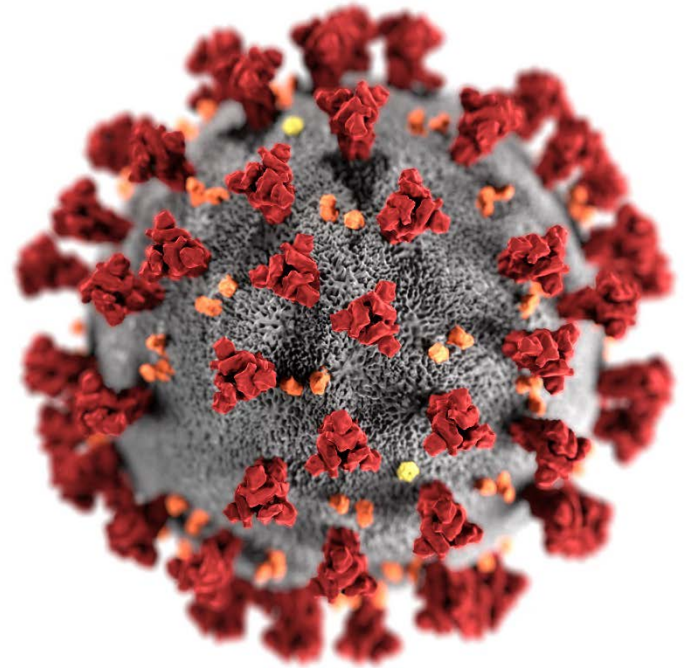


# COVID-19 Surveillance Seminar- May 29, 2020

## Surveillance Strategies for COVID-19 Human Infection

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For more information: [www.cdc.gov/COVID19](https://www.cdc.gov/COVID19)

# SURVEILLANCE STRATEGIES FOR COVID-19 INFECTION

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Technical lead for Surveillance

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World Emergency Program

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**World Health  
Organization**

# Surveillance of COVID-19 human infection: national surveillance

- Objectives of national surveillance:
  - enable **rapid detection**, isolation, testing, and management of suspected cases
  - identify and **follow up contacts**
  - guide the implementation of **control measures**
  - detect and contain outbreaks among **vulnerable** populations
  - evaluate the impact of the pandemic on **health-care systems and society**
  - monitor longer term **epidemiologic trends** and evolution of COVID-19 virus
  - understand the **co-circulation** of COVID-19 **virus**, influenza and other respiratory viruses

# WHO recommended strategies for national Surveillance

## 1. **Strengthen** existing surveillance capacities

- adapt existing surveillance systems
- COVID-19 as a mandatory notifiable disease
- immediate reporting

## 2. Scale-up of **additional** surveillance capacities as needed

- in community : EWAR system, community surveillance, event based surveillance, participatory surveillance
- in vulnerable groups : EWAR, active case finding, daily clinical check, zero reporting

## 3. Use **innovative** technologies for surveillance

- digital/electronic technologies for rapid reporting, data management, and analysis
- Apps for contact tracing, hotlines, self reporting platform

# Type of surveillance and surveillance sites for COVID-19

Type of Surveillance	Surveillance Sites					
	Individuals in the Community	Primary Care Sites	Hospital	Sentinel ILI/SARI Site	Residential Facilities and Vulnerable Groups	Vital Statistics Offices
Immediate Case notification system	X	X	X	X	X	
Contact tracing system	X					
Sentinel virus surveillance			X	X		
Sentinel case surveillance		(X)	X	X		
Cluster investigations	X	X	X	X	X	
Special settings surveillance			X		X	
Mortality surveillance	X		X	X	X	X

# Surveillance sites - 1

- Community
  - Community and event based surveillance
  - Contact tracing, cluster investigation
  - Participatory surveillance, telephones hotlines, self reporting platform
- Primary care level
  - Probable and confirmed cases
  - 24 h notification
  - Zero reporting
  - Limited set of data (age, sex, date onset, date sample, test result, location testing site)

## Surveillance sites - 2

- Hospital
  - Probable and confirmed cases
  - Minimum data set : age, sex/gender and place of residence, date of onset, date of sample collection, date of admission, laboratory test result, severity on admission: admitted to intensive care unit (ICU), treated with ventilation, health care worker status, outcome (discharge or death) if follow-up report feasible.
- Global Influenza Surveillance and Response System
  - For ILI and SARI
  - Community transmission
  - Virological surveillance and Sequencing

## Surveillance sites - 3

- Vulnerable groups: residential facilities, closed settings
  - Active case finding, daily screening
  - zero reporting
  - Health care workers : clusters investigation, specific study
- Humanitarian settings
  - EWAR, community surveillance
  - Active case findings
  - Identification of high risk individuals
- Mortality surveillance
  - Case based surveillance daily, weekly reporting
  - Religious centers, burial sites
  - Vital statistics



THANK YOU FOR YOUR ATTENTION

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# Overview of Surveillance Strategies for COVID-19 Outlined in WHO Guidance

Operationalizing guidance to review objectives and  
indicators by surveillance strategies

**Veronica Pinell-McNamara**  
**Epidemiologist**  
**Division of Bacterial Diseases**  
**National Center for Immunization and Respiratory Diseases**  
**Centers for Disease Control and Prevention**



# Outline

- Objectives of the surveillance
- Short- and long-term goals
  - Review indicators from each
- Surveillance systems
  - How systems can meet those objectives
  - Indicators each can get from each
- Considerations for incorporating COVID-19



# Short-Term Objectives

- **Characterize the outbreak to guide control measures and limit spread of disease**
  - Enable rapid detection, isolation, testing and management of suspected cases
  - Identify and follow up contacts
  - Detect and contain outbreaks among vulnerable populations
  - Guide the implementation of control measures



# Short-Term Indicators

- **Weekly reporting to WHO by age and sex:**
  - # new confirmed cases
  - # deaths in confirmed cases (case fatality rate)
  - # new confirmed cases hospitalized (general and intensive care unit [ICU], if available)
  - # confirmed cases discharged or recovered
  - # persons tested for COVID-19



# Long-Term Objectives

- Monitor longer term epidemiologic trends and evolution of COVID-19 virus
- Evaluate the impact of the pandemic on health-care systems and society
- Understand the co-circulation of COVID-19 virus, influenza, and other respiratory viruses



# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

- **Overall and weekly regional trends (by age, sex, race)**
  - # confirmed COVID-19 cases by subnational levels
  - Incidence rates (general and by subnational levels)
  - % SARS-CoV-2 cases out of hospitalized severe acute respiratory infection (SARI)
  - % SARS-CoV-2 cases out of outpatient influenza-like illness (ILI) cases



# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

- **Changes in deaths (by region, age, sex, and race)**
  - # deaths in confirmed cases (case fatality rate)
  - # confirmed COVID-19 deaths among hospitalized (hCFR (%))
  - # deaths of COVID-like illness (pneumonia, ILI/SARI and other, including country or geography specific conditions)
  - Estimate of excess all cause mortality (the degree to which currently measured mortality exceeds historically established level)





# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

- **Changes in risk factors or co-morbidities (by region, age, sex)**
  - % cases with risk factors (by underlying conditions or co-morbidity)
  - % deaths with risk factors (by underlying conditions or co-morbidity)



# Indicators to Evaluate the Impact of the Pandemic on Healthcare Systems and Society

- **Core indicators (by age/sex-reported daily/weekly and cumulatively)**
  - # new confirmed cases hospitalized (general and ICU, if available)
  - # confirmed cases discharged or recovered
  - % hospital or ICU beds occupied
  - % hospitalized confirmed COVID-19 cases out of all hospitalizations
  - # confirmed cases among HCW
  - # confirmed case deaths among HCW
  - Estimate of excess mortality



# Indicators to Understand the Co-circulation of COVID-19 Virus, Influenza and Other Respiratory Viruses

- **Trends over time (by age, sex, region)**
  - % positive specimens for SARS-CoV-2 vs. other respiratory viruses



# Objectives of Systems

System	Objective
National surveillance (aggregate or case-based)	Identify all cases of disease at all levels of health system for any nationally notifiable disease to characterize trends and risk factors associate with disease.
Sentinel surveillance	Identify all cases of disease in a specific site with strong laboratory confirmation to characterize trends and risk factors associated with disease.
Mortality surveillance	Identify deaths attributable to disease and estimate case fatality proportion and risk factors associated with mortality.






# Indicators to Characterize Outbreak by Surveillance System

Core indicators (by age/sex – reported daily/weekly and cumulatively)	Universal surveillance	Sentinel surveillance	Mortality surveillance
# new confirmed cases	Population based	Aggregate and case-based reporting	
# deaths in confirmed cases (case-fatality rate)	Aggregate and case-based reporting *	Aggregate and case-based reporting	Population based
# new confirmed cases hospitalized (general and ICU, if available)	Population based	Case based reporting only	
# confirmed cases discharged or recovered	Population based	Case based reporting only	
# persons tested for COVID-19	Population based	Case based reporting only	

*\*Mortality information is difficult to access from universal surveillance systems unless the event occurs at the time of reporting and often is not updated after reporting unless system is structured to specifically obtain this information.*

Key

 Aggregate and case-based reporting	 Case based reporting only	 Population based
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# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

Core indicators (by age/sex – reported daily/weekly and cumulatively)	National surveillance	Sentinel surveillance	Mortality surveillance
# confirmed COVID-19 cases by subnational levels	Population based		
Incidence rates (general and by subnational levels)	Population based		
% SARS-CoV-2 cases out of SARI (hospitalized)		Aggregate and case-based reporting	
% SARS-CoV-2 cases out of ILI cases (outpatient)		Aggregate and case-based reporting	

Key

	Aggregate and case-based reporting	Population based
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# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

Core indicators (by age/sex – reported daily/weekly and cumulatively)	National surveillance	Sentinel surveillance	Mortality surveillance
# deaths in confirmed cases (case-fatality rate)	*		
# confirmed COVID-19 deaths among hospitalized cases (hCFR (%))			
# deaths of COVID-like illness (pneumonia, ILI/SARI and other, including country/ geography specific conditions)			
Estimate of excess all-cause mortality (the degree to which currently measured mortality exceeds historically established level)			

*\*Mortality information is difficult to access from universal surveillance systems unless the event occurs at the time of reporting and often is not updated after reporting unless system is structured to specifically obtain this information.*





Key

	Aggregate only		Aggregate and case-based reporting
	Case based reporting only		Population based

# Indicators to Monitor Longer Term Epidemiologic Trends and Evolution of COVID-19

	National surveillance	Sentinel surveillance	Mortality surveillance
Overall and weekly (by age, sex)			
% confirmed cases with risk factors (by underlying conditions or co-morbidity)			
% confirmed deaths with risk factors (by underlying conditions or co-morbidity)			

Key

	Case based reporting only		Population based
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# Indicators to Evaluate the Impact of the Pandemic on Healthcare Systems and Society

Core indicators (by age/sex - reported daily/weekly and cumulatively)	Universal surveillance	Sentinel surveillance	Mortality surveillance
# new confirmed cases hospitalized (general and ICU, if available)	Population based	Case based reporting only	
# confirmed cases discharged or recovered	Population based	Case based reporting only	
% hospital or ICU bed occupied		Case based reporting only	
% hospitalized confirmed COVID-19 cases out of all hospitalizations		Case based reporting only	
# confirmed cases among HCW	Population based	Case based reporting only	
# confirmed case deaths among HCW	Population based *	Case based reporting only	Aggregate and case-based reporting
Estimate of excess all-cause mortality			Aggregate only

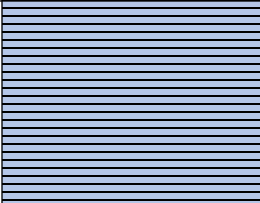
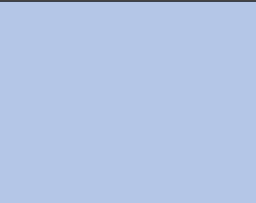

*\*Mortality information is difficult to access from universal surveillance systems unless the event occurs at the time of reporting and often is not updated after reporting unless system is structured to specifically obtain this information.*



Key

Aggregate only	Aggregate and case-based reporting
Case based reporting only	Population based

# Indicators to Understand the Co-circulation of COVID-19 Virus, Influenza, and Other Respiratory Viruses

Core indicators (by age/sex – reported daily/weekly and cumulatively)	National surveillance	Sentinel surveillance	Mortality surveillance
% positive specimens for SARS-CoV-2 vs. other respiratory viruses			

Key

	Case based reporting only		Population based
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# Strengths

National surveillance	Sentinel surveillance	Mortality surveillance
<p>Can provide estimates on burden of disease across regions and nationally</p> <p>Can generate incidence rates for easy interpretation of data</p>	<p>Trained personnel to implement syndromic surveillance</p> <p>Detailed case information (mild-severe disease)</p> <p>Requires limited resources</p>	<p>Can monitor outcome, disparities in disease across geographic and demographic groups</p>

# Limitations

National surveillance	Sentinel surveillance	Mortality surveillance
<p>Identification of trends dependent on completeness of variables collected and reliability of lab results</p> <p>Need extensive clinical and lab capacity and resources for robust data management</p>	<p>May not be population-based or geographically representative</p>	<p>Weekly counts are rarely published from low-middle-income countries</p> <p>May require indirect demographic methods for baseline measures or advanced estimation methods for population structure</p>

# Considerations for Incorporating COVID-19 Surveillance



## Adapt and strengthen existing surveillance systems

At different levels of health care system



## Mandatory reporting



## Immediate reporting where feasible



## Digital technologies

Rapid reporting for data management where possible



## Laboratory capacity

SARSCoV-2-positive and total tests conducted



## Representativeness

Geographically, age, risk factors of broader population

# Survey of Country Offices

9 responses

- Africa Region (n=7)
- Latin America (n=1)
- Asia (n=1)

System	Q2 What surveillance systems are you considering COVID-19?	Q3 What system do you want guidance for?
Acute febrile illness	44%	33%
Mortality surveillance	33%	56%
Case-based surveillance	56%	33%
ILI surveillance	67%	56%
SARI surveillance	78%	56%
Aggregate surveillance	33%	22%
Community event-based surveillance	56%	56%
Malaria surveillance	33%	22%
Polio surveillance	22%	33%



# Upcoming Webinars

- Please join us next week, same place, same time for a session on electronic tools to support surveillance.
- Following webinars to come, including mortality surveillance, syndromic surveillance, serosurveys, and more!

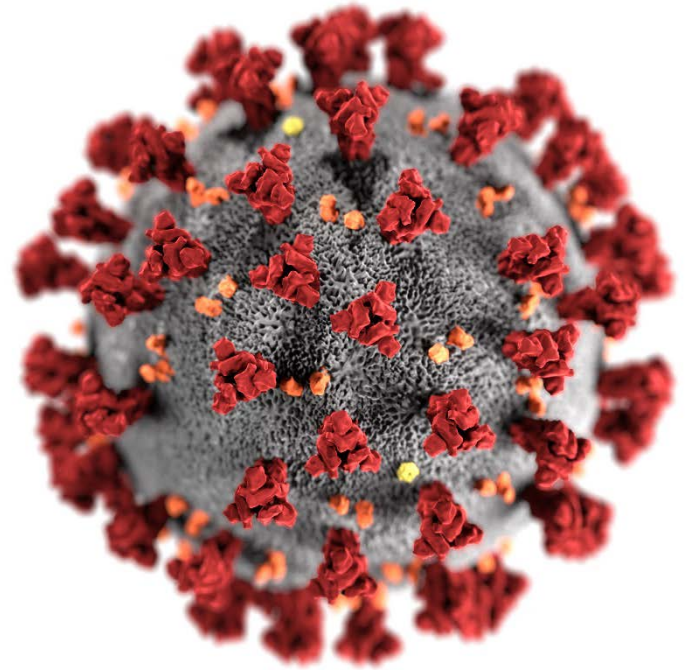


# WHO Resources for COVID-19 Surveillance

- Surveillance strategies for COVID-19 human infection (<https://www.who.int/publications-detail/surveillance-strategies-for-covid-19-human-infection>, assessed 10 May 2020)
- Contact tracing in context of COVID-19 (<https://www.who.int/publications-detail/contact-tracing-in-the-context-of-covid-19>, assessed 10 May 2020)
- Global surveillance for COVID-19 caused by human infection with COVID-19 virus (<https://www.who.int/publications-detail/global-surveillance-for-covid-19-caused-by-human-infection-with-covid-19-virus-interim-guidance>, assessed 20 April 2020, assessed 20 April 2020)
- Case based reporting form (<https://www.who.int/publications-detail/case-based-reporting-form>, accessed 28 February 2020)
- Global surveillance of COVID-19: WHO process for reporting aggregated data (<https://www.who.int/publications-detail/aggregated-weekly-reporting-form>, assessed 6 April 2020)
- Considerations in the investigation of cases and clusters of COVID-19 (Interim Guidance) (<https://www.who.int/publications-detail/considerations-in-the-investigation-of-cases-and-clusters-of-covid-19>, accessed 02 April 2020)
- Operational considerations for COVID-19 surveillance using GISRS (<https://www.who.int/publications-detail/operational-considerations-for-covid-19-surveillance-using-gisrs-interim-guidance>, assessed 26 March 2020)
- Laboratory testing strategy recommendations for COVID-19 (Interim Guidance) (<https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19>, accessed 22 March 2020)
- Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19) (Interim Guidance) ([https://www.who.int/publications-detail/considerations-for-quarantine-of-individuals-in-the-context-of-containment-for-coronavirus-disease-\(covid-19\)](https://www.who.int/publications-detail/considerations-for-quarantine-of-individuals-in-the-context-of-containment-for-coronavirus-disease-(covid-19)), accessed 19 March 2020)







For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

