



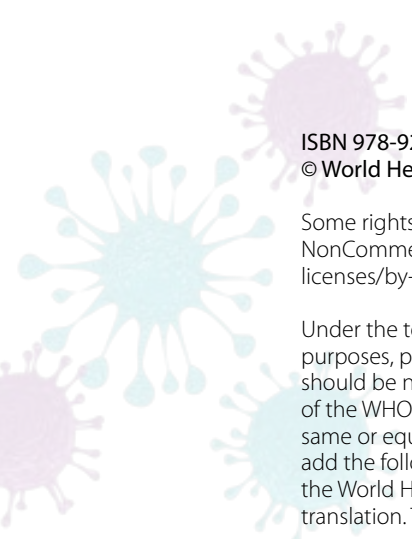
GLOBAL INFLUENZA PROGRAMME

2017 UPDATE

**WHO** guidance  
for **surveillance**  
during an **influenza**  
**pandemic**



World Health  
Organization



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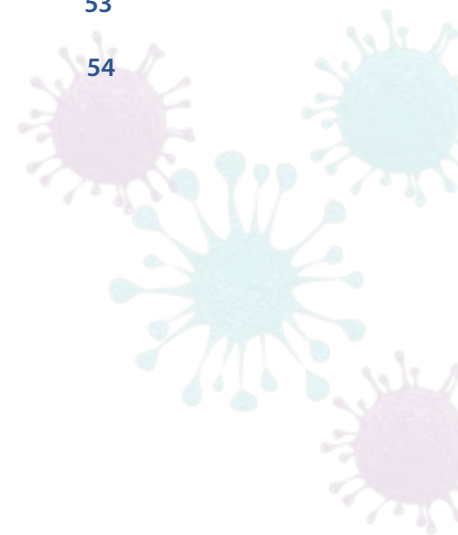
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# Executive Summary

An influenza pandemic will affect every country; therefore, standardized and coordinated international information sharing is crucial to manage such an event at global and national levels. National authorities will need to know how the pandemic is evolving, not only in their own country but also in neighbouring countries and continents. Surveillance during the pandemic will provide the core information on which pandemic-response decisions are based. Sharing of information and virus isolates at the global level will be of benefit to all.


This guidance is an update to an earlier document – *Global surveillance during an influenza pandemic (1)*, published in April 2009 – and it focuses on the different surveillance components used during the pandemic. In general, the purpose of this guidance is to outline the data requirements and surveillance strategies that Member States can use throughout the course of a pandemic. This will ensure that Member States can make informed risk management decisions and will have the capacity to meet their obligations under the *International Health Regulations (2005) (2)*.

**Key new additions include:**

- roles and responsibilities of WHO and Member States;
- reference to the new global pandemic phases (interpandemic, alert, pandemic and transition);
- information on risk and severity assessments to be conducted by Member States;
- recommendations to cease case-based reporting once sustained human-to-human transmission is occurring in the community; and
- an emphasis on the need for Member States to determine pandemic responses based on national risk assessments.

This guidance covers the period from the reporting of sustained human-to-human transmission. It is designed to assist Member States with surveillance immediately before and during an influenza pandemic, from the **verification and detection** of sustained human-to-human transmission, through **risk and severity** assessments and **monitoring of the pandemic**. Some of these surveillance components will happen concurrently.

Early detection of the start of a pandemic is crucial to rapidly implement measures to control the outbreak at its source, and to mitigate the impacts by slowing the spread of the virus. Early surveillance data will inform public health



interventions aimed at slowing transmission, including non-pharmaceutical interventions, which may involve movement restrictions, cancelling mass gatherings and social distancing; and pharmaceutical interventions, such as antiviral prophylaxis and vaccination. Surveillance activities are focused on verifying reports of sustained human-to-human transmission and detecting first influenza cases in other Member States.

Once sustained human-to-human transmission has been verified, detailed risk and severity assessments of the earliest cases of pandemic influenza will be needed. The primary objective of the risk and severity assessment surveillance component (together with information from special studies) is to characterize the new pandemic at an early stage, to facilitate more effective responses both nationally and internationally. Information from risk and severity assessments will be critical to policy-makers in the affected country for making informed decisions about pandemic mitigation strategies, to health-care providers for treating ill persons, and to the general public for reducing their risk of infection and minimizing damaging rumours. Understanding the transmissibility, seriousness of disease and impact of the influenza virus will help in ascertaining the likelihood of a severe pandemic.

The primary objective of surveillance monitoring during the pandemic is to track the course of the pandemic. Surveillance will include geographical spread, disease trends, intensity of transmission, impact of the pandemic on health-care services and changes in the epidemiology, as well as antigenicity and antiviral sensitivity. Monitoring the pandemic will help in modifying response strategies; it will also help to indicate whether a second wave is occurring. Risk and severity assessments should continue throughout the pandemic.

Through the implementation of this guidance, WHO aims to standardize the collection of pandemic influenza data by recommending minimum data requirements for surveillance. The reporting of these data to WHO will enable the aggregation of data at a global level, providing better information on the characteristics and progress of a pandemic, and helping to mitigate the impact of the pandemic.

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### Abbreviations and acronyms

CONWISE	Consortium for the Standardization of Influenza Seroepidemiology
GISRS	Global Influenza Surveillance and Response System
ICU	intensive care unit
IHR	International Health Regulations
ILI	influenza-like illness
PHEIC	public health emergency of international concern
PIP	pandemic influenza preparedness
SARI	severe acute respiratory illness
WHO	World Health Organization



# 1.0 Introduction

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## 1.1 Purpose

This guidance is designed to help Member States to implement pandemic influenza surveillance immediately before and during an influenza pandemic, from the verification and detection of sustained human-to-human transmission, through risk and severity assessments and monitoring of the pandemic. In general, the purpose of the guidance is to outline the data requirements and surveillance strategies that Member States can use throughout the course of a pandemic. This will help to ensure that Member States make informed risk management decisions and have the capacity to meet their obligations under the *International Health Regulations (IHR) (2005)* (2).

## 1.2 Development history

Before the 2009 A(H1N1)pdm09 influenza pandemic (referred to as the 2009 H1N1 pandemic), WHO developed the guidance document *Global surveillance during an influenza pandemic* (1), published in April 2009, to help Member States to undertake surveillance during a pandemic. Since 2009, WHO has made significant progress in further developing standards and guidance relating to influenza surveillance and pandemic preparedness. These developments include various publications: *Pandemic influenza risk management* (3), *Tool for influenza pandemic risk assessment* (4), *Pandemic influenza severity assessment* (5) and *Global epidemiological surveillance standards for influenza* (6).

In addition, key surveillance issues that should be considered when planning and implementing pandemic surveillance were highlighted by the IHR (2005) (2) review in relation to the 2009 influenza pandemic (7), the development of the Joint external evaluation tool (8) and evaluations conducted after the 2009 influenza pandemic. Because of these developments, and to ensure consistency with other WHO guidance documents, there was a need to update the existing 2009 version of the guidance, *Global surveillance during an influenza pandemic* (1).<sup>1</sup>

Evaluations conducted after the 2009 A(H1N1)pdm09 influenza pandemic highlighted a number of key surveillance issues that should also be considered when planning and implementing pandemic surveillance. Lessons learned from these evaluations have helped shape the new guidance. The most important of these findings were that:

- there is a need to plan for different levels of pandemic response based on local and global risk assessments;
- data requirements should be scaled to a minimum core set of indicators and, where possible, should build on existing systems;

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<sup>1</sup> Further details on reasons for updating the guidance can be found in Annex 2.

- case-based reporting (the counting of individual cases) should cease once there is broad community transmission in a country – at this point, syndromic data from sentinel sites, hospital-based data and systematic laboratory testing should be used instead;
- triggers for response need to be easily determined early in the pandemic – during the 2009 influenza pandemic many triggers for response were linked to severity measures (e.g. numbers of deaths and case fatality rates), which could not easily be determined early in the pandemic;
- guidance is needed on when to de-escalate or cease surveillance activities once they are no longer needed to inform decision-making; and
- severity (transmission, seriousness of disease and impact) needs to be monitored throughout the pandemic.

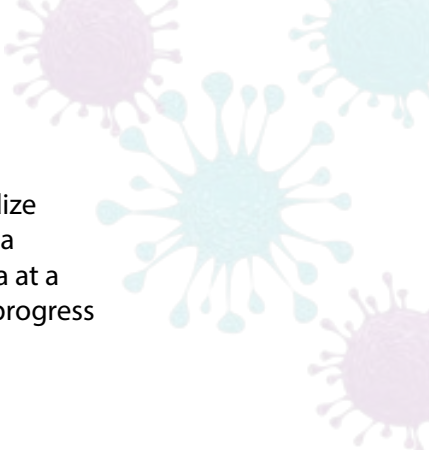
Following an initial WHO internal consultation in September 2016, WHO convened a meeting – the “WHO Meeting on Influenza Pandemic Preparedness: Launch of the PISA [pandemic influenza severity assessment] Framework & Finalizing the Guidance for Surveillance During an Influenza Pandemic” – in March 2017, to review a draft of the updated guidance. At this meeting, participants identified areas needing clarification and proposed minor amendments.

### 1.3 Overview of major updates

This updated guidance follows a similar format to the earlier document *Global surveillance during an influenza pandemic (1)*, published in 2009, and focuses on the various surveillance components used at different stages during the pandemic. Key new additions include the roles and responsibilities of WHO and Member States; reference to the new global pandemic phases (interpandemic, alert, pandemic and transition); information on risk and severity assessments to be conducted by Member States; recommendations to cease case-based reporting once sustained human-to-human transmission is occurring in the community; and an emphasis on the need for Member States to determine pandemic responses based on national risk assessments. Key surveillance-related findings from post-2009 influenza pandemic evaluations are not the primary function of this guidance, but have been included to assist Member States with surveillance planning.

Specifically, this document:

- provides guidance on surveillance components during the pandemic;
- identifies data to be collected and reported to WHO (some of these will occur concurrently) at different stages of the pandemic;
- provides information on risk and severity assessments; and
- outlines roles and obligations of WHO and Member States regarding surveillance during a pandemic.



Through the implementation of this guidance, WHO aims to standardize the collection of pandemic influenza data by providing minimum data requirements for surveillance. This will enable the aggregation of data at a global level, providing better information on the characteristics and progress of a pandemic.

#### **1.4 Target audience**

This document is aimed at policy-makers and public health professionals involved in disease and laboratory surveillance at the national level. It is also a guide for WHO staff involved in pandemic surveillance and response.

#### **1.5 International Health Regulations (2005)**

This guidance operates within the IHR (2005) (2), which represents a binding international legal agreement involving 196 countries across the globe, including all the Member States of WHO, to work together for global health security. The purpose and scope of the IHR (2005) is to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and that avoid unnecessary interference with international traffic and trade (2). Under the IHR (2005), all States Parties are required to have or to develop minimum core public health capacities to implement the IHR (2005) effectively, including the capacities to detect, assess, respond to and report public health emergencies of international concern (PHEIC). Outbreaks caused by viruses with pandemic potential may constitute a PHEIC if criteria under the IHR are met.

## 2.0 Background

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### 2.1 Influenza pandemics

Influenza, a viral respiratory disease, can cause high morbidity and mortality in humans and some animal species. Influenza pandemics (outbreaks that affect a large proportion of the world due to a novel virus) are unpredictable, recurring events that can have considerable health, economic and social consequences worldwide. An influenza pandemic occurs when key factors converge: a novel influenza virus emerges that has the ability to cause sustained human-to-human transmission, the virus causes disease, and the human population has little to no immunity against the virus. With the growth of global trade and travel, a localized epidemic can rapidly transform into a pandemic, with little time to prepare a public health response.

Since the 16th century, influenza pandemics have been described at intervals of between 10 and 50 years, and with varying severity and impact (3). The world's most recent pandemic – the 2009 A(H1N1)pdm09 influenza pandemic – was characterized as being highly transmissible with rapid spread. This swiftly led to sustained human-to-human transmission worldwide, but resulted in a lower mortality than for previous known pandemics, with between 123 000 and 203 000 deaths attributed to the A(H1N1)pdm09 virus (3, 9). In contrast, the infamous 1918 “Spanish influenza” pandemic spread more slowly but caused an estimated 20–40 million deaths (10). The differences in the severity of these two pandemics emphasizes that pandemics are unpredictable events. It is not easy to make assumptions about where the next influenza virus with pandemic potential will emerge, or what its characteristics will be, including its severity (3). This highlights the need for pandemic influenza surveillance to provide data and analyses to clarify the characteristics of the pandemic.

### 2.2 Importance of surveillance to detect and respond to a pandemic

Surveillance comprises the ongoing collection, interpretation and dissemination of data to enable the development and implementation of evidence-based interventions during a pandemic event. Surveillance during a pandemic will provide the core information on which pandemic response decisions are based. Critical information needed during the pandemic will vary at different points in time, and will be generated by different types of surveillance activities.

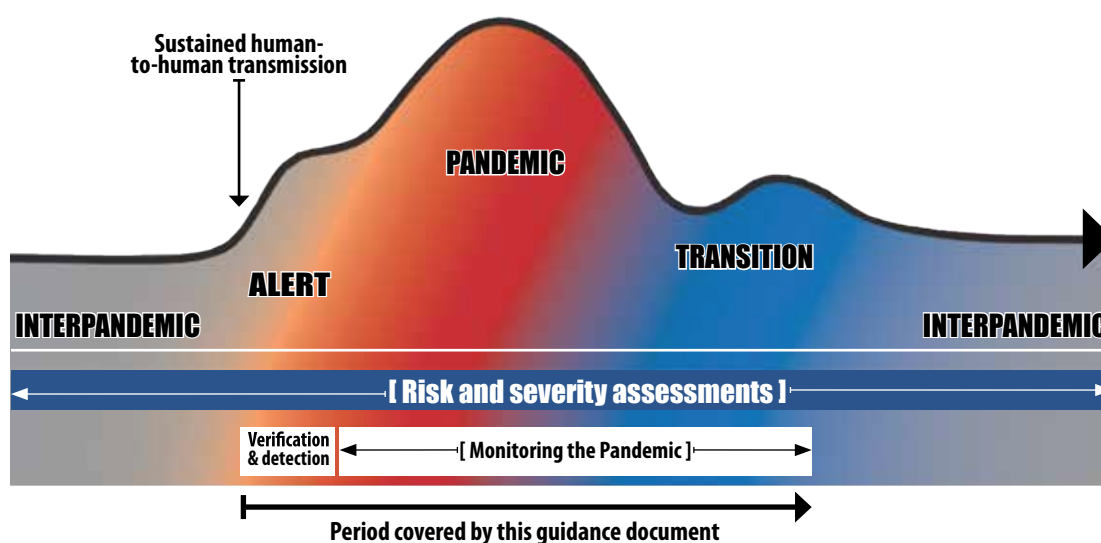
Successful control of pandemic influenza will rely on early recognition and verification of sustained human-to-human transmission. This requires a system with the capacity for outbreak detection, rapid data collection, analysis, assessment and timely reporting – all key features of an effective surveillance system. Surveillance during a pandemic will build on existing routine surveillance systems but may also require development of ad hoc systems to meet additional data needs.

## Pandemic phases

The pandemic phases – **interpandemic**, **alert**, **pandemic** and **transition** – describe the spread of a novel influenza virus around the world, and are used to provide a high-level global view to assist with local risk assessments<sup>1</sup> (Fig. 1). Member States are encouraged to use national risk assessments, based on their own surveillance data, to inform pandemic responses.

This guidance covers surveillance from the period from the detection of sustained human-to-human transmission during the alert phase, to the pandemic phase and the transition phase. Surveillance guidance for the interpandemic phase and the early stages of the alert phase can be found in the *WHO Manual for the laboratory diagnosis and virological surveillance of influenza* (11) and the *Global epidemiological surveillance standards for influenza* (6).

Fig. 1. The continuum of pandemic phases and surveillance components



Three major surveillance components – **verification and detection**, **risk and severity assessment** and **monitoring the pandemic** – are used during a pandemic (Fig. 1, Table 1). Risk and severity assessments occur in both the alert and pandemic phases.

<sup>1</sup> WHO's determination of the global pandemic phase will be based on risk assessments that will use surveillance data and will take into account severity, transmission, virological characteristics and population immunity.

## 2.3 Overview of key surveillance components during a pandemic

**Table 1. Summary of the three key pandemic surveillance components**

<b>COMPONENT</b>			
	<b>VERIFICATION AND DETECTION</b>	<b>RISK AND SEVERITY ASSESSMENTS</b>	<b>MONITORING THE PANDEMIC</b>
<b>Pandemic phase</b>	Alert	Alert, pandemic, transition, interpandemic	Pandemic, transition
<b>Objective</b>	In initial country, verify sustained human-to-human transmission.  In other countries, detect first cases that may signal imported cases of the influenza virus with pandemic potential.	Characterize the features of the new disease, as appropriate. Collect data and undertake national risk assessment. Understand the transmissibility, seriousness of disease and impact of the influenza virus.	Monitor the disease, including geographical spread, trend, transmissibility, seriousness of disease and impact.
<b>Key system features</b>	Outbreak investigations. Active case finding. Use routine and event-based surveillance, including virological surveillance.	Case-based reporting and detailed epidemiological, clinical and virological data collection from early cases.	Pandemic surveillance of ILI and SARI cases, systematic laboratory testing of a sample of cases, clinical data and qualitative indicators.
<b>Action at the national level</b>	Investigation of first cases of human-to-human transmission and clusters. Analyse and interpret early data. Notification and reporting to WHO.	Rapid risk and severity assessment of early cases. Modify responses according to national risk assessments. Implement and monitor impact of early intervention strategies. Report results of national risk and severity assessments to WHO.	Monitor the situation. Assess effectiveness of public health interventions. Continue to modify responses in accordance with risk and severity assessments. Report to WHO.
<b>Action at the global level</b>	Initiate joint risk assessment. Determine risk of global spread. Alert Member States and encourage strengthening of surveillance systems.	Aggregate epidemiological, clinical and virological data. Provide early assessment of pandemic risk and likely severity.	Monitor the pandemic. Update assessments as required. Modify global recommendations for surveillance, public health interventions, clinical management, etc. in response to data from Member States.

ILI, influenza-like illness; SARI, severe acute respiratory infection; WHO, World Health Organization



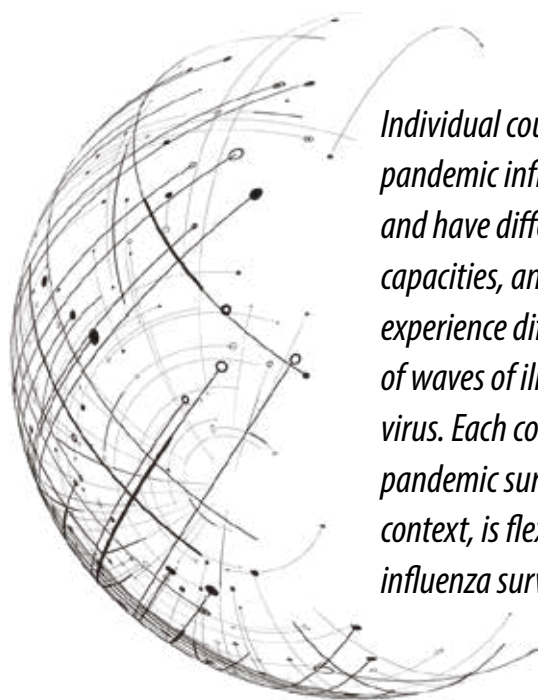
## Benefits of global pandemic influenza surveillance

An influenza pandemic will affect every country; thus, standardized and coordinated international information sharing is crucial for crisis management at global and national levels. National authorities will need to know how the pandemic is evolving, not only in their own country but also in neighbouring countries and continents. Sharing of information and virus isolates at the global level will be of benefit to all. The continual flow and aggregation of information provided by individual countries will contribute to the development of a global picture.

### 2.4 Case Definitions

During a pandemic, WHO will publish and update as needed pandemic influenza case definitions for surveillance purposes. Use of common global case definitions will allow Member States to interpret their data within a global context.<sup>1</sup>

The **preferred age groups** for reporting to WHO are 0 to <2 years, 2 to <5 years, 5 to <15 years, 15 to <50 years, 50 to <65 years and ≥65 years (6).



*Individual countries may be exposed to the pandemic influenza virus at different times, and have different surveillance and response capacities, and vulnerabilities. They may also experience different numbers and severities of waves of illness arising from the pandemic virus. Each country will need to develop its own pandemic surveillance system that suits the local context, is flexible and, ideally, is built on existing influenza surveillance systems.*

<sup>1</sup> The WHO companion document, the Global epidemiological surveillance standards for influenza (6), provides the minimum data set for SARI, medically attended acute respiratory illness (MAARI) and ILI syndromes. In brief, at the national level, the minimum data set for SARI, MAARI and ILI patients tested for pandemic influenza are unique identifier (to link laboratory and epidemiological data, and for tracking patient if necessary), sex, age, history of fever and body temperature at presentation, date of symptom onset and date of hospitalization (SARI and MAARI patients only). Additional information on various risk factors may also be included: date of specimen collection, antiviral use for present illness at the time of specimen collection, pregnancy status and presence of chronic pre-existing medical illness(es) (asthma, diabetes, chronic cardiac disease, chronic neurological or neuromuscular disease, chronic respiratory disease, haematological disorders and immunodeficiency).



## 3.0 Surveillance component: verification and detection

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### 3.1 Summary

#### 3.1.1 Objective

The objective of verification and detection is to **verify** the first reports of sustained human-to-human transmission of a human influenza caused by a new subtype, and then to **detect** further cases, either within the first affected country(ies) or elsewhere.

**National objectives in the country(ies) WITH reported sustained human-to-human transmission are to:**

- confirm that an influenza virus with pandemic potential has demonstrated the ability to transmit from person to person in a sustained manner;
- describe the very early epidemiological, virological and clinical characteristics of the outbreak;
- assess the geographical extent of virus spread to inform containment and control efforts; and
- notify WHO under the requirements of the IHR (2005), and report characteristics of early cases.

**National objectives in countries WITHOUT reported sustained human-to-human transmission are to:**

- enhance virological and epidemiological surveillance so that cases of the influenza virus with pandemic potential can be detected; and
- prepare surveillance systems for the collection and reporting of pandemic case data.

**Global objectives are to:**

- verify notification;
- assess pandemic potential of the influenza virus;
- alert other Member States of a PHEIC; and
- aggregate data from Member States to assist with describing early pandemic characteristics.

#### 3.1.2 Key features

**Key features of verification and detection are:**

- outbreak investigation to verify sustained human-to-human transmission;
- active case finding; and
- preliminary virological characterization of the influenza virus and epidemiological features of early cases.

#### 3.1.3 Benefits

At a global level, information from surveillance will guide initial global risk assessments and help in determining whether a pandemic is occurring. At the national level in the affected countries, this information will be used to determine public health responses to control the spread of the disease. For non-affected countries, this notification will enable government authorities to take necessary and appropriate health measures to prepare for a pandemic, and enhance surveillance of the influenza virus with pandemic potential.

### 3.2 Public health actions

It is crucial to verify the first reported episode of human-to-human transmission resulting in sustained community-level transmission. Detailed clinical and epidemiological information, both from individual cases and from the investigation itself, will be important for making critical decisions about global risks and public health responses. Such information will also be useful to other Member States that have not yet been affected, as they prepare for the pandemic. Data will need to be collected for initial risk and severity assessments, and to provide sufficient information for appropriate public health responses to be implemented.

Early response activities aim to delay the spread of pandemic influenza when it is first detected. These activities may include the use of antiviral medications, and public health measures such as contact tracing, movement restriction and social distancing, which are designed to control the spread of the outbreak.

Public health actions during the verification and detection component are detailed in Table 2.

**Table 2. Public health actions during the verification and detection surveillance component**

<b>OBJECTIVE</b>	<b>ACTION AT THE NATIONAL LEVEL</b>	<b>ACTION AT THE GLOBAL LEVEL</b>
Verify sustained human-to-human transmission.	Launch investigation for evidence of sustained human-to-human transmission. Determine whether sustained human-to-human transmission is occurring; if it is, conduct early assessment and determine appropriate public health responses. Virus and clinical sample submission. Notification to WHO. Request assistance and support if needed.	Initiate joint risk assessment to assess the pandemic potential of the influenza virus. Seek further information to inform risk assessments, as necessary.  Verify notification.
<i>Country(ies) with verified transmission</i> – detect further spread of influenza virus with pandemic potential.	Initiate active case finding.	Support Member State, as necessary.

**Table 2. Public health actions during the verification and detection surveillance component**

CONTINUED...

OBJECTIVE	ACTION AT THE NATIONAL LEVEL	ACTION AT THE GLOBAL LEVEL
<i>Other countries</i> – detect initial imported or locally transmitted cases of the influenza virus.	Enhance epidemiological and virological surveillance to detect signal events.	Alert and encourage Member States to strengthen epidemiological and virological influenza surveillance.
Describe early pandemic characteristics.	Analysis and interpretation of the data. Refine case management and control measures. Share early findings from surveillance data.	Aggregate data from Member States (if multiple outbreaks) to assist with describing early pandemic characteristics. Define case definitions.
Estimate geographical extent of spread.	Plan and adjust extent of control measures.	Determine risk of global spread.

### 3.3 Surveillance activities

Early detection<sup>1</sup> of the start of a pandemic is crucial, to allow countries to rapidly implement measures to control the outbreak at its source or to mitigate the impacts by slowing the spread of the virus. Early surveillance data will inform public health interventions aimed at slowing transmission. These will include non-pharmaceutical interventions, such as movement restrictions, cancelling mass gatherings and social distancing; they will also include pharmaceutical interventions, such as antiviral prophylaxis and vaccination. Surveillance activities at this stage focus on verifying reports of sustained human-to-human transmission and detecting first cases of the virus in other Member States (Table 3).

#### 3.3.1 Verification

In an outbreak of cases infected with a novel influenza virus, clusters of human-to-human transmission may occur in hospital or household settings that, by themselves, are not necessarily indicative of widespread or sustained transmission in a community. The **verification** process seeks to investigate influenza outbreaks and obtain **evidence** that sustained human-to-human transmission is occurring, increasing the likelihood of a pandemic.

<sup>1</sup> WHO has developed a Tool for influenza pandemic risk assessment (4) that Member States can use in assessing the pandemic risk of influenza viruses with pandemic potential, particularly in the early stages before the virus is known to spread from human to human.

Evidence of sustained human-to-human transmission of the novel influenza virus could include:

- clusters occurring outside of hospital or household settings;
- spread of the virus through multiple generations of transmission; and
- sporadic human infections in the community not linked to known confirmed cases.

### 3.3.2 Detection

An effective response to an emerging pandemic requires detection in the very earliest stages of the outbreak, when the number of cases is small and the geographical extent of spread is limited. This requires a sensitive surveillance system that can detect small-scale, unusual events.

In many settings, existing event-based surveillance systems are the primary means for early detection of unusual events, including the emergence of strains of influenza virus that have pandemic potential. These systems include activities such as rumour surveillance, monitoring of media sources, informal community-based reporting networks, and the immediate reporting of signal or trigger events by health-care workers. The occurrence of certain events, or signals or triggers, should prompt immediate investigation to inform a risk assessment.

Surveillance will be an integral part of early response activities to:

- monitor disease activity and the evolution of the outbreak;
- evaluate the effectiveness of the early response activities;
- guide decisions to continue, modify or end the response; and
- understand the key characteristics of the pandemic virus.

In the early stages, case-based data would serve as the basis for immediate action. Suspected cases play an important role at this stage, and it is important to seek a laboratory diagnosis to determine whether an individual has the influenza virus with pandemic potential.

**Table 3. Surveillance activities during the verification and detection surveillance component**

#### **PRIORITY SURVEILLANCE ACTIVITIES**

- Formulate case definitions, including suspected and confirmed cases, imported and locally transmitted.
- Alert clinicians and hospitals to report additional cases and clusters.
- Initiate active case finding – may include contact tracing and chart reviews (particularly in hospital wards where cases with known symptoms may be admitted).
- Prepare line list of initial cases (see Section 3.4 for further details).
- Investigate outbreaks, particularly clusters.
- Undertake initial analyses including producing epidemic curves, clinical symptoms, cases by age groups and spot maps of confirmed cases.
- Verify that sustained human-to-human transmission is occurring.
- Collect clinical data of confirmed cases including symptoms, comorbidities and outcomes.
- Use a laboratory system to report cases, collect and share specimens through the GISRS network.
- Summarize the outbreak.
- Submit timely data to FluNet and FluID.<sup>1</sup>



<sup>1</sup> WHO has developed FluID ([http://www.who.int/influenza/surveillance\\_monitoring/fluid/en/](http://www.who.int/influenza/surveillance_monitoring/fluid/en/)), a surveillance system that can be used by countries to assist in reporting epidemiological data. The relevant WHO regional office should be consulted for further guidance about online access to FluID. FluNet (<http://www.who.int/flunet>) is used for the reporting of virological data from laboratories. Contact WHO headquarters (GISN@who.int) for questions concerning FluNet.

**Table 3. Surveillance activities during the verification and detection surveillance component**

CONTINUED...

**ADDITIONAL SURVEILLANCE ACTIVITIES**

- Review data (e.g. ILI, ARI and SARI) against routine surveillance data, if available. Compare data to baselines or thresholds.
- If possible, determine virological characteristics of the virus.
- Contact WHO for additional surveillance support, if required.
- For non-affected countries, enhance epidemiological and virological surveillance.

ARI, acute respiratory infection; GISRS, Global Influenza Surveillance and Response System; ILI, influenza-like illness; PIP, pandemic influenza preparedness; SARI, severe acute respiratory infection; WHO, World Health Organization

### 3.4 Data requirements

Much of the data collected and analysed during the verification and detection surveillance component will be focused on investigations of outbreaks or case contacts. Special studies may be undertaken to provide greater detail on the characteristics. Further information on special studies is available in Section 6.1.

Data from the investigation would comprise a **line listing** that includes:

- a unique patient identification number that links epidemiological information with clinical specimens, and cases to contacts;
- patient demographic and exposure information;
- comorbidities;
- clinical presentation and course (requires follow-up of patients);
- outcome (i.e. death, recovery, hospitalization, convalescent or lost for follow-up);
- date clinical samples taken and results; and
- final status (i.e. suspected, probable, confirmed or lost for follow-up).

It is also important to include the following:

- **virological characteristics** (which may come from both the national laboratory and WHO collaborating centre)
  - ◆ name of laboratory and contact details;
  - ◆ antigenic and genetic characterization of the virus;
  - ◆ antiviral sensitivity;



- information on **how the investigation was conducted**, including:
  - ◆ case-finding activities, nature and extent of enhanced surveillance activities;
  - ◆ case definition used for case finding and classification, and algorithm for screening;
  - ◆ timeline of suspected, probable and confirmed cases with dates of illness onset within clusters and dates of exposures;
  - ◆ laboratory testing criteria for cases;
  - ◆ evidence for human-to-human transmission;
  - ◆ geographical extent of investigation and estimation of spread of virus;
  
- summary description of control measures taken:
  - ◆ isolation and quarantine measures used;
  - ◆ contact tracing and management, including the number of contacts under observation, their clinical status and the date of the last known contact;
  - ◆ infection control measures implemented in health-care facilities;
  - ◆ use of antiviral medications for treatment or prophylaxis;
  - ◆ border controls and travel restrictions, if any;
  - ◆ risk communication activities; and
  - ◆ estimates or indicators of effectiveness of containment.

Early in the response during the alert phase,<sup>1</sup> aggregated data should be collected and, if possible, reported daily.<sup>2</sup> Such data should include:

- epi curve with confirmed and suspected cases;
- number of hospitalized cases;
- age and gender of hospitalized cases;
- distribution across comorbidities and pregnancy;
- number of outpatient cases;
- number of pneumonia or other severe cases;
- number of pandemic influenza-related deaths, if available; and
- geographical map of cases.

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<sup>1</sup> Findings from evaluations conducted following the 2009 influenza pandemic indicated that during early responses limited data may be available, and it might be prudent to use a cautionary approach (assuming a more severe pandemic) and then scaling response activities up or down as more information becomes available. If data are limited, early response activities can be based on pandemic influenza assumptions, developed before a pandemic, or a range of illustrative potential pandemic scenarios that include associated risks. The WHO document *Pandemic influenza risk management* (3) includes a comprehensive listing of planning assumptions for a pandemic, including modes of virus transmission, incubation period and infectivity, symptom development and clinical attack rate, dynamics and impact of a pandemic.

<sup>2</sup> Daily reporting will be resource intensive for Member States, and may need to be scaled back to weekly reporting once the virus is widespread in the community.

## 3.5 Member States' roles and responsibilities

### 3.5.1 Surveillance capacity

Each country must have the capacity to undertake the assessments and to notify, report and verify to WHO as required under the IHR (2005).

Appropriate surveillance capacities include:

- a system that can detect, analyse and report events (including rumours and other ad hoc reports) that are a potential risk to public health;
- laboratory capacity to identify influenza viruses with pandemic potential, or rapid access to outside laboratory facilities with this capacity and the ability to ship samples;
- ability to collect and share samples under the pandemic influenza preparedness (PIP) framework;
- epidemiological expertise to carry out the initial investigation of signal events (including clusters), data analysis and reporting;
- a national IHR focal point to report PHEIC to WHO;
- outbreak response and pandemic preparedness plans; and
- materials and personnel for rapid containment of outbreaks of influenza with pandemic potential.

### 3.5.2 Reporting to WHO

This component of pandemic influenza surveillance is closely linked to the notification requirements for reporting and verification under the IHR, which provide a legal framework to support the technical description specified in the guidance. Using the decision instrument in Annex Two of the IHR, **all cases of human influenza caused by a new subtype are to be notified to WHO**. WHO has published the case definition to assist such notification.<sup>1</sup>

Member States should immediately report:

- an influenza virus with pandemic potential; and
- all acute respiratory events with severe and unusual characteristics and potential for international spread, even if unsure of agent.

Data obtained from the ongoing investigation should be reported as they are being collected, to update the national and global risk assessments.

### 3.5.3 Verification requests

In addition to country-initiated notifications and reports, WHO IHR contact points will request that Member States verify reports that WHO has received from non-official sources. Following such a request, the Member State is required to respond within 24 hours and to provide further information as it becomes available, in accordance with Section 3.4, above.

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<sup>1</sup>The definition is available at [http://www.who.int/csr/ihr/Case\\_Definitions.pdf](http://www.who.int/csr/ihr/Case_Definitions.pdf)

#### 3.5.4 Virus sample submission

All virus isolates from human infections obtained as part of the initial assessment<sup>1</sup> should be submitted for further characterization to the Global Influenza Surveillance and Response System (GISRS) network. For countries without the capacity for virus testing, clinical specimens from all suspected human cases should be submitted to the GISRS network for virus isolation and characterization. Each sample should be labelled with the same identifying information or number from the case epidemiological and clinical data forms, so that virological data can be linked with the other data. Member States without influenza laboratory capacity should seek support from neighbouring countries or WHO to develop surveillance for the novel virus.

### 3.6 WHO's roles and responsibilities

The IHR (2005) provides a mandate to WHO to support public health surveillance and risk assessment; coordinate the international response to PHEIC; and support States Parties in building their capacities to prevent, detect, assess and respond to public health events.

Under the IHR (2005) WHO is obliged to ask affected States Parties to provide verification of information on events involving influenza virus with pandemic potential. WHO conducts a global risk assessment in collaboration with affected States Parties, and offers to collaborate with the States Parties in assessing potential for disease spread, interference with international traffic and adequacy of additional measures.

WHO will also facilitate the sharing of study protocols, provide the framework for international institutional approval processes, and facilitate the availability of emergency funding for special studies.

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<sup>1</sup> Further details on laboratory surveillance are available in the WHO companion document, Manual for the laboratory diagnosis and virological surveillance of influenza (11).



## 4.0 Surveillance component: risk and severity assessments

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### 4.1 Summary

#### 4.1.1 Objective

Once sustained human-to-human transmission has been verified, detailed risk and severity assessments of the earliest cases of pandemic influenza will be needed. The primary objective of the risk and severity assessment surveillance component is to characterize the new pandemic at an early stage, to facilitate more effective responses both nationally and internationally. Information from the assessments will be critical to policy-makers in the affected country for making decisions about pandemic mitigation strategies, to health-care providers for treating ill persons, and to the general public for reducing their risk of infection and minimizing damaging rumours.

Understanding the transmissibility, seriousness of disease and impact of the influenza virus will help to ascertain the likelihood of a severe pandemic.

**National surveillance objectives** include:

- collecting and analysing early surveillance data so that the epidemiological, clinical and virological features of the influenza virus can be determined; and
- undertaking initial risk and severity assessments to inform the public health response.

**Global surveillance objectives** include:

- aggregating epidemiological, clinical and virological characteristics data;
- undertaking a global pandemic risk assessment, including likely severity; and
- sharing the risk assessment with Member States.

#### 4.1.2 Key features

Key features of risk and severity assessments are case-based reporting and detailed epidemiological, clinical and virological data collection from early cases. Analyses of these and other data will inform risk and severity assessments.

#### 4.1.3 Benefits

The early risk and severity assessments will be used by WHO and Member States to understand the evolving situation in order to inform and support global and national decisions and recommendations, including helping to determine the composition of a pandemic vaccine. The risk and severity assessments will be helpful to all countries for:

- adjusting their national response plans early in the pandemic;
- benchmarking and indirect measurement of the effectiveness of control measures to slow the spread of the virus; and
- communicating with health-care professionals, policy-makers, the general public and the media.

At a national level this information will be useful in prioritizing and scaling the public health interventions.

## 4.2 Public health actions

The risk and severity assessment surveillance component is an intensive data-gathering activity that may coincide with other pandemic response and control activities. Carrying out both activities at the same time can seriously strain already overstretched resources. Hence, Member States are urged to do advance planning and resource allocation, to train teams in investigation techniques, and to designate individuals responsible for the comprehensive assessment. Member States should assess how best to collect the information described in this document at the country level.

Each Member State is encouraged to undertake its own early **risk assessment**, including an assessment of severity (Table 4). Detailed information on pandemic risk assessments is available in the WHO companion document *Pandemic influenza risk management (3)*.<sup>1</sup>

**Severity assessments** should be conducted at the community, national and global level. The *Pandemic influenza risk management (3)* guidance<sup>2</sup> is intended for use by Member States and WHO as part of their overall pandemic risk assessments. Influenza (pandemic) severity is defined in terms of three indicators: **transmissibility** of an influenza virus, **seriousness of influenza disease** and **impact**.

The **aims** of the **influenza severity** assessment are to:

- describe the epidemiological situation and assess the severity of an influenza epidemic or pandemic based on all available information;
- inform national and global risk assessments; and
- inform public health preparedness, response and recovery measures, as well as resource allocation.

The global influenza severity assessment will be used by WHO to monitor and understand the global situation, and to provide evidence on severity to support decisions and recommendations.

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<sup>1</sup> The guidance provides detailed risk management and assessment information for Member States on policy and resource management, planning and coordination, information and knowledge management, health infrastructure and logistics, health and related services, and community capacities.

<sup>2</sup> Further information on pandemic influenza severity assessments is available at [http://www.who.int/influenza/surveillance\\_monitoring/pisa/en/](http://www.who.int/influenza/surveillance_monitoring/pisa/en/)

**Table 4. Public health actions during the risk and severity assessment surveillance component**

<b>OBJECTIVE</b>	<b>ACTION AT THE NATIONAL LEVEL</b>	<b>ACTION AT THE GLOBAL LEVEL</b>
Describe epidemiological characteristics of early initial and secondary cases.	Assess severity and initiate appropriate public health measures. Compare data with baseline influenza surveillance data. Undertake assessment of early cases.	Aggregate data to assess epidemiological characteristics.
Describe clinical characteristics of early cases.	Refine definitions for case finding, target treatment and control measures to high-risk groups.	Aggregate data to assess clinical characteristics. Refine case definitions.
Describe virological characteristics of early cases.	Adapt recommendations for use of antiviral drugs. Submit samples and isolates to GISRS network for confirmation and characterization.	Aggregate data to assess virological characteristics.
Undertake risk assessment.	Collect data and undertake national risk assessment. Determine likely risk of a pandemic threat and the severity of the virus infection, so that country specific public health interventions can be implemented. Share risk and severity assessment findings with WHO.	Undertake and share global pandemic risk assessment. Aggregate data to assess severity and pandemic risk. Share aggregated data with Member States. If required, declaration of PHEIC.
Determine the severity by assessing transmissibility, seriousness of disease and impact of the influenza viruses.		

GISRS, Global Influenza Surveillance and Response System; PHEIC, public health emergency of international concern; WHO, World Health Organization

### 4.3 Surveillance activities

The risk and severity assessment surveillance component is an intensive data-gathering activity that may coincide with other pandemic surveillance, response and control activities.<sup>1</sup> Once the influenza virus is spreading, numbers of confirmed cases will probably reflect diagnostic capacity rather than providing a true picture of virus spread.

<sup>1</sup> Member States will have varying capacity to carry out the comprehensive risk and severity assessments; however, data gathered on the early cases even with limited field investigation will still be useful for guiding subsequent control, management and mitigation activities. The earliest affected countries are encouraged to request support from the WHO Global Outbreak Alert and Response Network (GOARN) for human resources and technical expertise.



**Table 5. Surveillance activities during the risk and severity surveillance component**

**PRIORITY SURVEILLANCE ACTIVITIES**

- Refine the case definition.
- Continue active case finding.
- Prepare line list of initial cases (see Section 3.4 for further details).
- Collect respiratory and blood samples from early cases.
- Ensure laboratory systems are in place to confirm samples.<sup>1</sup>
- Manage the collection of data, including database management and data cleaning.
- Collect clinical data including symptoms, comorbidities and outcomes.
- Identify at-risk groups, and distribution of cases by age group.
- Follow the steps for pandemic influenza risk management (see Section 4.4 for further details).
- Undertake a situational analysis<sup>2</sup> and assess the risk of further spread and severity.
- Encourage clinicians and hospitals to look for and report additional cases and clusters.
- Submit virus isolates or clinical specimens (or both) for further evaluation and confirmatory testing to the GISRS network.
- Submit timely data to FluNet and FluID.
- Implement and monitor the impact of early public health intervention strategies.
- Mobilize additional epidemiological and laboratory resources.
- Summarize the outbreak data analysis in regular situation reports.



**ADDITIONAL SURVEILLANCE ACTIVITIES**

- Review data (e.g. ILI, ARI and SARI) against routine surveillance data, if available. Compare data to baselines or thresholds.
- If possible, determine virological characteristics of the virus.
- Collect and submit samples under the PIP framework.
- Contact WHO for additional surveillance support, if required.
- For non-affected countries, enhance epidemiological and virological surveillance.

GISRS, Global Influenza Surveillance and Response System; WHO, World Health Organization

<sup>1</sup> Member States will have varying capacity for testing clinical specimens and antigenic characterization of influenza viruses.

<sup>2</sup> A situational analysis is an assessment of the current health situation; it is fundamental to designing and updating national policies, strategies and plans.

#### 4.4 Data requirements

The separate guidance document developed by WHO – *Pandemic influenza risk management* (3) – encourages a risk-based approach to pandemic influenza management, based on national risk assessments. For initial cases, a country will need to rapidly understand which groups are at highest risk for the pandemic; how quickly the pandemic is spreading; the settings in which it is spreading; and the impact that the pandemic is having at the local, regional and national levels.

A useful approach may be to consider what key questions would need to be asked to make an informed risk assessment, and to identify what data would be needed to answer those questions. Different questions would need to be answered, depending on whether the influenza event is occurring within the Member State or whether there is widespread community transmission in another country.

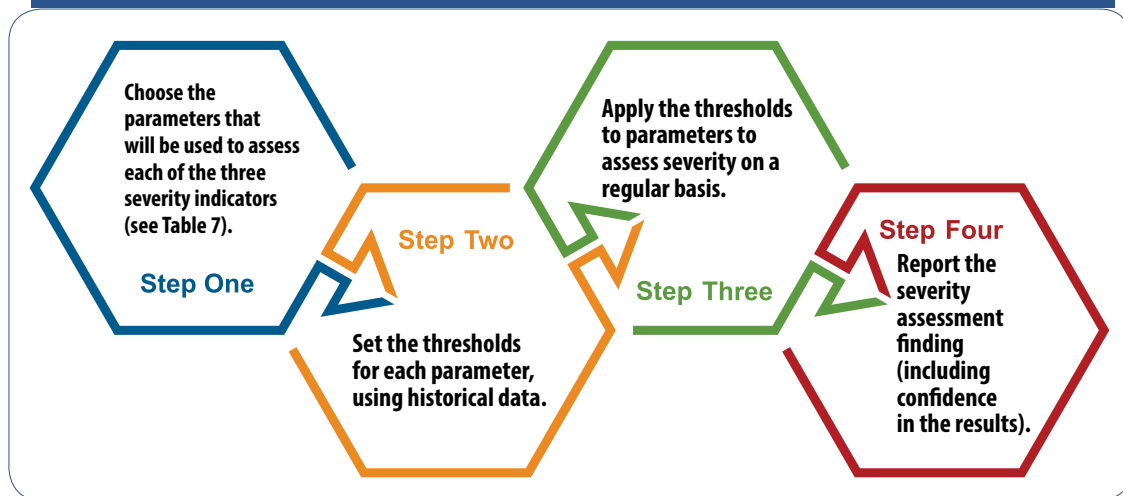
**Table 6. Key risk assessment questions and data sources**

KEY QUESTIONS	DATA
What are the clinical features and outcomes of the disease?	Clinical data including symptoms, symptom frequency and outcomes.
Who are the most vulnerable? What age groups are most affected?	Data on comorbidities, distribution of cases by age groups, and groups at-risk for hospital admission.
What proportion of cases are severe or what number of severe cases are occurring in the population?	Hospitalization, ICU and death data (if available); hospital denominator data will be required.
How fast is the disease spreading?	Epidemic curves, spot maps of cases by day or week, and estimation of transmission characteristics ( $R_0$ , serial interval and period of infectiousness).

Operationally, these questions will help to guide pandemic response decisions regarding vaccine production and strategy for usage, antiviral use, mobilization of health-care resources, school closures and other social-distancing strategies (3).

**Severity data** will be derived from a variety of data types, including virological, epidemiological and clinical data. Through analysing these data every year, WHO and Member States can determine the baseline of influenza severity during inter-pandemic and gauge the severity of the next influenza pandemic – a critical component of pandemic surveillance – is an important consideration for WHO and Member States in planning for and responding to a pandemic. As the pandemic spreads from country to country, data derived from existing influenza disease and virological surveillance, coupled with field investigations and other data sources, can be used to adjust global and national responses. Box 1 shows the four steps in undertaking a pandemic influenza severity assessment; these steps will assist Member States in their severity assessments.<sup>1</sup>

#### Box 1. Steps in pandemic influenza severity assessments



##### 4.4.1 Step 1: Choose the parameters

#### Step 1: Choose the parameters that will be used to assess each of the three severity indicators

*To select the parameters, consider the following criteria:*

- parameters must be indicative of influenza activity; therefore, at least a subset of samples should be laboratory tested for influenza viruses;
- parameters must be reliable and come from a surveillance system that is stable over time (or a system in which, when changes occur, they are well documented);
- parameters must be timely;
- parameters must be those for which historical data are available (historical seasonal epidemics or pandemics); and
- where possible, denominators should be available to calculate (representative) proportions or rates.

<sup>1</sup> Further information on pandemic influenza severity assessments is available at [http://www.who.int/influenza/surveillance\\_monitoring/pisa/en/](http://www.who.int/influenza/surveillance_monitoring/pisa/en/)

**Table 7. Pandemic influenza severity assessment indicators and parameters**

INDICATOR	PARAMETERS (Examples)
<b>Transmissibility</b>	ILI or MAARI cases as a proportion of total visits, or incidence rates
	Composite (product) of weekly ILI or MAARI rates and weekly percentage positivity rates for influenza
<b>Seriousness of disease</b>	Cumulative death: hospitalization ratio (ideally for confirmed influenza)
	Cumulative ICU: hospitalization ratio (ideally for confirmed influenza)
	SARI/ARI or SARI/ILI ratio
<b>Impact</b>	Weekly or monthly number or proportion of SARI cases with percentage influenza-positive among SARI cases
	Weekly excess pneumonia and influenza or all-cause mortality (ideally stratified by age)
	Weekly number of confirmed influenza cases admitted to ICU or weekly number of confirmed influenza cases admitted to hospital

ARI, acute respiratory infection; ICU, intensive care unit; ILI, influenza-like illness; MAARI, medically attended acute respiratory illness; SARI, severe acute respiratory infection

#### 4.4.2 Step 2: Set the thresholds

**Step 2: Set the thresholds for each parameter, using historical data**

*For each parameter, it is useful to set thresholds or to define ranges for the values that allow categorization in the following five categories:*

- no activity or below seasonal threshold;
  - low;
  - moderate;
  - high; and
  - extraordinary.
- 

#### 4.4.3 Step 3: Apply the thresholds

**Step 3: Apply the thresholds to parameters to assess severity on a regular basis**

*When performing the qualitative assessment, consider additional information such as:*

- timeliness;
  - age groups or groups with risk factors;
  - reporting biases;
  - relative reliability of information from different systems; and
  - experience.
- 

#### 4.4.4 Step 4: Report the findings

**Step 4: Report the severity assessment finding (including confidence in the results)**

WHO encourages Member States to provide additional clinical information, if available. For this purpose, a template for clinical data is available in Annex 1.

## 4.5 Member States' roles and responsibilities

As pandemic viruses emerge, countries and regions will face a range of risks at different times. Therefore, **countries are strongly advised to develop their own national risk assessments based on local circumstances**, taking into consideration the information provided by the global assessments produced by WHO. Pandemic response decisions by countries are thus expected to be informed by global risk assessments, but **based on local risk assessments** (3).

At any point in a pandemic, one or many Member States may be responding to a national level epidemic, while other Member States may not be affected for some months to come. As with seasonal influenza epidemics and previous pandemics, the experience of different countries is likely to be quite varied. Consequently, each Member State is encouraged to conduct its own risk assessments, which will determine the timing, scale, emphasis, intensity and urgency of the actions required at their national and local levels (3).

Member States are also encouraged to share their risk assessments through networks or multilateral arrangements, and to use regional resources for risk assessment (3).

### 4.5.1 Risk and severity assessment capacities

Countries should have the following in terms of risk and severity assessment capacities:

- laboratory capacity or access to laboratory capacity for virus isolation and identification, rapid testing for susceptibility to antivirals, and polymerase chain reaction (PCR) and serological testing;
- ability to characterize the epidemiological, clinical and virological features of the influenza virus;
- epidemiological capacity for extended field investigation and detailed analysis of case data, assessment of risk and reporting;
- epidemiological capacity to assess transmissibility, seriousness of disease and impact of the influenza virus on the population;
- supplies and personnel for a large field investigation involving hundreds of potential cases and contact tracing; and
- communications and data transfer capability.

### 4.5.2 Reporting to WHO

Early confirmed cases of pandemic virus infection detected in each country should be immediately reported by the IHR national focal point to the IHR contact point at the relevant WHO regional office (12). The WHO country representative should also be kept informed about the notification. After the first case or cases of pandemic virus infection have been notified, and for as long as is feasible for the country, IHR national focal points or national public health authorities should report the following information to WHO on a weekly basis:



- the number of confirmed cases and deaths in confirmed cases; and
- the age distribution<sup>1</sup> of confirmed cases and deaths (where available).

At the start of the pandemic, there will be a critical need for data from the first affected countries. In addition to the required information given above, all Member States are strongly encouraged to share with WHO any additional information relevant to ongoing global risk assessment. This includes, in particular, information on the clinical spectrum of the disease, the proportion of cases with severe illness and the risk groups for severe outcome. Data (even if incomplete) should be reported by the quickest means possible.

#### **4.6 WHO's roles and responsibilities**

Risk assessment is critical to decide, clarify and justify actions on public health preparedness, response and recovery. In collaboration with the affected Member State or States, WHO will undertake timely risk assessments of influenza viruses with pandemic potential. Findings from these assessments and the uncertainties that surround them will be communicated through the various WHO communication channels.

Depending on the course of events, at some point during the pandemic WHO may announce that detailed case-based data reports are no longer needed from newly affected countries. This situation would arise if the information available is sufficient to enable an effective response in all settings.

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<sup>1</sup>The WHO preferred standardized age groups can be found in Section 5.4.5.

## 5.0 Surveillance component: monitoring the pandemic

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### 5.1 Summary

#### 5.1.1 Objectives

The primary objective of surveillance monitoring during the pandemic is to track the course of the pandemic, including geographical spread, disease trends, intensity of transmission, impact of the pandemic on health-care services, and changes in antigenicity and antiviral sensitivity. Monitoring the pandemic will modify response strategies and indicate whether a second wave is occurring. Risk and severity assessments should continue throughout the pandemic.

Specific objectives are outlined below.

#### ***National objectives are to:***

- track the geographical spread of the virus;
- track the trend of disease occurrence as it rises and falls;
- continue to monitor the transmissibility, seriousness and impact of disease;
- monitor the effect of public health interventions and adjust as required;
- monitor for changes in the antigenicity and antiviral sensitivity of the virus;
- report on a weekly basis to WHO; and
- prepare for the return to routine surveillance activities as the pandemic ends.

#### ***Global objectives are to:***

- monitor the pandemic;
- use the data to inform vaccine selection and deployment;
- update the global risk assessment as the pandemic situation evolves; and
- keep Member States informed of the current state of the pandemic, and changes to the influenza virus that may affect public health responses.

#### 5.1.2 Key features

Key features of monitoring the pandemic are syndromic surveillance of influenza-like illness (ILI) and other sources of severe disease data, which may include severe acute respiratory illness (SARI) cases. Such sources include sentinel sites, systematic laboratory testing of a sample of cases, clinical data and qualitative indicators.

### 5.1.3 Benefits

Regular reporting from countries will make it possible to monitor the pandemic at the global level. It will also provide reliable information on the evolution of the crisis. At a national level, these data will be important for tracking the spread of the virus, monitoring its rise and fall, and watching for changes.

## 5.2 Public health actions

**Table 8. Public health actions during the monitoring the pandemic surveillance component**

OBJECTIVE	ACTION AT THE NATIONAL LEVEL	ACTION AT THE GLOBAL LEVEL
Track activity	Analyse data and implement appropriate control measures. Assess effectiveness of public health interventions.	Further refine case definitions. Aggregate and analyse global data. Communicate findings and analyses. Provide technical assistance to Member States, if required.
Track geographical spread		
Track trends of pandemic		
Track impact of pandemic	Adjust allocation of health-care resources, initiate additional management strategies as indicated.	Continue to assess severity. Update risk assessments as the pandemic situation evolves.
Track intensity of transmission		
Monitor changes in antigenicity and antiviral susceptibility	Adjust use of pharmaceutical interventions.	Vaccine virus selection, antiviral susceptibility monitoring, vaccine and antiviral deployment.

### 5.3 Surveillance activities

**Case-based reporting of confirmed cases** should cease once there is widespread community transmission in a country. The core of the surveillance system will be **syndromic surveillance of ILI** and other sources of **severe disease data** (which may include SARI cases), including **sentinel sites, systematic laboratory testing of a sample of cases, clinical data and qualitative indicators**.

Risk and severity assessments should continue to be undertaken throughout the course of the pandemic, as appropriate. The **trigger** for Member States to change from case-based reporting to syndromic surveillance and systematic testing at the country level is widespread community transmission of the influenza virus.

Table 9 provides details of the surveillance activities during the monitoring component of the pandemic.

**Table 9. Surveillance activities during the monitoring the pandemic surveillance component**

**PRIORITY SURVEILLANCE ACTIVITES**

- Cease case-based data collection and reporting.
- Modify national case definitions and update clinical and laboratory algorithms for diagnosis, as necessary.
- Document the evolving national epidemic including population susceptibility, changes in epidemiological and clinical features, geographical spread, trends and impact.
- Collect more detailed epidemiological and clinical data as time and resources permit.
- Maintain adequate virological surveillance to detect antigenic and genetic changes, and changes in antiviral susceptibility and pathogenicity.
- Summarize the outbreak in regular situational reports that inform decision-makers and the public about new information or other changes that affect disease status, signs and symptoms, case definitions, protocols and algorithms.



**ADDITIONAL SURVEILLANCE ACTIVITES**

- Monitor and assess national impact against baseline criteria such as workplace and school absenteeism, regions affected, groups most affected and essential worker availability.
- Undertake special studies (see Section 6.1 for further information).


**5.4 Data requirements**

Data collected during a pandemic will come from various sources. During the 2009 pandemic, many countries found that data collection placed a large burden on epidemiologists, laboratory staff and clinicians, and that it was difficult to interpret the data from a wide range of data sources. Therefore, it is important to consider what data are needed to answer key questions, to ensure that pandemic responses are appropriate.

The following section discusses how different types of data could be used during a pandemic, including routine surveillance, clinical, virological and modelling data.

**5.4.1 Routine influenza surveillance data**

Monitoring the course of the pandemic will use some of the same surveillance components as are used for seasonal influenza, but seasonal influenza surveillance is not directly transferable to a pandemic because of substantial differences between small-scale and large-scale events. However, having an existing influenza surveillance system makes it easier to implement effective surveillance during a pandemic. Also, such a system provides baseline data that can be used for comparative purposes to help understand the severity of the pandemic.



Rates of reporting both ILI and SARI, pneumonia hospitalizations and SARI deaths at sentinel sites compared to historical averages are likely to give the first indications of the severity of a pandemic as it unfolds.<sup>1</sup> The number of pandemic deaths will not be directly comparable with the annual estimates of seasonal influenza deaths; however, comparisons with seasonal excess mortality can be used.

#### 5.4.2 Clinical data

Health-seeking behaviour during an outbreak is likely to be strongly influenced by public concern and perception of risk, which in turn will affect ILI and SARI surveillance data. Data may also be affected by increased testing by clinicians,<sup>2</sup> a lowered threshold for admission and more aggressive data collection.

##### **Case fatality rates**

Case fatality rates are difficult to estimate in the early stages of an outbreak (6). However, the ratio of cumulative deaths to all hospitalizations (ideally for confirmed influenza), and the ratio of cumulative intensive care unit (ICU) admissions to all hospital admissions in comparison to previous years may be useful to estimate overall relative severity.

##### **Data on the most severe cases**

Data on the most severe cases are least subject to bias due to changes in health-seeking behaviour, although they may be affected by changes in testing and reporting. The additional monitoring of cases requiring ICU admission or mechanical ventilation, and respiratory deaths may provide a robust and stable indicator of relative severity.


Most clinical programmes will need to make enhancements to existing surveillance systems to provide additional critical information. Such enhancements might include:

- expanded data collection to include additional risk factors, and additional clinical data on signs and symptoms, severity of illness, course of illness, complications and outcome;
- admission and discharge diagnoses from severe cases;
- additional monitoring of high-risk populations and minority and other disadvantaged groups;
- specific monitoring of ICUs and cases requiring mechanical ventilation or extracorporeal support;
- collection of mortality data, including cause of death;

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<sup>1</sup> During a large-scale event, such as a pandemic, it is not possible to count all cases or deaths.

<sup>2</sup> During the 2009 pandemic, reporting of data proved to be a large burden on hospital staff; however, once the pandemic was established, primary care and hospital data were key to understanding severity and the progression of the pandemic.

- 
- collection of data on use of seasonal and pandemic vaccines and antivirals; and
  - more detailed data collection, which may be beneficial periodically during the pandemic period; for example, collecting detailed data on a limited number of cases at particular time points in the pandemic period to identify changes (such data do not need to be collected continuously).

#### 5.4.3 Virological data

Following the initial assessment of the early cases, and once there is widespread community transmission, **laboratory testing of a sample of suspected cases** of pandemic virus, particularly from **sentinel hospital sites**, is sufficient for ongoing virological surveillance.<sup>1</sup> It is important to distinguish between laboratory testing for diagnostic purposes and testing for surveillance purposes. Also, clear sampling and testing protocols<sup>2</sup> need to be in place to help prioritize testing.

Laboratory sampling<sup>3</sup> should be directed towards:

- confirming infection in new areas;
- testing severe cases, including deaths;
- monitoring the co-circulation of the pandemic influenza virus and other influenza viruses (and other respiratory viruses) in countries with laboratory capacity for more detailed virological investigations (12); and
- biobank storage of representative samples for future studies.

For those countries with capacity, **seroepidemiology** data may provide additional useful insights into the pandemic, particularly around pre-existing immunity, proportion of asymptomatic cases, and impact of vaccination programmes. However, it is likely that a large serosurvey would be difficult to implement in the early stages of a pandemic, and would be very labour intensive (13-19).

#### 5.4.4 Modelling data

Modelling of pandemic data can contribute to decision-making, especially vaccination production and distribution, particularly later in the pandemic. In the early stages of a pandemic, it is unlikely that there would be sufficient data to predict the course and impact of the pandemic through modelling.

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<sup>1</sup> During the monitoring the pandemic surveillance component, the **numbers of laboratory confirmed cases will relate to testing practices** and not to actual numbers of pandemic influenza infections. The **proportion of respiratory tests positive** for pandemic influenza can be used as a proxy epidemic curve to indicate the progress of the pandemic. A comparison against baseline seasonal influenza data for this measure would greatly assist in the interpretation of these data during a pandemic.

<sup>2</sup> Pandemic virus sampling and testing protocols, particularly from sentinel hospitals, should be developed before a pandemic.

<sup>3</sup> Further details on laboratory surveillance are available in the WHO companion document, *Manual for the laboratory diagnosis and virological surveillance of influenza* (11).

## 5.5 Member States' roles and responsibilities

### 5.5.1 Surveillance capacity

Member States will need the following capacities to adequately monitor the pandemic:

- routine surveillance for ILI or SARI (or both);
- systematic laboratory sampling of suspected cases from sentinel sites;
- epidemiological capacity for data analysis and interpretation;
- ability to provide a qualitative summary of overall trend, geographical spread, transmission severity, seriousness of disease and impact;
- capacity for ongoing severity assessments;
- capacity to assess effectiveness of public health interventions; and
- communication systems for regular reporting of surveillance data internationally.

### 5.5.2 Reporting to WHO

Reporting to WHO should continue on a **weekly basis** until the WHO Director-General declares that the pandemic has ended, even if the Member State is no longer detecting new cases (i.e. there should be reporting of zero cases).

IHR national focal points or national public health authorities should continue to notify WHO immediately on:

- any changes in the epidemiological, virological or clinical presentation that are likely to be of significance for global risk assessment; and
- any unusual or unexpected public health events, including clusters of unexplained SARI or unexplained deaths due to respiratory disease.

Member States are strongly encouraged to share data and reports of analyses internationally.

- National influenza centres or reporting laboratories are asked to report weekly via FluNet on the number of specimens collected and processed for influenza, and the number of specimens tested that are positive for influenza by subtype (12).
- For countries with limited laboratory capacity, or limited access to laboratory capacity, WHO recommends that they aim to test several samples per week to verify that disease activity is still largely due to pandemic virus.

### 5.5.3 Antiviral resistance reporting

In terms of antiviral resistance reporting:

- Member States that have the capacity to test for antiviral resistance are encouraged to continue doing so; cases that should be considered for antiviral resistance testing include:
  - ◆ treatment failures;
  - ◆ patients with secure immunosuppression on long-term treatment with antiviral medications;



- if antiviral resistance is detected, it is also important to document and report whether person-to-person transmission has occurred around the affected patient (through careful investigation of case contacts);
- the detection of the genetic markers for oseltamivir resistance is a reportable event; and
- viruses found to have oseltamivir resistance should be sent to a WHO collaborating centre for further characterization.

## 5.6 WHO's roles and responsibilities

During a pandemic, WHO is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to Member States, and monitoring and assessing health trends.

As the directing and coordinating authority for health within the United Nations system, WHO has a mandate for global pandemic influenza risk management, which is reflected at all levels of the organization. Key mechanisms by which WHO fulfils this obligation are summarized below.

### 5.6.1 Technical support and information to national authorities

Under the IHR (2005), WHO must offer assistance to States Parties in assessing or controlling public health events occurring within their territories, including pandemics. This support can be in the form of technical advice and guidelines, specialized materials, deployment of international teams to affected areas, and coordination of international support from various sources.

During a pandemic, WHO would:

- provide technical support and information to national authorities:
  - ◆ to enhance surveillance and collection of clinical, virological and epidemiological data, to facilitate assessment of the extent of human-to-human transmission and the epidemiological situation, including standardized reporting tools;
  - ◆ on risk assessment of clusters of ILI;
  - ◆ on interventions to reduce the spread of influenza disease;
- define standards for initial case investigations and for routine sentinel surveillance;
- establish and refine global case definitions for reporting by countries of human cases of influenza caused by viruses with pandemic potential;
- continue to conduct risk and severity assessments to inform decision-making;
- coordinate and disseminate relevant public health messages through channels such as the WHO website, published materials, press conferences and the media;
- provide regular and timely feedback on the results of the analysis of data reported by Member States to WHO;
- periodically reassess and modify recommended interventions, in consultation with appropriate partners (including those outside the health-care sector) on the acceptability, effectiveness and feasibility of interventions; and

- provide principles and update guidance for appropriate infection prevention and control, laboratory biosafety, clinical management in health-care facilities and home-based care, use of antiviral medications, and use of seasonal and pandemic vaccines.

WHO will communicate with its geographically and technically diverse group of staff, networks and external experts to help interpret the available qualitative and quantitative data.

### 5.6.2 Data use and reporting during a pandemic

Article 5 of the IHR (2005) describes the role of WHO in surveillance:

*WHO shall collect information regarding events through its surveillance activities and assess their potential to cause international disease spread and possible interference with international traffic. Information received by WHO under this paragraph shall be handled in accordance with Articles 11 and 45 [of the IHR 2005] where appropriate. (2)*

Under Article 11 of the IHR (2005), WHO is obliged to provide to States Parties – and, as appropriate, to relevant intergovernmental organizations – public health information received under Articles 5–10 of the IHR (2005), whenever that information is necessary for States Parties to respond to the public health risk.

When WHO intends to make pandemic-related surveillance information available to other States Parties, it has an obligation to consult with the country experiencing the event. WHO may also make information related to an arising influenza pandemic available to the public, if other information about the event is already in the public domain, and if a need exists for public availability of information that is authoritative and independent.

Data collected via WHO's global influenza surveillance systems will be analysed and summary data will be published in graphs, maps and tables on WHO's website and published in the *Weekly Epidemiological Record*. WHO will report the surveillance data provided; reports will include alerts, situational summaries, tables, charts and maps of the evolving pandemic situation.

WHO will use the information provided to inform global risk assessments, including mathematical modelling of the epidemic, to better understand the spread of the pandemic and the effectiveness of mitigation measures.

Scientists from countries providing data will be invited to participate in the development of, and be co-authors on, publications that draw on their country-specific data. Countries will always be consulted in the development of any articles in which their data have been used.



### 5.6.3 Vaccine selection and deployment

A critical action of WHO during an emerging pandemic is the selection of the pandemic vaccine strain and the determination of when to move from seasonal to pandemic vaccine production. As soon as there is credible evidence to suggest that an influenza virus with pandemic potential has acquired the ability to sustain human-to-human transmission, WHO will expedite the process of review, selection, development and distribution of vaccine viruses for pandemic vaccine production. WHO will also expedite vaccine potency testing reagents and preparations, involving all stakeholders as necessary. The efficiency of this process depends on the timely sharing of viruses and clinical specimens with WHO via GISRS.

The decision to recommend a move to pandemic vaccine production will be taken in collaboration and consultation with relevant technical advisory bodies, including the Strategic Advisory Group of Experts on Immunization (SAGE) and GISRS. In making the decision, due consideration will be given to applicable requirements under the IHR (2005), including advice from an IHR emergency committee, should one be convened. WHO will then announce its recommendations on whether and when to move production to pandemic vaccine, and on which virus strain should be used in the pandemic vaccine.

The decision to revert to seasonal vaccine production will be based on the formal recommendation for the composition of influenza vaccines. This recommendation will in turn be based on the virological and epidemiological information provided by GISRS and on the advice of relevant technical advisory bodies.

### 5.6.4 Antiviral medications

WHO will provide information on the clinical use of antiviral medications and their role in pandemic preparedness and planning; it will also monitor the effectiveness of antiviral medications. In addition, WHO will facilitate equitable and affordable antiviral medications in low-income countries by developing estimates of gaps and needs, and will foster influenza research on antiviral medications to improve their use in public health.

## 6.0 Additional considerations related to global surveillance during an influenza pandemic

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### 6.1 Special studies

In addition to pandemic surveillance, further information on the pandemic may be obtained from supplementary virological, clinical and epidemiological studies. Such studies should be considered by Member States with sufficient research capacity.

Special studies could include studies designed to (20):

- evaluate:
  - ♦ the dynamics of infection (e.g. measurement of laboratory markers over time to assess the duration of viral shedding and viral burden in different types of specimens);
  - ♦ viral pathogenesis;
  - ♦ viral susceptibility to current antiviral drugs;
  - ♦ transmission characteristics and risk factors (e.g. modes of transmission);
  - ♦ effectiveness of non-pharmaceutical countermeasures (e.g. infection control measures);
  - ♦ effectiveness of supportive measures for hospitalized patients (e.g. steroids, antibiotics);
  - ♦ level of cross-protection conferred by seasonal vaccine or previous natural infection;
  - ♦ viral antigenicity and evolution;
- determine vaccine effectiveness;
- undertake surveillance for secondary bacterial infections; and
- investigate outbreaks in closed settings (e.g. institutional settings).

#### 6.1.1 Research

Research during a pandemic poses several challenges, particularly around the need for rapid funding and ethics clearances. Other notable issues include the need for clearly defined research priorities and the capability to quickly evaluate proposals against those priorities. Research processes will need to be streamlined during a pandemic, and data sharing protocols agreed before a pandemic (14, 21-23).

#### 6.1.2 Global consortia

Several global consortia have been formed to provide additional and much needed information during a pandemic. For example, the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R) is a network that brings together research funding organizations on a global scale, to facilitate an effective research response within 48 hours of a significant outbreak of a new or re-emerging infectious disease with pandemic potential. Similarly, the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC) provides a collaborative platform through which global, patient-oriented clinical studies can be developed, executed and shared.

Finally, the Consortium for the Standardization of Influenza Seroepidemiology (CONWISE) is a global partnership aiming to standardize influenza seroepidemiology and develop comprehensive influenza investigation protocols to inform public health policy (24).

CONWISE, WHO and other groups have developed a number of protocols that could be useful during a pandemic.

**Table 10 : A list of special studies protocols**

AUTHOR	PROTOCOL
<b>Verification and detection surveillance component</b>	
GloPID-R	<a href="#">Principles for data sharing</a>
<b>Risk and severity assessment surveillance component</b>	
CONWISE	Protocol 2: Cross sectional seroprevalence study of influenza before and after epidemic periods*
CONWISE	Protocol 3: <a href="#">Household transmission studies for pandemic influenza</a> (26)
CONWISE	Protocol 4: Closed setting outbreak investigation protocol for pandemic influenza*
CONWISE	Protocol 5: Assessment of health care personnel*
CONWISE	Protocol 6: Seroepidemiology of human influenza infection using residual sera/convenience samples for establishing baselines and/or monitoring trends over time*
CONWISE	Protocol 7: <a href="#">Close contact serologic investigation for zoonotic influenza</a> (27)
WHO	<a href="#">Cross sectional seroprevalence study of Middle East respiratory syndrome coronavirus (MERS-CoV) infection in presumed high-risk populations</a> (28)
WHO	<a href="#">Case-control study to assess potential risk factors related to human illness caused by Middle East respiratory syndrome coronavirus (MERS-CoV)</a> (29)
WHO	<a href="#">Assessment of potential risk factors of infection of Middle East respiratory syndrome coronavirus (MERS-CoV) among health care personnel in a health care setting</a> (30)

\*Not yet available

**Table 10 : A list of special studies protocols**

CONTINUED...

AUTHOR	PROTOCOL
<b>Risk and severity assessment surveillance component</b>	
WHO	<a href="#">Seroepidemiological investigation of contacts of Middle East respiratory syndrome coronavirus (MERS-CoV) patients</a> (31)
ISARIC	<a href="#">Clinical characterization protocol</a> (32)
ISARIC	<a href="#">Clinical characterization protocol UK annual activation</a> (33)
ISARIC	<a href="#">SARI case record form</a> (34)
<b>Monitoring the pandemic surveillance component</b>	
CONWISE	Protocol 1: <a href="#">Prospective longitudinal cohort study of influenza infection during epidemic periods</a> (35)
ECDC	<a href="#">Protocol for case-control studies to measure influenza vaccine effectiveness in the European Union and European Economic Area Member States</a> (36)
ECDC	<a href="#">Protocol for cohort database studies to measure influenza vaccine effectiveness</a> (37)
ECDC	<a href="#">Protocol for cluster investigations to measure influenza vaccine effectiveness</a> (38)
ECDC	<a href="#">Generic protocol for measuring influenza vaccine effectiveness using the screening method in the European Union and European Economic Area Member States</a> (39)
<b>Interpandemic surveillance component</b>	
PHE	<a href="#">Epidemiological protocols to assess early MERS-CoV cases and their close contacts in the UK</a> (40)

CONWISE, Consortium for the Standardization of Influenza Seroepidemiology; ECDC, European Centre for Disease Prevention and Control; GloPID-R, Global Research Collaboration for Infectious Disease Preparedness; ISARIC, International Severe Acute Respiratory and Emerging Infection Consortium; PHE, Public Health Emergency; WHO, World Health Organization

## 6.2 Early cases

Investigation of early cases seeks to identify the clinical and virological features of the new influenza subtype, assess immunity, and provide evidence-based parameters to help inform risk and severity assessments. Sharing of virus isolates and genetic sequence data under the PIP framework will assist in risk assessments and inform vaccine composition.

A case report of early cases should include the following information: identifiers, basic demographic information, presenting illness, onset date, antiviral use, hospitalization details (including ICU admission, secondary infections, complications and outcome), influenza vaccine history, pre-existing medical conditions, exposure history and details of household and other close contacts (Annex 1). Acute and convalescent blood samples should be collected from the primary case (20).

Data collection on the early cases is likely to be quite detailed, and counting of suspected or confirmed cases (i.e. case-based reporting) will be a core surveillance activity. Data on contacts, including respiratory and blood samples, should also be collected if possible. At this stage, an epidemic curve of case counts by symptom onset date and diagnosis date is likely to assist a country in interpreting the progress of the pandemic. In general, ethics committees do not consider early cases investigations to be research, but rather surveillance of a potential epidemic (20). However, this determination will need to be guided by local ethics committees.

Investigations of early cases are detailed and resource intensive, and not all Member States will have the epidemiological capacity to carry them out. Member States without sufficient capacity are encouraged to seek additional assistance from WHO and from near neighbours likely to have surge epidemiological capacity.

Determining the number of early cases to be investigated will depend on local epidemiological capacity. Before the 2009 influenza pandemic, investigation of the first 100 cases was recommended. This number of investigations proved to be difficult for some countries to achieve. It is preferable for Member States to collect enough case-based data to inform risk assessment and pandemic response according to their local resource capacity. Data collection and reporting should always make use of the pandemic influenza minimum data set requirements (6) – including age groupings and most current case definitions – to allow global aggregation of data and comparisons between countries. If near neighbours with broadly similar health systems have already conducted an early case investigation, then it may not be necessary for Member States to conduct similar investigations; instead, they can rely on the existing collected data.

Data from early case investigations can assist in providing the following useful information:

- number of symptomatic cases of influenza or ILI per week;
- basic reproduction number ( $R_0$ ) – the average number of secondary cases generated from one case at the start of the epidemic;



- generation time – the mean delay between the time of infection of an index case and the times of infection of secondary cases infected by the index case;
- serial interval – the average length of time between symptom onset of individual cases and the persons they infect;
- secondary attack rate – the proportion of individuals exposed to a known case who become infected (e.g. in a household where a case is discovered);
- clinical attack rate (CAR) – the proportion of the population that is symptomatically infected in a given time period; CAR is relatively simple to measure since it does not rely on detection of asymptomatic individuals, and CARs can be calculated for different age groups, different settings (e.g. school and workplace) and different risk groups (e.g. pregnant women);
- mode of transmission, particularly if new modes or previously uncommon modes of transmission (e.g. faecal–oral) are important;
- sensitivity to available antiviral medicines;
- presence of genetic markers that have been associated with increased risk of severe disease; and
- pre-existing immunity in the population, as measured by the level of cross-reactive antibodies.

Data from early case investigations should be widely shared, particularly with WHO and near neighbours, and through expedited, peer-reviewed publication of the findings.

### 6.3 Review

After the pandemic, it is useful to **review the functioning of the pandemic surveillance system**, and to use the real-world experience to improve future pandemic responses. Reviews could be conducted face to face or by teleconference. Every Member State should evaluate the effectiveness of pandemic surveillance, identify surveillance issues faced during the pandemic and lessons learned, and document and share findings from the review process.

### 6.4 Surveillance in pandemic preparedness planning

This document is primarily designed to give guidance to Member States during a pandemic event; however, it will also be a useful tool to Member States as they update the surveillance components of pandemic plans. The unpredictable nature of pandemics and learnings from the 2009 influenza pandemic highlight the need for pandemic plans to be flexible. WHO supports a risk-based approach to pandemic influenza planning and response; such an approach is based on national risk assessments and takes into account global risk assessments conducted by WHO.

WHO recommends the inclusion of a pandemic surveillance in any updated pandemic preparedness and response plan. Ideally, the surveillance annex would be based on this guidance and would outline the surveillance approach to be used during an influenza pandemic, including:

- resources and funding, including how existing surveillance systems would be used during a pandemic;
- data and information requirements for the different phases of the pandemic;
- data sharing, reporting and communications;
- risk assessment questions;
- triggers for surveillance escalation and de-escalation;
- evaluation; and
- linkages between surveillance, risk assessment and response.

An underlying principle of this guidance is that Member States are encouraged to build on current seasonal influenza surveillance systems, if available, when developing their pandemic influenza surveillance plans. Member States with capacity are encouraged to assist neighbouring Member States with pandemic surveillance if required and requested. Sharing of information is encouraged, as is the sharing of pandemic viruses under the PIP framework.

### 6.5 Virus sharing and pandemic influenza preparedness framework

The PIP framework for the sharing of influenza viruses with pandemic potential and access to vaccines and other benefits brings together Member States, industry, other stakeholders and WHO to implement a global approach to pandemic influenza preparedness and response. Its key goals are to:

- improve and strengthen the sharing of influenza viruses with pandemic potential; and
- achieve more predictable, efficient and equitable access for countries in need of life-saving vaccines and medicines during future pandemics.

The framework was developed by Member States and became effective on 24 May 2011, when it was adopted at the Sixty-fourth World Health Assembly (3).

### 6.6 Ethical and confidentiality considerations

When setting up a surveillance system for pandemic influenza, Member States' laws on surveillance, data collection, storage and reporting, and patients' confidentiality must be followed. Ensuring the safety and confidentiality of patients and informing them as to why sampling is being done and how the specimen is being processed are considered good practice and are recommended.

Article 45 of the IHR (2005) describes the "treatment of personal data". Person-identifiable data collected under the IHR should be kept confidential and processed anonymously, as required by national law. However, such data may be disclosed for assessments and management of public health risks, provided the data are processed fairly and lawfully.

Further information on ethical considerations of importance to public health surveillance can be found in the *WHO companion document, WHO guidelines on ethical issues in public health surveillance (41)* – these considerations include common good, equity, respect for persons and good governance.

# Annex 1: WHO pandemic case summary form for clinical data collection of laboratory-confirmed cases

This form can be used to collect information on a person with a laboratory-confirmed case of pandemic virus infections, to enable disease severity and clinical characteristics to be determined. All data submitted on this form will be treated as confidential in accordance with the IHR (2005) (2).

## CASE INFORMATION

Case ID (including country identifier) \_\_\_\_\_

Date of birth (yyyy/mm/dd) \_\_\_\_/\_\_\_\_/\_\_\_\_ or Age (years) \_\_\_\_\_

Sex Male  Female  Unknown

## SYMPTOMS

Date of onset of symptoms (yyyy/mm/dd) \_\_\_\_/\_\_\_\_/\_\_\_\_

Symptoms at any time during the course of the infection

	TICK AS APPLICABLE	COMMENTS (IF ANY)
Fever > 38°C	<input type="checkbox"/>	_____
History of fever (not measured)	<input type="checkbox"/>	_____
Sore throat	<input type="checkbox"/>	_____
Runny nose	<input type="checkbox"/>	_____
Sneezing	<input type="checkbox"/>	_____
Cough	<input type="checkbox"/>	_____
Shortness of breath	<input type="checkbox"/>	_____
Conjunctivitis	<input type="checkbox"/>	_____
Diarrhoea	<input type="checkbox"/>	_____
Nausea	<input type="checkbox"/>	_____
Vomiting	<input type="checkbox"/>	_____
Headache	<input type="checkbox"/>	_____
Seizures	<input type="checkbox"/>	_____
Altered consciousness	<input type="checkbox"/>	_____
Muscle pain	<input type="checkbox"/>	_____
Joint pain	<input type="checkbox"/>	_____
Nose bleed	<input type="checkbox"/>	_____
Other (specify)	<input type="checkbox"/>	_____

## HISTORY AND PRE-EXISTING CONDITIONS

**Did the case have any of the following vaccines or prophylactic medication before the onset of illness?**

	TICK AS APPLICABLE	COMMENTS (IF ANY)
Vaccination with seasonal influenza vaccine within the last year?	<input type="checkbox"/>	_____
Vaccination with pneumococcal vaccine?	<input type="checkbox"/>	_____
Antivirals prophylaxis in the 14 days before onset of illness?	<input type="checkbox"/>	_____
<i>If prophylaxis was used, which type:</i>		
Oseltamivir	<input type="checkbox"/>	_____
Zanamivir	<input type="checkbox"/>	_____
Amantadine	<input type="checkbox"/>	_____
Rimantadine	<input type="checkbox"/>	_____
Other (specify)	<input type="checkbox"/>	_____

**Did the case have any pre-existing conditions?**

	TICK AS APPLICABLE	
Cancer	<input type="checkbox"/>	
Diabetes	<input type="checkbox"/>	
HIV/other immune deficiency	<input type="checkbox"/>	
Heart disease	<input type="checkbox"/>	
Seizure disorder	<input type="checkbox"/>	
Lung disease	<input type="checkbox"/>	
Asthma	<input type="checkbox"/>	
Pregnancy	<input type="checkbox"/>	months
Malnutrition	<input type="checkbox"/>	
Obesity	<input type="checkbox"/>	
Others (specify)	<input type="checkbox"/>	
	<input type="checkbox"/>	

## PNEUMONIA, OTHER COMPLICATIONS

Did the patient show clinical signs of pneumonia? Yes  No  Unknown

Was a chest x-ray taken? Yes  No  Unknown

*If yes:*

- Primary viral/influenza pneumonia diagnosed? Yes  No  Unknown
- Secondary bacterial pneumonia diagnosed? Yes  No  Unknown

Did other complications (e.g. ARDS, MOF or CNS involvement) occur? Yes  No  Unknown

*If yes, describe*

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## TREATMENT

Date (yyyy/mm/dd) of first presentation to health-care system? \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Case hospitalized during course of infection Yes  No  Unknown

*If yes, date (yyyy/mm/dd) of first hospitalization* \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

▪ Was case admitted to ICU? Yes  No  Unknown

▪ Was case mechanically ventilated? Yes  No  Unknown

Did case receive antibiotics? Yes  No  Unknown

Did case receive antiviral treatment? Yes  No  Unknown

*If yes:*

TREATMENT	TICK AS APPLICABLE	DATE STARTED (YYYY/MM/DD)	DURATION (DAYS)	DAILY DOSE
Oseltamivir	<input type="checkbox"/>	_____ / _____ / _____	_____	_____
Zanamivir	<input type="checkbox"/>	_____ / _____ / _____	_____	_____
Amantadine	<input type="checkbox"/>	_____ / _____ / _____	_____	_____
Rimantadine	<input type="checkbox"/>	_____ / _____ / _____	_____	_____

<sup>1</sup> Acute respiratory distress syndrome

<sup>2</sup> Multi-organ failure

<sup>3</sup> Central nervous system

**TREATMENT** [ CONTINUED ]

Were antiviral adverse events noted

Yes  No  Unknown

If yes, where they:

Moderate

Severe

Life threatening

Specify type of adverse event:

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**OUTCOME**

Patient fully recovered

Yes  No  Unknown

If yes, date of resolution of symptoms (yyyy/mm/dd)

\_\_\_\_ / \_\_\_\_ / \_\_\_\_

Patient died

Yes  No  Unknown

If yes, date of death (yyyy/mm/dd)

\_\_\_\_ / \_\_\_\_ / \_\_\_\_

Presumed cause of death

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**OTHER OBSERVATIONS/COMMENTS**

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## Annex 2: Updating the pandemic influenza surveillance guidance

**Table A2.1. Reasons for the 2017 update to the pandemic influenza surveillance guidance**

<p>Additional surveillance requirements identified during the 2009 influenza pandemic</p>	<p>Two supplementary surveillance documents were published by WHO during the 2009 pandemic to address additional identified surveillance needs:</p> <ul style="list-style-type: none"> <li>▪ <i>Human infection with pandemic (H1N1) 2009 virus: updated interim WHO guidance on global surveillance</i> (published 2009) (12); and</li> <li>▪ <i>Surveillance recommendations for Member States in the post pandemic period</i> (published 2010) (42).</li> </ul>
<p>Lessons learned during the 2009 influenza pandemic</p>	<p>Following the 2009 influenza pandemic, WHO, other key institutions involved in pandemic surveillance, and many Member States undertook and published comprehensive evaluations of their pandemic responses, including the surveillance component. These “lessons learned” and identified “best practices” have helped to shape the new guidance.</p>
<p>Consistency with recently published WHO documents</p>	<p>WHO has recently published a number of key documents that relate to pandemic influenza surveillance.</p> <ul style="list-style-type: none"> <li>▪ <i>Manual for the laboratory diagnosis and virological surveillance of influenza</i> (published 2011) (11);</li> <li>▪ <i>Pandemic influenza risk management: WHO interim guidance</i> (published 2013) (3);</li> <li>▪ <i>Global epidemiological surveillance standards for influenza</i> (published 2013) (6);</li> <li>▪ <i>Tool for influenza pandemic risk assessment</i> (published 2016) (4); and</li> <li>▪ <i>Pandemic influenza severity assessment guidelines</i> (published 2011) (5).</li> </ul>
<p>International Health Regulations (IHR) (2005) review</p>	<p>Update guidance to address findings from the IHR (2005) review in relation to the 2009 influenza pandemic (43), and the <i>Joint external evaluation tool</i> (44), which is intended to assess country capacity to prevent, detect and respond to public health threats.</p>



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