Pan American Health Organization

Regional Office of the World Health Organization

# OPERATIONAL GUIDELINES FOR INTENSIFIED NATIONAL SARI SURVEILLANCE

**IHR, Alert and Response, and Epidemic Diseases Project**

**Pan American Health Organization**

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## Introduction

Emerging respiratory infectious diseases pose a substantial risk for humans due to their extremely high potential to spread from person-to-person. These diseases can produce high morbidity and mortality.

There have been several incidents of emerging respiratory infectious diseases in the last hundred years, including the influenza pandemic of 1918 known as the “Spanish flu”, the 1957 “Asian flu” pandemic, the 1968 “Hong Kong flu” pandemic, the 2003 Severe Acute Respiratory Syndrome (SARS) pandemic, and the influenza A (H1N1) pandemic of April 2009. All of these events demonstrate the importance of having a respiratory disease surveillance system that can detect new viruses rapidly and provide information to assess impact on the population and having operational preparedness plans.

The International Health Regulations [IHR (2005)] in effect since 15 June 2007 require all Member States to strengthen their surveillance and response capacities for events with major public health implications. Under the IHR (2005), PAHO/WHO is to be notified immediately of all cases of the following diseases: smallpox, poliomyelitis (due to wild poliovirus), SARS, and human influenza due to new virus subtypes.

To strengthen basic surveillance and response capacities and integrate the epidemiological surveillance of influenza with laboratory surveillance into one system, the Pan American Health Organization (PAHO), in collaboration with the United States Centers for Disease Prevention and Control (CDC), developed a Generic Protocol for Influenza Surveillance, along with two operational guides designed primarily for local health teams in the PAHO Member States. The first operational guide was designed to help prepare health care facilities for unusual or unexpected cases or clusters of severe acute respiratory infection (SARI), while the second was designed to systematize approaches to the implementation of sentinel surveillance of influenza-like illness (ILI) and SARI.

One important lesson learned from the 2009 influenza pandemic was the importance of obtaining information about severe cases. To that end, resources should be focused on expanding SARI surveillance.

The purpose of this document is to provide a tool to support countries in implementing intensified SARI surveillance.

# 1. Overview

## 1.1. Background

On 24 April 2009, the World Health Organization (WHO) notified Member States of human cases of swine influenza A (H1N1) in Mexico and the United States. The following day, pursuant to the International Health Regulations (IHR-2005) the event was declared to be a public health emergency of international importance. On 11 June 2009, a WHO statement declared phase six of preparations for the pandemic to be implemented worldwide. In other words, human infection caused by the 2009 pandemic influenza virus A (H1N1) 2009 had spread at the community level on more than two continents. As of 10 August, 2010, when the pandemic was declared over by WHO, more than 213 countries, representing all the continents, had reported confirmed cases of infection caused by the new virus, including 18,449 deaths, 8,557 of which were in the Region of the Americas.

## 1.2. The International Health Regulations

The International Health Regulations (IHR) are a set of binding legal instruments adopted by the Member States of the World Health Organization (WHO) to contain the spread of disease.

The most recent revision of the regulations (2005) is an updated version of the 1969 regulations, which specified only four notifiable diseases – cholera, plague, yellow fever and smallpox (now eradicated). The 1969 version set forth general border control provisions, as well as relatively passive notification and monitoring measures. The new version – an unprecedented international public health agreement – provides for containing health emergencies at their local points of origin, rather than limiting action to national borders.

The IHR (2005) have been in effect since 15 June 2007. It covers all diseases and health events that can have serious public health impact and that have the potential for international propogation. These diseases can range from emerging infections such as SARS and new human influenza viruses to chemical spills or leaks and nuclear accidents. The IHR specify a series of procedures for the management of such events, as well as basic requirements for national surveillance and response. These core competencies include the capacities to detect, investigate, confirm, notify, and take action on diseases or health events that could constitute public health emergencies of international significance.

Under the IHR (2005), PAHO/WHO should be notified immediately of all cases of the following diseases: smallpox, poliomyelitis (due to wild poliovirus), SARS, and human influenza caused by new virus subtypes. Annex II of the IHR (2005) refers to the surveillance, exchange of information, consultation, confirmation, and public health response to any new influenza virus subtype with pandemic potential. These notifications are to include assessments of human risk from influenzas occurring in avian populations. Detecting such outbreaks is responsibility of the World Organization for Animal Health (OIE).

### 1.3. The Epidemiology of Influenza

**The influenza virus**

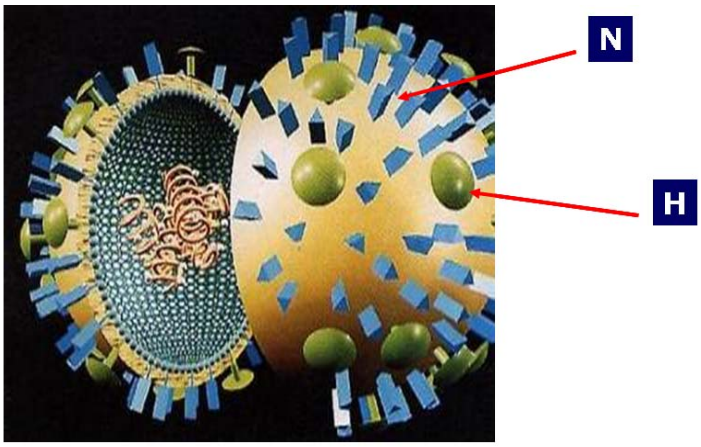
The influenza virus is an RNA virus of the orthomomyxoviridae family. There are three types of the virus capable of causing disease in humans which have been identified—A, B, and C. However, only the A viruses, which are highly mutatable, have caused pandemics. The B viruses have caused sporadic outbreaks with high mortality in older adults, while the C viruses are usually associated with mild disease.

Subtypes of the influenza A viruses also have designations, which are based on the hemagglutinin and neuraminidase proteins present on their surface (Figure 1). Sixteen hemagglutinin subtypes and nine neuramidase subtypes have been identified.

At present, the influenza A virus subtypes pandemic (H1N1) 2009 and H3N2 in circulation are responsible for seasonal epidemics (Table 1). The H5, H7 and H9 viruses rarely produce disease in humans.

**Figure 1**

**Characteristics of the influenza A virus**




**Lipoprotein shell with glycoprotein surface projections in the form of:**

- **Hemagglutinin (H) 16 antigens**
- **Neuraminidase (N) 9 antigens**

**Table 1**

**Influenza A viruses responsible for the last four pandemics**

| Virus type/subtype | Pandemic | Year |
|---|---|---|
| A/H1N1 | Spanish Flu | 1918 |
| A/H2N2 | Asian Flu | 1957 |
| A/H3N2 | Hong Kong Flu | 1968 |
| A/H1N1 | Influenza H1N1 | 2009 |

Influenza A viruses have two principal features that give them major pandemic potential:

- antigenic variability
- an extensive animal reservoir, especially wild aquatic birds, which are a natural reservoir of all the known influenza subtypes

The phenomenon of influenza A epidemics and pandemics is due to the frequency with which the genetic composition of influenza A viruses changes.

Genetic changes, known as “antigenic drift”, cause minor alterations of the antigens on the viral surface of the influenza virus. Drift is a continuous process that produces new antigenic variants and hence necessitates annual modification of influenza vaccine composition.

The larger genetic changes known as “antigenic shifts” are more radical, involving the appearance of viruses with new hemagglutinins or new combinations of hemagglutinin and neuraminidase. There are two main mechanisms of antigenic shift: (a) reassortment, which involves an exchange of genetic material between an influenza virus of nonhuman origin and one of human origin when both are present in a human being or intermediate host mammal such as a pig, and (b) a more gradual process of adaptive mutation through replication in successive human infections, which gives the virus an increasing ability to unite with human cells and transform itself into a new virus with full capacity to circulate in humans.

**Reservoirs**

The influenza A virus is found in numerous animal species. However, its principal reservoir is wild aquatic birds, which can transmit the infection to other birds, both wild and domestic, and to various mammals, including humans, whales, pigs, horses, and domestic and wild felines. The pig has been considered an intermediate reservoir serving as a mixing vessel for exchange of genetic material between different influenza viruses.

**Transmission**

The influenza virus is transmitted in the following ways:

- Direct contact:
  - from person to person at a distance of less than one meter
  - through droplets of over 5 μm that generally travel up to one meter and are generated when an infected individual coughs or sneezes
  - through aerosols generating procedures (droplet nuclei of up to 5 μm that travel over one meter)
- Indirect contact:
  - through contaminated objects (fomites)

The virus can survive outside a living organism—five minutes on the hands, 8-12 hours on paper, cloth, and other fibers, and 24-48 hours on hard surfaces.

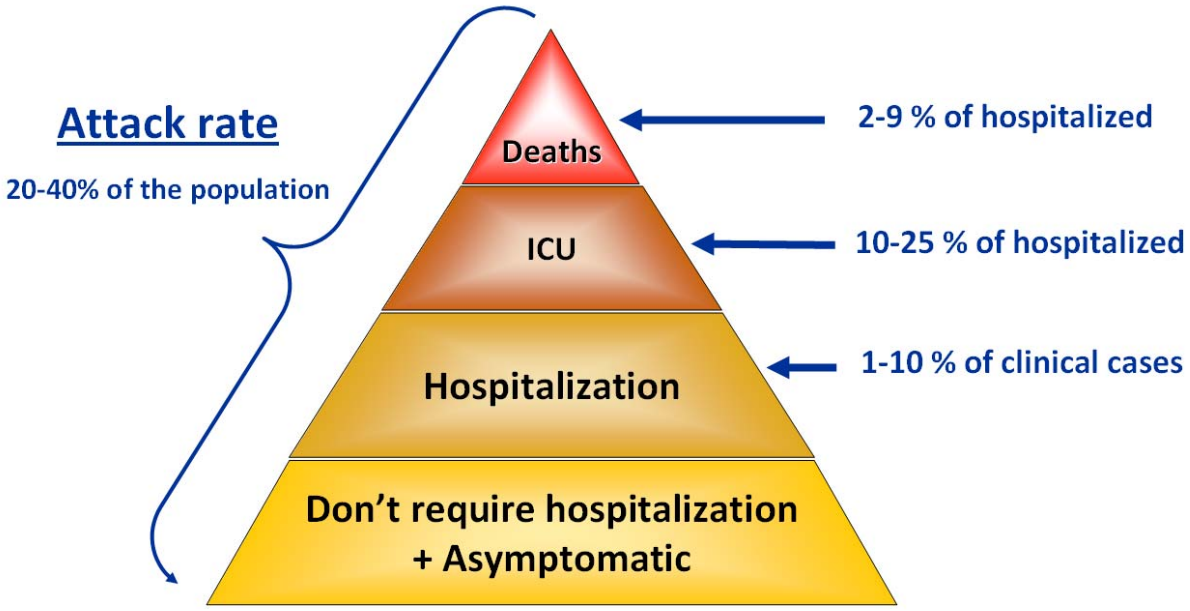
The contagious period ranges from one day before the onset of symptoms to 3-7 days after. Even if a person is asymptomatic, he/she can transmit the virus. Children and people with immunodeficiencies may shed the virus over longer periods of time.

The influenza virus has high attack rates and spreads rapidly in closed environments. Attack rates in non-pandemic years can reach 30% in schoolchildren and between 1% and 15% among adults. Attack rates in institutional settings can be even higher.

The transmission of pandemic influenza virus H1N1 is similar to that of the seasonal variety. Figure 2, below, shows case rates, hospitalization rates, and mortality. These are estimates based on the first wave of the H1N1 2009 pandemic.

**Figure 2**

**Estimated attack rate, percent hospitalized, and percent mortality for the pandemic virus H1N1 2009**




Source: Weekly Epidemiological Record No. 49, 2009, 84, 505-516. Available at: http://www.who.int/wer

### 1.4. Clinical Description of Influenza

The incubation period for the virus ranges from 1 to 4 days, and averages 2 days. The disease's manifestations vary widely. The infection may be asymptomatic, may produce an influenza syndrome, or may develop into an illness serious enough to cause death. The symptoms span a broad clinical spectrum, including fever of ≥38$^{o}$C, cough, sore throat, nasal congestion, headache, myalgia, prostration, and coryza, as well as gastrointestinal symptoms. The cough can be intense and of longer duration, but the other symptoms are shorter-term, and patients recover in two to seven days. Clinically, influenza is not always distinguishable from diseases caused by other respiratory viruses.

Symptoms vary according to the patient's age, underlying comorbidities, and individual immune response. In children, the clinical presentation includes high fever, cervical lymphadenopathy, bronchiolitis and bronchitis, and gastrointestinal symptoms. Although young children are unable to describe their symptoms, the presence of a sore throat is detectable because they cry when eating, find it difficult to eat, salivate, vomit, or have vocal changes. Older adults almost always present with fever, though not as high as that observed in children, but sometimes without any other symptoms.

Serious complications and death occur mainly in the elderly, in children, in institutionalized individuals, and in persons with chronic disease or immunosuppression (e.g. heart disease, hemoglobinopathies, metabolic disease, pulmonary and renal diseases, and AIDS). Pregnant women have been shown to have increased morbidity and mortality associated with influenza infection.

While the influenza virus can cause a primary infection of the upper and/or lower respiratory tract, rarely, it can occur with another virus or bacteria, a situation known as a co-infection. Bacterial co-infections are often secondary infections that result from the initial viral changes caused by the influenza virus in the respiratory tract, which facilitate the invasion by bacteria. Secondary bacterial co-infections are most often due to *Streptococcus pneumoniae, Haemophilus Influenzae* or *Staphylococcus aureus.*

Annual deaths from influenza worldwide are estimated to be as high as one million.

### 1.5. Influenza and SARI surveillance

Given that influenza does not cause a specific clinical syndrome that differentiates it from other pathogens (Table 2), it is not possible to identify patients with influenza without a diagnostic test. This is complicated, however, by the fact that it is not practical, from the standpoint of resource utilization, to test all suspect patients for influenza. For these reasons, a proxy respiratory syndrome is used, which is felt to be sensitive to detect influenza cases, and a subset of these patients is tested for influenza.

**Table 2**

**Principal viruses responsible for Acute Respiratory Infections**

| Syndromes | Etiologic agents | Clinical manifestations |
|---|---|---|
| Influenza-like Illness | Influenza, Adenovirus, Coronavirus, Parainfluenza, Rhinovirus, Respiratory Syncytial Virus (RSV) | Fever (38°C), sore throat, cough. May be accompanied by malaise, myalgia, headache, nasal congestion. |
| Rhinitis (common cold) | Adenovirus, Coronavirus, Influenza, Parainfluenza, Rhinovirus, Respiratory Syncytial Virus (RSV) | Headache, nasal congestion malaise, myalgia. |
| Pharyngitis | Coronavirus, Influenza Rhinovirus, Respiratory Syncytial Virus (RSV) | Localized oropharyngeal pain . |
| Laryngotracheobronchitis (croup) | Adenovirus, Influenza, Parainfluenza, Respiratory Syncytial Virus (RSV) | Fever, dry and persistent cough, hoarseness. |
| Bronchiolitis | Influenza, Respiratory Syncytial Virus | Dry and persistent cough, tachypnea, wheezing observed through pulmonary auscultation, and chest X-ray alterations. |
| Pneumonias | Adenovirus, Influenza, Hantavirus, Parainfluenza, | Systemic symptoms such as fever, malaise, and dry |

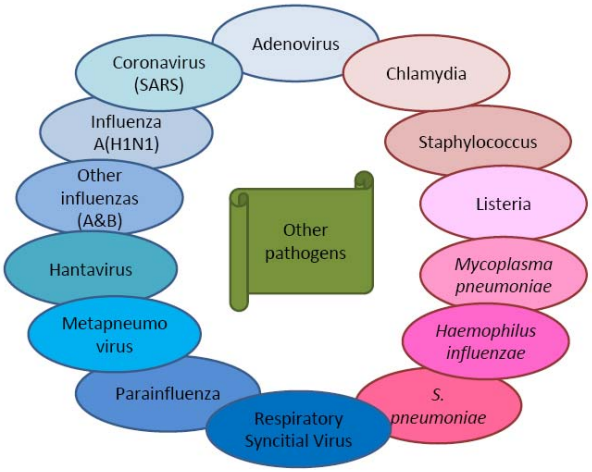
| | | |
|---|---|---|
| | Measles, Varicella, Respiratory Syncytial Virus (RSV) | cough in association with tachypnea and alterations observed through pulmonary auscultation or chest X-ray. |

Source: Adapted from the "Plano de Preparação Brasileiro para o enfrentamento de uma pandemia de influenza", Série B, Textos Básicos em Saúde, Secretariat of Health Surveillance, Ministry of Health of Brazil, Brasília, D. F., 2005.

Given that a proxy syndrome is used, one reality is that not all captured patients will have influenza. As mentioned, above, there are many other pathogens that cause respiratory illness similar to influenza (Figure 3) and for this reason, it is important to monitor the percent of the syndromic cases that are positive for influenza as well as other pathogens.

**Figure 3**

**Etiologic agents of severe acute respiratory infections**




### 1.6. Influenza Surveillance

Surveillance is essential to monitor events that might jeopardize the health of a population so that appropriate prevention and control measures can be implemented in a timely manner.

The following are criteria that can be used to decide which events to survey:

1. Utilize the IHR (2005) criteria, relating to smallpox, poliomyelitis (due to wild poliovirus), SARS, human influenza caused by new viral subtypes, and other public health events of international significance
2. Monitor the events that are most relevant to the country's public health because of their magnitude, potential for spread and impact based on the population's vulnerability
3. Utilize the goals set in conjunction with other international partners such as those that the countries of the Americas have made to PAHO/WHO for the eradication/elimination of measles, rubella, and congenital rubella syndrome, and introduction influenza vaccination (Resolution 10 of the 47th Directing Council of the PAHO Member Countries, September 2006).

The following are the objectives of influenza surveillance, as set forth in the PAHO/CDC Generic Protocol:

- Detect the appearance of new influenza subtypes on a timely basis, as called for by the IHR (2005)
- Detect unusual or unexpected outbreaks of viral respiratory diseases

- Identify the epidemiological characteristics of influenza and other viral respiratory diseases (such as those caused by *Adenovirus, Parainfluenza* and respiratory syncytial virus)
- Monitor influenza viruses to help formulate recommendations for the annual composition of vaccines and to determine the vaccine concordance with circulating influenza strains
- Provide data to calculate the ILI and SARI burden in humans
- Provide data to guide influenza prevention and control measures
- Assess impact of implemented prevention and control measures

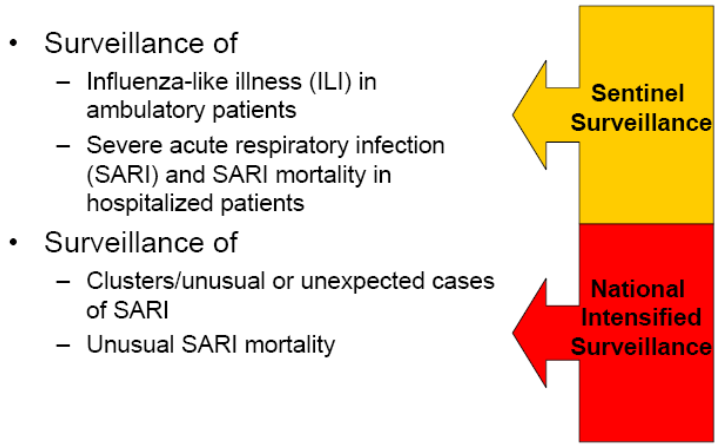
In order to achieve these objectives, the Generic Protocol recommends conducting two types of influenza surveillance (Figure 4):

- **Sentinel surveillance of:**
  - **ILI** in the outpatient setting
  - **SARI** in hospitals and health facilities that provide inpatient treatment
- **Intensified national surveillance** to detect unusual or unexpected cases of severe acute respiratory infection, which all health facilities should be equipped to detect

**Figure 4**

**Types of influenza surveillance**

**(PAHO/CDC Generic Protocol)**




During the pandemic of 2009, in the Americas Region, limited data were available to make decisions about disease severity. So, one important lesson learned was the need to strengthen and enhance surveillance of severe cases.

## 2. Intensified National Surveillance of Severe Acute Respiratory Infection (SARI)

| SARI: case definition |
|---|
| • **sudden onset of fever >38°C AND**<br>• **cough or sore throat AND**<br>• **difficulty breathing (dyspnea) AND**<br>• **need for hospitalization** |

Respiratory rate is a very useful parameter in evaluating dyspnea or difficulty breathing (Table 1). Another parameter which can be used to evaluate difficulty breathing is oxygen saturation while breathing ambient air. Measured by digital pulse oximetry, saturation should be 95% or greater. Saturation ≤ 90% is an indication of severe disease, while in pregnant women, <95% can indicate severe disease.

**Table 1**

**Upper limits of respiratory rate by age**

| AGE | Increased respiratory rate (tachypnea) |
|---|---|
| < 2 months | > 60 breaths/minute |
| 2-11 months | > 50 breaths/minute |
| 12 months to 5 years | > 40 breaths/minute |
| Adults | > 26 breaths/minute |

### 2.1. Introduction

Acute respiratory infections, including influenza-type illnesses (ILIs), are typically managed in the outpatient setting. However, when serious symptoms and signs develop, patients should be hospitalized. It is these hospitalized patients that are eligible for inclusion in the SARI surveillance system.

### 2.2. Specific surveillance objectives

• Determine the proportion of hospitalizations, ICU admissions, and deaths associated with SARI

• Determine the relative burden of respiratory viruses causing SARI

- Determine the seasonal patterns of respiratory virus circulation
- Determine the types/subtypes of circulating influenza viruses
- Describe the epidemiology of influenza
- Detect early the emergence of novel and high pathogenicity influenza viruses
- Provide viruses for the development of seasonal and pandemic influenza vaccines
- Provide data to estimate the disease burden of influenza

### 2.3. Purpose of surveillance

- To provide information to make decisions about the prevention and control of influenza

### 2.4. Type of surveillance

- Hospital-based surveillance

### 2.5. Area of surveillance

- Nationwide

### 2.6. Target population for surveillance

- Individuals of all ages and both sexes

### 2.7. Seasonality

- Year-round, as tropical climates do not have well-defined influenza seasons and a novel influenza subtype can emerge anytime

### 2.8. Data management

**Epidemiologic component:**

To determine the epidemiological characteristics of SARI cases, data should be collected on all cases admitted to the hospital. These data should include the number of hospitalized SARI

cases, the number of SARI cases admitted to ICUs, and the number of SARI. All data should be stratified by sex, age, risk factors, and presence/absence of a sample.

Additionally, the total number of all-cause hospitalizations, ICU admissions, and deaths should be collected and used as the denominator, to calculate a proportion. Sites which are able to estimate the catchment area should use it as the denominator to calculate incidence.

**Etiologic component:**

To determine the etiology of the SARI cases, respiratory specimens should be collected from all patients meeting the SARI case definition.

**Note: specimens should be collected throughout the year, regardless of the season**

### 2.8.1. Data Collection Forms

**The forms provided in Annex IV are recommended for recording the data**

- Form IÍI – Consolidated daily or weekly data on all-cause hospitalizations, ICU admissions, and deaths and all SARI hospitalizations, ICU admissions, and deaths.

2.8.2. Data collection steps

**All patients meeting the SARI case definition should be counted, even if a specimen cannot be collected**

*Case Identification and Collection of Epidemiologic Information*

1. Select those hospitalized patients that meet the case definition of SARI.

-To identify potential SARI cases and deaths, the 10th revision of the International Classification of Diseases (ICD 10) is recommended as a reference. Upper respiratory infections (ARIs) are classified from J00 to J06 (Table 2), and lower respiratory infections from J09 to J18 and from J20 to J22 (Table 3). However, care should always be taken to note whether the case identified from the ICD-10 codes, meets the SARI case definition—for example, ensuring that a hospitalized patient with bronchitis, in addition to cough and dyspnea, has fever. If ICD-10 codes are not available until discharge, the codes can be used as a quality control measure to confirm that all potential cases are being identified.

**Table 2 – ICD 10, upper ARI**

| ICD-10, upper ARI | Description |
|---|---|
| J00 | Flu or common cold |
| J01 | Acute sinusitis |
| J02 | Acute pharyngitis |
| J03 | Acute tonsillitis |
| J04 | Acute laryngitis and tracheitis |
| J05 | Acute obstructive laryngitis and epiglottitis |
| J06 | Upper respiratory infections at multiple sites |

Source: World Health Organization

**Table 3 – ICD 10, lower ARI**

| ICD-10, lower ARI | Description |
|---|---|
| **J09** | Influenza due to avian virus |
| **J10**<br>**J10.0**<br>**J10.1**<br>**J10.8** | Influenza due to another identified virus<br>Influenza with pneumonia, identified viruses<br>Influenza with other respiratory manifestations, identified viruses<br>Influenza with other manifestations, identified viruses |
| **J11**<br>**J11.0**<br>**J11.1**<br>**J11.8** | Influenza due to unidentified virus<br>Influenza with pneumonia, identified virus<br>Influenza with other respiratory manifestations, unidentified virus<br>Influenza with other manifestations, unidentified virus |

| | |
|---|---|
| **J12** | Viral pneumonia not classified elsewhere |
| **J12.0** | Viral pneumonia due to adenovirus |
| **J12.1** | Viral pneumonia due to RSV |
| **J12.2** | Viral pneumonia due to parainfluenza |
| **J12.8** | Viral pneumonia, other etiology |
| **J12.9** | Viral pneumonia, unspecified |
| **J13** | Pneumonia due to *Streptococcus pneumoniae* |
| **J14** | Pneumonia due to *Haemophilus influenzae* |
| **J15** | Bacterial pneumonia not classified elsewhere |
| **J16** | Pneumonia due to another infectious agent, not classified elsewhere |
| **J17** | Pneumonia in other diseases classified elsewhere (see ICD-10 specifications) |
| **J18** | Pneumonia due to an unspecified agent |
| **J20** | Acute bronchitis (see ICD-10 specifications) |
| **J21** | Acute bronchiolitis |
| **J21.0** | Acute bronchiolitis due to RSV |
| **J21.8** | Acute bronchiolitis due to another infectious agent |
| **J21.9** | Acute bronchiolitis due to an unspecified agent |
| **J22** | Unspecified acute lower respiratory infection |

Source: World Health Organization

2. Complete Form III daily for every patient admitted with SARI (including hospitalized and ICU patients and deaths)

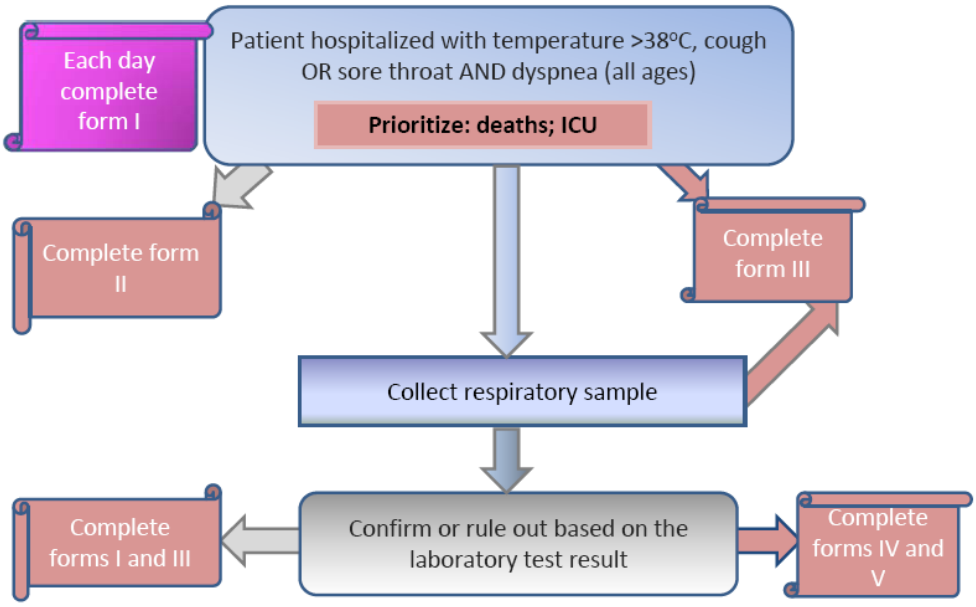
*Specimen Collection*

3. Collect respiratory specimens from patients meeting the SARI case definition, preferably presenting within three days (72 hours) of onset of fever, but within 10 days at the most
4. Independent of time since onset of symptoms, sample:
    - every SARI patient admitted to ICU
    - every death admitted with SARI
5. Prepare materials for sample collection

6. Collect sample with special attention to infection control principles and biosafety standards (Annex III), using appropriate PPE
7. Prepare specimens for storage and transportation (see Annex I) in accordance with biosafety standards and send to hospital laboratory

**Figure 1**

**SARI surveillance steps**




### 2.8.3. Data Analysis

There are three key steps to the data analysis procedure: compiling the data, assessing the quality of the data, and analyzing the data.

1. Data compilation

Data should be compiled at least once a week. Data should be organized the in the following manner:

By sex and age group*

a. Total number of hospitalizations
b. Total number of hospitalizations for SARI
c. Total number of ICU admissions

d. Total number of ICU admissions for SARI
e. Total number of deaths
f. Total number of deaths associated with SARI
g. Number of SARI hospitalized cases with underlying comorbidities
h. Number of SARI ICU admissions with underlying comorbidities
i. Number of SARI-associated deaths with underlying comorbidities
j. Number of SARI hospitalized cases who received antiviral treatment
k. Number of SARI ICU admissions who received antiviral treatment
l. Number of SARI-associated deaths who received antiviral treatment
m. Number of SARI hospitalized cases who received the current seasonal influenza vaccine
n. Number of SARI ICU admissions who received the current seasonal influenza vaccine
o. Number of SARI-associated deaths who received the current seasonal influenza vaccine
p. Number of SARI cases (hospitalizations, ICU admissions, and deaths) positive for influenza and other respiratory viruses
q. Total number of samples collected and tested

Information about age should be collected in the following age categories and can be later aggregated if needed:

- 0-5 months
- 6-11 months
- 12-23 months
- 2-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40-49 years
- 50-59 years

- 60-64 years
- ≥ 65 years

The rationale for using these age groups has to do with the following factors:

- The vaccine is not used in infants under 6 months of age
- Infant mortality is a universal indicator, and it is important to have data on the contribution of influenza to morbidity and mortality
- Increased risk for morbidity and mortality has been shown in the age extremes

2. Data critique

It is important to review the data on a routine basis to ensure that all quality standards are being met (Annex II). The general questions to be answered are: Are the data complete? Are they timely? Are they consistent?

3. Data analysis

Below are the key indicators to calculate and the recommended outputs.

KEY INDICATORS

a. Overall and by age:

- The proportion of hospital admissions for SARI

*Calculation:* Total number of admissions for SARI during the reporting period

Total number of medical admissions during the reporting period

- The proportion of ICU admissions for SARI

*Calculation:* Total number of ICU admissions for SARI during the reporting period

Total number of ICU medical admissions during the reporting period

- The proportion of deaths associated with SARI

*Calculation:* Total number of deaths associated with SARI during the reporting period

Total number of deaths during the reporting period

b. For SARI hospitalized cases, SARI ICU cases, and SARI deaths:

- The number of cases with underlying co-morbid conditions
- The number of cases who received the seasonal influenza vaccine
- The number of cases who received antiviral therapy

c. Of all samples tested, the proportion of samples positive for influenza

*Calculation:* $\frac{\text{Total number of influenza-positive samples during the reporting period}}{\text{Total number of samples tested during the reporting period}}$

d. The distribution of influenza positive cases by type and subtype

e. Of all samples tested, the proportion of samples positive for any respiratory virus

*Calculation:* $\frac{\text{Total number of respiratory-positive samples during the reporting period}}{\text{Total number of samples tested during the reporting period}}$

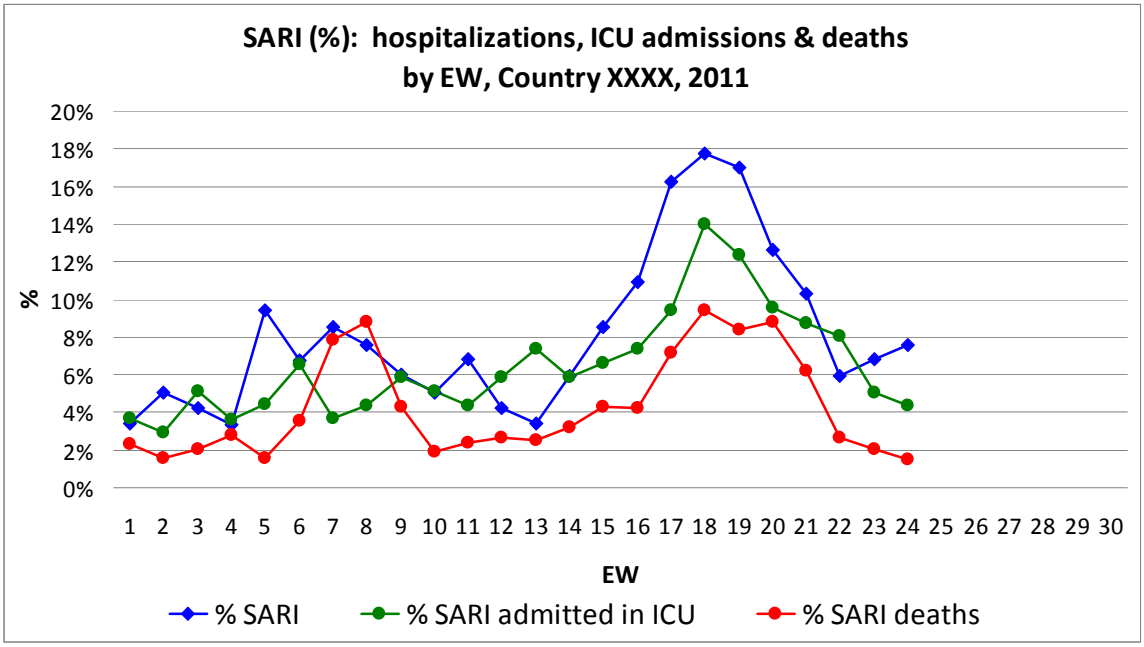
f. The distribution of respiratory virus positives cases

g. Overall, by age group, and by case severity (i.e. SARI hospitalized cases, SARI ICU cases, and SARI death), the distribution of respiratory virus positive cases

OUTPUTS

a) A line graph showing the proportion of hospitalizations, ICU admissions, and deaths associated with SARI. If the catchment area of the surveillance site is known, incidence instead of proportions can be calculated.

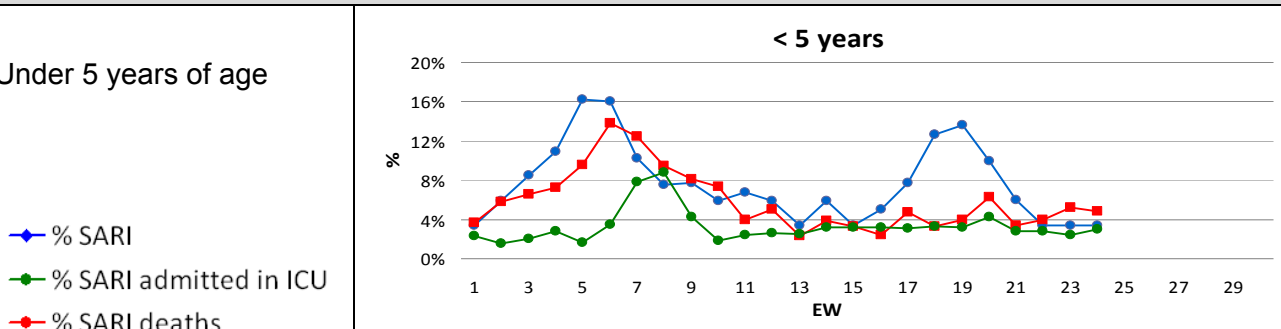
- Overall (i.e. for all age groups)


SARI (%): hospitalizations, ICU admissions & deaths
by EW, Country XXXX, 2011
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
EW
% SARI
% SARI admitted in ICU
% SARI deaths

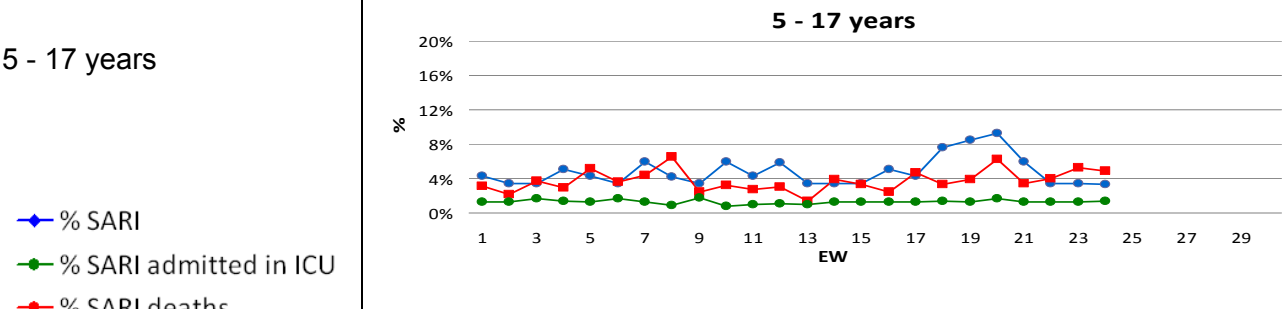
- By age group (<5 years, 5-17 years, 18-49 years, 5-64 years, ≥65 years)

**SARI (%): hospitalizations, ICU admissions and deaths by EW, Country XXXX, 2011**

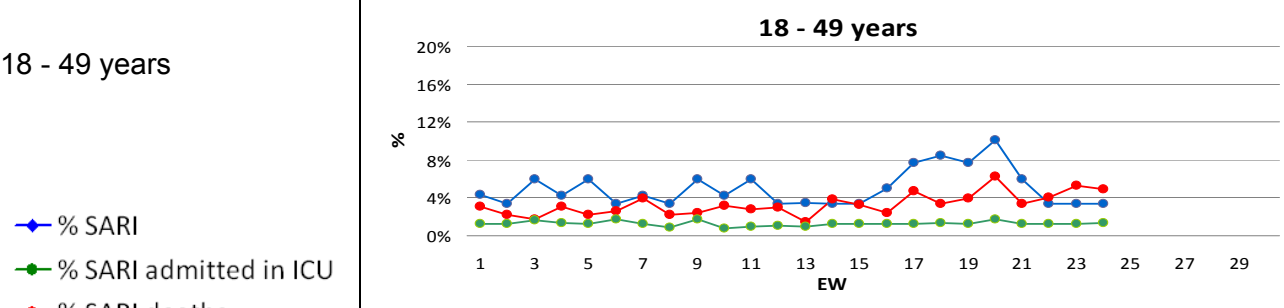
Under 5 years of age



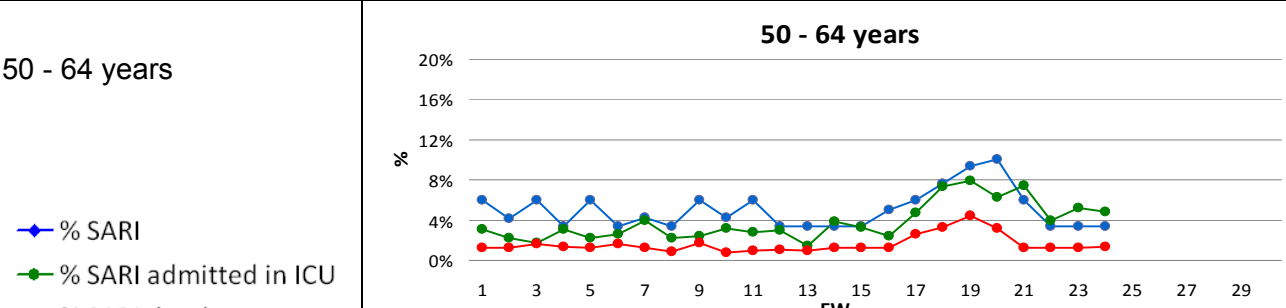

5 - 17 years

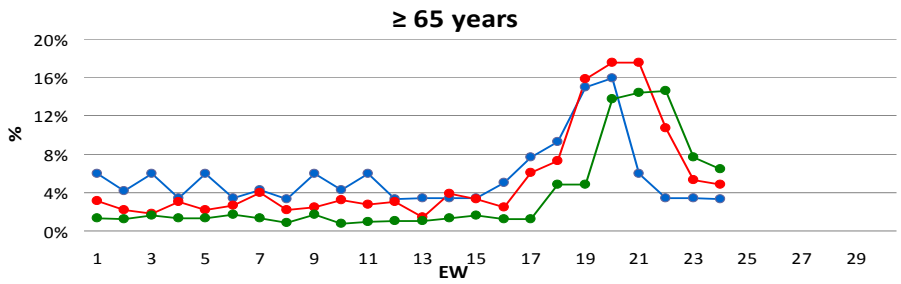



18 - 49 years




50 - 64 years



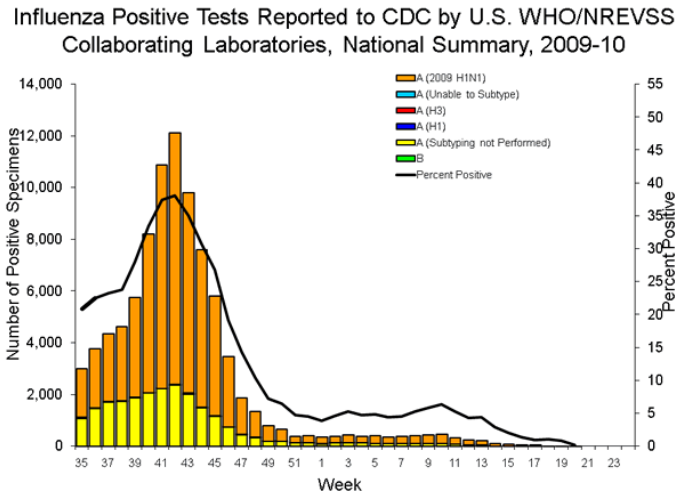
| | |
|---|---|
| ≥ 65 years<br><br>% SARI<br>% SARI admitted in ICU<br>% SARI deaths |  |

b) A table showing the proportion of cases in each severity category with underlying comorbidities, history of vaccination, and history of antiviral therapy. The data shown are fictitious.

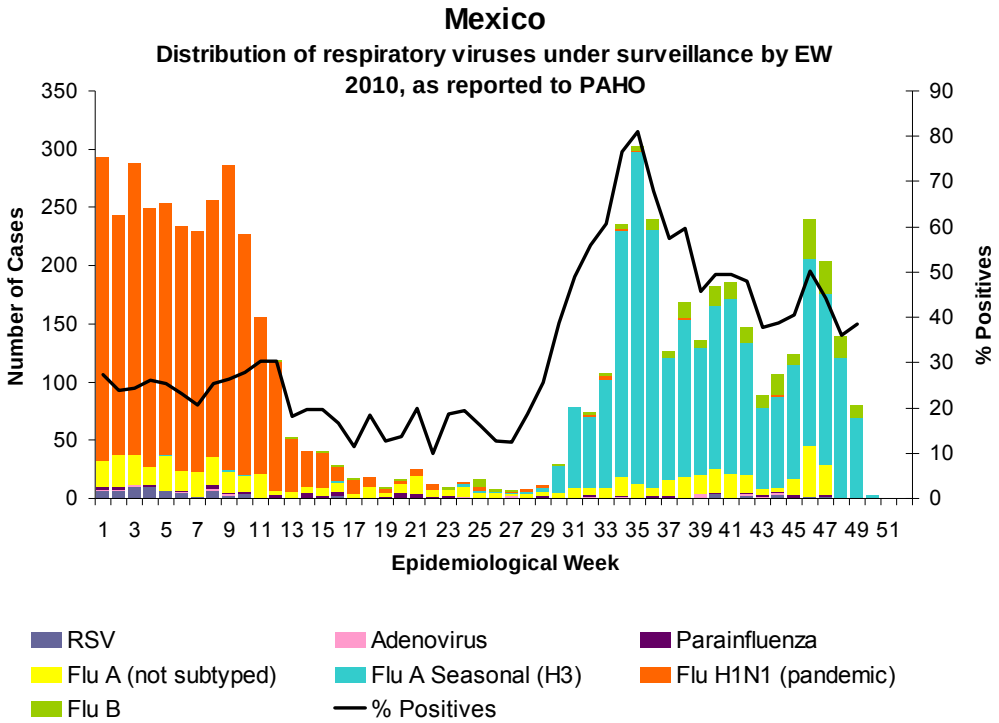
| | SARI hospitalized (n=100)<br>n (%) | SARI ICU (n=100)<br>n (%) | SARI deaths (n=100)<br>n (%) |
|---|---|---|---|
| Comorbid conditions | 50 (50) | 75 (75) | 75 (75) |
| • Asthma | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Chronic Respiratory | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Neurological | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Immunosuppression | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Chronic Renal | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Cardiac Disease | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Diabetes | 5 (10) | 10 (7.5) | 10 (7.5) |
| • Obesity | 5 (10) | 5 (6.7) | 5 (6.7) |
| • Chronic Hepatic | 10 (20) | 0 | 0 |
| • Pregnancy | 10 (20) | 5 (6.7) | 5 (6.7) |
| Seasonal influenza* vaccine | 10 (10) | 10 (10) | 20 (20) |
| Oseltamivir therapy | 10 (10) | 10 (10) | 20 (20) |

*Depending on the time of the year and the country, this will be either the Northern or Southern Hemisphere formulation

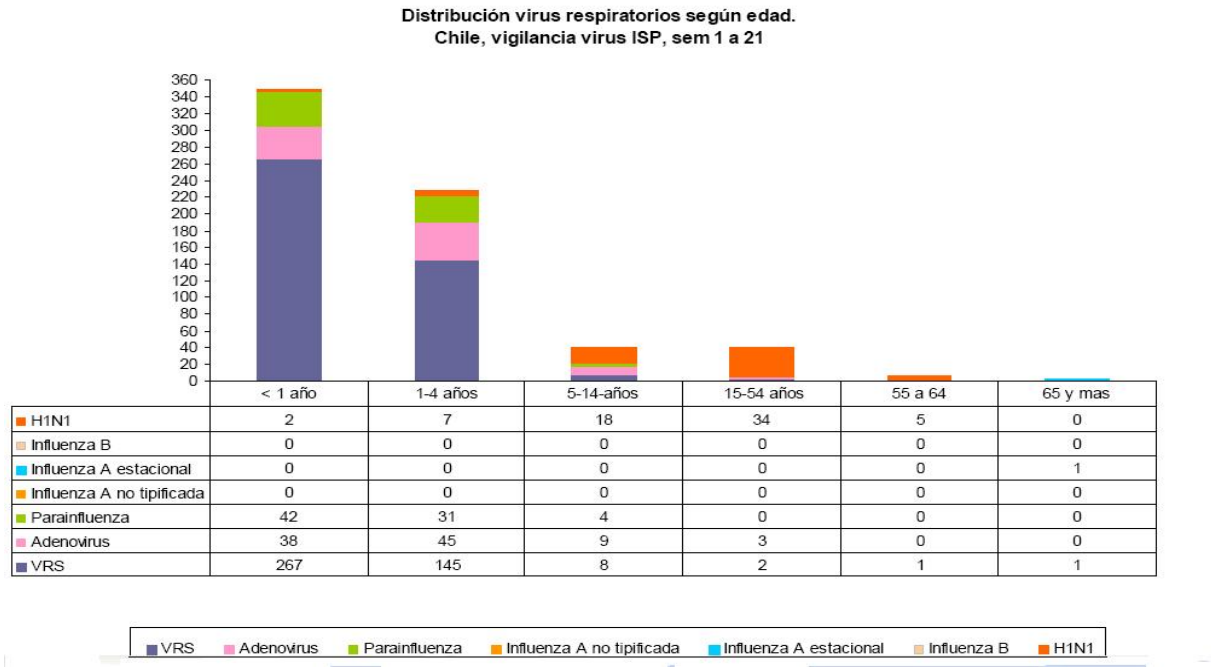
c) A combined line graph and bar chart showing the distribution of influenza cases by type and subtype with the percent positivity for influenza. The example here is from the U.S. CDC.




d) A combined line graph and bar chart showing the distribution of all respiratory viruses with the percent positivity for any respiratory virus. These are data reported to PAHO by Mexcio.

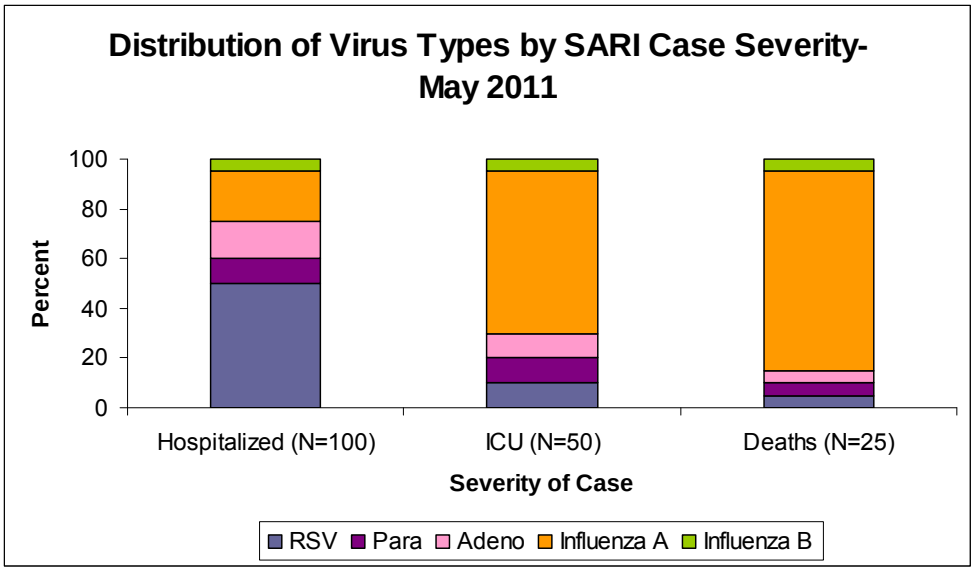


e) A bar graph showing the distribution of respiratory viruses by age group. The same age groups should be used as those for the SARI graph. The graph below, from Chile's Ministry of Health, is an example.




| | < 1 año | 1-4 años | 5-14-años | 15-54 años | 55 a 64 | 65 y mas |
|---|---|---|---|---|---|---|
| H1N1 | 2 | 7 | 18 | 34 | 5 | 0 |
| Influenza B | 0 | 0 | 0 | 0 | 0 | 0 |
| Influenza A estacional | 0 | 0 | 0 | 0 | 0 | 1 |
| Influenza A no tipificada | 0 | 0 | 0 | 0 | 0 | 0 |
| Parainfluenza | 42 | 31 | 4 | 0 | 0 | 0 |
| Adenovirus | 38 | 45 | 9 | 3 | 0 | 0 |
| VRS | 267 | 145 | 8 | 2 | 1 | 1 |

f) A bar graph showing the distribution of respiratory viruses in each severity category. The data shown are fictitious.




**4. Interpret tables and figures**

- Examine trends over time
- Assess which risk groups are being most affected
- Assess patterns to determine temporality
- Identify acute or unusual events which necessitate immediate follow-up

## 2.9. Organizing the Intensified National Surveillance System

National SARI surveillance should be integrated within the country's epidemiological surveillance system. To that end, each country should determine the structure of the system that best utilizes and incorporates the country's resources and realities. In general, there must be a team, the size of which each country will determine, at the surveillance site, within the laboratory, and at the ministry of health, who are dedicated to SARI surveillance. The following paragraphs delineate the general tasks to complete at each level.

**Local-level surveillance site responsibilities**

- Identify cases meeting the SARI case definition
- Select SARI cases for which specimens are to be collected
- Collect respiratory specimens utilizing appropriate infection control practices, including PPE

- Prepare specimens for shipment to the laboratory
- Arrange for shipment of specimens to the laboratory under the appropriate biosafety conditions
- Complete Forms I and II
- Immediately notify the Ministry of Health of any unusual SARI cases
- Enter and assess data on a daily basis
- Conduct data analyses and prepare epidemiologic reports on a weekly basis
- Report any situation outside normal parameters to the ministry of health

**Laboratory responsibilities**

- Train personnel on proper technique for collecting, preparing, and transporting specimens
- Confirm that biosafety standards for handling and transporting specimens are being followed
- Process specimens on a timely basis
- Complete Form III with the laboratory test results and the test date
- Communicate results to the surveillance site and the ministry of health
- Monitor positivity index to ascertain whether it is within the expected ranges
- Indentify issues with sample collection, preparation, and transport that are affecting laboratory test results
- Routinely send influenza viruses, according to the protocol, to the Centers for Disease Control (CDC) laboratory in Atlanta, USA
- Send unsubtypeable influenza viruses to the Centers for Disease Control (CDC) laboratory in Atlanta, USA, immediately
- Collaborate in data analysis and process evaluation
- Collaborate in the preparation and dissemination of reports
- Report virologic results to PAHO and WHO through the systems established for the purpose

**National level (i.e. Ministry of Health) responsibilities**

- Coordinate the surveillance process, including providing the resources needed to sustain the surveillance program
- Collaborate with the laboratory to conduct surveillance training and awareness activities
- Monitor activities in each hospital to identify and resolve problems

- Promote integrated work between the laboratory and each hospital
- Periodically evaluate the quality of the data being obtained
- Prepare, in collaboration with the local surveillance team and laboratory personnel, the national report on a weekly basis
- Disseminate the weekly report to all relevant stakeholders, including PAHO
- Disseminate public health alerts regarding events of national and/or international importance

Within the hospital setting, hospitals should consider how SARI surveillance can be integrated into the other hospital surveillance systems, so as to create a sustainable program. One such approach is to create a department of hospital surveillance and epidemiology that deals both with community-acquired infections as well as health care-associated infections.

### 2.10. Information Flow

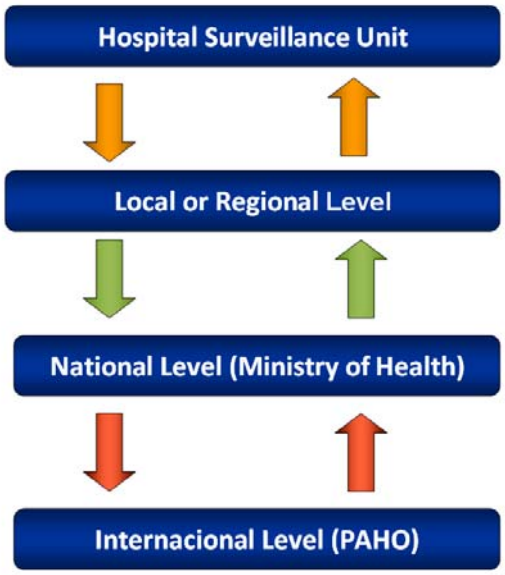
The information generated in each hospital in collaboration with the laboratory should be sent to the next highest hierarchical level, and from there to the next, until the national level is reached.

In order to provide feedback for the system, the information consolidated at the national and subnational levels should follow the same route back, through all the intermediate levels to the hospital and laboratory.

The national level will notify PAHO through the surveillance coordinator, using the information system provided by PAHO. PAHO will be responsible for disseminating the information in other world regions.

**Figure 2**

**Information flow related to intensified national surveillance of SARI**




## Bibliography

1. Brazil. Ministry of Health. Secretariat of Health Surveillance. Plano de Preparação Brasileiro para o enfrentamento de uma pandemia de influenza, Série B, Textos Básicos em Saúde, Ministry of Health of Brazil, Brasília, D.F., 2005. [Accessed 25 February 2009]. Available at: http://dtr2001.saude.gov.br/influenza/docs/flu1.pdf
2. Cao B et al. Clinical Features of the Initial Cases of 2009 Pandemic Influenza A (H1N1) Virus Infection in China. N Engl J Med 2009; 361.
3. Center for Disease Control and Prevention. Prevention and Control of Influenza. Recommendations of the Advisory Committee on Immunization Practices (ACIP) MMWR. 2006; 55 (No. RR-10).
4. Centers for Disease Control and Prevention. Prevention and Control of Influenza. Recommendations of the Advisory Committee on Immunization Practices (ACIP) 2008 MMWR. 2008; 57 (No. RR-7).
5. Centers for Disease Control and Prevention. Safety of Influenza A (H1N1) 2009 Monovalent Vaccines – United States, October 1 - November 24, 2009. MMWR Early Release Vol. 58/December 4, 2009.

6. Centers for Disease Control and Prevention. [Homepage on the Internet]. Influenza Antiviral Medications: A Summary for Clinicians. [Updated 17 July 2008, accessedAvailable at: http://www.cdc.gov/flu/PROFESSIONALS/ANTIVIRALS/SUMMARY-CLINICIANS.HTM.
7. Clark TW et al. Trial of 2009 Influenza A (H1N1) Monovalent MF59-Adjuvanted Vaccine. N Engl J Med 2009; 361:2424-35.
8. Cox NJ, Subbarao K. Influenza. Lancet 1999; 354:1277-82.
9. Heymann, DL. Control of communicable diseases. 18th edition, Scientific and Technical Publication No. 613, PAHO/WHO. Washington, D.C.. 2005. p: 379--380.
10. Food and Agriculture Organization (FAO), World Organization for Animal Health (OIE) in collaboration with World Health Organization (WHO). A Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI). October 2005 [accessed 25 February 2009]. Available at: http://un-influenza.org/files/aj134e00.pdf
11. World Health Organization. Guidelines on the Use of Vaccines and Antivirals during Influenza Pandemics. Geneva; WHO; 2005. [Accessed 5 February 2009]. Available at: http://www.who.int/csr/resources/publications/influenza/11_29_01_A.pdf
12. World Health Organization. WHO strategic action plan for pandemic influenza 2006-2007. Geneva, WHO, 2006 (WHO/CDS/EPR/GIP/2006.2). [Accessed 25 February 2009]. Available athttp://www.who.int/csr/resources/publications/influenza/StartAcPlanES.pdf
13. World Health Organization. Responding to the avian influenza pandemic threat. Recommended strategic actions. [Accessed 25 February 2009]. Available at: http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_05_8-EN.pdf
14. World Health Organization. Infection Control Strategies for Specific Procedures in Health-Care Facilities. Epidemic-prone and pandemic-prone acute respiratory diseases. A quick reference guide. WHO, 2008. [Accessed 25 February 2009]. Available at: http://www.paho.org/English/AD/DPC/CD/epi-pan-prone-ards-inf-ctl-quick-guide.pdf
15. Pan American Health Organization. Centers for Disease Control and Prevention (CDC), Atlanta. Generic Protocol for Influenza Surveillance. Washington, D.C. Available at: http://www.paho.org/EnglishAD/DPC/CD/404.asp [TN: Unable to definitively confirm this URL for the English-language document, or to access the document (some current problem with the PAHO site, seemingly).

16. Pan American Health Organization. CD47.R10: Regional Strategy for Maintaining National Vaccination Programs in the Américas. CD47/FR, Rev. 1 (Esp.) 23 January 2007. [Accessed 25 February 2009]. Available at: http://www.paho.org/Spanish/GOV/CD/CD47-fr-s.pdf [TN: As above, unable to verify URL for the English-language document, or to access it.]
17. Pan American Health Organization. Programa AIEPI. World Health Organization. UNICEF. Neumonía. In: Diagnóstico y tratamiento de enfermedades prevalentes graves de la infancia. Washington D.C.:PAHO, 2004.
18. Pan American Health Organization. Effective Management of Vaccination Programs. Module I: Diseases. Washington, D.C.: PAHO, 2006. [TN: This title is taken from PAHO's description of the publication at http://www.paho.org/English/DD/PUB/Training_Modules.pdf. However, it diverges slightly from the form of the title given in the source document.]
19. Pan American Health Organization. Effective Management of Vaccination Programs. Module II: Vaccines. Washington, D.C.: PAHO, 2006. [TN: See previous note.]
20. Pan American Health Organization. Health Establishments Preparation for Unusual or Unexpected Cases or Clusters of Severe Acute Respiratory Infection (SARI). April 2009. [TN: This is the title I find in an online reference, though the lack of an apostrophe or colon after "Health Establishments" make it potentially suspect. The source doc cites a 2008 version of the publication in Spanish, but April 2009 is the date I found in my online search.]
21. Pan American Health Organization. Clinical management of human infection with pandemic (H1N1) 2009: revised guidance. November 2009. [Accessed 29 November 2010.] Available at: http://www.who.int/csr/resources/publications/swineflu/clinical_management_h1n1.pdf
22. Pan American Health Organization. . Pandemic (H1N1) Regional Update 14 Dec 2009. http://www.reliefweb.int/rw/RWFiles2009.nsf/FilesByRWDocUnidFilename/EGUA-7YRR4G-full_report.pdf/$File/full_report.pdf [TN: I couldn't find the English doc on the PAHO site, so cite the URL where I found it. The source doc reference reads: Actualización Semanal Pandemia (H1N1) 2009 (14 de diciembre, 2009--17 h GMT; 12 h EST). [Accessed 16 December 2009]. Available at: http://new.paho.org/hq/index.php?option=com_content&task=blogcategory&id=805&Itemid=569&lang=es]

23. Pan American Health Organization. 18th meeting of the Technical Advisory Group, Costa Rica, 2009 – Draft Final Report (26 August #2).
24. Webster RG, Peiris M, Chen H, Guan Y. Emerging Infectious Disease online. Vol 12 No 1. January 2006 [cited 28 Feb 2009]. Available at: http://www.cdc.gov/ncidod/EID/vol12no01/pdfs/05-1024.pdf
25. World Health Organization, Influenza Fact Sheet No. 211. Revised March 2003 [cited 1 March 2009]. Available at: http://www.who.int/mediacentre/factsheets/2003/fs211/en/print.html
26. World Health Organization. Resolution WHA 58.5: Strengthening Pandemic Influenza Preparedness and Response. 2005 [cited 1 March 2009]. Available at: http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_5-en.pdf
27. World Health Organization. Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO. [Cited 9 November 2008.] Available at: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2008_09_10/en/index.html
28. World Health Organization. Recommended laboratory tests to identify avian influenza A virus in specimens from humans. 2005 [cited 28 February 2009]. Available at: http://www.who.int/csr/disease/avian_influenza/guidelines/avian_labtests2.pdf
29. World Health Organization. Situation updates--Avian influenza. 2006 [cited 27 November 2006]. Available at: http://www.who.int/esr/disease/avian_influenza/updates/en/index.html.
30. World Health Organization. Influenza vaccines. WHO position paper. Weekly Epidemiological Record [online series of position papers]. August 2005 [cited 1 March 2009]. No 33(80): 279-287. Available at: http://www.who.int/wer/2005/wer8033.pdf
31. World Organization for Animal Health (OIE). Update on Avian Influenza in Animals (Type H5) 2006 [cited 4 November 2006]. Available at: http://www.oie.int/downld/AVIAN%20INFLUENZA/A_AI-Asia.htm.
32. World Health Organization. Avian Influenza Timeline. [Cited 14 December 2009]. Available at: http://www.who.int/csr/disease/avian_influenza/Timeline090727.pdf
33. World Health Organization. Avian Influenza Timeline. [Cited 2009 Dec 14]. Available at: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2009_12_11/en/print.html

34. World Health Organization. WHO guidelines for investigation of human cases of avian influenza A (H5N1). 2006. Revised 2007 [cited 14 December 2009]. Available at: http://www.who.int/csr/resources/publications/influenza/WHO_CDS_EPR_GIP_2006_4r1.pdf)
35. Ruvinsky [TN: spelling of the name needs to be corrected in the source doc. No English translation of this publication found.] R and Balanzat AMC. Neumonías Bacterianas y Virales. In: Infecciones respiratorias en niños. Benguigui Y, Antuñano FJL, Schmunis G, Yunes J, editors. Washington, D.C, Pan American Health Organization. 1997. Pages 215-43.
36. Secretariat of Health of the State of São Paulo. Coordenação dos Institutos de Pesquisa. Instituto Adolfo Lutz. Serviço de Virologia. Laboratório de Vírus Respiratórios. Instruções para colheita, acondicionamento e envio de amostras clínicas. São Paulo, 6 January 2005. [Accessed 28 February 2009]. Available at: ftp://ftp.cve.saude.sp.gov.br/doc_tec/resp/influ_protocolo.pdf
37. Sociedade Brasileira de Pneumologia e Tisiologia. Diretriz para Pneumonias Adquiridas na Comunidade (PAC) em adultos Imunocompetentes. J Bras Pneumol, 2004;30 (Supl 4): S2-S3.
38. Jain S, et al. Hospitalized Patients with 2009 H1N1 Influenza in the United States, April-June 2009. N Engl J Med 2009; 361:1935-44.
39. Zhu FC et al. A Novel Influenza A (H1N1) Vaccine in Various Age Groups. N Engl J Med 2009; 361:2414-23.
40. World Health Organization. Pandemic influenza A (H1N1) 2009 virus vaccine – conclusions and recommendations from the October 2009 meeting of the immunization Strategic Advisory Group of Experts. Weekly Epidemiological Record No. 49, 2009, 84, 505-516. [Cited 22 February 2010.] Available at: **http://www.who.int/wer**

## ANNEX I - Collecting, Storing and Transporting Specimens of Respiratory Secretions for Virus Identification

### Types of specimens

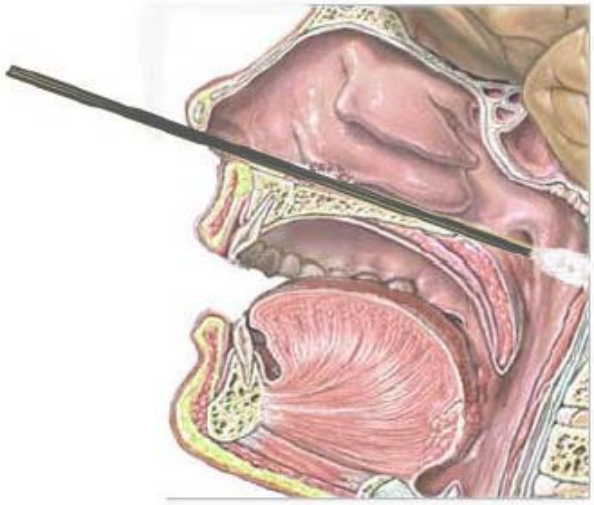
- In cases of ILI or SARI, nasopharyngeal and oropharyngeal swabs are collected from adults and children five and older
- For children under five, a nasopharyngeal aspirate is recommended.
- An aspirate is also recommended when it is not possible to collect a swab

### Techniques for collecting specimens

- Nasopharngeal swab
  - Rayon or polyester fiber swabs should be used; do not use calcium alginate or cotton swabs with wooden stems
  - Insert a dry swab in the nostril and move it inward to the nasopharynx
  - Hold it there for a few seconds
  - Slowly remove the swab while rotating gently.
  - Put the swab in the tube containing the transport media

**Figure 1**

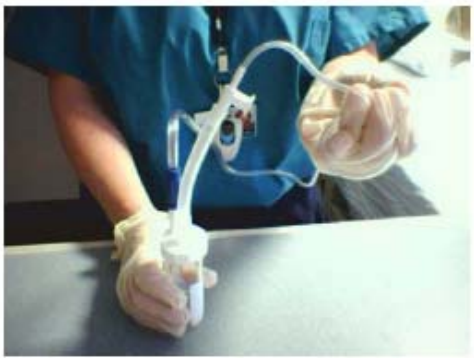
**Collecting a nasal swab**

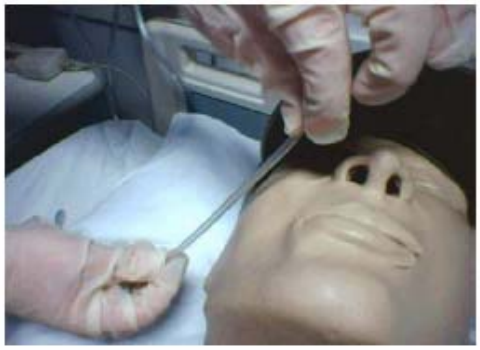


- Oropharyngeal swab
  - Ask the patient to open his or her mouth
  - Lower the tongue with the depressor
  - Use the swab to take a specimen from the posterior pharynx
  - Avoid contact with the tonsils
  - Place the swab in the transport media

  NOTE: If the medium has been prepared in the laboratory, the nasopharyngeal and oropharyngeal swabs can be put in the same transport media

- Nasopharyngeal aspirate
  - Review the expiration date of the transport media, aspiration tube, and vacuum pump
  - Break open the envelope with the aspiration kit and connect the smaller-diameter end of the tube to a sterile probe
  - Use the probe to measure the distance from the nose to the base of the ear; half of this distance equals the distance between the patient's nose and oropharynx
  - Connect the larger-diameter end of the tube to the vacuum pump
  - Insert the probe in the patient's nostril
  - Withdraw the probe, rotating gently
  - Repeat the procedure in the other nostril
  - Draw a volume of approximately 8-10 ml of cold tampon solution (pH 7.2) through the probe to remove all the secretion
  - Change the cover of the collector tube





Source: Johns Hopkins Hospital Epidemiology and Infectious Control and Nursing Education Department

NOTE: For all specimens, according to the algorithm, send specimens to the laboratory immediately, along with the form designed to accompany specimens; specimens should be refrigerated until arrival in the laboratory and should never be frozen

**Preserving and transporting specimens**

- If using a commercial media, place the swab in the transport tube and press the bottom of the tube or press the pad at the bottom to release the media; if the media is prepared in the laboratory, cut the stem of the swab so that only the part adhering to the swab remains and close the tube with the cap
- Swabs must always be kept moist while being transported
- The tube with the media and the swab should be kept refrigerated at 4-8$^{o}$C in a thermos for holding specimens
- Transfer the specimens to the laboratory that is to process them as soon as possible (preferably within 24 hours, but within 48 hours at most)
- Follow the recommendations of the United Nations Committee of Experts on the Transportation of Dangerous Goods

## ANNEX II–Evaluation and Analysis of Surveillance Data

| Nº | Indicator | Structure | Observations | Value |
|---|---|---|---|---|
| SURVEILLANCE INDICATORS | | | | |
| 1 | Timeliness of notification of denominators | Number of EWs with timely notification of denominators/Total EWs notified x 100 | *Timely* is considered as the reporting of denominators on the pre-specified day each week | |
| 2 | Timeliness of reporting of cases | Median interval in the days between the hospitalization date and the notification date | | |
| 3 | Investigation coverage | Total number of completely investigated and closed SARI cases/ Total of cases reported with a sample x 100 | | |
| LABORATORY INDICATORS | | | | |
| 4 | Coverage of SARI sampled cases | Number of SARI cases with collected sample/Number of SARI cases with criteria for sample collection | Criteria for sample collection are those that fall within the interval of 7 days since the onset date of the fever | |
| 5 | Coverage of sampled SARI cases in ICU | Number of SARI cases in ICU with collected sample/Number of SARI cases in ICU x 100 | | |
| 6 | Coverage of sampled SARI deaths cases | Number of SARI death cases with collected samples/Number of SARI deaths X 100 | | |

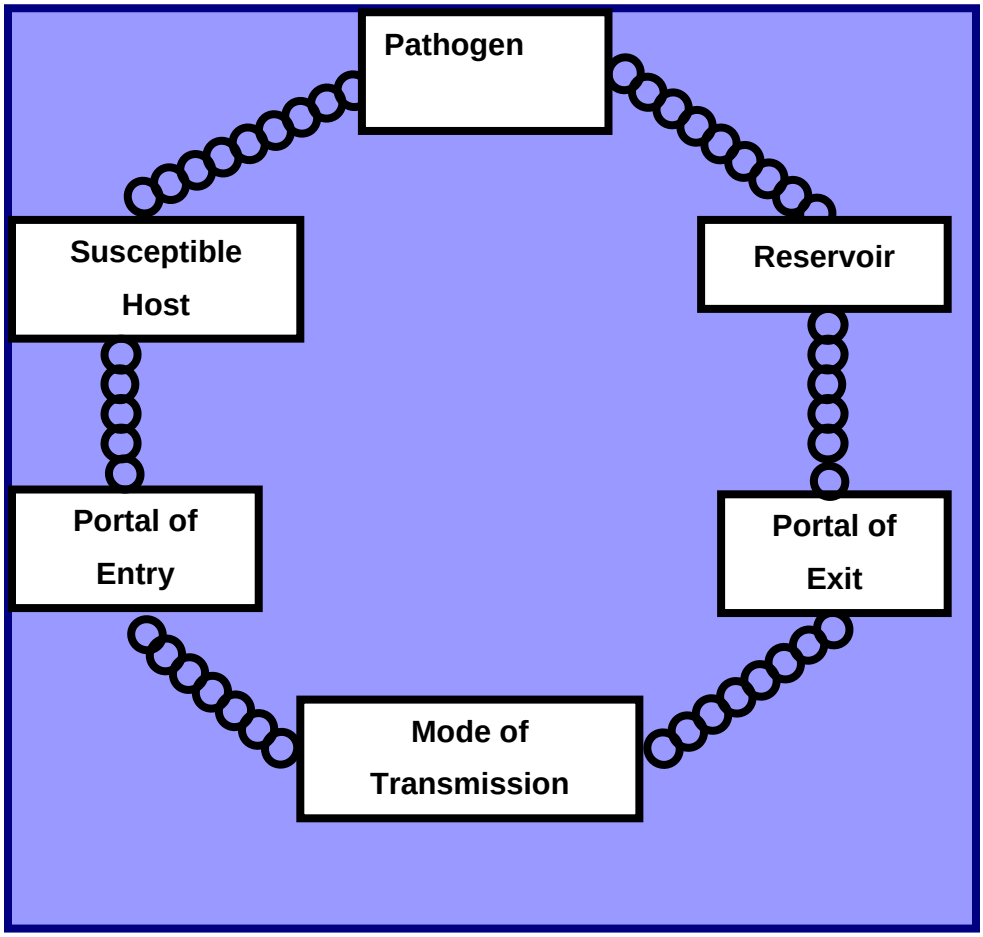
| | | | | |
|---|---|---|---|---|
| | | | | |

| Nº | Indicator | Structure | Observations | Value |
|---|---|---|---|---|
| 7 | Timing of sampling | Median of the interval in the days between date of hospitalization and date of sampling | | |
| 8 | Timing of receipt of the sample | Median of the interval in the days between date of sampling and date of receipt of the sample | In case the receipt date is not available calculate this indicator with the shipping date | |
| 9 | Quality of the sample | Number of quality samples receipt/ Total of samples receipt x 100 | Quality is defined as, the samples were correctly sampled, conserved and transported until the l arrival in the laboratory | |
| 10 | Processing coverage | Number of processed samples/ Total of samples receipt correctly x 100 | The sample was collected from a person meeting the case definition | |
| 11 | Processing opportunity | Median of the interval between receipt date and beginning of the processing | | |
| 12 | Timely of delivery of results | Median of the interval between the date of reception and delivery of result | | |

## ANNEX III – Infection Control

### Principles of Infection Control

The concept of the chain of infection, with its' links stretching from the infectious agent to the susceptible host through a transmission mechanism, helps to explain how infection occurs and facilitates understanding of infection control mechanisms, which operate by breaking a link in the chain




### Types of transmission

The mode of transmission varies from one microorganism to another and some can be transmitted by more than one route. The three most important modes of transmission are: contact, droplet, or airborne.

- **Transmission by contact**

Microorganisms can be transmitted through direct or indirect contact with the patient or his/her contaminated body fluids. Direct transmission occurs when microorganisms are transferred from person to person without an intermediate contaminated object.. Indirect transmission occurs when an infectious agent is transferred through an intermediate contaminated object. Contact precautions should be observed with various pathogens, which include Varicella and *Clostridium difficile.* With certain pathogens, contact precautions will be employed in addition to another precaution (e.g. airborne or droplet).

- **Droplet transmission**

Droplet transmission involves contact between droplets with particles containing microorganisms from a person who is clinically ill or is a carrier of a microorganism, and the nasal or oral conjunctiva or mucous membranes of a susceptible person. Droplets are most often generated when an infected person coughs, sneezes, or converses. Transmission by droplet requires close contact between source and host, because the droplets do not remain suspended for long and thus usually only travel short distances through the air (~one meter). The respiratory pathogens transmitted through droplets include adenovirus, human influenza virus, SARS and avian influenza A (H5N1).

**Droplet transmission is the most important route of transmission for the influenza virus**

- **Airborne transmission**

Pathogens transmitted via this route are also transmitted via mucosal membrane contact with aerosolized droplets of an infectious person. The difference from droplet precautions is that the aerosolized particles are smaller, can travel larger distances, and remain in the air longer. The management of this type of transmission depends on special air management and ventilation systems (e.g. rooms with negative pressure). Examples of pathogens transmitted via this route are *M.tuberculosis* and the measles virus.

**Routine precautions for infection control**

**Standard precautions**

AIDE-MEMOIRE

OCTOBER 2007 INFECTION CONTROL

# Standard precautions in health care

## Background

**Standard precautions are meant to reduce the risk of transmission of bloodborne and other pathogens from both recognized and unrecognized sources.** They are the basic level of infection control precautions which are to be used, as a minimum, in the care of all patients.

**Hand hygiene** is a major component of standard precautions and one of the most effective methods to prevent transmission of pathogens associated with health care. In addition to hand hygiene, the use of **personal protective equipment** should be guided by **risk assessment** and the extent of contact anticipated with blood and body fluids, or pathogens.

In addition to practices carried out by health workers when providing care, all individuals (including patients and visitors) should comply with infection control practices in health-care settings. The control of spread of pathogens from the source is key to avoid transmission. Among source control measures, **respiratory hygiene/cough etiquette**, developed during the severe acute respiratory syndrome (SARS) outbreak, is now considered as part of standard precautions.

Worldwide escalation of the use of standard precautions would reduce unnecessary risks associated with health care. Promotion of an **institutional safety climate** helps to improve conformity with recommended measures and thus subsequent risk reduction. Provision of adequate staff and supplies, together with leadership and education of health workers, patients, and visitors, is critical for an enhanced safety climate in health-care settings.

## Important advice

- Promotion of a safety climate is a cornerstone of prevention of transmission of pathogens in health care.
- Standard precautions should be the minimum level of precautions used when providing care for all patients.
- Risk assessment is critical. Assess all health-care activities to determine the personal protection that is indicated.
- Implement source control measures for all persons with respiratory symptoms through promotion of respiratory hygiene and cough etiquette.

## ✔ Checklist

### Health policy

- Promote a safety climate.
- Develop policies which facilitate the implementation of infection control measures.

### Hand hygiene

- Perform hand hygiene by means of hand rubbing or hand washing (see detailed indications in table).
- Perform hand washing with soap and water if hands are visibly soiled, or exposure to spore-forming organisms is proven or strongly suspected, or after using the restroom. Otherwise, if resources permit, perform hand rubbing with an alcohol-based preparation.
- Ensure availability of hand-washing facilities with clean running water.
- Ensure availability of hand hygiene products (clean water, soap, single use clean towels, alcohol-based hand rub). Alcohol-based hand rubs should ideally be available at the point of care.

### Personal protective equipment (PPE)

- ASSESS THE RISK of exposure to body substances or contaminated surfaces BEFORE any health-care activity. **Make this a routine!**
- Select PPE based on the assessment of risk:
  - clean non-sterile gloves
  - clean, non-sterile fluid-resistant gown
  - mask and eye protection or a face shield.

### Respiratory hygiene and cough etiquette

- Education of health workers, patients and visitors.
- Covering mouth and nose when coughing or sneezing.
- Hand hygiene after contact with respiratory secretions.
- Spatial separation of persons with acute febrile respiratory symptoms.

World Health Organization

EPIDEMIC AND PANDEMIC ALERT AND RESPONSE

# Health-care facility recommendations for standard precautions

## KEY ELEMENTS AT A GLANCE

### 1. Hand hygiene[1]

**Summary technique:**

- Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly with a single use towel; use towel to turn off faucet.
- Hand rubbing (20–30 sec): apply enough product to cover all areas of the hands; rub hands until dry.

**Summary indications:**

- Before and after any direct patient contact and between patients, whether or not gloves are worn.
- Immediately after gloves are removed.
- Before handling an invasive device.
- After touching blood, body fluids, secretions, excretions, non-intact skin, and contaminated items, even if gloves are worn.
- During patient care, when moving from a contaminated to a clean body site of the patient.
- After contact with inanimate objects in the immediate vicinity of the patient.

### 2. Gloves

- Wear when touching blood, body fluids, secretions, excretions, mucous membranes, nonintact skin.
- Change between tasks and procedures on the same patient after contact with potentially infectious material.
- Remove after use, before touching non-contaminated items and surfaces, and before going to another patient. Perform hand hygiene immediately after removal.

### 3. Facial protection (eyes, nose, and mouth)

- Wear (1) a surgical or procedure mask and eye protection (eye visor, goggles) or (2) a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.

### 4. Gown

- Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.
- Remove soiled gown as soon as possible, and perform hand hygiene.

### 5. Prevention of needle stick and injuries from other sharp instruments[2]

**Use care when:**

- Handling needles, scalpels, and other sharp instruments or devices.
- Cleaning used instruments.
- Disposing of used needles and other sharp instruments.

### 6. Respiratory hygiene and cough etiquette

**Persons with respiratory symptoms should apply source control measures:**

- Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions.

**Health-care facilities should:**

- Place acute febrile respiratory symptomatic patients at least 1 metre (3 feet) away from others in common waiting areas, if possible.
- Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practise respiratory hygiene/cough etiquette.
- Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the evaluation of patients with respiratory illnesses.

### 7. Environmental cleaning

- Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces.

### 8. Linens

**Handle, transport, and process used linen in a manner which:**

- Prevents skin and mucous membrane exposures and contamination of clothing.
- Avoids transfer of pathogens to other patients and or the environment.

### 9. Waste disposal

- Ensure safe waste management.
- Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with local regulations.
- Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste.
- Discard single use items properly.

### 10. Patient care equipment

- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.
- Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.

[1] For more details, see: WHO Guidelines on Hand Hygiene in Health Care (Advanced draft), at: http://www.who.int/patientsafety/information_centre/ghhad_download/en/index.html.
[2] The SIGN Alliance at: http://www.who.int/injection_safety/sign/en/

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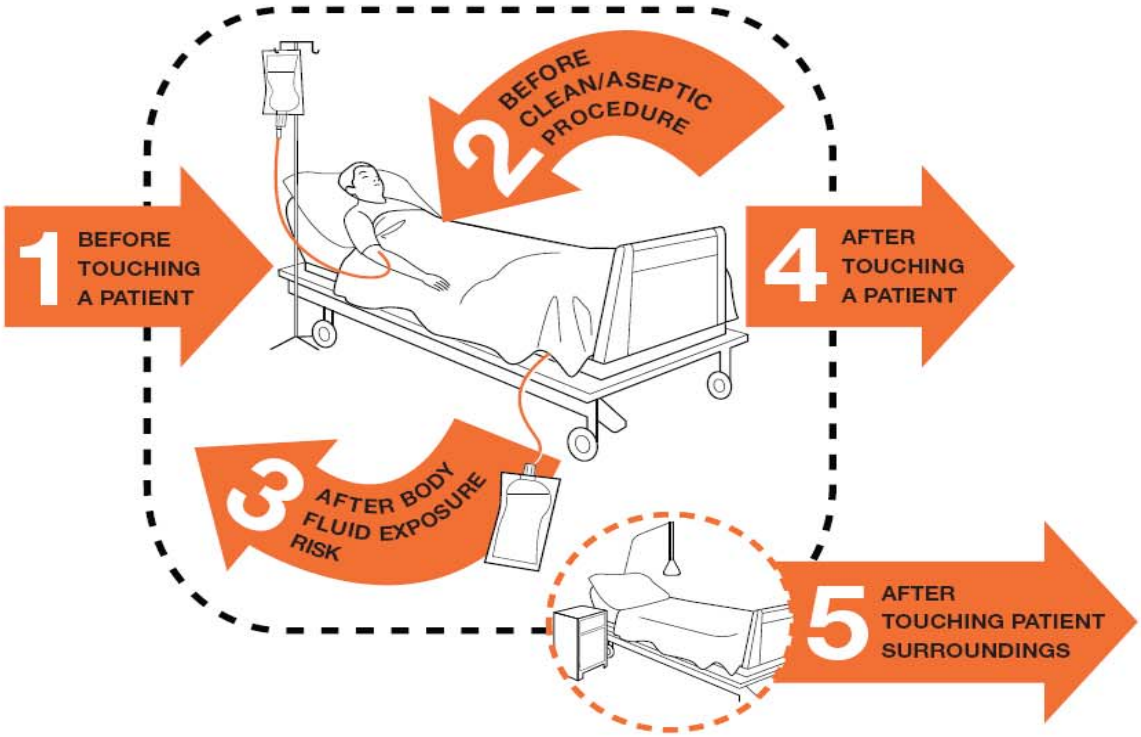
Hand hygiene is one of the most important ways of preventing and controlling the spread of disease in health care facilities and is a principal component of standard precautions. Below, we see a diagram depicting the five opportunities for hand hygiene during a clinical encounter in the hospital setting and also in the following figure, we see the appropriate technique for hand-washing with soap and water and hand-rubbing with alcohol.

# Your 5 Moments for Hand Hygiene




| | | | |
|---|---|---|---|
| 1 | BEFORE TOUCHING A PATIENT | WHEN? | Clean your hands before touching a patient when approaching him/her. |
| | | WHY? | To protect the patient against harmful germs carried on your hands. |
| 2 | BEFORE CLEAN/ ASEPTIC PROCEDURE | WHEN? | Clean your hands immediately before performing a clean/aseptic procedure. |
| | | WHY? | To protect the patient against harmful germs, including the patient's own, from entering his/her body. |
| 3 | AFTER BODY FLUID EXPOSURE RISK | WHEN? | Clean your hands immediately after an exposure risk to body fluids (and after glove removal). |
| | | WHY? | To protect yourself and the health-care environment from harmful patient germs. |
| 4 | AFTER TOUCHING A PATIENT | WHEN? | Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side. |
| | | WHY? | To protect yourself and the health-care environment from harmful patient germs. |
| 5 | AFTER TOUCHING PATIENT SURROUNDINGS | WHEN? | Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched. |
| | | WHY? | To protect yourself and the health-care environment from harmful patient germs. |

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WHO acknowledges the Hôpitaux Universitaires de Genève (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.

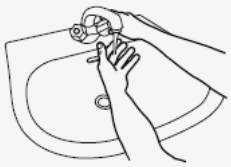
May 2009

Figure II.2
How to handwash

## Hand Hygiene Technique with Soap and Water

**Duration of the entire procedure: 40-60 seconds**

0



Wet hands with water;

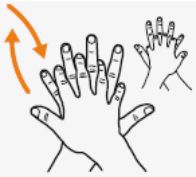
1

Apply enough soap to cover all hand surfaces;

2

Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4

Palm to palm with fingers interlaced;

5

Backs of fingers to opposing palms with fingers interlocked;

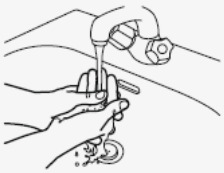
6

Rotational rubbing of left thumb clasped in right palm and vice versa;

7

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8

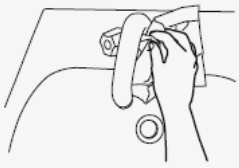


Rinse hands with water;

9

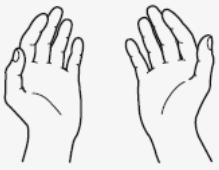
Dry hands thoroughly with a single use towel;

10



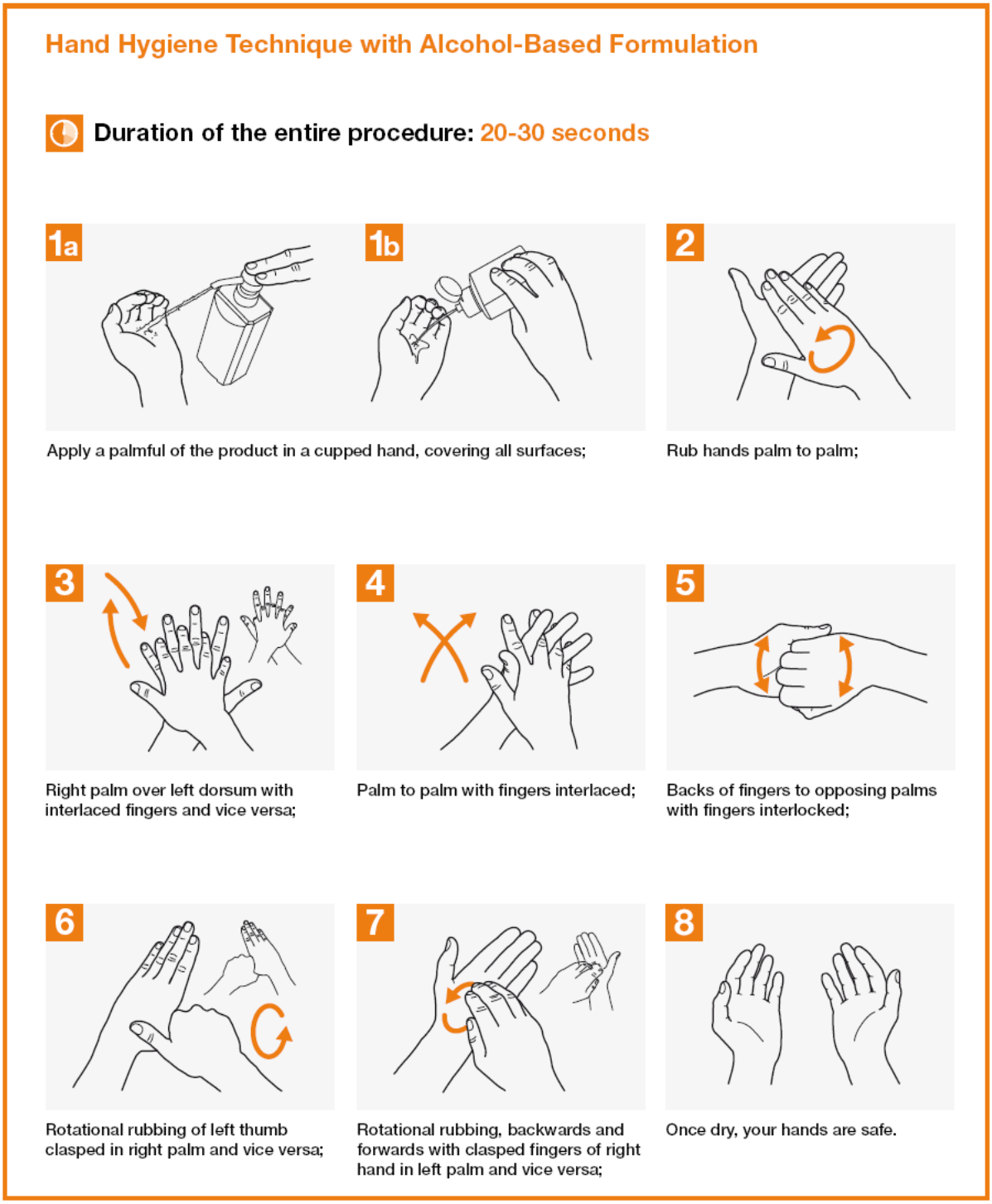
Use towel to turn off faucet;

11



Your hands are now safe.

Figure II.1
How to handrub




## ANNEX IV – Data Collection Forms

Organización Panamericana de la Salud
Oficina Regional de la Organización Mundial de la Salud

# Vigilancia nacional intensificada de infección respiratoria aguda grave (IRAG)

**Formulario III – Datos de paciente**

Hospital:_____Departamento:_____

Ciudad/Municipio:_____Departamento: _____País:_____

Número del caso:_____

Nombre:_____

Sexo Masculino_____Femenino_____ ¿Embarazada? _____Trimestre de embarazo_____

¿Post-parto? No_____Si_____

Fecha de nacimiento_____/_____/_____(Si no está disponible, edad informada_____)

Residencia (barrio o localidad; municipio/provincia)_____

_____

Ciudad/Municipio:_____País:_____

Factores de riesgo – señalar con una X:

| | | | | |
|---|---|---|---|---|
| Asma _____ | Cardiopatía crónica:_____ | Enfermedad hepática crónica:_____ | Enfermedad renal crónica:_____ | Obesidad: _____ |
| Otra enfermedad pulmonar crónica:_____ | Diabetes dependiente de insulina o de hipoglicemiante:____ | Enfermedad neurológica crónica:_____ | Inmunodeficiencia por enfermedad o tratamiento:_____ | Otro: informar |

Fecha de inicio de la fiebre: _____/_____/_____Fecha de hospitalización_____/_____/_____

¿Ingresó en UCI? No_____Si_____

Fecha de ingreso_____/_____/_____Fecha de salida_____/_____/_____

¿Usó oseltamivir? No_____Si_____ Fecha de inicio_____/_____/_____

¿Tomó muestra respiratoria? No_____Si_____ Fecha de toma de muestra:_____/_____/_____

Fecha de recibimiento del resultado del laboratorio por vigilancia:_____/_____/_____

Virus identificado_____ Tipo y subtipo_____

¿Falleció? No_____ Si_____¿Referido a otro hospital? No_____Si_____Fecha de salida: _____/_____/_____

Fecha de notificación:_____/_____/_____Semana #_____

Responsable de la notificación:_____

Nombre y firma