the Division of Global Health Protection/CGH are here to help.

- Please reach out for additional questions:
  - Olga Henao, dot8@cdc.gov

Thank you and thanks to those involved in developing this guidance:
Nick Schaad, Michele Parsons, Len Peruski, COVID-19 ITF, and colleagues in NCIRD, WHO, and EISLB/DGHP

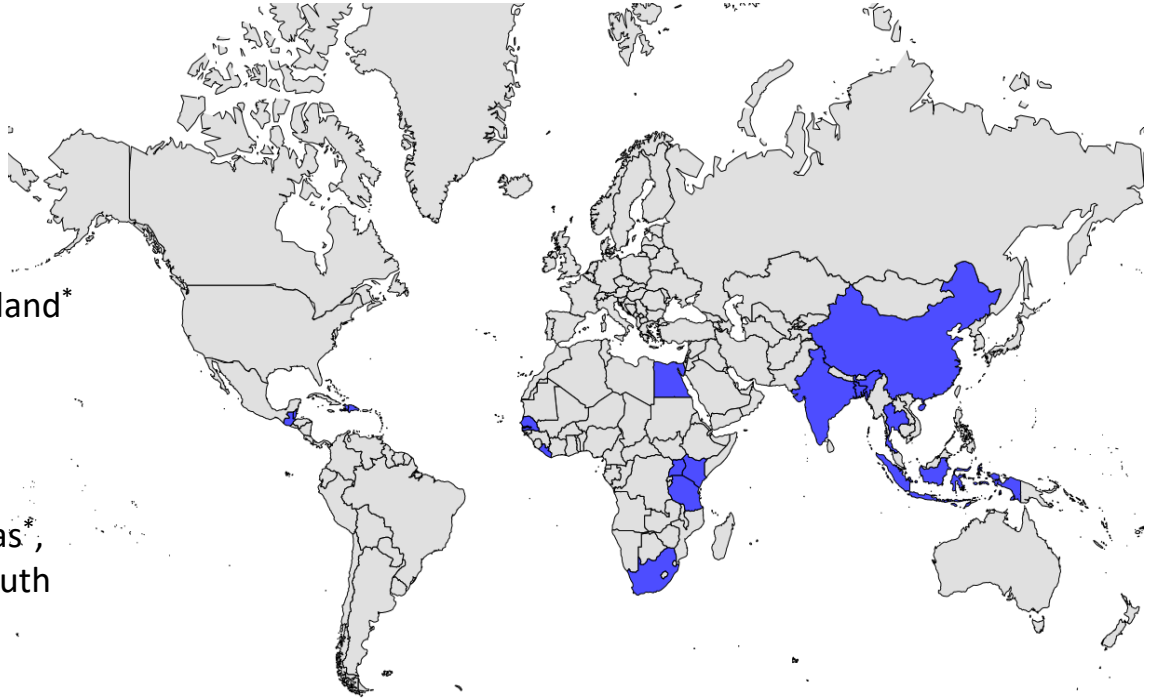
CDC-Supported AFI Surveillance

Current activities:

- Africa: Egypt*, Kenya*, Liberia*, Senegal*, South Africa†, Tanzania*, Uganda*
- Americas: Belize*, Dominican Republic*, Guatemala*, Haiti†
- Eastern & SE Asia: China*, Indonesia, Thailand*
- South Asia: Bangladesh*, India†

FY2021 activities:

- Georgia*, EL Salvador*, Ethiopia*, Honduras*, Colombia and 2 additional countries in South America*



**DGHP supported activities (financial or technical support)*

†Past AFI surveillance

Limitations & Challenges

- Sentinel surveillance should be complemented by other systems early in an epidemic
  - Sample bias
  - Representativeness
  - Often not population-based
  - Limited detection of positive infections until virus circulating at sufficient prevalence in the community
  - Does not do a good job of capturing clusters, local level transmission
  - Data management & reporting not consistent in all locations

Upcoming webinars

- Please join us next week, same place, same time for a session on national surveillance strategies using multiple systems!

- Following webinars to come, including data systems, mortality surveillance, syndromic systems, sero-surveys and more!

SARS-CoV-2 Laboratory Testing

Specimens for laboratory diagnosis

- **ILI sample types:**
  - Specimens from nasal and nasopharyngeal specimens
    - nasal swab, nasopharyngeal swab, nasopharyngeal aspirate, nasal wash
    - Oropharyngeal swabs
    - Combined nasal and throat swabs may have a higher yield of virus detection in ILI cases than do oropharyngeal specimens.

- **SARI sample types:**
  - As above and/or from lower respiratory tract
  - Or, if patients are intubated, endotracheal aspirates or bronchoalveolar lavages may have a higher yield than upper respiratory specimens

- **AFI sample types:**
  - upper respiratory tract (NP and/or OP swabs or nasal wash) with preference for NP/OP in ambulatory patients

Laboratory tests for COVID-19 detection

- CDC and WHO recommend using PCR for laboratory confirmation due to high sensitivity
  - FDA has issued 52 individual emergency use authorizations (EUAs) for molecular test kit manufacturers and laboratories
  - Tests should be performed according to manufacturer or developing laboratory instructions

- For laboratories that have the resources, a combination of use of RT-PCR and virus isolation is possible if adequate biosafety requirements are met (i.e., BSL-3 capacity for isolation of SARS-CoV-2)
  - Virus isolates allow for in-depth characterization of the virus
    - Proportion of PCR-positive specimens can be selected for viral culture based on CT values
    - Further antigenic and genetic characterization
    - Drug-susceptibility testing
    - Other research (i.e., animal models)
    - Biorepositories for future virus sharing with reference laboratories

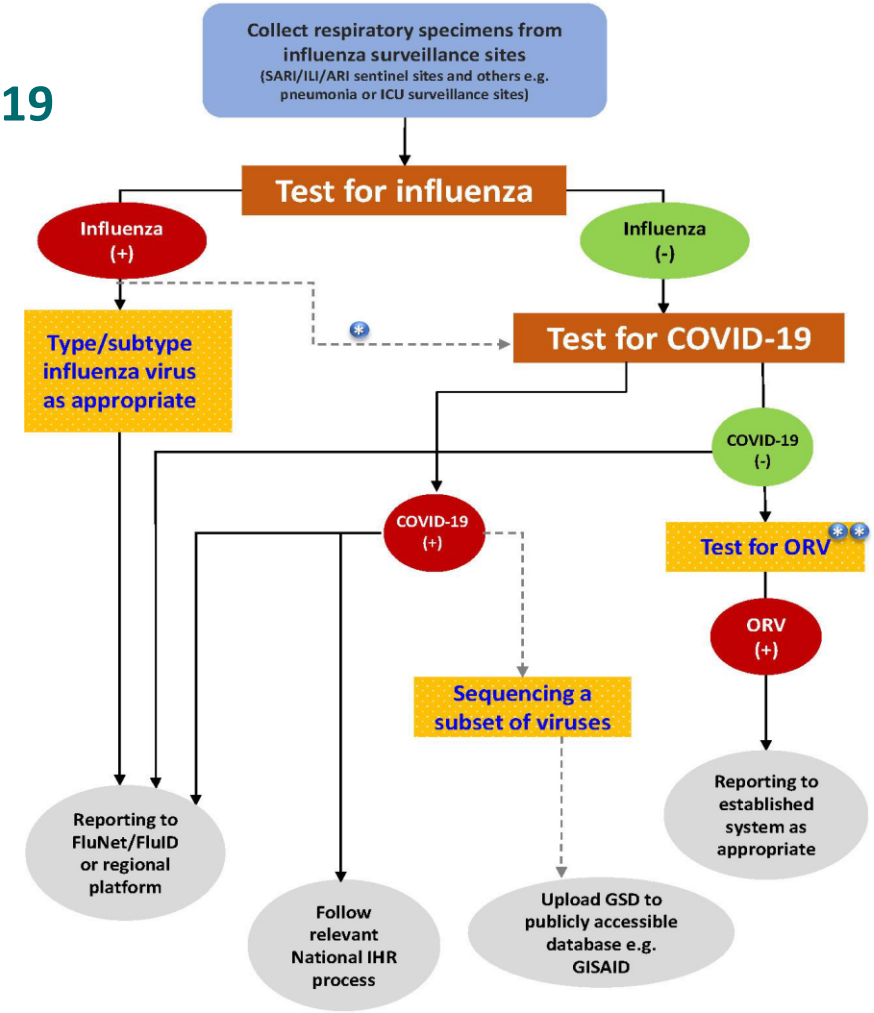
Testing algorithm

- Priority for COVID-19 testing should be given to influenza-negative specimens
  - Recommended to test at least 50 to 100 specimens for SARS-CoV-2 per week
  - Dependent on availability of resources
  - Specimens positive for influenza may also be tested for COVID-19 to detect possible co-infections

- More than 50% of labs are also testing for other respiratory viruses, as part of routine surveillance
  - Testing should continue based on country priority and available resources
  - Recommended to test for COVID-19 and influenza before testing for other respiratory viruses

- Order of testing can be adjusted according to individual testing platforms or epidemiologic situation
  - Known prevalence of influenza or COVID-19 disease in local setting
  - Exposure to known cases
  - Seasonality

Testing algorithm for Influenza and COVID-19



WHO. March 2020. Operational considerations for COVID-19 surveillance using GISRS: Interim guidance

Laboratory Tests for COVID-19 Detection *(continued)*

- **Antigen POC tests / Rapid Diagnostic tests (RDTs)**
  - Quidel Sofia 2 SARS Antigen FIA received an EUA from the FDA
  - Fast and specific to the virus, but are not as sensitive as molecular PCR tests
  - Positive results from antigen tests are accurate, but higher chance of false negatives (negative results do not rule out infection)
  - Negative results from an antigen test may need to be confirmed with a PCR test

Laboratory Tests for COVID-19 Detection *(continued)*

- **Serology**
  - If used in conjunction with other diagnostic tests (e.g., labs without capacity to run molecular-based tests) or in situations where individuals have clinical history or exposure within transmission clusters, serologic tests may be used to establish a diagnosis of COVID-19 and identify probable cases.
  - Results from antibody testing should not be used as the sole basis to diagnose SARS-CoV-2 infections
  - Monitor ongoing discussions on use of different testing algorithms to improve overall confidence in test results and consider how any forthcoming guidance on testing algorithms should be incorporated into serologic testing plans

Other testing strategies/future considerations

- Multiplex PCR assay availability and development
  - BioFire Respiratory pathogen panel (2.1)
  - CDC is developing a multiplex rRT-PCR to detect Influenza A&B, SARS-CoV-2
    - Identified primer/probe sets that work well together
    - Generating data for EUA submission

- Sensitivity of alternate specimen types
  - Nasal swabs and nasal mid-turbinate swabs in asymptomatic people
  - Saliva (non-invasive)

- Evaluating alternate nucleic acid extraction strategies
  - Bridging studies to utilize alternative lysis buffers/extraction methods across multiple platforms
  - Heat treatment methodologies under investigation; FDA EUA

- Evaluating routine influenza cell lines for SARS-CoV-2 susceptibility
  - Biosafety concerns about cells permissive for SCoV-2 (MDCK cells, chicken embryo fibroblasts, eggs)

Reporting Covid-19 Cases to WHO GISRS

COVID-19 virus detection in sentinel specimens of GISRS

Outline

1. Activities at global level
2. Global Influenza Surveillance and Response (GISRS)
3. Operational considerations, focusing on collection and reporting of data
4. Strategic issues, focusing on preparing for co-circulation
5. Useful links

COVID-19 virus detection in sentinel specimens of GISRS

Activities at global level

-26 March 2020: published **Operational considerations for COVID-19 surveillance using GISRS (1)**

- **Complement**, not replace, COVID-19 surveillance activities, outbreak investigation, and containment activities focused on active case finding and reporting as recommended under the Global surveillance for human infection with coronavirus disease (COVID-19) guidance.
- **Leverage existing**, routine, national, and sub-national influenza surveillance systems for efficient and cost-effective implementation of COVID-19 surveillance.
- It should ***NOT*** conflict with routine influenza surveillance.
- Report data to regional and global platforms.

-continuous analysis of reported data (especially from sentinel systems)

-using reported data to inform guidance development:

- **Surveillance strategies for COVID-19 human infection (2)**
- **Public health criteria to adjust public health and social measures in the context of COVID-19 (3)**

COVID-19 virus detection in sentinel specimens of GISRS

Global Influenza Surveillance and Response System (GISRS)

-The **mission of GISRS** is to protect people from the threat of influenza by continuously functioning as a:

- global mechanism of surveillance, preparedness and response for seasonal, pandemic and zoonotic influenza;
- global platform for monitoring influenza epidemiology and disease; and
- global alert for novel influenza viruses and other respiratory pathogens.

-**Network** of National Influenza Centres (NICs), collaborating centres and essential regulatory labs

COVID-19 virus detection in sentinel specimens of GISRS

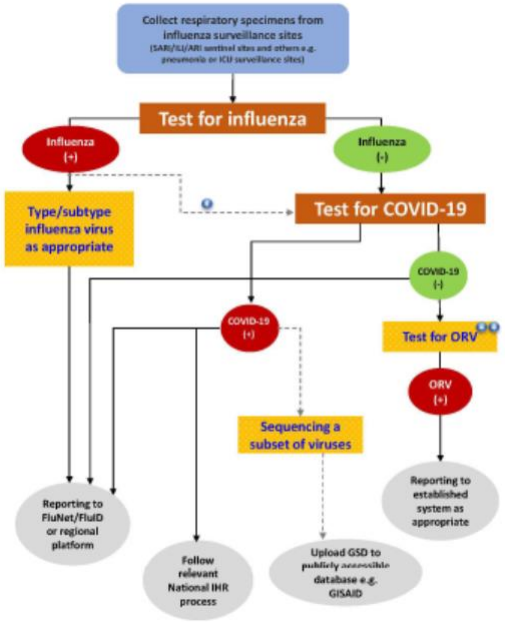
Operational considerations for COVID-19 surveillance using GISRS

1. Specimen collection:

- Within the existing surveillance systems, continue to collect samples from both ILI and SARI sentinel sites to represent both mild and severe illness and endeavor to sample patients that are representative of the population and include all ages and both sexes.

2. Laboratory surveillance

- Testing algorithm



COVID-19 virus detection in sentinel specimens of GISRS

Operational considerations for COVID-19 surveillance using GISRS

3. Reporting to regional and global platforms

- collates data for real-time monitoring of influenza activity and severity
- allows for making informed decision at national, regional and global level
- allows each country to analyze their data in a global context

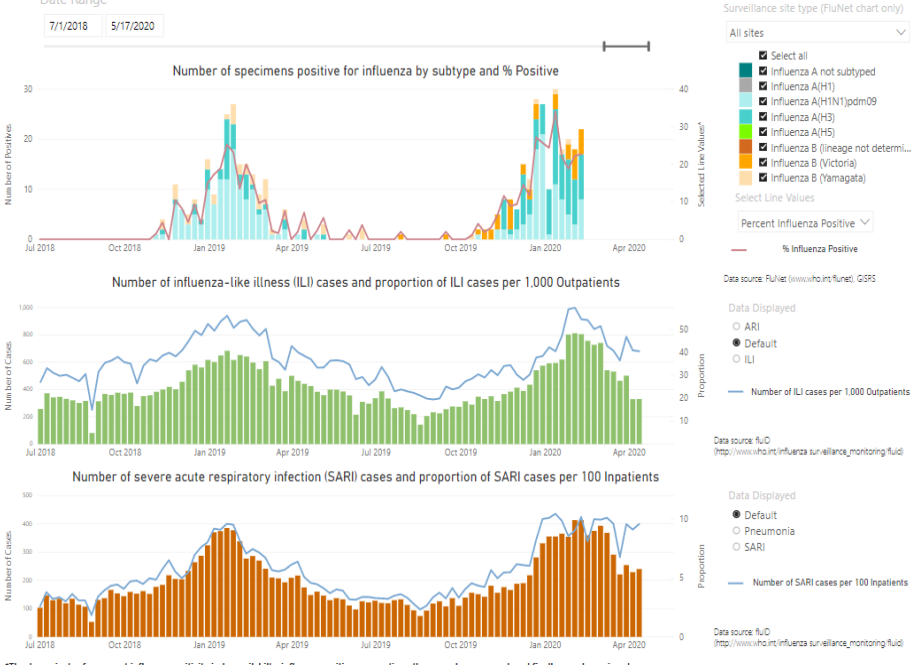
COVID-19 virus detection in sentinel specimens of GISRS

Operational considerations for COVID-19 surveillance using GISRS

FLUMART (platform for data exchange, harmonization, consolidation and storage) which contains many datasets, such as:

- **FLUNET** (virological dataset) (4) and **FLUID** (epidemiological dataset) (5)

FLUMART surveillance outputs (6)



COVID-19 virus detection in sentinel specimens of GISRS

Operational considerations for COVID-19 surveillance using GISRS

For FluNet reporting, where possible laboratory data should be reported separately by source (sentinel vs non-sentinel) and the following variables may be included in addition to influenza data:

- Number of specimens processed for COVID-19 by the week of specimen collection;
- Number of specimens that test positive and negative for COVID-19 by the week of specimen collection;
- *Comment field:* Please note which specimens are being tested for COVID-19 (e.g. all specimens received for respiratory virus testing or only influenza-negative specimens or a subset of influenza-negative specimens) as this may change over time.

Data reporting should continue following the routine weekly reporting of influenza results to FluNet and FluID. COVID-19 information should be included as additional variables in the same data file as influenza data.

COVID-19 virus detection in sentinel specimens of GISRS

Operational considerations for COVID-19 surveillance using GISRS

For FluID reporting, in addition to data fields already reported routinely to FluID (including age-group stratification where available) the following variables may be included but not all may apply to every country:

- Number of ILI specimens tested for COVID-19 and number of those positive;
- Number of SARI specimens tested for COVID-19 and number of those positive;
- Comment field: please note any changes to your case definition, sample collection, or other changes to your routine surveillance.

Data reporting should continue following the routine weekly reporting of influenza results to FluNet and FluID. COVID-19 information should be included as additional variables in the same data file as influenza data.

COVID-19 virus detection in sentinel specimens of GISRS

Operational considerations for COVID-19 surveillance using GISRS

-For countries uploading data directly to FluNet and FluID via FLUMART or reporting via the online platforms, please contact flumart@who.int for assistance in modifying the routine reporting template to include COVID-19 data and for assistance in uploading and reporting.

-For countries reporting to regional platforms, this should be done through existing regional platforms and WHO regional contact persons. Please include flumart@who.int in all messages.

COVID-19 virus detection in sentinel specimens of GISRS

Strategic issues:

-**Maintain routine influenza surveillance and vigilance** for the emergence of zoonotic and non-seasonal influenza viruses

- monitor influenza specimen testing, shipments and numbers of influenza viruses to CCs, reporting and vaccination
- Send alerts through GISRS network

-**Prepare** for influenza and COVID19 co-circulation

- Developing global guidance on lab, surveillance, data reporting and analysis

COVID-19 virus detection in sentinel specimens of GISRS

What can you do?

-Does the country already conducts primary care or hospital-based sentinel surveillance for influenza like illness (ILI), acute respiratory infection (ARI), severe acute respiratory infection (SARI), or pneumonia?
If yes, they should continue this syndromic surveillance and continue to collect respiratory specimens using existing case definitions.
If no, do not develop new systems.

-Are samples collected from all or a subset of patients meeting these case definitions for laboratory testing?
If yes, laboratories should continue testing routine sentinel site samples, as well as non-sentinel samples for influenza, with the addition of testing for COVID-19.

-Is this data reported to regional and global influenza surveillance platforms?
-If yes, encourage to continue reporting along regular channels to regional and global platforms. Contact flumart@who.int with reporting questions.

COVID-19 virus detection in sentinel specimens of GISRS

Links

(1): https://www.who.int/publications-detail/operational-considerations-for-covid-19-surveillance-using-gisrs-interim-guidance
(2): https://www.who.int/publications-detail/surveillance-strategies-for-covid-19-human-infection
(3): https://www.who.int/publications-detail/public-health-criteria-to-adjust-public-health-and-social-measures-in-the-context-of-covid-19
(4): https://www.who.int/influenza/gisrs_laboratory/flunet/en/
(5): https://www.who.int/influenza/surveillance_monitoring/fluid/en/
(6): https://www.who.int/influenza/resources/charts/en/

WHO surveillance case definitions for ILI and SARI
WHO Global Epidemiological Surveillance Standards for Influenza
Open WHO course on influenza sentinel surveillance

Thank you and thanks to those involved in collecting and sharing viruses, data and information, GISRS colleagues, regional and country office colleagues and Global Influenza Programme colleagues