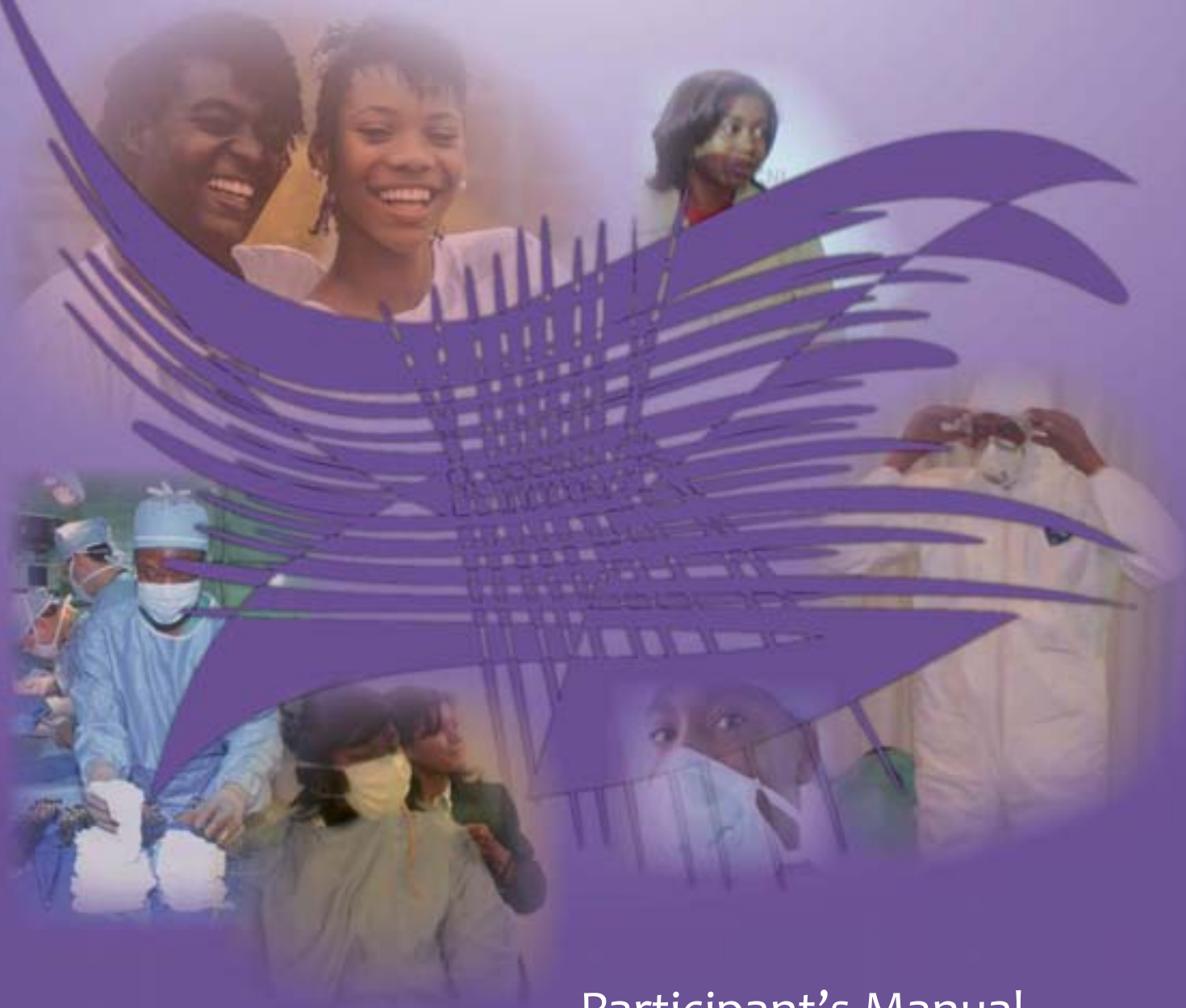


HEALTH SERVICES PREPAREDNESS FOR PANDEMIC INFLUENZA



Participant's Manual



**Pan American
Health
Organization**

Regional Office of the
World Health Organization

FOREWORD

The emergence of an avian influenza strain capable of infecting humans has served as a strong reminder of humankind's vulnerability to another pandemic. Successful control and containment of a pandemic will be dependent on early recognition of the first instances of human-to-human transmission with timely detection and rapid response.

Timely detection will only be accomplished by increasing the sensitivity of surveillance systems at all levels. One strategy for reaching such an increase is the involvement and training of healthcare workers to engage their efforts in the notification of signal events that may indicate the emergence of a new pathogen with pandemic potential. This training package aims at providing such training and at offering tools to facilitate the response by healthcare facilities in a situation where the demand for services surpasses their operating capacity.

This training package draws upon the growing body of knowledge on influenza, and attempts to consolidate it in an easy-to-use format for healthcare workers. The materials included in this training package have been designed as a generic guideline that requires adaptation to country specificities. Of particular importance is the inclusion of country-specific procedures for the immediate notification of such signal events.

While this material has been developed with influenza in mind, the capacities that will be reinforced by the tools provided in this training package will serve for the detection, notification, and response to any disease with epidemic potential. The strengthening of such basic public health capacities will be fundamental in the implementation of the new International Health Regulations.

It is hoped that this material will be of assistance to national programs tasked with the challenging but necessary task of preparing for a possible influenza pandemic.

Health Surveillance,
Disease Prevention and
Control Area (HSD)

Health Systems and Services Area (HSS)



AGENDA



Pan American
Health
Organization
Organización Panamericana de la Salud



HEALTH SERVICES PREPAREDNESS
FOR PANDEMIC INFLUENZA:
Train the Trainers Workshop



Miami, USA, September 2008



HEALTH SERVICES PREPAREDNESS
FOR PANDEMIC INFLUENZA:
Train the Trainers Workshop

BACKGROUND

Important efforts and resources have been invested worldwide in recent years in preparations to respond to a Human Influenza Pandemic prompted by the emergence of Avian Flu outbreaks in many parts of the world. In the region of the Americas, in response to the imminent danger, all countries developed and approved National Influenza Pandemic Preparedness Plans (NIPPPs); however, despite the existence of these plans, the health services of most countries remain unprepared for the challenge.

As a response to this need, an inter-programmatic work group of the Pan American Health Organization developed a training package targeted at healthcare delivery services (hospitals and community services) at the sub-national levels in Member States. Based on an “all hazards” approach, the training package aims to strengthen the capacity of these units to detect and respond to outbreaks of Severe Acute Respiratory Infections (SARI), with emphasis on Human Influenza. The Spanish version of the training package has been tested and implemented in 8 countries in Central and South America, while the English version was tested in Belize.

PAHO has secured a USAID grant to support Avian and Pandemic Influenza preparedness activities in the English-speaking Caribbean. One of the components of this project is the strengthening of the healthcare delivery services which includes the implementation of the training package for healthcare facilities.

The proposed *Train the Trainers* workshop seeks to create a sub-regional team of trainers and facilitators for the dissemination of the training package to a large number of healthcare institutions in the Caribbean. The participants will include a National Focal Point appointed by the Ministry of Health of each Member State, PAHO's Health Systems and Services Advisors, Communicable Disease Advisors/Focal Point, and/or Pandemic Preparedness Focal Points. It is anticipated that once trained, the members of this team will organize and conduct similar training in each country in an effort to cascade the training experience down to all levels of healthcare delivery units that could potentially be at the forefront of a pandemic response.

OBJECTIVE

To train Health Services and Pandemic Influenza focal points for the delivery of the Course for *Preparation of the Health Facilities for Detection and Response to Unusual or Unexpected Cases or Clusters of Severe Acute Respiratory Infections-SARI*

DATE & VENUE

The Train the Trainers workshop will take place at the Holiday Inn Miami Beach Oceanfront Hotel, in Miami, Florida, during the week of September 15 to 18, 2008.

PARTICIPANT'S PROFILE (TRAIN THE TRAINERS)

1. Ministry of Health Focal Point: A national professional with responsibility for coordination of Pandemic Influenza preparedness with ample knowledge of the health services and experience in the delivery of clinical care, plus good communication skills.
2. Health Systems and Services Advisors (BLZ, JAM, ECC, GUY, SUR, TRT, VEN).

3. Country Program Officer – PWR-ECC.
4. Communicable Diseases Advisors or Focal Points.
5. Pandemic Influenza Focal Points.

Brief Description of the Course for *Preparation of the Health Facilities for Detection and Response to Unusual or Unexpected Cases or Clusters of Severe Acute Respiratory Infections-SARI*

The sub-regional team (Trainers), in coordination with a PAHO Short Term Consultant (STC), will undertake the dissemination of the course at the national and sub-national levels. It is anticipated that the first step will be the conformation and training of national teams at country level and these national teams in turn, will train teams at facility levels (hospitals and health care centres) throughout the country based on an action plan agreed at the Train the Trainers workshop. A summarized description of the course is as follows.

1. Purpose of the Course:

To strengthen the capacity of the health services to detect and respond rapidly to cases or clusters of unusual or unexpected severe acute respiratory infections, including human influenza.

2. General Objectives:

Part I-- To strengthen the capacity of health professionals for the detection and early case management of clusters of Severe Acute Respiratory Infection at the level of health facilities. Emphasizing the early identification of newly emerging viruses and outbreak investigation of any case or clusters of cases in order to control them in a timely fashion.

Part II-- To provide tools for the improvement of the response capacity of health facilities to sporadic or epidemic outbreaks of **SARI**.

It is important to underscore that our aim is to reach health providers who will deliver care to patients mostly in in-patient facilities.

3. Methodology:

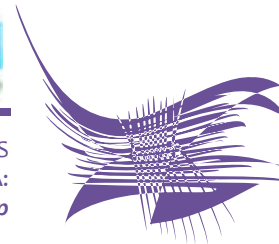
The course content is based on PAHO's and the Centers of Disease Prevention and Control of the U.S (CDC) ⁽⁴⁾ Generic Protocol for Surveillance of Influenza, published in 2007, and WHO guidelines, articles, and updates.

The course uses short 20-30 minute presentations, followed by discussions and work groups. The training experience will include case studies and practical demonstrations, and simulation exercises which will be carried out in work groups (five groups of 8 for a total of 40 participants).

3.1 Profile of the Participants (for courses in the national context):

The course is primarily directed to healthcare providers in public and private health facilities, especially hospitals. This includes physicians, nurses, laboratory staff and others. The course also contains components aimed at the management of the healthcare services and for this reason should involve clinical coordinators and other managers.

At the first in-country course, it is important to ensure participation of managers at the national level (Ministry of Health) and at sub-national levels (in decentralized systems, i.e. regional and local levels), as well as persons responsible for alert and rapid response units.



4. Content:

PART I - Case-detection and Response

Objectives:

That health professionals of every health facility are capable of:

- ✓ Detecting cases or clusters of severe acute respiratory infections;
- ✓ Initiating immediate reporting mechanisms to the sub-national and/or national authorities for the mobilization of rapid response teams in accordance with established protocols for the country;
- ✓ Adequately collect samples from these cases and sending them to the appropriate laboratory in a timely and secure manner.
- ✓ Initiating proper early case management for SARI cases or clusters, and implementing early prevention and hospital infection control measures;
- ✓ Understanding the International Health Regulations (IHR) and the necessary basic skills for the surveillance and response tasks.

PART II – Health Services Response

Objectives of the Module

- ✓ To train healthcare provider teams in the fundamentals for the response of health facilities to emergencies caused by Influenza-Like-Infections (ILI) and SARI.
- ✓ To provide practical tools for the organization of increased surge capacity
- ✓ To recognize ethical issues related to the response, and necessary measures for the re-organization of the services, management of cases, and efficient utilization of the resources of the health facilities.



HEALTH SERVICES PREPAREDNESS FOR PANDEMIC INFLUENZA:

Train the Trainers Workshop

(September 15-18, 2008)

	Day 1 (15 /Sep)		Day 2 (16 Sep)		Day 3 (17 Sep)		Day 4 (18 Sep)
8:00-8:30	Registration and Opening		Lab diagnosis Taking and shipment of samples Demonstration (Dr. Monica Guardo)		Introduction: Surge Capacity (Dr. Reynaldo Holder)		PAHO-USAID Project (Dr. Reynaldo Holder)
8:30-09:30	Introduction, objectives & methodology (Dr. Reynaldo Holder)		Pre- Test Influenza basics (Dr. Robert Lee)		Hospital preparedness plan (Mrs. Monica Zaccarelli)		How to plan and conduct the course (Ms. Lealou Reballos)
	Triage (Dr. Reynaldo Holder)				Planning the Way Forward (Workgroups)		
10:15-10:30	Break						
10:30-11:00	International Health Regulation (Thais Dos Santos)		Infection Control II (Dr. Maria C. Rangel)		Management of beds and resources (Dr. Reynaldo Holder)		Planning the Way Forward (Workgroups) Continuation
					Management of excess mortality (Dr. Robert Lee)		
					Occupational health (Dr. Reynaldo Holder)		
11:00-12:00	Influenza Pandemic Preparedness (Dr. Robert Lee)		Demonstration & practice		Risk Communication for the health facility (Ms. Bryna Brennan)		Workgroups Report & Closing (Reynaldo Holder, Robert Lee, Monica Zaccarelli, Lealou Reballos)
Influenza Pandemic Preparedness (Dr. Paul Edwards)							
12:00-13:30	Lunch						
13:30-14:10	Surveillance of Influenza: Generic Protocol for Influenza Surveillance (Dr. Monica Guardo)		Case management (Dr. Monica Guardo)		Simulation Exercise Hospital response		
14:10-15:15	Nationwide Enhanced Surveillance National & sub-regional information flows (Thais Dos Santos)		Vaccines and antivirals (Dr. Paul Edwards)				
15:15-15:30	Break						
15:30-16:50	Surveillance exercises		Case study		Checklist for health facilities (Ms. Lealou Reballos)		
Post-test							
16:50 -17:30							

GUIDELINE



Pan American
Health
Organization

Organización
Panamericana de la Salud

HEALTH ESTABLISHMENTS PREPAREDNESS FOR UNUSUAL OR UNEXPECTED CASES OR CLUSTERS OF SEVERE ACUTE RESPIRATORY INFECTION (SARI)



CONTENTS

1. Introduction
2. Purpose of the Course
3. General Objectives
4. Specific Objectives
5. Methodology

Part I–Detection of and Response to Severe Acute Respiratory Infection (SARI)

6. General Information about Influenza
 - 6.1. Seasonal Influenza
 - 6.2. Avian Influenza
 - 6.3. Pandemic Influenza
7. International Health Regulations 2005 (IHR-2005)
 - 7.1. Necessary Core Capacities for Surveillance and Response
 - 7.2. IHR and the Risk of a Human Influenza Pandemic
 - 7.3. Operational Aspects of IHR
 - 7.4. Public Health Emergency of International Concern
8. Preparations for an Influenza Pandemic
9. Influenza Surveillance
 - 9.1. Case Definitions for ILI and SARI
 - 9.2. Enhanced Nationwide Surveillance
 - 9.3. Importance of Hospital-based Surveillance
 - 9.4. Reporting
10. Laboratory
 - 10.1. Laboratory Tests for Diagnosis of Influenza
 - 10.2. Sampling and Shipment to the Laboratory
11. Hospital Infection Control
 - 11.1. ABC of Infection Control
 - 11.2. Specific guidance for SARI with Pandemic Potential
 - 11.3. Practical Demonstration
12. Case Management
 - 12.1. Triage
 - 12.2. Evaluation of the Required Level of Care
 - 12.3. Evaluation of the Availability of Medical Management Resources
 - 12.4. Need for Referral and Transportation of Patients
 - 12.5. Organization of the Healthcare Facility for Case Management
13. Vaccines and Antiviral Agents
 - 13.1. Vaccines
 - 13.2. Antiviral Agents

Part II–Hospital Response to a Pandemic

14. Hospital Preparedness Plan to Respond to an Emergency with Large Number of SARI Cases

- 14.1. Introduction
- 14.2. Organization, Command and Coordination Structure
- 14.3. Ethical-Legal Aspects
- 14.4. Triage
- 14.5. Bed Management
- 14.6. Resources Management
- 14.7. Management of Excess Hospital Mortality
- 14.8. Occupational Health

15. Risk Communication for Healthcare Facilities

16. Annexes

- Annex 1 Seven strategic actions to guide application of IHR-2005
- Annex 2 Epidemiological Surveillance Algorithm
- Annex 3 Formulas for Calculating the Proportions of Cases of SARI
- Annex 4 Forms for Weekly Compilation of SARI and Death by SARI
- Annex 5 Form for Reporting SARI–Generic Protocol for Influenza Surveillance
- Annex 6 Differential SARI Laboratory Diagnosis
- Annex 7 Techniques for Taking Respiratory Samples
- Annex 8 Packaging of Samples for Transportation
- Annex 9 Sample form for monitoring healthcare workers for detection of diseases similar to flu and for health workers exposed to patients with unusual or unexpected SARI
- Annex 10 Triage



1. INTRODUCTION

Emerging respiratory-transmitted diseases pose a substantial risk for humankind due to their very high potential for transmission. These diseases can produce high morbidity, and in more severe forms can cause high rates of hospitalization and high case-fatality rates. It is important to emphasize that lack of previous immunity in the population to novel viruses can lead to a high number of cases and greater severity of disease. This potential for severity requires that measures for patient care and control and prevention of new cases be put in place immediately.

In the last century three major pandemics have been documented: the first occurred in 1918 (influenza A/H1N1) and was responsible for the death of approximately 40 to 50 million people throughout the world, mainly affecting the young; the second was in 1957 (influenza A/H2N2) causing approximately 2 million deaths; and the third in 1968 (influenza A/H3N2), causing approximately 1 million deaths. (1)

Currently, influenza virus A/H5N1 has infected birds in more than 50 countries on three continents. This H5N1 strain has not demonstrated the ability to easily infect humans, but the possibility still exists that it could mutate to become a pandemic strain. Cases in humans caused by this strain have shown high case-fatality of about 60%. While it is not possible to predict whether the next influenza pandemic will be caused by influenza H5N1, the emergence of an avian influenza strain capable of infecting humans highlights the importance of surveillance systems that are sensitive enough to detect such viruses as they emerge. (2)

Considering the risk that this poses for humankind, the newly adopted International Health Regulations (IHR-2005), which entered into force on 15 June 2007, require that any case of human influenza caused by a new subtype be reported immediately (within a period of 24 hours) to the World Health Organization (WHO). (3)



This manual is part of a training package that was developed by the Pan American Health Organization (PAHO) with the objective of providing professionals in healthcare facilities with necessary tools for the rapid identification and proper management of cases with pandemic potential. Such rapid identification of initial cases will make it possible to put in place prevention and control measures in a timely manner. This training package is directed to primarily healthcare workers, particularly those working in facilities with inpatient services. Such workers include any professional that provides patient care such as nurses, physicians, laboratory staff, and others. The course should also include medical coordinators and other managers, as it contains components aimed at management of resources with health facilities during a surge of patients.

2. PURPOSE OF THE COURSE

To strengthen the capacity of the health facilities to detect and to respond rapidly to one or more cases of unusual or unexpected severe acute respiratory infection (SARI), including those caused by human influenza.

3. GENERAL OBJECTIVES

Part I	Prepare healthcare workers for detection and early management of a unusual case or cluster of SARI within healthcare facilities thus enabling the early identification of emerging agents and their investigation and control on a timely manner.
Part II	Provide tools for improvement of the response by healthcare facilities in a situation of SARI cases that exceed their capacity in order to achieve adequate and efficient care.



4. SPECIFIC OBJECTIVES

PART I: Detection and Management of SARI

That healthcare workers in every facility be capable of detecting on a timely basis:

- Unusual or unexpected SARI cases.
- Clusters of SARI
- Excess cases of SARI.

That healthcare workers in every facility be capable of responding on a timely basis to:

- Carry out effective case management while observing infection control standards.
- Report such events immediately to corresponding sub-national and/or national authorities for the mobilization of rapid response teams according to the mechanisms established in the country.
- Collect adequate samples from these cases and appropriately ship them to the laboratory in a timely manner.
- Know the International Health Regulations 2005 and their role in its implementation.

PART II: Hospital Response to a Pandemic

- Train the healthcare workers on the fundamental measures for the management of and emergency caused by SARI cases.
- Provide practical tools for the organization of the healthcare response to a sudden surge in demand for healthcare services.
- Know the measures for the organization of health services that contribute to efficient case management and utilization of available resources.

5. METHODOLOGY

The content of the training package is based on the Generic Protocol for Influenza Surveillance developed by PAHO and Centers for Disease Prevention and Control of the United States (CDC) (4), on WHO guidelines, and on scientific articles from peer-reviewed journals. The package was designed for a training course for a group of 40 people. The course consists of short presentations from 20 to 30 minutes, followed by a discussion of each topic. The material presented will be supplemented with exercises, case studies, practical demonstrations, and simulations where participants will be separated into smaller work groups of 5 to 8 people. It is important to emphasize that the course is aimed at healthcare workers whose work includes the inpatient treatment of patients with SARI.

References:

1. WHO Ten things you need to know about pandemic influenza. <http://www.who.int/csr/disease/influenza/pandemic10things/en/>
2. World Health Organization (WHO), Interim Protocol: Rapid operations to contain the initial emergence of pandemic influenza. Update October 2007. http://www.who.int/csr/disease/avian_influenza/guidelines/RapidContProtOct15.pdf
3. WHO. *International Health Regulations* 2005.
4. OPS-CDC. Protocolo genérico para la vigilancia de la influenza, 2006. PAHO/HDM/CD/V/411/06.



6. GENERAL INFORMATION ABOUT INFLUENZA

Influenza is an RNA virus belonging to the orthomomyxoviridae family. There are three types of influenza virus (A, B and C) that can cause disease in humans. However, only type A and B viruses have been known to cause outbreaks. Influenza type C viruses tend to cause only mild disease. The most mutable of the three are type A viruses, which are the only influenza viruses known to have caused pandemics. Influenza A viruses are also classified by subtype according to the proteins present on their surface, the hemagglutinin (16 subtypes), and the neuramidase (9 subtypes). (1)(2) The subtypes of the human influenza A virus that are currently circulating in humans are H1N1 and H3N2.

Minor changes in influenza viruses are responsible for seasonal outbreaks and drive the need for the development of an annual vaccine that provides protection against the strain in circulation. Major changes in the genetic composition of influenza A viruses can yield a pandemic virus if such a virus is capable of causing illness in humans and can be transmitted easily from person to person.

Influenza A viruses also infect other species of animals, such as other mammals and birds. While certain subtypes of influenza A virus are specific to specific species, birds are known to be the natural hosts to all known subtypes of influenza A.

6.1 SEASONAL INFLUENZA

Seasonal influenza (or flu) refers to the commonly circulating viruses that cause yearly epidemics at specific times of the year, mainly in the coldest months in countries with marked seasons. In countries with a tropical climate, the patterns of circulation are not clearly defined.

The incubation period of the virus varies from 1 to 4 days, with an average of 2 days. The disease is characterized by fever, headache, myalgia, prostration, runny nose, sore throat, and cough. The cough tends to be intense and long-lasting. Other symptoms are limited in duration and the patient recovers in a 2 to 7 days. From a clinical standpoint, influenza may not be distinguishable from diseases caused by other respiratory viruses.

This virus is effectively transmitted from person to person through various mechanisms such as direct contact, through droplets that in general disperse up to 1 meter, by fomites, and more rarely by aerosols. Disease caused by influenza can be effectively prevented with annual vaccination. For this purpose there is a virological surveillance system, the Global Influenza Surveillance Network (GISN), made up of 122 National Influenza Centers (NIC) in 94 countries. Such laboratories systematically sample patients with Influenza-Like Illness (ILI) to find out the viral circulation profile. Based on such circulation profile, WHO convenes a meeting of experts twice a year to determine the composition of the vaccine. (3) These vaccines should be administered before the annual peak. In industrialized countries, the influenza vaccine, when there is a good match between the antigens of the vaccine and the viruses in circulation, provides approximately 70% to 90% protection against clinical disease in healthy adults. Among older persons who do not live in institutions, vaccination against influenza can reduce the number of hospitalizations between 25% and 39% and reduce mortality between 39% and 75% during the influenza season. (4) Since 2004, PAHO has recommended annual vaccination for people over 60 years of age, the chronically ill, people who are immunocompromised, health professionals, pregnant women, and children between 6 and 23 months old. (5)

The most frequent complication of influenza is severe acute respiratory infection (SARI) with the clinical symptoms of pneumonia. This can sometimes be a primary infection due to influenza virus or it more commonly can



be secondary bacterial pneumonia (*S. pneumoniae*, *Haemophilus influenzae*, or *S. aureus*). During annual epidemics, the most serious cases and deaths take place mainly among children, the elderly, and people with underlying health conditions. It is estimated that annual mortality from influenza throughout the world reaches 1 million people.

In the majority of epidemics, between 80% and 90% of deaths occur in people over 65 years of age. The monthly peak of cases of influenza varies by country according to geographical location. In the United States of America, the CDC estimates that the peak generally is around the month of February. In the countries of the Southern Cone it is estimated that the peak generally takes place in May, while clear evidence is still not available to determine the peak in countries with a tropical climate.

6.2 AVIAN INFLUENZA OR AVIAN FLU

Avian influenza or avian flu is a disease of birds (wild or domestic), which are the natural reservoir of the virus. Humans are not generally a part of this cycle. The influenza A/H5N1 currently causes most concern because it has demonstrated the capacity to infect humans and a variety of other mammals. Human infections with this virus were first detected in Asia in 1997, but the virus has been spreading rapidly to other regions since 2003.

To date, H5, H7, and H9 avian influenza strains have demonstrated the capacity of infecting human beings. Sporadic infections in humans with influenza H5N1 in Asia since 1997 have resulted from contact with sick or dead birds or with their secretions, since the virus is excreted in the stools, blood, and respiratory secretions of the birds. Human cases that have occurred to date are associated with contact with birds between 76% and 100% of the time, depending on the country. Clusters of H5N1, considered to be groups with at least 2 cases that are linked epidemiologically, have been identified in 10 countries, corresponding to 25% of the cases. (2) More than 90% of clusters have occurred among family members. In these cases, the infection was probably acquired by a common source of exposure, such as birds, but limited person-to-person and unsustained transmission has also been considered. This probably occurred through close, unprotected contact with very sick patients. (2)

The incubation period of the virus in humans appears to be less than 7 days, in the majority of cases from 2 to 5 days. H5N1 infection seems to favor the young, with case patients averaging 18 years of age, and 90% of the cases are in patients less than 40 years old. The overall case-fatality rate is 61%, but this percentage is greater in the group under 20 years of age. Pneumonia occurs in 61% to 100% of the cases and the most frequent presentation of infection by H5N1 influenza in humans is severe pneumonia that rapidly evolves to an acute state of respiratory distress syndrome. Most frequent symptoms documented to date are fever (almost 100%), dyspnea (37%-94%), cough (71%-98%), runny nose (14%-33%), sore throat (32%-68%), and diarrhea (5%-52%). (2)

In Indonesia, for example, the initial diagnosis in the cases of patients with a confirmed diagnosis of influenza A (H5N1) was pneumonia in 46%, dengue in 12%, and acute respiratory disease in 27% of the cases. Only in 12% of the cases was human infection by an avian influenza virus considered as a first diagnosis. The period between the onset of symptoms and hospitalization ranged from 3 to 5 days and the time between the onset of symptoms and death ranged from 8 to 13 days. In these cases the time that the patient spends in the hospital is very short, with rapid evolution toward death. Other findings are leukopenia, lymphopenia, thrombocytopenia, and increase in lactic dehydrogenase (LDH). (2)



6.3 PANDEMIC INFLUENZA

An influenza pandemic occurs when a new viral subtype is generated by major changes in the virus, a subtype to which the human population has not had previous exposure. When the new virus finds a susceptible human population, epidemics can spread rapidly globally and can produce high mortality.

In order for an influenza virus to be able to cause a pandemic, the following criteria need to be met:

- **The virus should be capable of producing disease in humans;**
- **The population is totally susceptible to the virus (i.e. it does not have previous immunity); and**
- **The virus should be capable of being transmitted efficiently and sustainably from one person to another.**

It is not possible to know when and where a pandemic will begin or which strain of influenza will cause it or if the H5N1 virus currently in circulation will mutate so that it is transmitted efficiently from person to person. If H5N1 were capable of generating an influenza pandemic, it is also not possible to know the severity of disease caused by new pandemic strain. What is known is that never before have so many opportunities to generate a pandemic strain been documented, with so many cases in humans of infection by an avian influenza virus. In addition, the H5N1 virus has already become an enzootic virus in Asia and Africa, increasing the opportunities for human infection and the risk of emergence of a pandemic strain. Based on information provided by countries during training workshops in the use of statistical packages for epidemic modeling developed by the CDC, (6)(7) PAHO has estimated that, in a scenario of moderate severity—such as that observed in the 1968 pandemic—a first pandemic wave of 8 weeks of duration and 25% clinical attack rate would produce, on average, a potential pandemic impact equivalent to 334,163 deaths, 1,461,401 hospitalizations, and more than 76 million outpatient visits throughout Latin America and the Caribbean. (8) The impact of such a pandemic wave on hospital capacity would reach its maximum around the fourth to fifth weeks of the pandemic, with nearly 43,600 daily hospitalizations, using 84% of installed capacity. In this scenario, the capacity of intensive care units and respirators would be surpassed after the second week of the pandemic. These estimates, while using conservative assumptions, show the vulnerability of the healthcare services of the Region of Latin America and the Caribbean to an influenza pandemic.

This scenario highlights the importance of early detection of the circulation of any virus with pandemic potential for the immediate adoption of control measures aimed at containing its circulation. To meet this increased risk, the countries have developed, as a first step, National Preparedness Plans for an Influenza Pandemic.

References:

1. The Writing Committee of the World Health Organization (WHO) Consultation on Human Influenza A/H5. Avian influenza A (H5N1) infection in human. *N Engl J Med* 2005; 353:1374-85 [Erratum, *N Engl J Med* 2006; 354:884.]
2. The Writing Committee of the World Health Organization (WHO) Consultation on Human Influenza A/H5. Avian influenza A (H5N1) infection in human. *N Engl J Med* 2008; 358:261-273.
3. WHO. (<http://www.who.int/csr/disease/influenza/vaccinerecommendations/en/>)
4. WHO. (<http://www.who.int/wer/2005/wer8033.pdf>)
5. WHO. http://www.paho.org/Spanish/AD/FCH/IM/GTA16_2004_FinalReport_Spa.pdf.



6. Meltzer MI, Shoemaker HA, Kohnski M, Crosby R. 2000. FluAid 2.0: Software and manual to aid state and local-level health officials plan, prepare and practice for the next influenza pandemic (beta test version). Centers for Disease Control and Prevention. [Online]. Available at: <http://www.cdc.gov/flu/tools/fluaid/> [accessed 1 May 2007].
7. Zhang X, Meltzer MI, Wortley P. 2005. FluSurge 2.0: Software and manual to aid state and local public health officials and hospital administrators in estimating the impact of an influenza pandemic on hospital surge capacity (beta test version). Centers for Disease Control and Prevention. [Online]. Available at: <http://www.cdc.gov/flu/tools/flusurge/> [accessed 1 May 2007].
8. Mujica OJ, Oliva O, dos Santos T, Ehrenberg JP. Pandemic influenza preparedness: regional planning efforts; In: Institute of Medicine (IOM) 2007. Ethical and Legal Considerations in Mitigating Pandemic Disease. Workshop Summary. The National Academies Press; Washington DC.

7. INTERNATIONAL HEALTH REGULATIONS - 2005

International Health Regulations 2005 (IHR-2005), which entered into force on 15 June 2007, is a set of legally-binding norms adopted by WHO Member States in order to respond to disease risks that are capable of rapidly spreading from one country to another. The IHR-2005 updates the IHR-1969 which only referred to four diseases -- cholera, plague, yellow fever, and smallpox (now eradicated) -- and contained general provisions for border control and relatively passive measures of reporting and control.

The review in 2005 resulted in an unprecedented international agreement for public health that foresees the containment of health emergencies at the point of origin where the incident is located and not only at national borders. The new regulation encompasses all health events that can constitute a public health emergency of international concern. Unlike previous versions of the Regulations, the IHR-2005 include other public health emergencies of international concern such as chemical or nuclear accidents.

IHR-2005 also requires all the Member States to strengthen their capacities for surveillance and response (Annex 1: figure 1, actions 2-5). PAHO/WHO is collaborating closely with Member States providing them with technical guidance in reaching such core capacities.

7.1 NECESSARY CORE CAPACITIES FOR SURVEILLANCE AND RESPONSE

IHR-2005 contains a series of procedures for the management of events that represent a public health emergency of international concern as well as basic requirements for national systems for disease surveillance and response. These core competencies include the ability to detect, investigate, confirm, communicate, and intervene in events or diseases, defined in part A of Annex 1 of the Regulation.

7.2 IHR-2005 AND THE RISK OF A HUMAN INFLUENZA EPIDEMIC

In accordance with IHR-2005, all cases of the following diseases, smallpox, poliomyelitis (by wild poliovirus), SARS, and human influenza caused by a new virus subtype, should be reported immediately to PAHO/WHO. Reporting also includes the detection of influenza in birds.



7.3 OPERATIONAL ASPECTS OF IHR-2005

IHR-2005 introduces new operational concepts, namely:

- Specific procedures for monitoring and reporting of events and risks to public health.
- PAHO/WHO request the verification of public health events that occur in the countries
- Rapid risk assessment in collaboration with the countries and delivery of assistance, should it be required.
- Determination if an event constitutes a public health emergency of international concern.
- Coordination of international response.

7.4 PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

According to IHR-2005, a public health emergency of international concern is understood to be an extraordinary public health event that:

- It constitutes a hazard for public health of other states because of the international spread of a disease, and;
- It could require a coordinated international response.

In order to facilitate timely and adequate communication with PAHO/WHO with regard to possible public health emergencies of international scope, the IHR-2005 contains a decision instrument (Annex 1: see figure No.. 2) that establishes the parameters for reporting by countries to PAHO/WHO of all events that can constitute a public health emergency of international concern, on the basis of the following criteria:

- Severity of the public health impact of the event;
- Unusual or unexpected character of the event;
- Possibility of international spread of the event, and/or;
- Risk of restrictions to travelers or to trade due to the event.

In order for this tool to be used appropriately by the national government, it is required that the network of epidemiological surveillance set up by the health facilities fulfill the functions of early detection of events and immediate communication to the higher levels of each country.

References:

1. Text adapted from information available at: http://www.who.int/topics/international_health_regulations/es/ and <http://www.who.int/csr/ihr/es/index.html>
2. The complete IHR is available at: http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_3-sp.pdf
3. For additional information on the Region, consult the PAHO website at: <http://www.paho.org/spanish/ad/dpc/cd/EER-IHRS.htm>



8. INFLUENZA PANDEMIC PREPAREDNESS

While disturbances caused by influenza pandemics are often compared with natural disasters, it is probable that the effects of a pandemic are both widespread and continuous and could rapidly exhaust rapidly national and international resources. Such a possibility underlines the need for all countries to prepare a National Influenza Pandemic Preparedness Plan (NIPPP).

The objective of preparing and implementing a NIPPP is to plan and implement the national response to a pandemic, so that countries are prepared for detecting and handling its effects. Planning can help reduce transmission of the pandemic virus strain; diminish the number of cases, hospitalizations, and deaths; maintain essential services; and reduce the economic and social impact of a pandemic.

In the WHO Global Influenza Preparedness Plan (1) released in 2005, WHO establishes 6 phases of increasing risks to public health caused by the appearance of a new subtype of the influenza virus that could represent a pandemic threat. For each one of these phases, WHO recommends measures to national authorities and describes the measures that WHO would adopt to improve international coordination and transparency in application of the measures at the national level. The Global Plan provides guidelines for preparation of the NIPPP according to these phases. Every phase is associated with national and international public health measures. In accordance with this definition, in April 2008, WHO observes that the world is in phase 3 of pandemic risk.

Table 1: WHO Pandemic Risk Phases

Interpandemic period	<i>Phase 1</i>	No new subtype of human influenza. Low risk of infection by virus circulating in animals
	<i>Phase 2</i>	No new subtype of human influenza. New virus circulating in animals represents a risk for humans
Pandemic Alert Period	<i>Phase 3</i>	Human infection with a new subtype but without transmission from person to person
	<i>Phase 4</i>	Small clusters of cases with limited transmission from person to person
	<i>Phase 5</i>	Larger clusters of cases with transmission from person to person still localized
Pandemic Period	<i>Phase 6</i>	Pandemic: increased and sustained transmission in the general population

Since 2005, PAHO has been supporting the countries of Latin America and the Caribbean in the preparation, assessment, and implementation of their NIPPPs. At the same time, PAHO has supported countries in strengthening core capacities required to implement such plans. These capacities include establishment of early warning systems within the countries that improve their capacity to detect events that can represent public health threats, through expanding surveillance targets and through strengthening of the existing virological surveillance network. In addition, technical cooperation has aimed at strengthening mechanisms for response to any public health emergency, which has included the training, preparation, and equipment of rapid response teams in all the countries of the Region of the Americas.

PAHO technical cooperation aims that every country have a national pandemic preparedness plan in compliance with the recommendations established in WHO checklist (2) and that these plans be implemented



at national, sub-national, and local levels. In addition, the plans should be validated with simulations and drills at all administrative levels. In April 2008, all the countries of Latin America and of the Caribbean were actively involved in activities to prepare for an influenza pandemic and most had a NIPPP. In accordance with WHO guidelines, NIPPP should include specific actions for each phase, classified into five categories: 1) planning and coordination; 2) monitoring and evaluation of the situation; 3) prevention and containment; 4) response by the health system; and 5) communications.

References:

4. OMS. Plan mundial de la OMS de preparación para una pandemia de influenza 2005 <http://www.paho.org/spanish/ad/dpc/cd/vir-flu-plan-mundial-oms.htm>
5. OMS. Lista de verificación de la OMS del plan de preparación para una pandemia de influenza <http://www.paho.org/Spanish/AD/DPC/CD/vir-flu-oms-lista-verificacion.htm>.

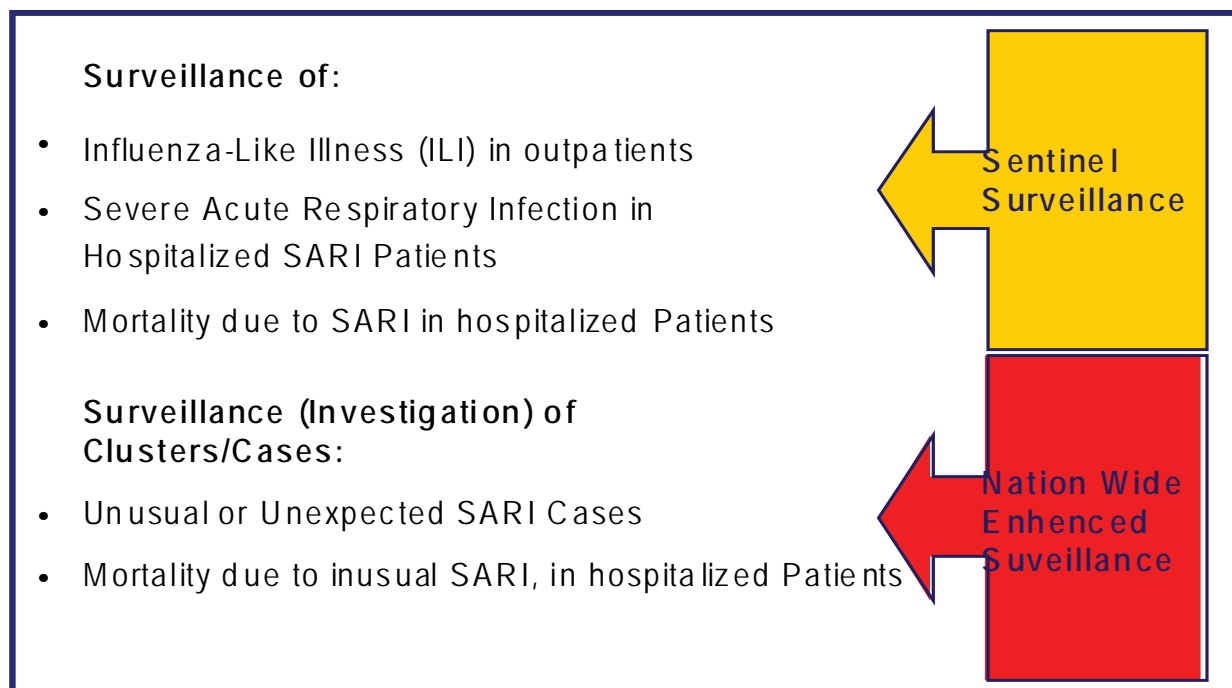
9. INFLUENZA SURVEILLANCE

Influenza surveillance has as its principal objectives:

- 1. Identifying the seasonal viral strain circulating in a country or region, for the purpose of determining the composition of and preparing the seasonal influenza vaccine.**
- 2. Detecting early on the presence of a strain with pandemic potential and implementing the pertinent control measures.**

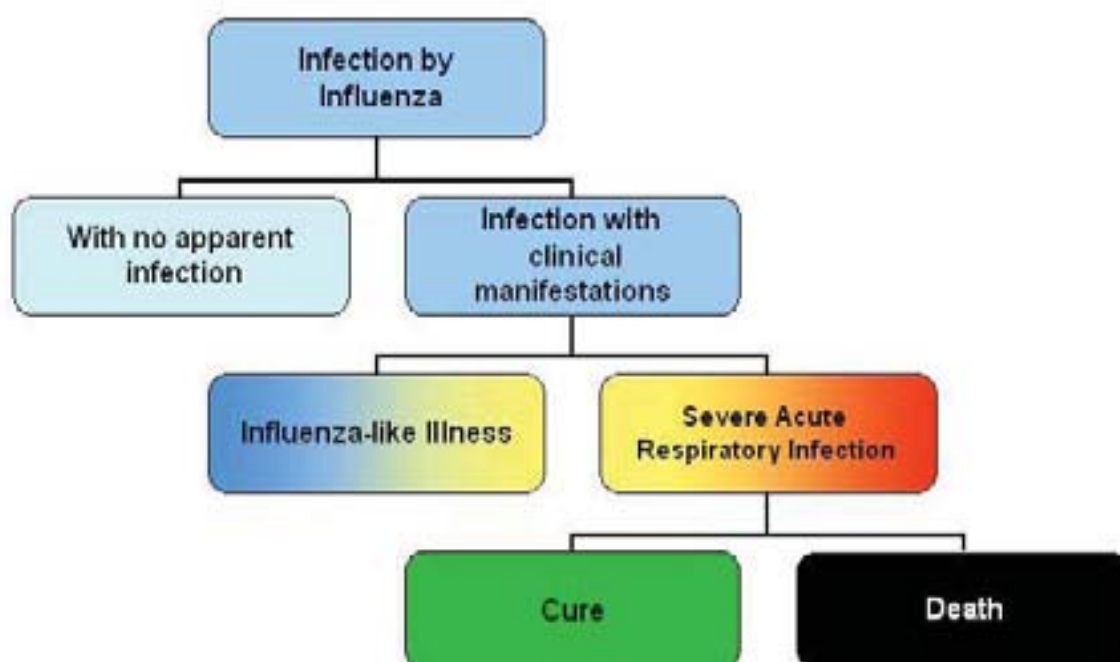
In order to meet these objectives the Generic Protocol for Influenza Surveillance (1) establishes the following means of surveillance:

- Sentinel Surveillance of Influenza-Like Illness (ILI) and of Severe Acute Respiratory Infections (SARI), in sentinel sites strategically selected by the Ministry of Health of every country. Sentinel surveillance of ILI is carried out in outpatients while the monitoring of SARI takes place in hospitalized patients. The protocol also proposes the surveillance of the mortality associated with SARI. The sentinel surveillance modality includes all cases of SARI, whether usual or unusual or unexpected forms. The objective of this surveillance is to provide data for determination of the epidemiological characteristics of the influenza, to guide the policies on the prevention and control of the disease.
- The Enhanced Nationwide Surveillance proposed by the protocol is carried out in **all** the healthcare facilities of the country, not only in selected sites. This surveillance is an improved system for reporting surveillance of events, with the sensitivity required to detect a case of unexpected or unexpected acute respiratory infection.

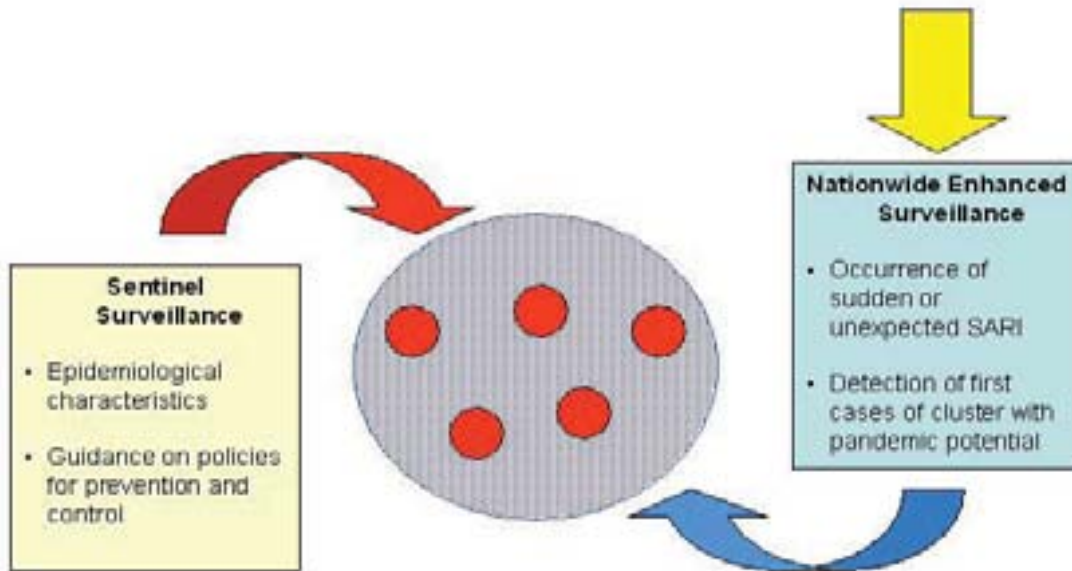


It is necessary to use different modalities for the surveillance of influenza as clinical manifestations of influenza are very variable, from a case without apparent infection up to complications such as pneumonia, which can evolve to severe cases of respiratory distress syndrome and death. The case definitions establish that patients with SARI are those that require hospitalization while patients with ILI are treated on an outpatient basis.

Infection by Influenza Virus: Vector of Clinical Manifestations



Sentinel influenza surveillance is already in place in most countries of the Americas. This course is aimed at preparing healthcare workers to carry out Enhanced Nationwide Surveillance as it is proposed in generic protocol for influenza surveillance. The distinctive characteristic of this surveillance is that it focuses on patients with unusual manifestations of SARI of greater severity and on deaths of people who show a pattern of febrile acute respiratory infection, of an unknown cause.





9.1 DEFINITION OF ILI, SARI, AND CONFIRMED CASE OF INFLUENZA

Influenza-Like Illness (ILI):

- Sudden appearance of fever higher than 38 ° C **AND**
- Cough or sore throat **AND**
- Absence of other causes

Severe Acute Respiratory Infection, SARI :

In the case of individuals ≥ 5 years

- Sudden appearance of fever higher than 38 °C **and**
- Cough or sore throat **and**
- Dyspnea or difficulty breathing **and**
- **Need for hospitalization**



For children under 5 the case definition has been adopted from the integrated management of childhood illness program (IMCI):

Every child suspected of **pneumonia** presents:

- Fever (temperature >38 C) and
- Cough or difficult breathing.

Difficult breathing is considered to be:

- Before 2 months old,: more than 60 breaths per minute;
- 2 to 11 months old: more than 50 breaths per minute;
- 12 months to 5 years old: more than 40 breaths per minute

Every child with **severe pneumonia** presents:

- Fever (temperature >38 C) more
- Cough or difficult breathing more
- Chest indrawing or stridor when is quiet or
- Any of the following general danger signs (severe disease):
Inability to drink or nurse, constant vomiting, convulsions, lethargy or unconsciousness
Those younger than 2 months can present fever or low body temperature

Suspicion of SARI is based on symptoms and clinical signs; a chest X-Ray is not necessary for the determination of a suspect case



Confirmed case of influenza:

Any case with positive results for the influenza virus in laboratory tests.

Table summarizing Sentinel Surveillance and Enhanced Nationwide Surveillance.

Sentinel Surveillance ILI e SARI	Enhanced Nationwide Surveillance Unusual or unexpected SARI
The case definition is broader. These are all cases of ILI and SARI	The case definition is more specific. This only includes unusual and unexpected cases or clusters of outbreaks of SARI, and those that show epidemiological characteristics suggesting infection with avian influenza.
Healthcare facilities strategically selected by a Ministry of Health	All public and private healthcare facilities
Systematic nasopharyngeal specimen sampling for influenza research	Systematic sampling of nasopharyngeal specimens for research on influenza in any unusual case of SARI.
Useful for estimating the disease burden. Serves to isolate the virus for determining the composition of the seasonal vaccine. Can detect circulation of atypical viruses with pandemic potential	Indispensable for early detection of pathogens with pandemic potential and the timely establishment of response measures. Supports implementation of the International Health Regulations 2005.

9.2 ENHANCED NATIONWIDE SURVEILLANCE

9.2.1 INTRODUCTION

This module for Enhanced Nationwide Surveillance is based on three documents: the Generic Protocol for Influenza Surveillance developed by PAHO and the CDC, the Guidelines for Investigation of Human Cases of Avian Influenza from WHO, and International Health Regulations 2005.

According to the Generic Protocol for Influenza Surveillance, early detection of all outbreaks of unexpected or unexpected respiratory infections is essential for effective application of control measures aimed at limiting morbidity and mortality. An effective system for surveillance of infectious diseases should have the capacity to detect and respond to outbreaks of human influenza and atypical respiratory infections. Furthermore, early detection of sustained person-to-person transmission of a virus with pandemic potential is crucial for application of control measures designed to interrupt or stop the spread of the disease.

Such a “Nationwide Enhanced Surveillance” system can provide an early warning for respiratory disease outbreaks with pandemic potential. Such a system requires that there be general awareness of the factors

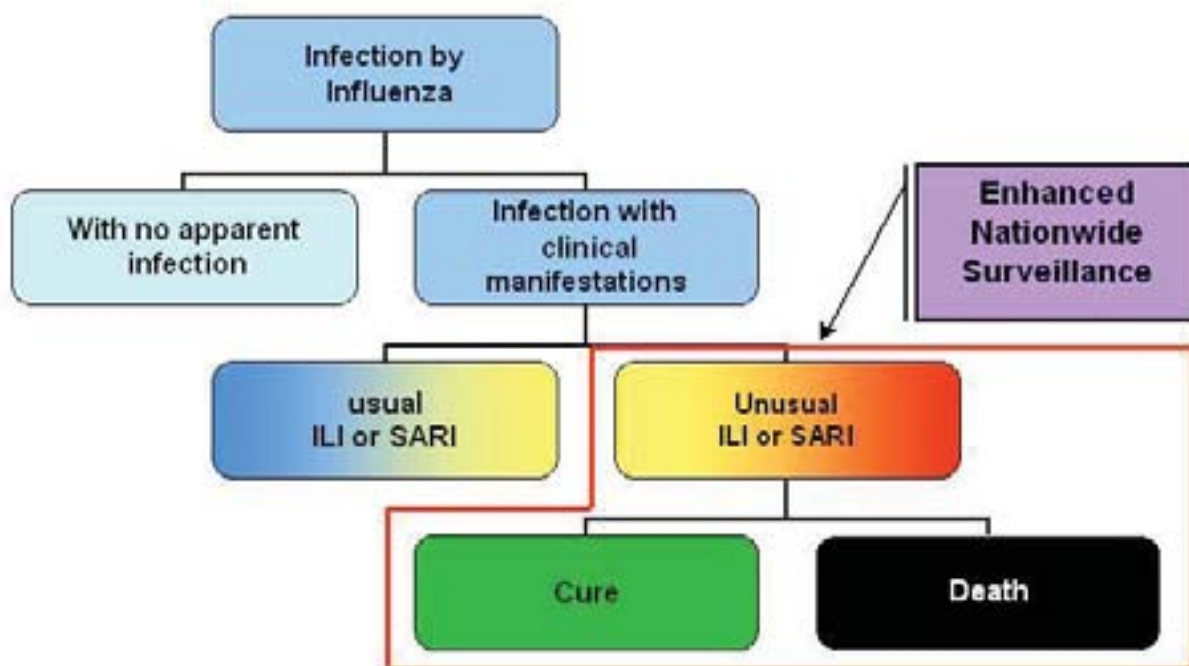


that should trigger a report and an effective report mechanism. (1)

This training package has been developed as a tool to facilitate compliance with International Health Regulations (IHR) with respect to detection of influenza in humans caused by a new subtype by increasing the sensitivity of surveillance systems.

As the following figure shows, Nationwide Enhanced Surveillance attempts to detect those cases with unusual and atypical manifestations of SARI.

Infection by Influenza Virus: Vector of Clinical Manifestations



The main focus of this chapter is unusual or unexpected cases and clusters of SARI. The terms “unusual” or “unexpected” are used in IHR-2005 to distinguish those events that deserve the particular attention of national surveillance systems, so that they can be evaluated in order to determine whether or not they constitute events of international concern. For Enhanced Nationwide Surveillance, these are events that trigger further investigation, as noted below. In order to further clarify the terms “unusual” and “unexpected,” several examples and specific situations are included, illustrating the objective of Enhanced Nationwide Surveillance.



An unusual case is one that is different, atypical, unusual, or uncommon and should always be regarded as a warning signal for the professional to initiate a report; take a sample for early diagnosis, and undertake immediate infection control measures.

Another unusual situation is the emergence of cases of SARI at an unexpected time of year or outside the normal season. This means that if, for example, the normal seasonal influenza peak is at the end of spring and the beginning of winter, and cases increase in the fall, this fact should cause us to pay attention.

According to the IHR -2005 an unusual event is:

- The event is caused by an unknown agent or the source, vehicle, route of transmission is unusual or unknown.
- Evolution of cases more severe than expected (including morbidity or case-fatality) or with unusual symptoms.
- Occurrence of the event itself unusual for the area, season or population.

According to the IHR-2005, an unexpected event is one caused by a disease/agent that had already been eliminated or eradicated from or not previously reported in the specific geographic location.

9.2.2 OBJECTIVES OF ENHANCED NATIONWIDE SURVEILLANCE

Detection

- Timely detection of unusual or unexpected cases of SARI.
- Timely detection of clusters of SARI.
- Timely detection of excess SARI cases

Reporting

- Immediate reporting of unusual or unexpected cases or clusters of SARI to local and/or national authorities for mobilization of the rapid response team according to established national procedures.

Investigation

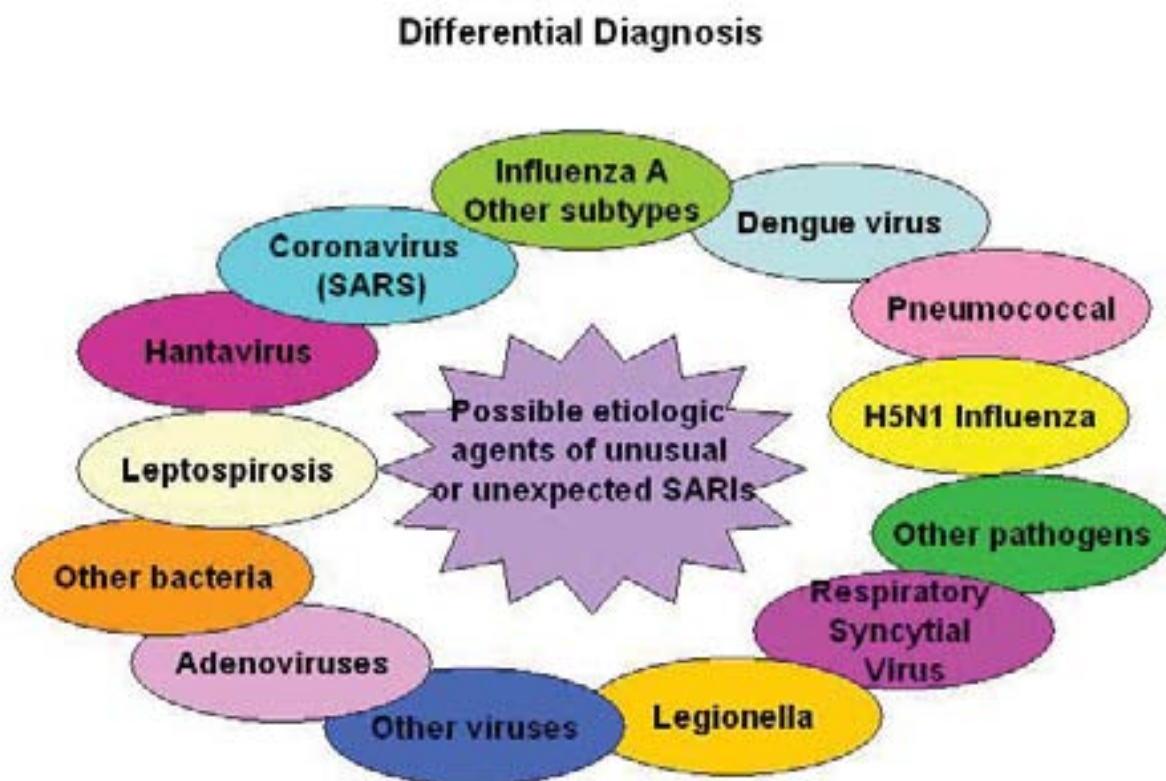
- Collaboration in the epidemiological investigation, including active search for additional suspect cases in the community, and in the initial control of the outbreak, when required.

9.2.3 EARLY DETECTION OF UNUSUAL OR UNEXPECTED SARI

Healthcare workers should be alert to *unusual, uncommon, or unexpected* diseases (including respiratory infections linked with epidemiological factors, for example, clusters of SARI, cases of SARI related to travel or exposure to sick animals), in order to report these immediately to public health authorities and so that control measures can be put in place in a timely fashion.



There are many diseases that can manifest themselves as SARI. Among the principal etiologic agents we have viruses, followed by bacteria. The figure below illustrates the most common diagnoses:



9.2.4 TRIGGERS FOR INVESTIGATION (1) (2) (3)

Healthcare workers should be alert to the appearance of unusual SARI cases, since these constitute triggering factors for investigation, as noted below:



• Unusual (atypical or uncommon) cases of SARI

Definition of unusual (atypical or uncommon) cases of SARI:

- **In healthcare workers** in contact with patients with SARI
- **Unexplained SARI in a person who works with birds or animals**
- **In people who travel** to areas of circulation of the avian influenza virus H5N1.
- Cases in previously healthy **young adults, between 5 and 59 years of age.**
- **Deaths** by SARI of unknown cause.
- Every case which a **health professional perceives** as being unusual or atypical.

• Clusters (outbreaks) of SARI

Definition of Clusters of SARI:

A cluster is defined as **TWO or more** people with manifestations of SARI or who died of unexplained SARI, linked socially or geo-spatially within a period of 2 weeks. (2)

- Clusters that include two or more members of a family, social nucleus or workers at a given site.

• Excess cases of SARI

Definition of excessive number of cases of SARI:

Knowing the expected number of cases of SARI throughout the year enables the detection of when the current number of cases exceeds the epidemic threshold (defined by an endemic channel)

This is a parameter that healthcare facilities should monitor. For this purpose, it is necessary for the healthcare facility to have a time series, of 5 years or more, of the number of cases hospitalized for SARI per epidemiological week. Based on these data, it is possible to construct the endemic channel for the specific facility, thus establishing the epidemic threshold. This allows the determination if the number of cases seen fall within the expected range for the time period being evaluated. The rate of SARI cases per epidemiological week in proportion to the total number of hospitalized patients is one of the parameters most used for this surveillance (% of SARI hospital cases, per epidemiological week). Another important parameter is the rate of deaths by SARI in proportion to total deaths for the healthcare facility (5). Annex 3 includes some rates used for monitoring SARI in the healthcare facility.



The epidemiological week is the unit of time for the reporting, tabulation, and analysis and is established on the basis of the epidemiological schedule for each year. Once the data have been collected and analyzed on the basis of the weekly trend, information is generated that **allows early detection of clusters for adults and children** who require medical care for SARI and reporting of an epidemiological alert. Some models for forms to capture the data collected in routine surveillance for SARI and deaths by SARI in a healthcare facility are found in Annex 4.

Epidemiological history to investigate to confirm a suspicion of avian influenza: (1) (2) (3)

Any of the following events **must be reported and an investigation begun** to identify changes in the agent or in the host and confirm its etiology. Patients with SARI who have a history that strongly indicates possible exposure to the avian influenza virus A, within ten (10) days prior to the onset of symptoms, are the ones that¹:

- Travel or reside in an area affected by influenza outbreaks in birds or other animals (especially if they have visited livestock establishments, farms, markets for meat or live animals or have participated in game hunting activities).
- Have a history of direct contact with animals, especially dead or sick birds, in an affected area
- Indicate possible occupational exposure to animal products or products of animal origin,² including working as a butcher, veterinarian, laboratory technician, poultry worker.
- Consumption of products originating from domestic or wild birds, either raw or cooked (for example, meat, eggs, blood, liver)

Laboratory confirmation of a human case of avian influenza (H5N1), for example, should immediately trigger a full investigation.

Epidemiological surveillance also should begin to investigate **rumors**:

- Unofficial reports of respiratory infection outbreaks have demonstrated usefulness in early identification of cases. Healthcare workers should be alert to such information, which can come from communications media, the public, other professional groups, and laboratory staff.

1 It is necessary to point out that human cases of infection by influenza A (H5N1) have been diagnosed in some areas in which there had been no previous notice of disease or death in birds..

2 Certain types of exposure imply greater risk: plucked birds, slaughtered birds, cooked birds, cleaning of cages, living together in the home, handling of excrements used as fertilizers, etc.



Other triggering factors for investigation of outbreaks can be clusters of animal deaths or excessive absenteeism at schools and places of work.

In summary, the triggering factors for an investigation, beginning with cases detected in health facilities, are:

- **Unusual cases of SARI;**
- **clusters of SARI;**
- **cases of SARI related to trips or to contact with animals with the potential for exposure to the influenza virus.**
- **excess number of cases of SARI.**

It is important to point out that investigation should begin immediately, without waiting for confirmation of laboratory results identifying the causative agent.

In situations of unusual or unexpected SARI, there should be an active search of clinical histories to detect additional cases, as well as death certificates for deaths caused by respiratory disease in the previous period of a month or more. Travel history should always be investigated, as well as other activities that took place in the 10 days preceding the appearance of symptoms. It is important to involve all workers in the healthcare facility, so that all are alert to the appearance of new cases for them to be reported and investigated immediately.

An essential element for success of epidemiological surveillance, early detection, and the timely establishment of control measures, is strengthening basic capacities for surveillance and response in healthcare facilities. One should also add the need for integration in the healthcare facility of healthcare workers and epidemiological and laboratory professionals.

9.3 IMPORTANCE OF HOSPITAL EPIDEMIOLOGICAL SURVEILLANCE

Both public and private hospitals are entry points into the health system that are important for detection of serious or unusual cases of emerging diseases and of outbreaks. Hospitals constitute the principal location for detection of cases of unusual or unexpected respiratory infections, with pandemic potential. As such, professionals who work in these establishments should know the mechanisms by which to notify such events as well as appropriate procedures to respond to these cases. Such response includes complying with required biosafety standards, investigation of risk factors and additional cases, and collection of laboratory samples. Such response will protect healthcare workers and provide health authorities with information in which to base the decision on appropriate control measures. Similarly, health authorities should



continuously update healthcare workers on disease outbreaks and other risks occurring in the population.

9.3.1 ENTRY POINTS FOR HOSPITAL CASES

The principal entry points for cases of SARI are the first aid and emergency units, from which patients are referred to intensive care or intermediary units. All staff of these areas should receive training on procedures to follow with these cases. All unusual events, not only with respect to respiration, but also hemorrhagic symptoms of jaundice, or neurological systems, should also be reported immediately to the corresponding health authorities. In case of death of a patient without samples having been collected of material from the oro/nasopharynx and of blood, blood samples and tissue biopsies should be carried out when possible for the purpose of laboratory investigation of the case and contact should be established immediately the unit responsible for local epidemiological surveillance.

It is important to stress that the adoption of measures described below should be simultaneous. This means that reporting, adequate management, and the taking samples should be carried out as soon as such cases are detected

9.4 NOTIFICATION

Immediately report to local and/or national authorities for mobilization of rapid response teams:

- Unusual cases of SARI;
- Clusters of SARI;
- Excess cases of SARI.

FLOW OF REPORTING

- The healthcare facility should immediately report to the appropriate local authorities any case or cluster of SARI that is determined to be unusual or unexpected. This report should rapidly trigger epidemiological investigation by the epidemiological surveillance rapid response team.
- Reporting of unusual or unexpected SARI should follow the information channels of the national surveillance system. The information should pass from the healthcare facility up established channels of national surveillance until it reaches the appropriate authorities at the national level (commonly the epidemiology department of the Ministry of Health) so that appropriate investigations can be made.



Follow national guidelines established for flow of information and investigation by the rapid response team.

INVESTIGATION EVENT AND ACTIVE SEARCH OF SUSPECT CASES

This action is usually an attribute of sub-national health secretariats. However, if the healthcare facility where the case was detected is the only health authority in a given locality, it will have the responsibility for initiating epidemiological investigation, including active case-finding of additional suspect cases and initial control of the outbreak.

Initiating an investigation to identify additional cases beyond immediate contacts is fundamental for prevention and control of infection. The search for active cases should concentrate on:

- People that may have been exposed to the same source as that of the cases identified;
- People with exposures to animals, especially sick birds;
- People with unexplained SARI or people who have died of an unexplained febrile respiratory disease.

The strategy for case-finding in the area under investigation can focus on the community, through house-to-house visits (carried out by those charged with local-level surveillance) or on institutions, through telephone surveys of healthcare facilities, private physicians, and laboratories, or through the review of records.

A record should also be prepared of all co-exposed contacts and people, with demographic information, date of last exposure or date of contact with the case.

During the investigation, it is fundamental to prepare daily reports on the situation and establish effective and timely communication with relevant authorities at local and national level, as well as with other stakeholders (for example, the public and the communications media).

References:

1. OPS-CDC. Protocolo genérico para la vigilancia de la influenza, 2006.
2. World Health Organization. WHO guidelines for investigation of human cases of avian influenza A (H5N1). 2006. revised in 2007. (Accessed 9 April 2008, at http://www.who.int/csr/resources/publications/influenza/WHO_CDS_EPR_GIP_2006_4r1.pdf)
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4. Centers for Disease Control and Prevention (CDC). Case studies in applied epidemiology. Influenza A(H5N1) in humans: Surveillance and case management (international setting), December, 2007.
5. Centers for Disease Control and Prevention (CDC). FLU VIEW, a weekly influenza surveillance report prepared by influenza division. (Accessed 9 April 2008 <http://www.cdc.gov/flu/weekly/>)



10. LABORATORY

SARI can be caused not only by the influenza virus but also by other viruses, such as respiratory syncytial virus (RSV), Parainfluenza subtypes 1, 2 and 3 and Adenovirus. SARI can also be of bacterial origin. The only way of knowing with certainty the etiology of a case of ILI or SARI is by means of laboratory diagnosis.

Laboratory diagnosis of influenza is an important public health tool, for prevention, surveillance, containment, and therapeutic management. It is also required for identifying the circulation of the influenza virus and formulating compatible vaccines.

The sensitivity and specificity of the diagnosis method for influenza will depend on technical laboratory operation, the type of test used, and the specimen analyzed (the time it is taken, the sample quality, and the sample origin).

10.1 LABORATORY TESTS FOR DIAGNOSIS OF SARI AND INFLUENZA

Samples of nasopharyngeal secretion and blood for serology and hemoculture should be collected in all cases of SARI. Differential laboratory diagnosis of SARI is very broad. (Annex 6)

For diagnosis of influenza, several characteristics of the specimen are very important:

- **Collection of samples within the first 72 hours of onset of symptoms.**
- **Adequate specimen collection procedures.**
- **Conditions of shipment and storage of samples before they are processed in the laboratory**

The virus influenza is replicated primarily in epithelial cells of the respiratory tract. For this reason it is necessary to capture cells in taking samples of material and not only secretion.

The most used respiratory specimens are:

- Nasopharyngeal swab
- Nasopharyngeal aspirate
- Tracheal aspirate and bronchoalveolar lavage are only used in special situations, according to medical criteria.

Laboratory Tests (1)

- **Indirect immunofluorescence**

Samples are processed and are analyzed in the laboratory to detect the presence of viral antigens (*Adenovirus*, *Influenza* virus of types A and B, *Parainfluenza*, and respiratory syncytial virus) using the immunofluorescence test with monoclonal antibodies. The sensitivity of this technique varies from



70% to 100% and its positive predictive value is from 84% to 94%, reaching the maximum in periods of higher virus circulation. Ideally this technique is carried out using level 2 biosafety practices. However, in suspected cases of avian influenza, unusual or unexpected cases or outbreaks of SARI, the processing should be at level 2 biosafety, applying level 3 practices at the national reference laboratory. This is a test that can be carried out in some reference laboratories, although in general it is carried out by the public health laboratory.

- **Virus culture**

This is a method of high sensitivity and high utility for diagnosis of viral infections, when the specimens are high-quality. This is the gold-standard laboratory test for influenza. It can be carried out in a cell culture or in fertilized eggs. The test can give results in 2 to 3 days using immunological methods for reading the results, since immunofluorescence with the conventional system can take from 7 to 10 days. The culture performed in fertilized eggs allows isolation of the virus for vaccine production. The principal advantage of viral isolation is that this method amplifies the virus of the initial material and makes possible antigenic characterization with reference antibodies that is indispensable for the selection of the virus for vaccination, as well as tests of antiviral resistance antiviral. It is a test carried out in **National Influenza Centers (NIC) or in the Reference Centers for the Region.**

- **Molecular Techniques--Polymerase Chain Reaction (PCR)**

The PCR detects genetic material of the virus that is present in clinical samples and in viral cultures. The tests are based on amplification of the nucleic acid RNA. Another technique used is RT-PCR (in real time), with a more rapid result, although few laboratories are using this due to the cost of equipment. Sequence analyses of the virus permit study of its evolution and of the mutations that modify the antigenic sites for strain selection for the vaccine. This test is carried out in **National Influenza Centers of Influenza (NIC) or in the Reference Centers for the Region.**

- **Serological techniques**

The technique used is hemoagglutination inhibition (HI). It requires two paired serum samples from the patient (with 10 to 15 days difference among them). This allows checking seroconversion for a given viral strain. The test is carried out making use of a reference panel of antigens and antisera provided by the CDC.

- **Rapid Influenza Test**

There are three types of tests, those that only detect influenza A, those that detect influenza types A and B but do not distinguish between them, and those that detect influenza A and B and distinguish between the two types.

These are useful to support the investigation of outbreaks and initiate antiviral treatment within 48 hours of appearance of the symptoms Among the disadvantages are that they do not permit identification of viral subtype and the fact that they have low sensitivity, principally by comparison with viral isolation, which leads to results with false negatives and high cost. In addition, this is a low-sensitivity test in comparison with viral isolation.



10.2 SAMPLING AND SHIPMENT TO THE LABORATORY (2)(3)(4)(5)

Collect samples of these cases, sending them to the laboratory in a proper and timely way.

Important aspects for taking respiratory samples:

- Satisfy the definition of an unusual case of SARI
- Samples for isolation of respiratory viruses should usually be collected during the **first 3 days** from appearance of the symptoms.
- The sample should be taken before administering antiviral drugs.
- Several samples should be collected on different days.
- **In children under 5, the ideal respiratory sample to take is that using the nasopharyngeal aspirate technique.**
- In adults and children over 5, the ideal respiratory sample is the nasopharyngeal aspirate, since it is more effective. However, it can be obtained through nasopharyngeal swab or nasal lavage. Directions for collection and management of respiratory samples are found in Annex 7.
- After being collected, the sample should be kept in ice until placed in the refrigerator.
- If samples for viral isolation are going to be transported to the laboratory within 2 days, they should be kept at 4° C, and transported to the laboratory promptly. Otherwise, the samples should be frozen to -70° C until they are transported to the laboratory.
- Avoid freezing and thawing of samples. Annex 8.
- The serum should be stored to 4° C for approximately a week but afterwards should be frozen to -20° C (see more detail in Annex 7 and Annex 8). Group paired samples, the 1st sample collected on the first 3 days and the 2nd sample during convalescence (10 to 15 days after the 1st sample).
- It is important in these cases to take an additional serum sample (10ml of blood), because of differential diagnosis with other pathologies.

References:

1. World Health Organization WHO. Role of laboratory diagnosis of influenza.
2. World Health Organization (WHO). Guidelines for collection of clinical specimens during field investigation of outbreaks, 2000.
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4. World Health Organization (WHO). Guidelines for The storage and transport o human and animal specimens for laboratory diagnosis os suspected avian influenza A infection. January 2005.
5. World Health Organization (WHO). Guidelines for Collecting, preserving and shipping specimens for the diagnosis of avian influenza A(H5N1) virus infection Guide for field operations, October 2006.



11. INFECTION CONTROL

11.1 PRINCIPLES OF INFECTION CONTROL

Understanding the epidemiological chain of disease causation is necessary to understand the points in which to intervene in order to interrupt transmission of infectious pathogens.

- The first link is **the infectious agent** in the reservoir and/or source of infection.
- The second link in the epidemiological chain is **the transmission mechanism**. Infectious agents leaving the source of infection reach the entry point to the susceptible host through one or more transmission mechanisms.
- The third link is **the susceptible host**. When the infectious agent reaches the host, it must find contributory mechanisms for producing the infection.

11.1.1 TYPES OF TRANSMISSION

The types of transmission vary depending on the type of microorganism, and some can be transmitted through more than one route. The three most important ways of transmission are:

- **By Contact**

Microorganisms are transmitted by direct or indirect contact with the patient or the environment of the patient. Direct transmission occurs when microorganisms are transferred from one person to another person without an object or a contaminated person as intermediary. Indirect transmission includes the transfer of an infectious agent through an intermediary object or contaminated person. Precautions for contact also apply where there is presence of excessive drainage from wounds, fecal incontinence, or other discharges from the body that have greater potential for environmental pollution and a greater risk of transmission. In addition to transmission by droplets, some respiratory pathogens, for example, parainfluenza and respiratory syncytial virus (RSV), can be transmitted through contact; particularly contamination of the hands and auto inoculation in the conjunctiva or the nasal mucous membrane. Transmission by contact can also play a role in infections by SARS and avian influenza A (H5N1).

- **By Droplets**

Transmission by droplets implies contact with the conjunctiva or with the mucous membranes of the nose or mouth of a susceptible person, and droplets of particles that contain microorganisms coming from a person who has a clinical disease or is a carrier of a microorganism. Droplets are generated mainly in the person-source when the person coughs or sneezes or during conversation. Droplet transmission requires close contact between the source and the receptor persons, because droplets do not remain suspended in the air and usually only travel short distances (approximately three feet or 1 meter) through the air. Respiratory pathogens that are transmitted through droplets include adenovirus, human influenza, SARS, and avian influenza A (H5N1).



Based on epidemiological patterns of transmission of the influenza virus, transmission by droplets is considered the most important transmission route.

- **By air (aerosols)**

Pathogens transmitted through the air are transmitted through inhalation of droplet nuclei that continue to be infectious over a great distance (more than 1 meter), and require special systems of air management and ventilation (for example, negative pressure rooms). Their transmission is classified as: **required airborne transmission**, i.e., *Mycobacterium tuberculosis* that causes lung tuberculosis and, **preferential airborne transmission**, referring to respiratory pathogens that can also be transmitted through other routes (for example, measles).

Under certain circumstances, the transmission of droplet nuclei over short distances could occur with human influenza, and perhaps with other respiratory viral infections, for example, during procedures that generate aerosols in rooms that are not adequately ventilated or the inadequate use of personal protective equipment (PPE) (for example, SARS). This type of transmission has been known as “opportunistic airborne transmission,” and is not the same as the classical airborne transmission that involves transmission over a great distance.

11.1.2 ROUTINE PRECAUTIONS FOR INFECTION CONTROL

Standard Precautions

Standard precautions are **routine** precautions for infection control, which should be applied to **ALL** patients, in **ALL** health contexts.

Their purpose is to minimize the spread of infection associated with healthcare and avoiding direct contact with blood, bodily fluids, secretions, and non-intact skin of patients. The SARS outbreak in Hong Kong in 2003 illustrated the critical importance of basic precautions for infection control in healthcare facilities. Generally the transmission of SARS in a healthcare facility is associated with lack of compliance with standard precautions.

The threat of emerging respiratory infectious diseases implies that promotion of standard precautions is more important than ever, and should be a priority in all healthcare facilities.

Hand hygiene

Hand hygiene is one of the most important measures for preventing and controlling spread of disease in health facilities. It is a core component of the standard precautions. Although it is a simple



procedure, numerous studies have demonstrated that compliance with hand hygiene is low. In recent years, the use of alcohol-based hand solutions has been implemented in health facilities in an attempt to increase compliance with hand hygiene. Its main aspects are:

- Routine hand hygiene includes washing hands with water and liquid soap (avoid bar soap) and using an individual towel for drying (do not use hand dryer); alternatively, if the hands are not visibly dirty, using an alcohol-based hand solution with 60% or 70% concentration
- If the hands are visibly dirty or spotted with blood or other bodily fluids, or if injured skin could have been exposed to potentially infectious material, hands should be washed thoroughly with water and soap.

Indications for hand hygiene:

- Before and after direct care of a patient.
- Immediately after taking off gloves.
- Before handling an invasive device that does not require a surgical procedure, including central intra-vascular catheters, urinary catheters, or peripheral vascular catheters.
- After touching blood, body fluids, secretions, excretions, non-intact skin, or contaminated elements, even when gloves are used.
- When going from a contaminated body part to a clean body part of the same patient, during patient care.
- After contact with inanimate objects in the immediate proximity of the patient.
- After using the bathroom.

11.1.3 PRECAUTIONS BASED ON THE TYPE OF TRANSMISSION

Diagnosis of many infections requires laboratory confirmation. Since diagnostic tests results often require two or more days, **precautions for transmission should be implemented while waiting for the results, based on the clinical symptoms and on possible pathogens.** The use of appropriate precautions for transmission at the time that the patient develops the symptoms or signs of infection, or upon arriving at the health facility, reduces opportunities for transmission to others.

Contact, droplets, and airborne precautions are detailed in the following section.

End of precautions based on the type of transmission:

Precautions should remain in effect over limited time periods (for example: while the risk of transmission of the infectious agent persists or during the natural progress of disease). For the majority of infectious diseases this duration reflects known patterns of persistence and elimination of the infectious agent associated with the natural progress of the infection and its treatment.



11.1.4 USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE should be used in the context of other strategies for prevention and control, and following the recommendations for infection control (for example, standard precautions for contact, droplet, or airborne transmission).

- **Appropriate training should be given on the use of PPE.**
 - Provision of adequate supplies of PPE should be a national and institutional priority.
 - Recycling of disposable PPE should be avoided. It is not known whether using disposable PPE again gives the same efficacy and safety of protection as using new PPE, and recycling can increase the risk of infection for healthcare workers.

If resources are limited and disposable PPE is not available, one can use materials that can be reused (for example, cotton gowns that can be disinfected), and sanitize them adequately after each use.

In order to avoid waste, critically evaluate the situations in which PPE is indicated using the analysis in **Table 3**, and take the maximum clinical precautions during each visit to the room of a patient.

- Selection of PPE based on risk assessment
 - Routinely evaluate the risk of exposure to body substances or contaminated surfaces before any planned healthcare activity.
 - Select the PPE on the basis of the risk assessment.
 - Have adequate PPE available for the case of an unexpected emergency.
- Gloves
 - Gloves should be used whenever contact is foreseen with blood, body fluids, secretions, excretions, mucous membranes, or non-intact skin. Change gloves between tasks and procedures on the same patient.
 - If the supply of gloves is limited, reserve them for situations in which there is probability of being in contact with blood, respiratory secretions or body fluids, including procedures that generate aerosols associated with a defined risk of pathogen transmission.
 - Perform hand hygiene immediately after removing gloves.
- Face protection
 - Use face protection, including a medical mask and protection for the eyes (safety glasses, facial protectors) to protect the conjunctiva and mucous membranes of nose, eyes, and mouth during activities with potential to generate splatters or aerosols of blood, bodily fluids, secretions, or excretions. When one is treating and is in close contact with a patient with respiratory symptoms (for example, cough or sneezing), there can be sprays of secretions and ocular protection should be used.
- Gowns



- o Use gowns to protect the skin and to avoid soiling of clothes during activities with a possibility of generating splatters or aerosols of blood, bodily fluids, secretions, or excretions.
- o Select a gown adapted for the activity and the amount of fluid that is expected. If the gown being used is not resistant to liquids, a waterproof apron should be used if splatter or sprays with potentially infectious material is expected.
- o If the supply of gowns for health workers is limited, their use should be prioritized for carrying out procedures that generate aerosols associated with a defined risk of pathogen transmission and for activities that involve being close to the patient (for example, in a pediatric environment), or when other prolonged and direct contacts with the patient are anticipated.
- Medical masks
 - o Medical masks should remain adjusted to the face of the user and should be discarded immediately after use. If the mask is soaked or soiled with secretions, it should be changed immediately.
- Ocular protection
 - o Conventional glasses are not designed to protect the ocular mucous membrane against splatters and should not be used as protection of the eyes.
 - o Reusable ocular protection equipment (for example, safety glasses, facial protectors) can be used. However, their use can pose a potential risk of cross infection if they are not adequately cleaned and decontaminated after each use according to the manufacturer's instructions. Cleaning should precede disinfection. Hand hygiene should be carried out after discarding or cleaning ocular protection equipment that may be contaminated with splatters or aerosols.

PPE has the purpose of giving protection to the user but should not produce a greater risk for other individuals or for the environment. PPE supplies can be limited and their recycling may be unavoidable, but recycling should be carried out in safety conditions. Furthermore, unnecessary use of PPE should be avoided.

11.1.5 MORTUARY HANDLING

Removal of body from the isolation room or area

According to standard precautions, use PPE to avoid direct contact with body fluids.

Cultural sensitivity is required. If the family of the patient wishes to see the body after it has been taken from the isolation room or area, this can be permitted, applying standard precautions.

11.1.6 INFECTION CONTROL STRATEGIES IN THE HEALTHCARE FACILITY

Infection control strategies in healthcare facilities are generally based on the following types:

- **Reduction and elimination**
Examples of reduction and elimination are promotion of respiratory hygiene and cough etiquette as well as treatment to make the patient noninfectious.



- **Management controls**

These include establishment of infrastructures and activities for sustainable infection control, clear policies on early recognition of SARI of potential concern, implementation of adequate measures for infection control, among others.

- **Environmental and engineering controls**

These include methods for reducing the concentration of infectious respiratory aerosols (for example, droplet nuclei) in the air: adequate environmental ventilation (≥ 12 ACH), spatial separation between patients (> 1 m), reduction of the presence of surfaces and contaminated elements according to the epidemiology of the infection.

These types of control are closely interrelated. They should be integrated to promote an institutional climate of safety, the basis of safe behaviors.

Summary of Key Aspects of Infection Control in Healthcare Facilities

1. **Isolation, and limitation of movement of cases and limitation of visitors;** by means of identifying and separating patients by symptoms. Hospitalize only the severe cases. Identify the appropriate structure: good ventilation, a single process flow. Discontinue non-essential services.
2. **PPE:** at the very least, standard precautions; mask, gloves, gown, eye protection, if necessary, depending on the type of pathogen and the type of exposure (expected risk).
3. **Emphasize hand hygiene.**
4. **Emphasize cleaning, disinfection, and sterilization.**
5. **Appropriate management of waste,** especially of contaminated material.
6. **Protection for health workers and family members who take care of the patient:** prophylaxis when indicated (example, in case of contact without protection), health surveillance, education: respiratory hygiene, hand washing, social distancing
7. **Proper management of corpses**

References:

1. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, June 2007, Centers for Disease Control and Prevention, Atlanta, Georgia. Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007
2. Infection Prevention and Control of epidemic- and pandemic-prone acute respiratory diseases in health care, WHO Interim Guidelines. WHO/CDS/EPR/2007.
3. Control de infección. Precauciones estándar. Política de aislamientos, *Infection control. Standar precautions. Isolation policy*, T. Rubio, J. García de Jalón, F. Sanjuan, M.A. Erdozain, J.I. Sainz de Murieta, E. Escobar Anales, Universidad de Navarra, Spain 2000.



11.2 SPECIFIC PRECAUTIONS FOR UNUSUAL OR UNEXPECTED SARI

These guidelines concentrate on infection prevention and control measures of respiratory infections that:

- cause acute respiratory tract infection, including pneumonia and acute respiratory distress syndrome;
- cause severe diseases in susceptible people with apparently normal immune systems;
- can constitute a public health emergency of international concern as defined by IHR-2005.

The fundamentals of infection control for patients with unusual or unexpected SARI include:

- Early and rapid recognition of suspected cases.
- Application of standard precautions for infection control.
- Additional precautions in selected patients (on the basis of the presumed diagnosis).
- Establishing an infection control infrastructure for healthcare facilities.

11.2.1 EARLY RECOGNITION, ISOLATION, REPORTING, AND SURVEILLANCE OF EPISODES OF UNUSUAL OR UNEXPECTED SARI:

These are extremely critical activities for preventing dissemination of unusual or unexpected SARI, which have been widely covered in other sections. This section focuses on prevention and control measures to be applied as soon as the suspected case is identified. :

- **Action algorithm:** This should be established and be known to all staff who work in entry points for patients into the healthcare facility, to ensure early recognition and proper management of people with possibilities of having a SARI of epidemic or pandemic potential.
- **Rapidly strengthen infection control precautions when there is a suspicion of an unusual or unexpected SARI (see Table 3).**
- **Isolation:** all patients with suspicion or confirmation of an unusual or unexpected SARI should be located in a room or area separated from other patients and be evaluated as rapidly as possible.
- **During care prior to hospitalization and during transportation of these patients to the healthcare facility, procedures that generate aerosols should be avoided,** since they are associated with a defined risk of pathogen transmission (for example, intubation), unless this is clinically necessary to preserve life. During transportation, optimize ventilation in the vehicle to increase the volume of air exchange (for example, opening the window). Whenever possible, use vehicles that have separate compartments for driver and patients.



The principles of infection control are the same throughout the entire sequence of healthcare. Areas that require particular attention are the following:

Emergency and Outpatient Care Areas.

For these areas the following is recommended:

- Put up notices to alert people with severe acute febrile respiratory disease to report it immediately to healthcare personnel and implement the respiratory hygiene and cough etiquette.³
- Evaluate patients with acute febrile respiratory disease as rapidly as possible.
- Consider processing outpatients with acute febrile respiratory disease in different locations than other patients, either totally separated, or at least ≥ 1 m (3 feet) between every patient in the waiting room.
- Provide paper tissues in the waiting room for containing respiratory secretions from coughing or sneezing whenever possible. Provide receptacles for discarding used tissues (if possible, receptacles that do not need to be touched).
- If possible, provide masks for people with acute febrile respiratory disease when they are admitted. If these are not available, alternatives may be used to replace them.
- Promote hand hygiene after contact with respiratory secretions and provide facilities for hand hygiene (for example, washstands equipped with water, soap and disposable towels, alcohol-based solution with a concentration of 60% to 70%) in the waiting rooms, if possible.
- Eliminate or reduce the use of objects shared by patients, such as pens, paperclips, telephones, etc.
- Make sure that equipment used for patient care is cleaned and disinfected between patients.
- Healthcare workers should implement standard precautions and droplet precautions when providing care, in close contact, to patients with acute febrile respiratory disease.
- If a patient with confirmation or suspicion of being infected with a SARI of epidemic or pandemic potential is referred to another healthcare facility, convey these recommendations to the personnel at the receiving healthcare facility so necessary precautions can be taken for infection control.

3 <http://www.cdc.gov/flu/protect/covercough.htm>



If it is known that there have been cases of unusual or unexpected SARI admitted at the facility or in other healthcare facilities in the area, in addition to the previous measures, also implement the following:

- Establish criteria for triage for rapidly identifying people having a risk of being infected with an unusual or unexpected SARI.
- If there is suspicion of an unusual or unexpected SARI, the healthcare worker should use the appropriate PPE (see Table 3), depending on availability.
- High-risk procedures that generate aerosols in patients with SARI should not be carried out in an outpatient environment, unless it is necessary for saving life and there is no alternative.
- If such a procedure is carried out, it should be in a separate and well-ventilated room. Healthcare workers performing the procedures involved should use adequate PPE.
- After a patient with confirmed or suspected unusual or unexpected SARI has left the outpatient care environment, clean and disinfect environmental surfaces in the physician's office or other areas where the patient was and clean and disinfect any equipment used to treat the patient.

11.2.2 ISOLATION PRECAUTIONS

When treating patients with SARI, adequate isolation precautions should be taken. In addition to the application of standard healthcare precautions, other additional precautions should be applied depending on:

- presence of epidemiological and clinical signs that suggest that patients have an unusual or unexpected SARI;
- presumed or confirmed causative agents of SARI; and
- type of contact with the patient.

The majority of acute respiratory infections are transmitted mainly through droplets, but in some cases other forms of transmission can have an important role. The type of precautions for infection control should be adjusted accordingly (Table 3). Furthermore, transmission of some of these infections has been associated with specific procedures such as those that generate aerosols. The latter have the potential to increase the risk of infection transmission. Greater personal protection is justified, at least for those procedures with a documented increase of risk of infection transmission (see table 1).

11.2.3 ISOLATION AND SPECIAL MEASURES FOR UNUSUAL OR UNEXPECTED SARI

- Due to the risk of transmission, whenever possible suspected patients should be isolated in individual rooms.



- When individual rooms are not available, groups of patients infected or colonized with the same pathogen should be grouped in a single room or wing, whenever possible, in order to implement isolation measures.
- The number of people assigned to the isolation unit or area, or for special measures, should be limited to the minimum necessary for care and support of the patients.
- Whenever possible, the healthcare worker assigned to care for units with patients with unusual or unexpected SARI should be experienced and not rotated or also assigned to other patient care areas. Monitoring the appearance of symptoms similar to influenza in all healthcare workers exposed to these patients is recommended, up to 7 to 10 days after the last possible exposure to a patient with unusual or unexpected SARI (model Annex 10).
- Consider having designated portable X-ray equipment available in the assigned areas.

Table 1.

Procedures that generate Aerosols:

In this document reference is made to implementation of the following procedures in patients with SARI:

- Intubation and related procedures (for example, manual ventilation, aspiration);
- cardiopulmonary resuscitation;
- bronchoscopy;
- surgery and autopsy.

Additional precautions for healthcare workers that carry out procedures that generate aerosols in patients with SARI seem to be justified.

A.1.1 PPE for procedures that generate aerosols

The PPE should cover torso, arms, hands, eyes, nose and mouth, and should include a long-sleeve gown, disposable gloves, ocular protection (for example, safety glasses, facial protectors) and respiratory protection. The use of a cap for the hair is optional.

A particle respirator with at least N95 protection certified by the National Institute for Occupational Safety and Health (NIOSH), EU FFP2 or equivalent is the minimum level of respiratory protection required for healthcare workers who carry out procedures that generate aerosols with a greater documented risk of transmission of respiratory pathogens.

A.1.2 Environmental controls for procedures that generate aerosols

Carry out the procedure in an adequately ventilated individual room and far from other patients.

For patients with unusual or unexpected SARI who receive high-flow oxygen or ventilation with non-invasive positive pressure, add an outlet with a filter for bacteria/virus (for example, HEPA filter) to reduce emission of aerosols.

For the patients with unusual or unexpected SARI who receive ventilation with intermittent positive pressure, filter filters for bacteria/virus (for example, HEPA filters) can be connected to the respiratory support system, and, whenever possible, use a closed system for tracheal aspiration to vacuum respiratory secretions.



ADDITIONAL PRECAUTIONS IN SELECTED PATIENTS (ON THE BASIS OF A SUSPECTED DIAGNOSIS)

11.2.4 DROPLET PRECAUTIONS

Respiratory pathogens that are transmitted through droplets include **adenovirus, human influenza, SARS and avian influenza type A (H5N1)**. During an influenza pandemic it is expected that the circulating human virus will be transmitted just as seasonal influenza viruses, and as a result droplet precautions should be applied in addition to standard precautions.

Droplet precautions include:

- **PPE:** Use of a medical mask if working within a radio of 1 meter around the patient. For practical purposes, the use of a medical mask is recommended when entering the room of a patient.
- **Location of the patient:** in individual rooms or groupings of patients with the same etiological diagnosis. If a diagnosis of the etiology is not possible, patient should be grouped by similar clinical diagnoses and on the basis of epidemiological risk factors, with a spatial separation greater than or equal to 1 meter.
- **Transport of patients:** limit the transfer of patients; patients should use a medical mask when outside their rooms.

11.2.5 CONTACT PRECAUTIONS

In addition to droplet transmission, some respiratory pathogens [for example, **parainfluenza and respiratory syncytial virus (VRS)**, SARS, and influenza type A (H5N1)] can be transmitted through contact; particularly contamination of the hands and auto inoculation in the conjunctiva or nasal mucous membrane. Contact precautions include:

- **PPE:** Put on upon entering the room and remove it when leaving.
- **Gloves:** Clean, non-sterile latex gloves should be used and discarded after every contact with the patient. Change the gloves between tasks and procedures for the same patient.
- **Gown:**
 - o One can use a disposable gown made of synthetic fiber, or a gown of washable cloth. Ensure that gowns are of the size needed to completely cover the areas to be protected.
 - o Gown should preferably be used once and then placed in a receptacle for waste or clothes to wash, as appropriate. Hand hygiene should be observed.
 - o Aprons should only be used when the gown is permeable in order to reduce penetration of fluids. They should not be used only for preventing contamination by contact.



- **Equipment and environment**
 - o If possible, use disposable equipment or instruments or designate instruments such as stethoscopes, blood pressure cuffs, thermometers, etc., for patients for whom contact precautions are being applied. If it is necessary to share the equipment among patients, it should be cleaned and disinfected after use with each patient.
 - o Healthcare workers should avoid touching their eyes, nose, or mouth with their hands with or without gloves, since these potentially be contaminated.
 - o Avoid contaminating environmental surfaces that are not directly related to patient care (for example, door handles, light switches).
- **Location of patients:** using individual rooms or forming groups of patients with the same etiological diagnosis can facilitate implementation of infection control measures. In rooms with multiple patients, maintain a spatial separation of at least 1 meter between the beds.
- **Transport of patients:** limit the transfer of patients; potential contact with uninfected people should be minimized.

11.2.6 PREVENTION OF AIRBORNE TRANSMISSION

For pathogens transmitted by air, the following should be added to the standard precautions:

- **PPE:** Upon entering the room or area of isolation or when treating a patient with an infection regularly or sometimes transmitted through air in other environments, use a particle respirator with a least a level of protection equivalent to a N95 NIOSH certificate.
- **Patient location (Table 2):**
 - o Place the patient in a room for prevention of airborne transmission.
 - o If a ventilated isolation room is not available, put patients in well-ventilated separate rooms.
 - o If individual rooms are not available, form groups of patients by the same etiological diagnosis in well-ventilated places.
 - o Procedures that generate aerosols with pathogen transmission should be carried out using appropriate PPE in a room for prevention of airborne transmission.

Transport of patients: limit the transfer of patients; Patients should use a medical mask when outside their room or area. Subsequently, the vehicle used for the transfer should be disinfected.



Table 2**Environmental Ventilation**

- The purpose of ventilation¹ is to maintain good indoor air quality and ensure that the indoor air is safe to breath. The majority of respiratory diseases (for example, **virus parainfluenza, RSV, influenza virus**) do not spread easily through the air over great distances in a health environment, and patients can be housed adequately without controls for ventilation of the environment.
- However, since **some SARI can be airborne, especially through opportunistic airborne transmission, airborne transmission precautions should be implemented for patients who are infected (or suspected of infection) with a new agent causing an unusual or unexpected SARI until the mode of transmission is identified.**
- As a result, if rooms with airborne transmission precautions are available, these patients should be placed there. If the facility does not have this kind of rooms, one should consider placing these patients in adequately ventilated individual rooms, that have ≥ 12 ACH, but not necessarily controlled directional air flow.

1. Ventilation of the environment refers to the process of introducing and distributing external air, and/or treated recycled air in an adequate way, in a building or room. Ventilation and air conditioning are two different concepts.

Precautions for control of diseases that can be transmitted opportunistically through droplet nuclei.

For the majority of these diseases, droplet precautions should be added to the standard precautions, and special measures should be taken for room ventilation and PPE use during procedures that generate aerosols associated with the transmission of pathogens.

- **PPE:**

- At the very least, use a well adjusted medical mask (surgical mask or procedures mask), on entering the room of the patient; the use of the mask is compulsory if working less than 1 meter from the patient.
- When carrying out procedures that generate aerosols associated with transmission of pathogens, use a particle respirator that satisfies at least a protection level of N95 certified by NIOSH, EU FFP2 or equivalent, as well as gloves, gown and ocular protection (for example, protective glasses).

- **Location of patients:**

- Rooms for prevention of airborne transmission are not indispensable. If available, they should be prioritized for patients with airborne transmitted diseases;
- If possible, individual rooms should be used; if they are not available, groups can be formed according to etiological diagnosis. If etiological diagnosis is not possible, place the patients so that they have more than 1 meter of separation between them;



- Procedures that generate aerosols associated with transmission of pathogens should be carried out in well-ventilated individual rooms.
- Transport of patients: limit the transfer of patients; patients should use medical masks when outside their room or area.

When patients with unusual or unexpected SARI are treated, make sure that health workers make proper use of personal protective equipment (for example, using supervisors).

Establish an infection control infrastructure for healthcare facilities as support for infection control activities:

The administration of healthcare facilities should promote and provide education about respiratory hygiene and cough etiquette for all health workers, patients, and members of the families of patients with acute febrile respiratory disease.

Respiratory hygiene / cough etiquette

For diseases transmitted through droplets and/or droplet nuclei, all individuals with respiratory symptoms should perform respiratory hygiene and cough etiquette. All individuals (health workers, patients, and visitors) with signs and symptoms of respiratory infection should:

- Cover mouth and nose upon coughing/sneezing;
- use paper or cloth tissues, cloth masks, or medical masks, if they are available, to control respiratory secretions at the source, and discard them in waste receptacles;
- use a medical mask on a person who is coughing or sneezing if it is tolerated and properly placed; and
- perform hand hygiene

11.2.7 SELECTION OF EQUIPMENT FOR RESPIRATORY PROTECTION

Particle respirators:

- **Healthcare workers who treat patients infected by a microorganism with unknown mode of transmission, or by a pathogen known to or suspected to be capable of airborne transmission**, or when procedures that generate aerosols are carried out, should select respiratory protection equipment of the highest possible level, preferably a particle respirator.
- Adjustment and sealing of disposable particle respirators are important for their effective functioning. If good adjustment and sealing are lacking, particles transmitted through the air can be inhaled through filtrations, and the particle respirator may not be effective.



- The people who use particle respirators should receive training on how to use the device (for example, placement of the respirator, avoiding auto-contamination during use and removal, and ways of achieving a better seal). Hospitals should follow local regulations with respect to regular implementation of adjustment tests.
- The user should check the seal whenever using a disposable particle respirator.

Environmental controls: cleaning and disinfection

Cleaning **MUST** precede the disinfection. Objects and surfaces cannot be disinfected if they are not cleaned first of organic matter (excretions, secretions from the patients, dirt, spots, etc.).

- Cleaning should be carried out to avoid possible aerosol generation to avoid the possible aerosol generation. This process significantly reduces the environmental biological charge.
- Follow manufacturers' instructions for use/dilution, contact time, and management of disinfectants.
- Common hospital disinfectants include:
 - sodium hypochlorite (domestic bleach);
 - alcohol at 60% or 70% or >60%;
 - phenolic compounds;
 - quaternary ammonium compounds;
 - compounds of peroxygen.

Particular attention should be paid to:

- Cleaning of the patient-care environment.
- Equipment and instruments for patient care.
- Bedclothes and clothes to be washed.
- Waste management.
- Packing and transportation of equipment for patient care, bedclothes and clothes to wash and waste from isolation areas.
- All staff that handles equipment that has been used, dirty bedclothes, and waste should use standard precautions and carry out hand hygiene after removing the PPE.

11.2.8 DURATION OF PRECAUTIONS FOR INFECTION CONTROL

The duration of precautions for infection control varies according to the known or presumed infection period of the specific SARI. In the case of avian influenza in humans, infection control precautions should be implemented according to the age of the patient.



- For adults and adolescents of more than 12 years old—implement precautions at the time of admission and continue for 7 days from resolution of the symptoms.
- For babies and children of less than 12 years old—implement precautions at the time of admission and continue for 21 days after the beginning of the symptoms (young children can transmit seasonal flu virus for up to during 21 days).

Note: In immunocompromised patients, production of pathogens can be prolonged and there are no precise data to define the duration of the infection. Microbiological control is advised to determine the absence of detectable pathogens, whenever possible.

Recently emergent SARI

Implement precautions at the time of admission and continue until a week after symptoms have been resolved, or until there is laboratory evidence of absence of active infection. Precautions, including their duration, should be implemented according to the information available and recommendations of the local health authorities



Table 3: Infection control precautions for HCWs and caregivers providing care for patients with ARIs according to a sample of pathogens

Precaution		Pathogen						
		No pathogen identified, no risk factor for ARD of potential concern (e.g. influenza-like illness without risk factor for ARD of potential concern)	Bacterial ARI ^a	Parainfluenza RSV & adenovirus	Influenza virus with sustained human-to-human transmission (e.g. seasonal influenza, pandemic influenza)	New influenza virus with no sustained human-to-human transmission (e.g. avian influenza)	SARS	Novel organisms causing ARI ^b
Hand hygiene ^c		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gloves		Risk assessment ^d	Risk assessment ^d	Yes	Risk assessment ^d	Yes	Yes	Yes
Gown ^c		Risk assessment ^d	Risk assessment ^d	Yes	Risk assessment ^d	Yes	Yes	Yes
Eye protection		Risk assessment ^f	Risk assessment ^f	Risk assessment ^f	Risk assessment ^f	Yes	Yes	Yes
Medical masks on healthcare workers and healthcare providers		Yes	Risk assessment ^f	Yes	Yes	Yes ^g	Yes ^h	Not routinely ^b
Particle respirator for healthcare workers and healthcare providers	For room entry	No	No	No	No	Not routinely ^g	Not routinely ^h	Yes
	Within 1 m of the patient	No	No	No	No	Not routinely ^g	Not routinely ^h	Yes
	For aerosol-generating processes	Yes	Not routinely ⁱ	Not routinely ⁱ	Yes	Yes	Yes	Yes
Medical mask on patient when outside isolation areas ^j		Yes	Yes	Yes	Yes ^k	Yes	Yes	Yes
Single room		Yes, if available ^l	No	Yes, if available ^l	Yes, if available ^l	Yes	Yes	
Airborne precaution room ^m		No	No	No	No	Not routinely ⁿ	Not routinely ⁿ	Yes
Summary of infection control precautions for routine patient care, excluding aerosol-generating procedures		Standard plus droplet precautions	Standard precautions	Standard plus droplet plus contact precautions	Standard plus droplet precautions	Standard plus contact precautions	Standard plus droplet plus contact precautions	Standard plus Airborne plus Contact Precautions

- Bacterial ARD refers to common bacterial respiratory infections caused by organisms such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Chlamydia* spp., and *Mycoplasma pneumoniae*.
- When a novel ARD is newly identified, the mode of transmission is usually unknown. Implement the highest available level of infection control precautions, until the situation and mode of transmission is clarified.
- Perform hand hygiene in accordance with Standard Precautions
- Gloves and gowns should be worn in accordance with Standard Precautions. If glove demand is likely to exceed supply, glove use should always be prioritized for contact with blood and body fluids (nonsterile gloves), and contact with sterile sites (sterile gloves).



- e. If splashing with blood or other body fluids is anticipated and gowns are not fluid-resistant, a waterproof apron should be worn over the gown.
- f. Facial protection (medical masks and eye protection) should be used in accordance with Standard Precautions by HCWs if activities are likely to generate splashes or sprays of blood, body fluids, secretions and excretions on to mucosa of eyes, nose or mouth; or if in close contact with a patient with respiratory symptoms (e.g. coughing/sneezing) and sprays of secretions may reach the mucosa of eyes, nose or mouth.
- g. As of the date of this document, no sustained efficient human-to-human transmission of avian influenza A is known to have occurred, and the available evidence does not suggest airborne transmission from humans to humans. Therefore a medical mask is adequate for routine care.
- h. The current evidence suggests that SARS transmission in health-care settings occurs mainly by droplet and contact routes. Therefore a medical mask is adequate for routine care.
- i. Some aerosol-generating procedures have been associated with increased risk of transmission of SARS and tuberculosis. To date, the infectious risk associated with aerosol-generating procedures in patients with bacterial ARDs, ARDs caused by rhinovirus, parainfluenza, RSV and adenovirus is not defined. As a minimum, a tightly-fitted medical mask should be used.
- j. If medical masks are not available, use other methods for source control (e.g. handkerchiefs, tissues or hands) when coughing and sneezing.
- k. These are common pathogens in children, who may not be able to comply with this recommendation.
- l. Cohort patients with the same diagnosis. If this is not possible, place patient beds at least 1 m apart.
- m. Airborne precaution rooms can be naturally or mechanically ventilated, with adequate air change rate of at least 12 ACH and controlled direction of air flow.
- n. Airborne precaution rooms, if available, should be prioritized for patients with airborne infections (e.g. pulmonary tuberculosis, chickenpox, measles) and for those with novel organisms causing ARD.

*For further details, see original source of this section: Infection Prevention and Control of epidemic- and pandemic-prone acute respiratory diseases in health care, WHO Interim Guidelines. WHO/CDS/EPR/2007.6.

12. CASE MANAGEMENT

OBJECTIVE

Identify the basic actions that should be considered by the health facility for appropriate and safe management of sudden or unexpected cases of SARI.

DESCRIPTION

The current dynamics of travel by persons and technological advances have increased the possibility of man reaching remote locations rapidly. In addition, they have increased potential transmission of infectious agents. The most recent example was the SARS outbreak in 2003. In theory, this is also a latent possibility for any emerging disease. The following variables influence management of sudden or unexpected cases of SARI due to their potential to cause epidemics and/or pandemics:

- *There is clear evidence that **health workers are a high-risk group** and that **health facilities can easily become locations where infections are spread**.* For example, during the SARS epidemic, out of 138 cases of secondary and tertiary transmission in Hong Kong, 85 (62%) occurred in health workers (1). Out of 144 cases in Toronto, 73 (51%) were in health workers (2).
- The main purpose of appropriate and early case management is not only **recovery of the individual's health**. It also plays an important role in control of the outbreak.



- **Many countries have limited ability to rapidly increase their hospital capacity (human and logistic resources)** in the event of sudden emergence of a high number of cases. Consequently, **preparation** is a key part of the response.

This situation demands that the health workers in health facilities remain alert. They should be aware that an outbreak of sudden or unexpected cases of SARI could occur at any time and they should be prepared to manage this situation appropriately.

The sequence followed by a patient from the time of arrival at the health facility and admission until discharge due to recovery or death is shown below. In addition, the specific characteristics of appropriate management of a patient suspected of sudden or unexpected SARI have also been identified in each of these steps.

12.1 TRIAGE

Triage is the first step in case management. It is a systematic process that allows a patient to be classified based on his condition, which is then related to the type of immediate care the patient should receive.

The overall organization of the triage process depends on the magnitude of the problem. Treatment of a few cases is not the same as the wide-scale demand that might occur in an epidemic or pandemic. Accordingly, during a wide-scale outbreak, in some situations additional facilities or centers where initial screening of the patients can be conducted may be required in order to prevent overflow of the health facilities. For example, use of fever clinics during the SARS outbreak in Asia or hydration stations during the cholera outbreaks.

Action protocols must be developed and circulated at the hospital-wide level in order to separate and manage suspected patients in the emergency departments and other patient admission areas.

There are some useful general considerations for implementation of triage in the health facility (7):

- **The physical site of "triage"** should be located in a designated area at the emergency department. Suspected cases should be differentiated as of this time.
- A map of the emergency department that **clearly indicates the "triage" routes** should be prepared.
- **Suspected cases and their companions (preferably one for each case)** should be referred to a waiting room. It is advisable for the waiting room to be large and to have its own toilet facilities, in the event of a high number of cases.
- The waiting room should be equipped with devices for use of oxygen tanks in patients when required.
- The patient and his companion(s) should receive instructions on infection control and have surgical masks.



- Patients should receive care in the cubicles adjacent to the waiting room.
- The number of cubicles will depend on the needs and availability of the emergency department.
- A route to reach the diagnostic x-ray area in the emergency department should be defined. There should also be a route for intra-hospital transfer from the emergency department to the regular hospital floor if admission is required.

The objectives of triage are:

- Reduce the risk of transmission or contagion.
- Prioritize care, and define or assign the immediate destination of the patient (e.g., isolation, ambulatory management, other departments, home). All patients that undergo triage receive some type of care.
- Assign patients according to the required level of care in order to prevent unnecessary overload of the health facilities and inappropriate use of human and technical resources.
- Compile information that facilitates identification or subsequent location of the patient
- The following are the general steps of any triage. They are applied regardless of the triage scale that is routinely used in the health facility (if any).
- Determine the type and severity of disease (differential diagnosis).

When the patient arrives at the health facility, the following question is inevitably posed at the emergency department, outpatient office, and the hospital wards:

Does this patient have sudden or unexpected SARI? Based on this question, a systematic process should begin that leads to diagnosis, treatment, and the most appropriate management of the patient in the context of a comprehensive approach to care that includes factors such as biosafety variables, infection control, referral and counter-referral, and resource management.

It is important to clarify that the clinical characteristics aid in the diagnostic process. However, they are not sufficient to rule out or confirm a definitive diagnosis since the correlation with epidemiological data is an essential element for diagnosis (4). Management of the suspected case of SARI is a key aspect that is directly influenced by the clinical, epidemiological, laboratory, and administrative variables of the health facility.

At any rate, as more cases are reported (e.g., in an outbreak or pandemic), the specificity and predictive value of the diagnostic impressions based on clinical manifestations are expected to improve.

The case definitions aid in the triage process for conducting patient management, particularly in outbreak situations. For this process, it is important to take into account the concepts of SARI that have already



been defined. In addition, it should be taken into account that clinical and epidemiological criteria are fundamental variables when defining the therapeutic behavior for each case.

Clinical symptoms of sudden or unexpected SARI

The clinical manifestations are not specific, as shown in the following table that summarizes the case definitions. Rather, they are shared by many different infectious diseases. Therefore, it is always important to consider the characteristic of the clinical condition that makes it atypical, unusual, or unexpected, as described in the section on surveillance.

ILI	SARI ^a
Sudden fever >38°C	Sudden fever >38°C
Cough	Cough
Sore throat	Sore throat
	Dyspnea
	Pneumonia ^b

^a Requires hospital management

^bAs criteria for IMCI in children under 5 years

Furthermore, it should be pointed out that the clinical symptoms may be accompanied by other concurrent symptoms that can occur in either of the two conditions:

Nasal Congestion	Weakness	Loss of Appetite	Headache	Myalgia
Diarrhea	Conjunctivitis	Altered state of consciousness	Vomiting	Seizures

Differential diagnosis

As in clinical management of any patient, in the event of unusual or unexpected SARI, several different possible diagnoses that could lead to appropriate therapeutic behavior should be considered. Some of the diseases to be considered in differential diagnosis are as follows:



Viral diseases associated with respiratory infection: Rhinovirus, Coronavirus, Parainfluenza, Influenza, Adenovirus, Respiratory Syncytial Virus	Other Viral Diseases: Mononucleosis, Hantavirus, Dengue, Cytomegalovirus	Leptospirosis, Typhoid Fever, Tuberculosis	Atypical Pneumonia: <i>Mycoplasma pneumoniae</i> , <i>Chlamydia pneumoniae</i> , <i>Chlamydia psittaci</i> , <i>Coxiella burnetii</i> (Q fever), Legionnaire's disease	Subacute Bacterial Endocarditis
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Preexisting conditions

Some preexisting diseases can represent clinical conditions of greater severity than ILI and SARI. Consequently, health workers should take this into account in case management. Some of these conditions are:

- Diabetes
- HIV/immunodeficiency
- Heart disease
- Pulmonary disease
- Pregnancy

12.2 EVALUATION OF THE REQUIRED LEVEL OF CARE

Although it is a routine practice, it is mentioned here due to its importance. During or immediately after the triage process, the level of care required by the patient should be determined in accordance with the initial diagnosis and the severity of the condition. This process is of vital importance in order to *locate the patient as soon as possible* in the place where *the required level of care and biosafety* will be received (this could be in another facility). This evaluation is also important in order to *avoid overloading the health facility* and use the health care network rationally.

12.3 EVALUATION OF THE AVAILABILITY OF MEDICAL RESOURCES FOR MANAGEMENT

For the previous step, the resources available in the health facility should be known (e.g., trained human resources, isolation rooms or areas, equipment, supplies). The capacity of other facilities in the health care



network as well as the operating procedures established for these cases by the facility management and/or the respective authorities should also be known in order to determine the need for referral to another institution that has the required resources.

3.4 NEED FOR PATIENT REFERRAL AND TRANSPORT

The evaluation of the steps of triage will determine whether or not the patient should be referred to another institution and, if so, in what conditions, according to the operating procedures of the health care facility and the respective authorities.

3.5 ORGANIZATION OF THE HEALTH FACILITY FOR CASE MANAGEMENT

Care for one or more cases of sudden or unexpected SARI in a health facility entails the joint and integrated effort of many persons with responsibilities in the facility (e.g., clinicians, administrative staff, logistic services).

- **Management of suspected cases:**

The health facility should define and set aside an area exclusively for clinical assessment and management of suspected cases that ensures application of the infection control measures. Inpatient admission or hospitalization should ideally be done in a respiratory isolation unit. The human and physical resources assigned to management of the suspected case or cases should be set aside exclusively for care of such cases insofar as that this can be achieved based on the capacity and resources of the facility. In any case, standard and special infection control measures should always be followed.

Special attention is required in the following situations (6)(7):

- **Movement of the patient in the hospital facilities:** Logistics and resources should be available for this purpose. This implies use of a clear travel route, unobstructed elevator or ramps, and use of a surgical mask by the patient whenever possible. In all cases, patient transfer or movement within the hospital should be limited to that which is strictly necessary. All of the surfaces in contact with the patient during the transfer should be cleaned appropriately.
- **Sample collection for laboratory tests:** Etiological identification is a fundamental element for management of cases of unexpected SARI. Therefore, the health facility should ensure availability of the resources and mechanisms required for collection and subsequent processing of samples, either in their own laboratory or by safe and proper shipment of the sample to a reference laboratory. It should be pointed out that, in the event of wide-scale emergence of disease, it will no longer be necessary to collect and analyze samples of all of the cases.



- **Medical care and case treatment:** The health facility should attempt to maintain an inventory of appropriate drugs and case management protocols should be available.
- **Aerosol-generating invasive procedures:** In procedures such as bronchoscopy, tracheal intubation, or respiratory nebulizers, the health workers must use the complete personal protective equipment, including high efficiency N-95 respirators.
- **Patient transfer by ambulance:** Since they are narrow and poorly ventilated environments, the vehicles used for patient transport require special attention in terms of biosafety. Crew members should wear surgical masks at all times and persons who come into contact with the patient should use gloves. As an additional measure, the patient may also have a surgical mask. If the patient and the driver compartments are separated by a window, the separation should be maintained at all times during patient transfer and opening the window should be avoided. Only the crew members required for patient movement and care should come into contact with the patient. Therefore, if the driver has only been assigned to driving, he should not enter the patient compartment under any circumstances.
- After the transfer has been completed, before it is used for another transfer, the patient compartment and the equipment used should be cleaned and disinfected.
- **Patient referral and counter-referral:** It is essential to have a referral and counter-referral system for management of sporadic suspected cases and situations that require wide-scale care. In some situations the health facility will have to provide treatment or referral for cases of SARS because of its level of complexity. In order to do so, clear and timely communication about the case between the facility that makes the referral and the facility that receives the patient is essential. All of the characteristics of the referral process should be specified: identification, diagnosis, treatment introduced, required biosafety conditions, companions, transfer time, and other items. The receiving facility will ensure the appropriate conditions for care of the case taking into account the infection control measures. When the patient arrives at the receiving facility, it is recommended that he/she be taken directly to the final destination that was the reason for referral (e.g., intensive care unit, operating room, radiology). The patient should not be stationed at transitory points that increase the risk of contagion to other persons. This is one of the subjects to be defined by the hospital.
- **Companions:** If they are symptomatic, the companions of the suspected case should be considered to be contacts unless it has been demonstrated otherwise. Therefore, they should be supplied surgical masks for use. Unrestricted movement throughout the facility should be avoided until the Epidemiology Department establishes the guidelines to be followed. The infection control measures should be applied in the waiting rooms.



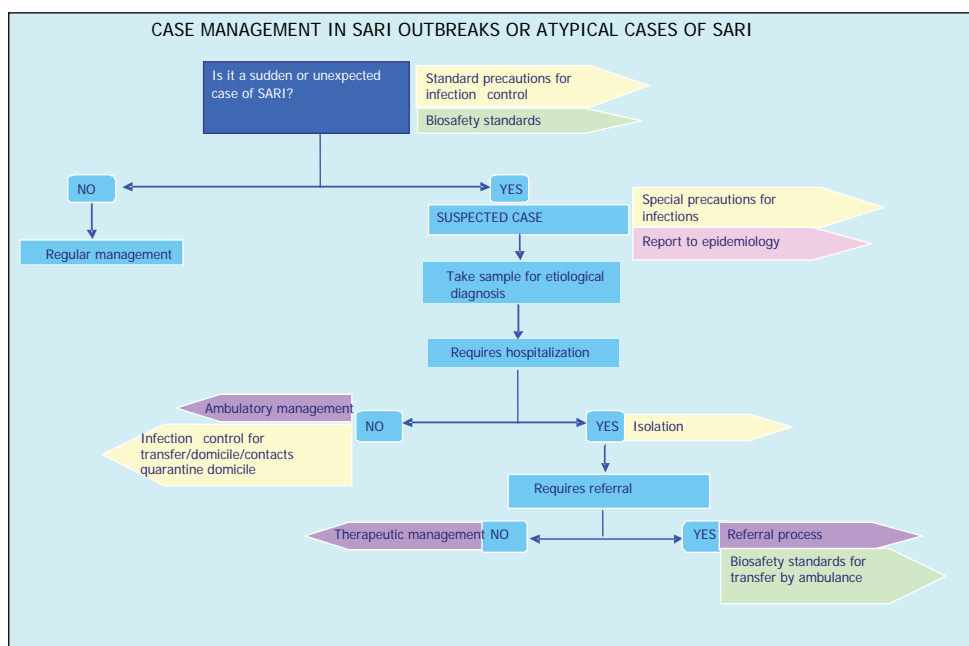
- **Visiting control:** The cases that have been hospitalized can receive visits from their closest family members. Admission of visitors should be rational and visitors should not be admitted indiscriminately. Visitors should wear a surgical mask and disposable gloves when they enter the patient's room. After visiting the family member, the mask and gloves should be discarded. Visitors should wash their hands before going through the rest of the facility.
- **Isolation rooms or areas:** Ideally the hospitalized cases should be located in individual isolation rooms. However, if the facility does not have such rooms, the patients should be assigned to individual rooms with the optimum resources nearby (e.g., toilet, nursing station). If there are several cases, the patients should be placed in cohorts in rooms or wards that only include these cases and a distance of at least 1 meter should be maintained between patients.

Whether they are in an individual room or a ward, natural or artificial ventilation conditions should ensure air exchange with the door closed.

The rooms or wards should have exclusive equipment (e.g., thermometers, sphygmomanometers, phonendoscopes) that is not shared with other areas that manage another type of patients.

- **Recommendations for health workers:** The health workers assigned to care for these cases should not have respiratory symptoms or fever. In addition, it is recommended that all staff be vaccinated each year with the seasonal influenza vaccine. Insofar as possible, an exclusive group of staff should be assigned to provide care for the suspected case or cases. Special emphasis should be placed on use of biosafety elements and hand washing. In situations with growing outbreaks, the health workers should be screened for febrile syndromes and their temperature should be taken when they enter the health facility.
- **Patient discharge:** The clinical staff of the health facility should also take into account the clinical progress of the patient and the epidemiological variables in order to ensure complete patient recovery and prevent the risk of contagion to other persons. Therefore, the incubation and contagious periods for the different etiologic agents that are capable of producing sudden or unexpected cases of SARS should be considered. For example, for cases of pandemic influenza in patients over 12 years of age it is recommended that infection control measures should be maintained for 7 days after resolution of the symptoms. For cases in patients under 12 years, the measures should be maintained for 21 days.
- **Mental health:** Protection of mental health⁸ is an aspect that should not be overlooked when managing cases of respiratory disease with epidemic or pandemic potential since the stress, isolation, and uncertainty can easily lead to conditions that affect the patient's psychological structure and further complicate the cases. Consequently, a health team should be trained to offer psychological support that modulates the patient's condition and contributes to improved self-care as well as precautions to prevent contagion of other persons.

In order to simplify this situation, a case management algorithm that summarizes the basic components the health facility should prepare and perform is shown below.



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13. VACCINES AND ANTIVIRAL DRUGS

13.1 VACCINES

In the event of a possible influenza pandemic due to a new virus, the directives and guidelines regarding use of the influenza vaccine and antiviral drugs should be known, including general recommendations as well as treatment and prophylaxis.

Availability of vaccines and antiviral drugs would facilitate mitigation of the effects of a pandemic. However, it is accepted that timely availability of the required amounts may be difficult to achieve. Therefore, use and distribution should be based on well-structured analyses and processes that are specific to each region and country.

Seasonal influenza vaccines have been available for over 60 years, especially in developed countries (1). In this period their safety and efficacy have been demonstrated. In populations with risk of severe complications, it is well-known that vaccination reduces hospital admissions and deaths. Therefore, vaccination is the cornerstone of influenza prevention. Since the influenza viruses evolve constantly, vaccines are produced every year. Vaccine composition is based on the most important strains of the virus that have been identified by the worldwide surveillance system. Storage of vaccines as a preparatory measure for a pandemic is not a viable option since vaccine composition depends on the causative virus. It is necessary to wait until the virus emerges and is identified at the beginning of the pandemic. At this time, the vaccine supply will be limited. In some parts of the world vaccines may not be available.

The vaccines for seasonal influenza virus are usually produced by growth of the virus particles in fertilized chick embryos. The period from the time of identification of the strain until the vaccine is available is approximately 6-8 months.

Twice a year, in February for the Northern Hemisphere and in September for the Southern Hemisphere, WHO organizes a consultation with the directors of the collaborating centers and representatives from the national laboratories in order to provide recommendations on the composition of the trivalent vaccine, which contains a type A/H3N2, type A/H1N1, and type B virus. Since 1972, WHO has recommended 39 changes in the formulation of the influenza vaccine.

The PAHO Technical Advisory Group on Immunization recommends to the countries that they vaccinate against **seasonal influenza** in the risk groups defined by WHO. PAHO also promotes vaccination of children aged between 6 and 23 months. Vaccination of these risk groups has been found to be one of the most cost-effective public health interventions.

Another advantage of more widespread use of the seasonal vaccine is that it will help increase the production capacity required to respond to a pandemic. In principle, the same technology that is available would be used to produce a vaccine against a pandemic strain.



Risk groups defined by WHO in Weekly Epidemiological Bulletin No. 33 of 19 August 2005, by order of priority, in order to reduce incidence of severe forms of disease and premature death:

- 1. Residents of facilities for the elderly and disabled*
- 2. Elderly persons who do not live in health care facilities but have chronic heart or lung diseases, metabolic diseases, neuropathies, or immunodeficiencies*
- 3. All persons over 6 months of age with any of the aforementioned diseases*
- 4. Persons older than the national age limit, regardless of other risk factors*
- 5. Other groups defined based on data and national capacity, such as the contacts of high-risk persons, pregnant women, health care professionals and other persons responsible for essential social services, and children aged between 6 and 23 months.*

In the event of an **influenza pandemic**, since there are limitations on vaccination of the entire population, the countries could consider vaccination of certain population groups to be a priority. Evolution of the pandemic in each country should be analyzed on an ongoing basis in order to provide for vaccination of the groups that are affected the most. The groups to be considered are:

1. Persons responsible for essential services (in order to prevent interruption of services during the pandemic): health workers in areas of clinical care, essential staff for production of vaccines and drugs, workers from retirement homes and facilities for chronically ill patients, police, fire department, armed forces, and personnel in charge of other public services.
2. Persons with high risk of influenza-related mortality: residents of facilities for the elderly or the chronically ill, persons over 65 years of age with chronic heart and lung diseases, pregnant women in the second or third trimester of pregnancy, children from 6 to 23 months of age, persons between 6 months and 18 years of age receiving chronic treatment with aspirin, other vulnerable groups such as indigenous communities that live in isolation, as well as others.
3. Persons in close contact with high-risk persons: health workers and retirement home staff, families in daily contact with high-risk persons, and persons in daily contact with children from 0 to 5 months of age.
4. Children of preschool and school age, who are considered to spread disease in the community.
5. Persons without risk factors for complications: This is the largest population group, and it includes adults and healthy children. The main objective is to reduce the demand for



medical services, allow individuals to continue their daily activities, and prevent greater social disruption. This decision depends on the availability of the vaccine and the epidemiological situation.

13.2 ANTIVIRAL DRUGS

Although the indication of antiviral drugs for respiratory viral processes and especially influenza has been known for several years, use and prescription of these drugs is not widespread in the countries of Latin America and the Caribbean. The advantage of this situation is that antiviral resistance in the Region will probably not be a major problem when use of these drugs begins. However, on the other hand, it must also be acknowledged that since the medical community is not very familiar with use of these drugs, the process of introduction of use could be complicated.

The antiviral drugs used at present would probably be effective for prophylaxis and treatment of disease caused by a new pandemic virus. However, the reserves would be depleted rapidly in the first part of the pandemic, when the vaccine is not yet available and there is greater demand for an alternative control method. Once they are available, the vaccines will continue to be the primary means of prevention of influenza. However, antiviral drugs will be used in special situations.

Antiviral drugs can be used in prophylaxis or treatment. For treatment, they should be administered as soon as possible (within 48 hours). This is expected to reduce the duration of the disease by one day in healthy adults. In addition, when they are used in prophylaxis, antiviral drugs reduce the risk of developing influenza by 60 to 90%. When they are administered to household contacts, they prevent 80% of the cases of influenza and reduce the severity of the symptoms.

There are two groups:

M2 ion channel inhibitors	Amantadine Rimantadine
Neuraminidase inhibitors	Oseltamivir (Tamiflu [®]) Zanamivir (Relenza [®]) Peramivir (investigational drug)

At present use of neuraminidase inhibitors for treatment as well as prophylaxis of patients with influenza is recommended.

If possible, antiviral treatment should be introduced within 48 hours after onset of the symptoms. However, it can be considered after this period in persons with severe influenza or high risk of complication.

Oseltamivir has been approved for use in patients over 1 year of age. Zanamivir has been approved for



treatment of patients over 7 years of age and prophylaxis in patients over 5 years of age.

For effective prophylaxis, the drug should be administered daily while there is potential exposure to the influenza virus or until post-vaccination immunity is achieved (approximately 2 weeks in adults; over 2 weeks in children).

Some examples of use of antiviral drugs as treatment or prophylaxis in the event of influenza virus activity in the community are as follows:

- Prophylaxis in persons that have been vaccinated within the last two weeks.
- Prophylaxis in unvaccinated and persons with high risk of contagion (health workers, geriatric home staff, social service volunteers that provide patient care).
- Prophylaxis in persons with compromised immune systems or that can not respond to vaccination (HIV patients or patients receiving immunosuppressive treatment)
- Prophylaxis in persons who cannot be vaccinated against influenza due to allergy or another contraindication.
- Treatment of persons with influenza who live with or care for the high-risk population.
- Treatment of high-risk persons with influenza.
- Treatment of persons with influenza with less than 48 hours of evolution of symptoms in order to reduce the duration and severity of the disease.

The following table summarizes the doses indicated for the antiviral drugs available:

Drug	Prophylactic Dose	Treatment Dose	Main Adverse Effect
→ Amantadine	→ Age 1-9 years: 5 mg/kg po bid → Age >9 years: 100 mg po bid	→ Age 1-9 years: 5 mg/kg po → bid → Age >9 years: 100 mg po bid	→ CNS: anxiety, dizziness, difficulties concentration
→ Rimantadine	→ Age 1-10 years: 5 mg/kg po qid → Age >10 years: 100 mg po bid	→ Adults: 100 mg po bid	→ CNS: less common



→ Oseltamivir	→ Age >1 year: 75 mg /day → Children: adjust for weight → (For 7-10 days after exposure)	→ Adults: 75 mg twice daily (up to 150 mg twice daily) → Children > 1 year: adjust for weight → (5 days), up to 10 days →	→ Gastrointestinal: nausea, vomiting. → Should be taken with meals →
→ Zanamivir	→ Children over 5 years: → 10 mg (2 inhalations once a day) → (For 7-10 days after exposure)	→ Over 7 years: → 10 mg (2 inhalations twice a day) → (5 days)	→ Bronchial: spasm → (Other: GI and dizziness)

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PART II – HOSPITAL RESPONSE TO A PANDEMIC

14. ORGANIZATION OF HEALTH FACILITIES' RESPONSE TO THE EMERGENCE OF SEVERE ACUTE RESPIRATORY INFECTION (SARI) CASES

14.1 INTRODUCTION

When one speaks about being prepared, there is an inevitable feeling that there is time to do so. However, time may not be in our favor and lead to unexpected adverse circumstances.

There are few occasions in the history of mankind in which there has been such a high level of expectation of an epidemic outbreak as there is now for a possible influenza pandemic. At present, when infectious diseases are still the leading cause of death in humans and nearly forty million people live with HIV, why is there a pronounced fear of an influenza pandemic? This is due to the fact that the influenza virus is often fatal. It causes 1-1.5 million deaths each season and in a pandemic its effect may be even greater. It is estimated that if the pandemic was caused by the H5N1 strain, global mortality could be between 180 and 360 million deaths.

SARS is the condition most similar to a potential influenza pandemic. However, it does not spread as quickly as the latter. After the SARS outbreaks emerged in China, it spread to five countries within 24 hours, and to three of six continents within months (In five months, 8,000 people were infected and 10% died) (1).

The process of preparation and response to a pandemic is a very complex one. It is linked to several aspects that are related not only to variables regarding disease or fatality, but also to the productivity and sustainability of communities. As a result, its impact and response will occur in multiple sectors and not only in the health sector. Therefore, preparedness plans, both at the national and local levels, should include the different sectors of society.

In addition to the response of the health services, other extremely important elements such as epidemiological surveillance, population containment measures, and risk communication should be considered.

The inevitable contact between ill population and healthcare workers is one of the major challenges when considering preparation and response measures to a wide-scale care of SARI cases as could occur in an influenza pandemic.

The estimates of impact on the clearly show that there is insufficient installed capacity to provide appropriate care to cases in an influenza pandemic. This situation could be more serious in areas that lack the required capacity even in regular conditions.



The clinical course of the infection tends to require complex care. Therefore, it is estimated that there will not be sufficient intensive care units, mechanical ventilation equipment and staff required for case management.

At least at the beginning of a pandemic outbreak, during its first wave, when vaccines will probably not be available as a preventive measure, health facilities will face the higher burden of morbidity and mortality.

Given this complex and adverse scenario, the response capacities of the health services, including their clinical, administrative, logistical, and financial components, should have sufficient coordination and the available information to control the situation

14.2 ORGANIZATION, COMMAND STRUCTURE AND COORDINATION

In an emergency situation, it is essential to ensure the concept of control, through a visible figure or structure capable of making timely rational decisions based on technical information.

Otherwise, the second disaster could be the lack of control and coordination in the event of a pandemic. This is why the health facility should foresee a structure that ensures control of actions, decision-making, and the authority to ensure that decisions are implemented and the responsibilities of all members clearly defined.

An influenza pandemic includes several critical elements. It is an emergency that has a major impact. Moreover, it can affect operation of the health facility since it uses the human, material, administrative, and financial resources of the institution.

An influenza pandemic brings together several critical elements. It is an emergency with a major impact on the operation of the Health Facility, as it tends to overwhelm and deplete its human, material, administrative, and financial resources.

An adequate coordination with regard to preparation and response for care in the event of a large number of cases requires that the health facility have at least four types of capacity:

Health facilities require at least four types of capacities to prepare and be ready to respond to a large number of cases:

Decision-making capacity: Oriented toward active participation of the directors of the organization in order to ensure rapid and effective decision-making.

Logistic capacity: Aimed at ensuring the necessary support to execute the operational actions of the health facility. All those activities such as transport, communications, safety, among others, should be clearly considered in the structure.

Operational capacity: Refers to ensuring the health facility conducts its activities, particularly its essential functions of provision of services, including the administrative component. The medical and paramedical



staff in the facility and the persons responsible for administrative tasks should play an active role in the structure.

External liaison capacity: This is an essential condition for the achievement of coordinated actions that directly or indirectly affect the functions of the health facility (e.g., public services, waste disposal, safety, patient referral, wide-scale mortality).

Operational actions

There are two non-exclusive approaches that can be implemented at the health facility: activation of a hospital committee in charge of emergency preparation and response (or creation of such a committee if there is none) and adoption of an incident management system (IMS) structure.

The hospital committee must be developed from the preparatory phase in order to achieve greater consolidation. The IMS could be implemented later on, even without prior preparation, assuming a methodology has already been established and validated. The key message is that, in either of the two cases, it is always better to be prepared as soon as possible.

Emergency preparation and response committee

The objective of activation or creation of a committee of this type is to integrate the key actors in the health facility responsible of implementing actions that ensure the effective operation of human and physical resources, needed to handle increased patient demand during an epidemic or pandemic outbreak.

The committee should meet at least the following conditions:

- a) Include representatives from each area of the health facility so that it is a multidisciplinary committee.
- b) Have a coordinator who will lead planning, task orientation, and decision-making. Preferably, the coordinator should be a director that is close to the management of the facility.
- c) Formalize creation of the committee.
- d) Define duties for each member.
- e) Meet on a regular basis, preferably monthly. Depending on the phase of the pandemic and the specific circumstances, the frequency of the meetings may be changed or extraordinary meetings may be called.

Depending on the size of the health facility and, therefore, the size of the committee, subcommittees in charge of groups of related tasks may be created in order to facilitate operation of the committee.

The committee should conduct at least the following tasks:



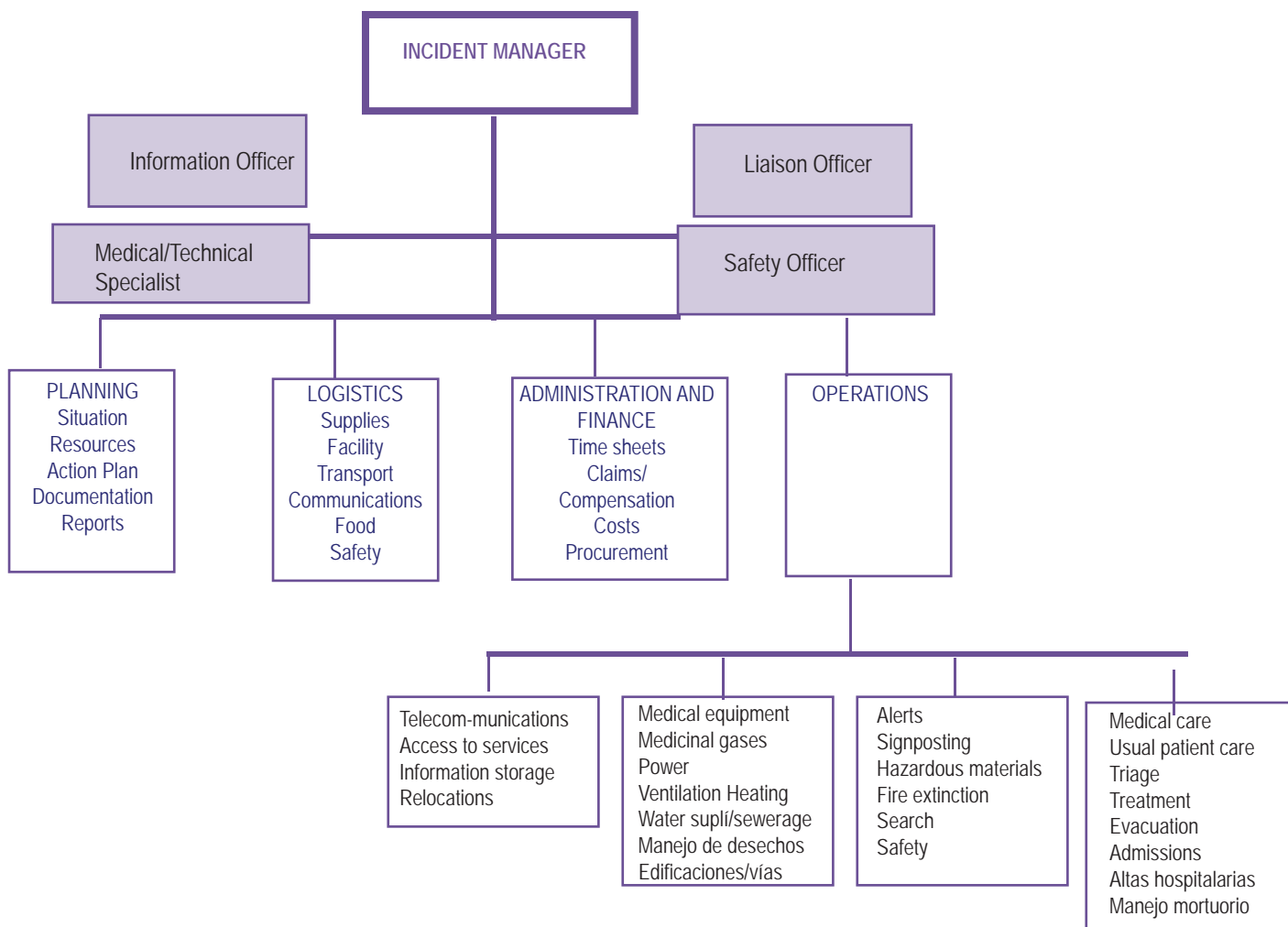
1. Designate the composition of the committee
2. Name a coordinator
3. Define the duties of each member
4. Elaborate, implement, and follow-up the hospital preparedness and response plan for cases of severe acute respiratory infection (SARI)

Incident Management System

Incident command (or incident management) is a system of organization and terminology that provides management tools to respond and operate in the event of disasters. This system was originally designed for forest fire operations in the United States. It has been used successfully in other circumstances that have required a robust response by the health sector with the support of other sectors. It should be an agile structure that is responsible primarily of the response to a crisis situation rather than of the preparation for this type of events. Its purpose is to quickly respond to the emergency and return the facilities, in this case the hospitals, to their regular operating status as soon as possible.

The incident management system (IMS) is based on four basic components: operations, logistics, planning, and finance. A coordinator is in charge of managing each of these components. In addition, there is an incident manager who is in charge of all the IMS tasks that have not been delegated. The manager has four officers (management personnel) who work directly under him:

- Liaison Officer: contact point for external agencies and inter-institutional relations.
- Information Officer: responsible for preparation and delivery of information to the media.
- Safety Officer: in charge of supervising all facilities and operations in order to guarantee safe procedures. It must be highlighted that the safety officer has the authority to immediately halt any procedure, operation, or task that may pose a risk for health workers. Therefore, an incident manager should not attempt to perform the duties of the safety officer.
- Medical/Technical Specialist: responsible of advising the incident manager as an expert in the specific area of the incident (e.g., a specialist in entomology/infection control in the event of an influenza pandemic or SARS epidemic; a radiation expert for an event of this type).



Each of the four main areas (planning, logistics, administration and finance, and operations) should have a leader that coordinates a team of personnel. In order to make incident management more effective, it is suggested that each team includes 5 to 7 members.

The IMS is based on a series of protocols for practical management of the situation. These constitute an important guide for the preparation of an incident action plan and daily guidance. The protocols are also a source of filed information for financial reporting and post-event reports.

In any case, whether there is a committee or an IMS (ideally both), implementation should be adapted to the conditions, size, and specific characteristics of the health facility.

Finally, it is important to remember that management of a situation such as an influenza pandemic implies external actions. Therefore, it is necessary to consider liaisons with the leading health authority in the town and with other sectors, such as the security forces, emergency agencies, humanitarian aid organizations, the educational system, media, and public utility companies.



14.3 ETHICAL AND LEGAL ASPECTS

In theory, ethical and legal aspects have many variables in common. However, in practice there may be slight differences that differentiate them or at times they may even be opposed to one another.

In disasters, health workers often have to leave their home and closest relatives in order to provide care at the event, and they may even put their own life at risk. In this situation questions such as the following inevitably arise: Was it his duty? Was it his obligation? If he had not gone, could he have been held liable? What would be the blame? Could there have been justifiable causes? Therefore, it must be considered that it is not easy to provide a single and irrefutable response to any of these questions.

For example, in the case of the SARS epidemic in 2003, there are registries that show that 30% of the cases reported occurred in health workers, many of whom died (4).

In the event of an influenza pandemic, conflicts between “obligations” and “duties” will inevitably arise. Work, family, affective, and civic responsibilities as well as self-care will be considered in the judgment scale of each person and will influence behavior to a significant extent. In addition, it is the duty of the individual providing care to protect himself and others (In this case, not infecting others or ensuring that other persons are not subject to unnecessary exposure risks).

In legal issues, each country establishes standards, regulations, or codes on providing health care. These tools can certainly be useful to guide discussions and decision-making related to the civil and legal responsibility of health care providers. To the extent that health is regarded as a right, this situation will lead to a series of responsibilities for all health care providers, including the public health system, the social security system, health facilities, and health workers in charge of providing care.

Another key aspect with ethical implications during an influenza pandemic is the management of the soaring demand for services. It is estimated that there will not be sufficient resources to provide care for all critical cases. Therefore, some type of triage will have to be applied in order to prioritize admission to intensive care units, use of mechanical ventilation(5), or the possibility of receiving supplies such as vaccines or antiviral drugs. Physicians will clearly face difficult decisions with implications that may extend beyond clinical aspects.

Operational actions

Both legal and ethical aspects will depend on the specific conditions of the site, the time and the persons involved when the event takes place. Consequently, only very general actions can be highlighted within the framework of an emergency response plan for epidemic respiratory diseases such as SARI will be mentioned.

The actions that could be considered by the health facility include:

- Discuss the subject and problems in the ethics committee of the health facility or the authority in charge of those functions.
- Review the legal and ethical guidelines for epidemic respiratory diseases established in the national, provincial and local emergency plans.



- Seek legal advice on national and local regulations on subjects such as emergency care, rights of both patients and health care providers, service provision in the event of disaster, labor related subjects, medical liability, and that of the organization.
- Analyze the scale of institutional values for problems that may occur in an emergency due to epidemic respiratory diseases, taking into account factors such as individual freedom, protecting the community from harm, proportionality, reciprocity, transparency, privacy, protecting the community from stigmatization, responsibility to provide care, equity, and solidarity (7).
- Seek agreements with workers of the health facility which reflect institutional values and legal regulations in a framework of respect and kindness as persons and health care providers.
- Promote activities directed to increase awareness and strengthen individual values such as respect, trust, and solidarity.

14.4. TRIAGE

Health facilities may receive a disproportionate demand from patients with SARI that surpasses their response capacity. The facilities will be filled to capacity with patients that have the epidemic infection as well as patients with other conditions, including mild clinical symptoms that they would not usually have visited for. The impact on the emergency services will be especially significant. They will probably have to make additional efforts to implement mechanisms of classification and prioritizing cases for hospital management.

It is estimated that in an influenza pandemic between 15% and 35% of the population will have symptomatic disease. In addition, 15% of the population admitted to hospitals will require an intensive care unit and 7.5% will require mechanical ventilation (8).

Implementation of triage mechanisms should be linked to guarantee care for all patients that request it. Therefore, the health services network should be prepared to provide care for hospital cases and also be capable of providing alternatives to ambulatory management through primary care centers or home care, among others. Moreover, depending on the technical capacities and sustainability of the system, telephone triage deserves special consideration when regulating demand for health facilities. This could involve channeling cases to a call center, as foreseen in the National Preparedness and Response Plan for Flu Pandemic in Spain (9).

For an emergency situation such as an influenza pandemic, three phases of triage may need to be implemented: an initial phase in order to separate patients with a potentially infectious condition from patients with other conditions; a second triage of patients with respiratory symptoms that may be related to avian influenza or infection with epidemic/pandemic potential from patients with other diseases (e.g., RSV, adenovirus, parainfluenza, bacterial pneumonia, tuberculosis) in order to identify patients taking into account the case definitions and their immediate destination; and a subsequent phase in order to decide on patient location (e.g., home, hospitalization in a hospital ward, hospitalization in intensive care unit).



Operational actions

- Availability of an area for triage of SARI in a location different from that set aside for the usual triage in the emergency department.
- Consider that due to the demand for patients, sufficient triage stations equipped with equipment, materials, personal protective equipment, and registration forms will be required.
- Provide adequate signposting for transit of patients and companions in the triage room and between this room and the different departments of the health facility.
- Availability of sufficient trained human resources to conduct the triage process.
- Provide a mechanism for immediate reporting of suspected or probable cases to the epidemiology department of the health facility.

Tools for implementation

Triage is a measure especially useful for infection control and epidemiological follow-up. Specifically, in the pandemic period, it is especially useful for the rationalization and organization of the services offered if the response capacity is surpassed.

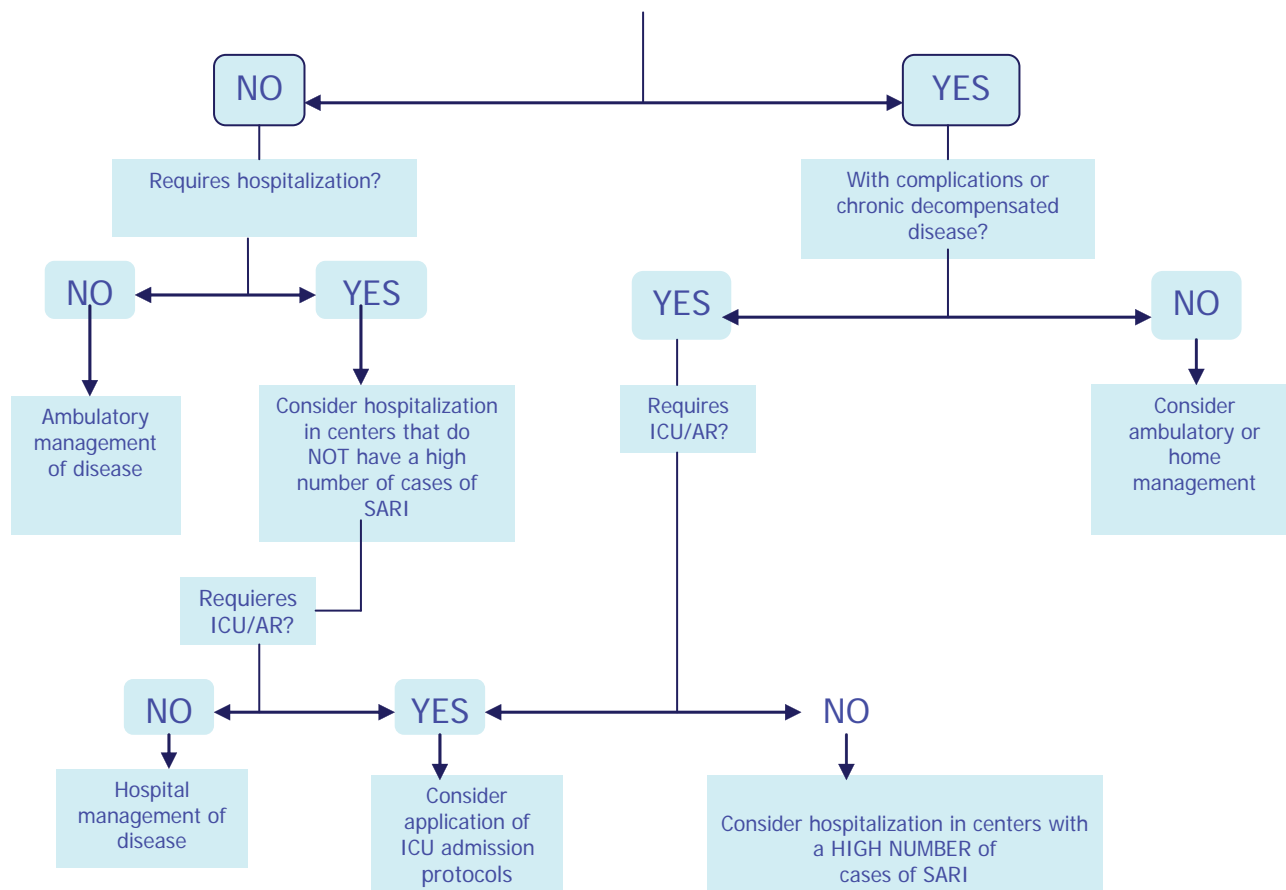
The health facilities are free to define the triage protocol they consider to be appropriate. However, the triage protocol should always be used to supplement and not to replace the judgment of the individual clinician.

It is important to mention that some of the systems of classification shown in the annexes refer to schemes to determine the severity –possible mortality– of community-acquired pneumonia. They are not necessarily appropriate for influenza-related pneumonia and even less so for pandemic influenza, in which the risk groups may be different. Therefore, they may not be correctly classified using the scores included in the annex (e.g., possible increased mortality in young patients, as occurred in 1918, or pregnant women). Finally, it is important to emphasize that those scores are not intended to replace clinical criteria. They are only a guide to help the decision-making process of the clinician.

The approach to initial triage could be simplified in the following diagram:



Patient with unexpected ILI/SARI?



References:

1. Osterholm, Michael T. En Previsión de la Próxima Pandemia. Salud Pública de Mexico. 2006;48:279-285
2. Desarrollo de Sistemas de Servicios de Emergencias Médicas-Experiencia de los Estados Unidos de América para países en desarrollo, Organización Panamericana de la Salud, Washington, DC, 2003,
3. Recommended modifications and applications of the hospital emergency incident command system for hospital emergency management. Prehospital and disaster medicine 2005; 20 (5): 290-300
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5. Development of a Triage protocol for critical care during an influenza pandemic, CMAJ, November 21, 2006,175(11) 1377:1381
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7. Clinics and SARS: lessons from Toronto, BMJ, volume 317, 6 December 2003.
8. Zhang X, Meltzer MI Flusurge 2.0, CDC,HHS,2005
9. Guía Para la Clasificación de Pacientes que Demandan Asistencia ("Triage") Plan Nacional de Preparación y Respuesta ante Pandemia de Gripe, Ministerio de Sanidad y Consumo, España, 2006.



14.5 BED MANAGEMENT

Catastrophes are events that usually demand the highest level of hospital capacity. Emergency and hospitalization departments are expected to face maximum demand in those cases. In a respiratory epidemic event, there special circumstances would be present due to the prolonged duration of the event, the risk of contagion, the severity of disease, the progressive increase in use of resources, and the limited possibilities of receiving external support. In addition, it must be added that many health facilities operate regularly at the limit of their capacity, which implies a minimal possibility of capacity for expansion.

Projections show that 45% of the population that contracts pandemic influenza will not require medical care (but will need health information and advice); around 53% will require outpatient care; and approximately 1.5 to 2% will require hospitalization (1).

For pandemic influenza the average hospital stay outside the intensive care unit (in the main hospital ward) could be 5 days. In contrast, the ICU stay would last about 10 days. A total of 15% of hospitalized patients would require ICU and 7.5% would require mechanical ventilation. It is estimated that there would be a 3% daily increase in cases requiring care (1). In countries such as the Netherlands, more dramatic estimates have been made: hospital stay times of up to 14 days, between 10% and 40% of hospitalized patients requiring ICU, and 30% of hospitalized patients could require mechanical ventilation (2).

Appropriate and rigorous triage is the first line of containment for a sudden increase in patients seeking care. The second line of containment would be the internal reorganization that occurs in the hospitalization departments of the facility. Finally, the availability of inpatient care in areas outside the facility should also be taken into account. It is essential to consider that each hospital bed available should be linked to the operational capacity of the hospital with regard to human resources, medical supplies, and support services (e.g., hygiene, food) required for each bed.

A recent study relating the experience of SARS in Toronto with possible scenarios of pandemic influenza indicated that measures restricting non-urgent admissions would only result in a 12% increase in hospital admission capacity for pandemic cases. This study also recommended the implementation of additional measures than those of Canada, as a higher case rate would lead to an even greater gap.

Operational actions

The actions to implement as a strategy of expanding capacity should be based on the correlation between the increased number of beds and the resources required for functionality as well as to control the transmission of infection in the facility. Some general measures described below should be adapted to the specific characteristics of the health facility if adopted.

An aspect of vital importance is the availability of environmental ventilation systems that ensure clean air in the patient care and hospitalization areas. To this end, mechanical ventilation or natural ventilation mechanisms that contribute to infection control should be implemented (4).



SITUATION	SUGGESTED MEASURES	EXPECTED SCOPE
There is a discrete tendency of increased demand for beds for SARI patients. At this time, individual isolation rooms are available.	Adjust maximum hospital stays for all patients. Promote early discharge strategies in medical and surgical hospitalization services.	Reduce hospital average stay to increase relative availability.
The availability of beds for patients with SARI in individual isolation rooms is at the limit of the required demand.	Prepare new individual isolation beds. Prepare shared rooms.	Increase number of isolation beds available.
The demand for beds for patients with SARI surpasses the existing availability of individual and shared isolation rooms.	Assign an exclusive ward or area for patients with SARI. Delay care for patients with other diseases that are not potentially fatal and do not imply serious adverse consequences as a result of the delay. Refer long-term stay patients to chronic care inpatient units as beds become available. Transform beds in elective services (e.g., ambulatory surgical recovery, palliative care) to operational beds for priority services and SARI patients.	Expand the internal hospitalization capacity for patients with SARI.
The availability of beds for patients with SARI in the wards is at the limit of the required demand.	Expand and enlarge areas for hospitalization in wards. Refer acute hospitalized patients (e.g., postoperative) to continue care at home as long as care can be provided safely in this environment.	Expand internal hospitalization capacity for patients with SARI.
The demand for beds for patients with SARI surpasses the current availability in the wards.	Assign an entire floor (or more if necessary) to management of SARI patients. Transfer patients with or without SARI to other health care centers with availability of beds.	Expand the internal hospitalization capacity for patients with or without SARI.
The demand for beds for patients with and without SARI clearly surpasses the existing availability in the wards.	Prepare areas that have been closed recently and are reserved for other purposes. Apply triage strategies for admission of patients with and without SARI. Prepare supplementary and unconventional inpatient units (e.g., hotels, schools, auditoriums, field hospitals).	Maximize availability of beds for patients with or without SARI.

References

1. Ontario Health Plan for Influenza Pandemic, September 2006
2. Genugten M, Scenario analysis of expected number of hospitalizations and deaths due to pandemic influenza in Netherlands, RIVM Report 217617004
3. Schull et al. Surge Capacity Associated with Restrictions on Nonurgent Hospital Utilization and Expected Admissions during an Influenza Pandemic, ACAD EMERG MED. November 2006, vol. 13 No 11



4. Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care, WHO Interim Guidelines, June 2007

14.6 RESOURCE MANAGEMENT

An unusual or unexpected increase in the number of cases of SARI in an epidemic entails a high demand for existing human and physical resources and supplies of the health facilities. The supplies of personal protective equipment, oxygen therapy devices, and some drugs could be rapidly depleted. Health workers would be overloaded with work and human resources diminished if also affected by the disease, as indicated by estimates of the occupational impact of a potential influenza pandemic(*I*). Based on the assumption that there would be patients with different severity degrees of disease in an influenza pandemic (mild, moderate or high), it has been estimated that initially only patients with moderate or severe conditions would use the medical resources of hospitals. Severely ill patients would require intubation, ventilation management and/or multiple drugs, including use of vasopressors and intravenous fluids. Meanwhile, patients with moderate conditions would require at least drugs and intravenous fluid.

Operational actions

The planning of resources required to fulfill the expected demand should start from the standard level that is appropriate and sufficient for regular requirements. However, for many health facilities, it is probable that even the regular demand exceeds existing resources.

The establishment should plan its resources taking into account the potential scenarios of demand, such as the expected influenza pandemic case rate (e.g., 35%) and the period that the situation is expected to remain critical (e.g., 8 weeks).

It is recommended that the facility addresses the situation from at least two perspectives:

- Human resources planning
- Planning of equipment, materials, and supplies requirements

14.6.1 HUMAN RESOURCES PLANNING

It may be necessary to review the competencies of the entire staff in the health facility in order to redistribute tasks and reassign duties.

Key aspects that should be taken into account include the following (2):

1. Identification of competencies:



Administrative and support staff	Management User services Patient referral
Transport	Patients Samples Waste Medicinal gases Health workers
Training	Health care staff Community education
Infection control and occupational health	Detection of staff with illness Development of surveillance programs Implementation of surveillance programs Logistic and psycho-social support for health care personnel
Care for healthy persons	Immunization Prophylaxis
Patient care	Case management

2. Assignment of competencies or duties:

After competencies have been identified, profiles may be matched to the existing positions in the health facility (e.g., administrators, physicians, nurses, assistants).

3. Distribution of activities:

After competencies have been assigned, the number of activities/day assigned to each profile or position can be determined (e.g., number of outpatient visits in each 8-hour shift). Activities for longer units of time such as weeks or months can also be calculated.

4. Gap analysis:

Based on the above estimates, the gap between current existing human resources and the required activities can be determined.

5. Identification of additional resources:

The available alternatives include:

- Reassign duties of current staff



- Use staff in training (e.g., college students)
- Recall retired staff
- Recruit voluntary staff

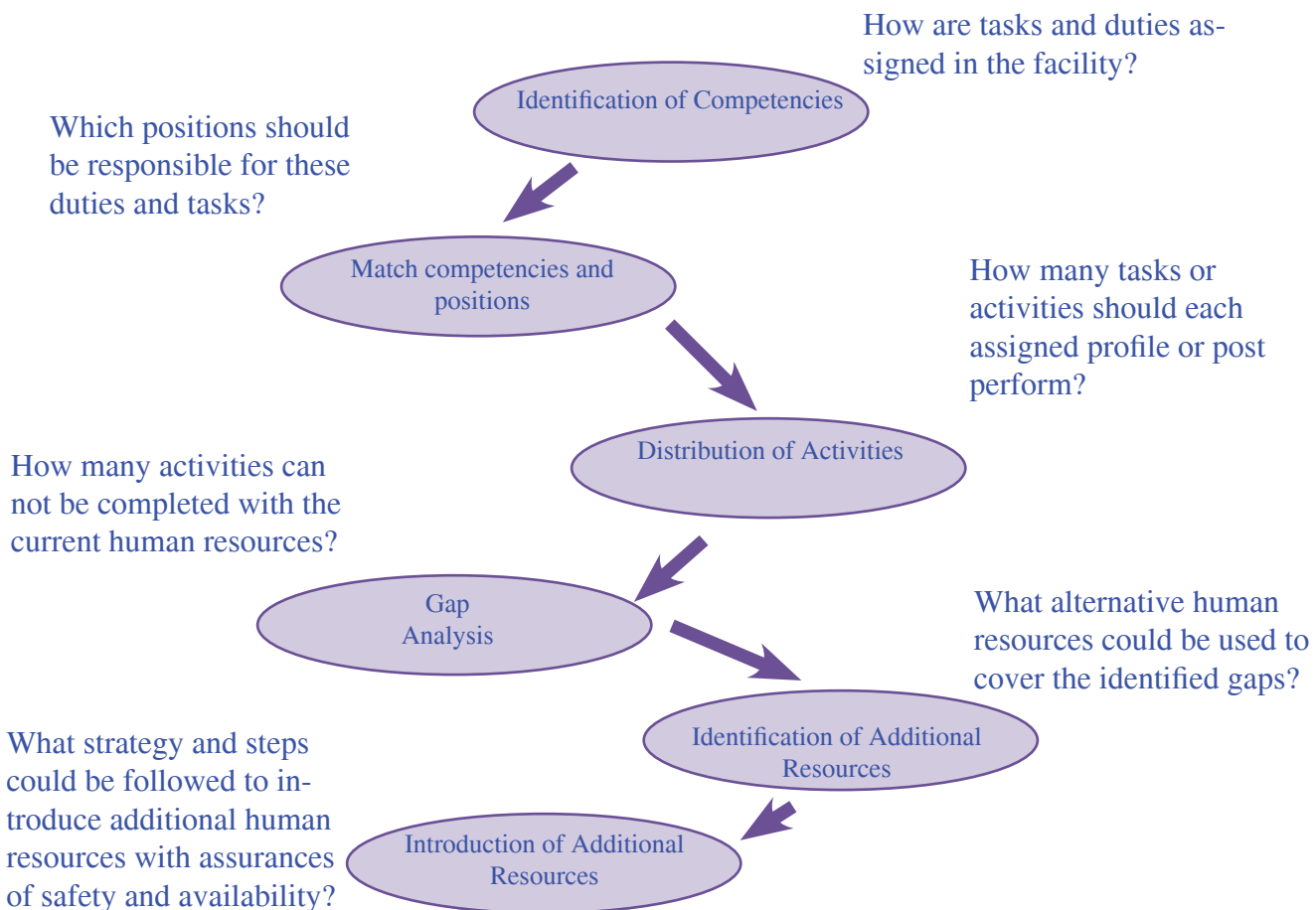
6. Strategy for hiring additional resources.

The following aspects should be taken into account when hiring additional resources:

- Identification and assignment of activities
- Legal liabilities
- Protection and safety conditions
- Labor issues
- Training and induction

The above process can be summarized in the following diagram:

HUMAN RESOURCES PLANNING





14.6.2 PLANNING OF EQUIPMENT, MATERIALS, AND SUPPLIES REQUIREMENTS

In order to estimate the medical equipment, drugs, personal protective equipment, and other supplies requirements, it is necessary to compare current installed capacity (including human resources) with the expected demand in a given period. Therefore, health facilities should consider the following steps:

- Identify the required supplies based on the management guidelines adopted and agreed with the clinical group. Conduct the same procedure for the infection control needs.
- Define a policy and a strategy to ensure availability of an emergency inventory during the first days of the crisis.
- Define a storage and distribution strategy for supplies and drugs that ensures immediate availability, safety, rational use, and efficient use of space.
- In conjunction with suppliers define a strategy for prompt and effective restock of inventories, guarantying a continuous and ongoing supply during each pandemic outbreak.
- Strengthen the preventive and corrective maintenance programs for medical equipment and electromechanical devices expected to require increased use.
- Keep comprehensive records of consumption of supplies, medical materials, and drugs.

WHO has proposed the following model scenario for calculations in the event of an influenza pandemic (3):

Scenario for model calculation ^a	
Infection control recommendations for routine care of pandemic influenza patients	Standard + Droplet Precautions Main points: <ul style="list-style-type: none"> • reinforce respiratory hygiene/cough etiquette • HCWs use medical masks when in close contact with patients • reinforce hand hygiene
Infection control recommendations when performing aerosol-generating procedures	PPE should include long-sleeved gown, single-use gloves, eye protection (e.g. goggle, face shield) and respiratory protection.
Population	100,000 persons
Duration of pandemic wave	90 days
Duration of infectious period/hospital days per patient	7 days
% of the population developing clinical symptoms	30% (30,000 persons)
% of persons with symptoms seeking care	100% (30,000 persons)
% of persons with symptoms seeking hospital care	2% (600, of which , 480 are in rooms and 120 in intensive care units)
% of patients with symptoms receiving home care	98% (29,400 persons)

^aNote the PPE estimates will change if any of the individual assumptions are changed.



Sample calculation of PPE needs in HCF according to the scenario above		
Item	Assumptions	Needs
Surgical masks for hospital inpatients		
No. of inpatients in wards = 480	Patient to use mask when out of isolation room; allow 1 mask/patient/day for 7 days	3 360
No. of patients in intensive care = 120	Most patients will not be able to use masks; all will survive and will use masks for 4 days (overestimate)	480
Masks for visitors		
600 inpatients each receive 2 visitors/day; no. of visits/day = 1200; no. of days = 7	1 surgical mask/visit; 2 visits/patient/day for 7 days	8 400
Masks for health workers		
Surgical masks for health workers that care for 600 patients for 7 days	12 HCW entries/isolation room/day + 2 aerosol-generating procedures/patient/day	50 400
TOTAL surgical masks		62 640
Other PPE for health workers when performing aerosol-generating procedures		
Respirators	2/patient/day	8 400
Disposable face shields or goggles or Re-usable face shields or Re-usable goggles	2/patient/day disposable 2/patient/day reprocessed* 10 times or 2/patient/day reprocessed* 50 times	8 400 840 or 168
Long-sleeved gowns Disposable (no reuse and discarded) gowns or Cloth gowns (no reuse on same day; laundered i.e. reprocessed up to 50 times)	2/patient/day or 2/patient/day	8 400 or 168
Gloves Non-sterile, single use gloves	2 pairs/patient/day	8 400

References:

1. Zhang X, Meltzer MI, Bridges CB FluWorkloss 1.0 A Manual to Assist State and Local Public Health Officials in Estimating the Impact of an Influenza Pandemic on Work Day Loss. CDC, HHS, 2005.
2. HHS, Pandemic Influenza Plan, 2006 (adapted).
3. Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care, WHO Interim Guidelines, June 2007.



14.7 MANAGEMENT OF EXCESS HOSPITAL MORTALITY

Although strictly speaking management of fatalities is under the responsibility of local government agencies and it should be considered by contingency plans as such in the event of an unusually high volume of bodies, health facilities, particularly facilities with hospitalization capacity, could receive the first and the highest impact of mortality. It has been estimated that 70% of the deaths in an influenza pandemic will occur in hospitals.¹ Consequently, health facilities should make provisions for handling fatalities, based on the expected number, with all of the biosafety, logistic, social and cultural implications that this entails.

Local coordination in the management of a large number of dead bodies is especially important. This should be the responsibility of a local agency, preferably not the hospital director or the health workers, since they are responsible primarily for the care of the living.²

With regard to the facility, a procedure that considers infection control measures as well as efficient and respectful corpse management should be established.

Operational actions

The facility should define the protocol in accordance with at least the following basic guidelines:

- Follow the guidelines defined in the national and local plans with regard to corpse management in disaster situations.
- Establish liaison with the local agency in charge of fatality management.
- Adopt and provide information on the procedures for prompt removal of corpses from the isolation area or room:
 - Biosafety precautions
 - Use of PPE (masks, gloves)
 - Use of waterproof hermetic bag for the corpse
- Transfer route to the morgue
- Mechanisms for timely delivery of the corpse to the family (use of PPE)
- Special precautions if autopsy is performed
- Identification of alternative strategies for temporary storage:
 - Refrigerated vans/containers
 - Appropriate corpse identification (labeling)
- Comprehensive mortality registry



- Coordination with the local funeral parlors in order to improve the efficiency of the processes and maintain biosafety conditions.

References:

1. Zhang X, Meltzer MI, Bridges CB FluWorkloss 1.0 A Manual to Assist State and Local Public Health Officials in Estimating the Impact of an Influenza Pandemic on Work Day Loss, CDC, HHS, 2005.
2. La gestión de cadáveres en situaciones de desastre: guía práctica para equipos de respuesta. OPS/OMS/CICR, Washington DC, 2006.

14.8 OCCUPATIONAL HEALTH

The risk factors that the health workers will face in the event of an emergency due to epidemic respiratory diseases will not be different from those that they are usually exposed. The difference will probably be evident in the magnitude and intensity of exposure; the potential increase in the number of occupational accidents and occupational diseases, not only from the biological, but also from the ergonomic and psycho-occupational perspective. There are several factors that could explain this hypothesis *a priori*:

1. Increased number of contacts with infected patients
2. Increased number of tasks/day
3. Longer working days
4. Assignment of new responsibilities
5. Increased contact with critically ill patients
6. Potential limitation of existing resources

It is necessary to consider that health workers may be influenced by these and other non-occupational factors such as disease or death of family members, changes in family and social situations, among others.

Therefore the authority in the health facility responsible of workers' health should promote the implementation of an internal contingency plan to improve worker protection from higher exposure and maintain their health and appropriate functionality.

Operational actions

The facility can implement a contingency plan comprising aspects such as the following:

- Training on use of personal protective equipment and biosafety precautions
- Epidemiological surveillance system for febrile/respiratory syndromes in HCW's.
- Definition of prophylaxis protocols (vaccines, antiviral drugs)
- Supervision and monitoring of staff commuting routines
- Verification of staff disabilities associated with influenza-like illness
- Psychological and social support for staff
- Special training for additional staff



There are some important factors¹ that should be taken into account when considering occupational health precautions:

- Timely recognition of health care professionals with SARI is essential in order to limit spread of the infection.
- Health care professionals with SARI should be excluded from work until recovery.
- As a general principle, health workers that provide care for SARI patients should not care for other patients.
- Health workers with high risk of SARI-related complications should not provide care for infected patients.

References:

1. Pandemic Influenza Guide: Infection Control in Hospitals and Primary Care Guidelines. Department of Health, England, Agency for Health Protection, October 2005 (adapted).

15. RISK COMMUNICATION FOR HEALTH FACILITIES

The objective of this section is to provide basic knowledge of risk communication for health facilities. Some basic concepts will be presented, as well as messages and skills that allow health workers, particularly medical coordinators and other managers, to communicate with several audiences involving the general community. The purpose of risk communication, within the framework of national, subnational, and local actions for pandemic control, is to decrease anxiety and negative attitudes that could arise in the event of an epidemic outbreak.

Standards for communication of epidemic outbreaks prepared by WHO (1) indicate that “the paramount goal of communication of epidemic outbreaks is to communicate with people in a way that promotes, maintains, or recovers trust.” In addition,, they stress the importance of making early announcements, acting with transparency, having knowledge of different audiences and planning communication strategies.

15.1 RISK COMMUNICATION

Risk communication for epidemic outbreaks, a process of information and opinions exchange between people, groups, and institutions, usually includes several different messages about the nature of the risk. It is a process that starts with preparation well in advance of any outbreak and ends with evaluation. It includes all forms of communication. Furthermore, risk communication facilitates the expression of concerns, opinions, or reactions related to the messages about risk or the legal and institutional provisions for



risk management (2). The ultimate goal is to communicate with the public in a way that creates, maintains and reestablishes trust and transparency. One of the keys is to create communication surveillance and a “listening” component that reflects peoples fears, concerns and realities and enables the health system to respond to those issues

Risk communication is implemented well before the danger of an epidemic outbreak causes strong feelings of anger in the community. It contributes to alleviate people by containing their feelings and effectively overcoming the dangers (3). Therefore, it is different from public relations or health education activities that are conducted in normal situations.

Risk communication is concentrated in 6 areas:

1. Contents of information: What do we know about the crisis? What do we want the people to know, and how do we communicate effectively?
2. Logistics and resources: How do we really communicate our contents to the hands (and minds) of our audiences?
3. Evaluation of audience: Who do we have to reach? What are these people thoughts, and how should this influence what we say?
4. Public participation: How do we make communication to allow audience involvement, and how do we keep them active and not passive?
5. Meta-messages: How much security should or can we provide? How much confidence should or can we demonstrate? How can multiple emotions be addressed simultaneously?
6. Self-evaluation: How will values, emotions, and political problems influence our crisis communication? What may we be wrong about? What are our internal sources of resistance to doing it well and how can we counteract them?

15.2 NATIONAL COMMUNICATION STRATEGY

Most countries have a national preparedness plan for an influenza pandemic that establishes a communications strategy, including actions for an epidemic outbreak or the onset of a pandemic:

Define the first announcements and when they will be made

Establish the limits of transparency

Define who will be the official spokesperson

Define the communication channels

Obtain support for training activities, elaboration of messages, definition of audiences, and selection of communication channels



The communication strategy should be written, approved, and aligned with the National Preparedness Plan for an Influenza Pandemic.

15.3 HEALTH FACILITY COMMUNICATION PLANS

National communication strategies should provide guidance for the development of communication plans of health facilities. The activities outlined in these plans tend to be divided into actions that will be conducted before the pandemic, the first actions at the beginning of a pandemic, and the actions to be implemented after the pandemic has been declared and spread internationally. Preparatory activities are critical for the later phases. Therefore, sufficient time must be set aside for each of the activities.

Activities prior to the pandemic

Define members of the communications team (including sponsors and health volunteers).

Create or activate chains of command and assign persons responsible for each area.

Establish the information flow protocols during a pandemic and assign persons responsible for each area.

Create mechanisms for “listening” to understand what the public is thinking.

Disseminate the national communication strategy.

Select a spokesperson and a substitute based on the criteria of credibility, ability to generate confidence, clear speech, availability. Preferably select a person on a top management position in the department such as a hospital director.

Prepare all contact information for the communications team (e.g., address, work and home phone, e-mail, messaging, radio) and keep the information accessible and up-to-date.

Estimate and allocate the necessary financial resources.

Prepare the health workers on how to communicate with the public, students, local authorities, and others during their routine medical visits.

Identify the target audiences (e.g., health workers, school directors, financial sector, unions, religious organizations, community). Segment the audiences by district or another significant and manageable territorial unit. Identify the relevant media to reach each segment.

Write down everything the team knows about the different audiences (e.g., how they reacted to previous crises). Determine whether they speak other languages or dialects. Describe their resources (e.g., occupational health resources). For the media, specify whether or not they support the current health system.



Discuss the emotions generated by a previous crisis and how they dealt with it (e.g., fear, anger, victimization, mistrust, and mourning).

Elaborate a basic set of messages. Draft them simply and concisely and evaluate technical consistency. Confirm that they are understandable to persons that have nothing to do with the health system.

Elaborate action plans that consider the phase of the epidemic, action times, responsible persons, feedback channels and evaluation.

Confirm that the department action plan is consistent with the general plans of the Ministry of Health. Send the action plan to the Ministry of Health communication offices and obtain feedback.

Review the plan periodically and update it as needed.

Emergence of the pandemic: early announcement

At the beginning of a pandemic, the public will want to know about subjects such as the following:

Am I or are we safe?

How will it affect me or my family?

Who or what caused this?

Can it be fixed? If you can not fix it, who or what can?

How can I protect myself or my family in the future?

It is important that health workers familiarize themselves with the pandemic communication strategy in their national preparedness plan, and take into account the following:

People have the right to receive information that influences their life.

If you wait, the news may become known anyway. When this happens, you may lose trust and credibility.

You can control the accuracy and framework of the information better if you are the first to deliver it.

It is more likely that there will be time for significant audience participation in decision-making if the information is circulated soon.

Early circulation of the information about a situation may prevent similar situations at other sites.

It is easier to circulate the information soon than to respond to the questions, attacks, and mistrust that can arise due to late circulation.

You will be better prepared to gain the trust of the public if you circulate the information promptly.

If you wait, people may feel angry and resentful.

It is more likely that people will overestimate the risk if you withhold the information.



Finally, the following suggestions are provided to guide the communication activities, particularly for the spokespersons, as well as face-to-face encounters with the media and community:

General measures:

- Do not over-reassure.
- Err on the alarming side.
- Acknowledge uncertainty.
- Share dilemmas.
- Acknowledge opinion diversity.

Face the emotional aspect of the crisis:

- Do not diagnose or over plan for the panic.
- Do not focus your attention on eliminating all fear.
- Do not forget that emotions are different from fear.
- Do not ridicule the emotions of the public.
- Legitimize the fears of the public.
- Tolerate early overreactions.
- Recognize your own humanity.

Include the public:

- Tell people what you expect and which measures should be taken.
- Offer people activities to carry out.
- Allow people to choose their own actions.
- Ask more about people.

Errors, bad impressions, and partial truths:

- Recognize errors, deficiencies, or improper behavior.
- Request often that errors, deficiencies, and improper behavior be excused.
- Be explicit about changes in the official opinion, forecast, or policy.
- Do not lie or tell half truths.
- Focus your attention on sincerity and transparency.
- Be careful when making risk comparisons.



References:

- 1 Normas de comunicación de brotes epidémicos de la OMS, 2006
- 2 HHS, Administration of Mental Health Services and Substance Abuse
- 3 Sandman P, Lanard J. Crisis Communication I: How Bad Is It? How Sure Are You? Available from: <http://psandman.com/handouts/sand12a.pdf>



ANNEX 1. SEVEN STRATEGIC ACTIONS FOR APPLICATION OF THE IHR

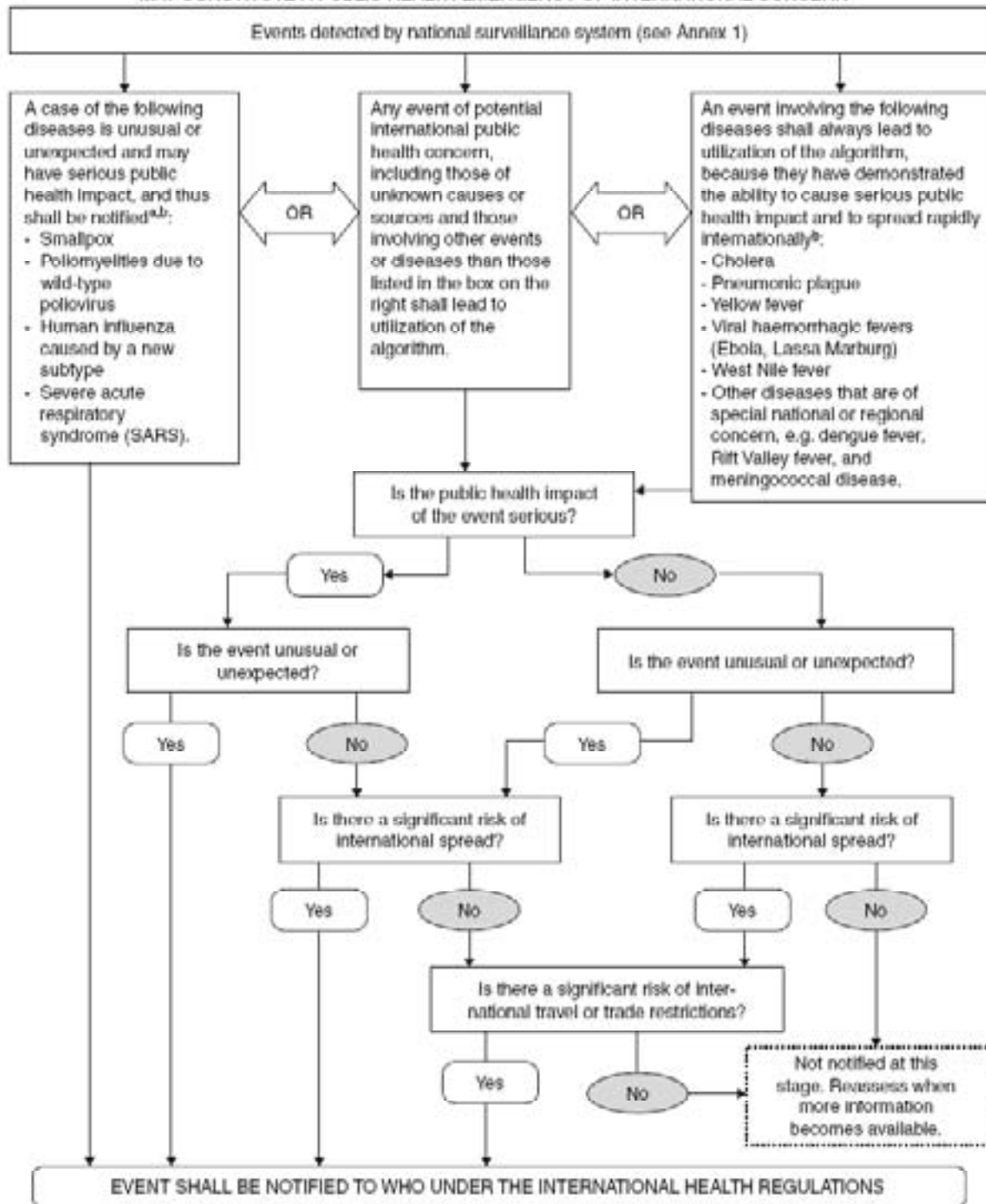
	Strategic action	Objective
	GLOBAL PARTNERSHIPS	
1	Foster global partnerships	WHO, all countries and all relevant sectors (e.g. health, agriculture, travel, trade, education, defence) are aware of the new rules and collaborate to provide the best available technical support and, where needed, mobilize the necessary resources for effective implementation of IHR (2005).
	STRENGTHEN NATIONAL CAPACITY	
2	Strengthen national disease surveillance, prevention, control and response systems	Each country assesses its national resources in disease surveillance and response and develops national action plans to implement and meet IHR (2005) requirements, thus permitting rapid detection and response to the risk of international disease spread
3	Strengthen public health security in travel and transport	The risk of international spread of disease is minimized through effective permanent public health measures and response capacity at designated airports, ports, and ground crossings in all countries
	PREVENT AND RESPOND TO INTERNATIONAL PUBLIC HEALTH EMERGENCIES	
4	Strengthen WHO global alert and response systems	Timely and effective coordinated response to international public health risks and public health emergencies of international concern
5	Strengthen the management of specific risks	Systematic international and national management of the risks known to threaten international health security, such as influenza, meningitis, yellow fever, SARS, poliomyelitis, food contamination, chemical and radioactive substances.
	LEGAL ISSUES AND MONITORING	
6	Sustain rights, obligations and procedures	New legal mechanisms as set out in the Regulations are fully developed and upheld; all professions involved in implementing IHR (2005) have a clear understanding of and sustain the new rights, obligations, and procedures
7	Conduct studies and monitor progress	Indicators are identified and collected regularly to monitor and evaluate IHR (2005) implementation at national and international levels. WHO Secretariat reports on progress to the World Health Assembly. Specific studies are proposed to facilitate and improve implementation of the Regulations

Strategic actions 2-5 are fundamental because they call for significantly strengthened national and global efforts.



ANNEX 2

DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

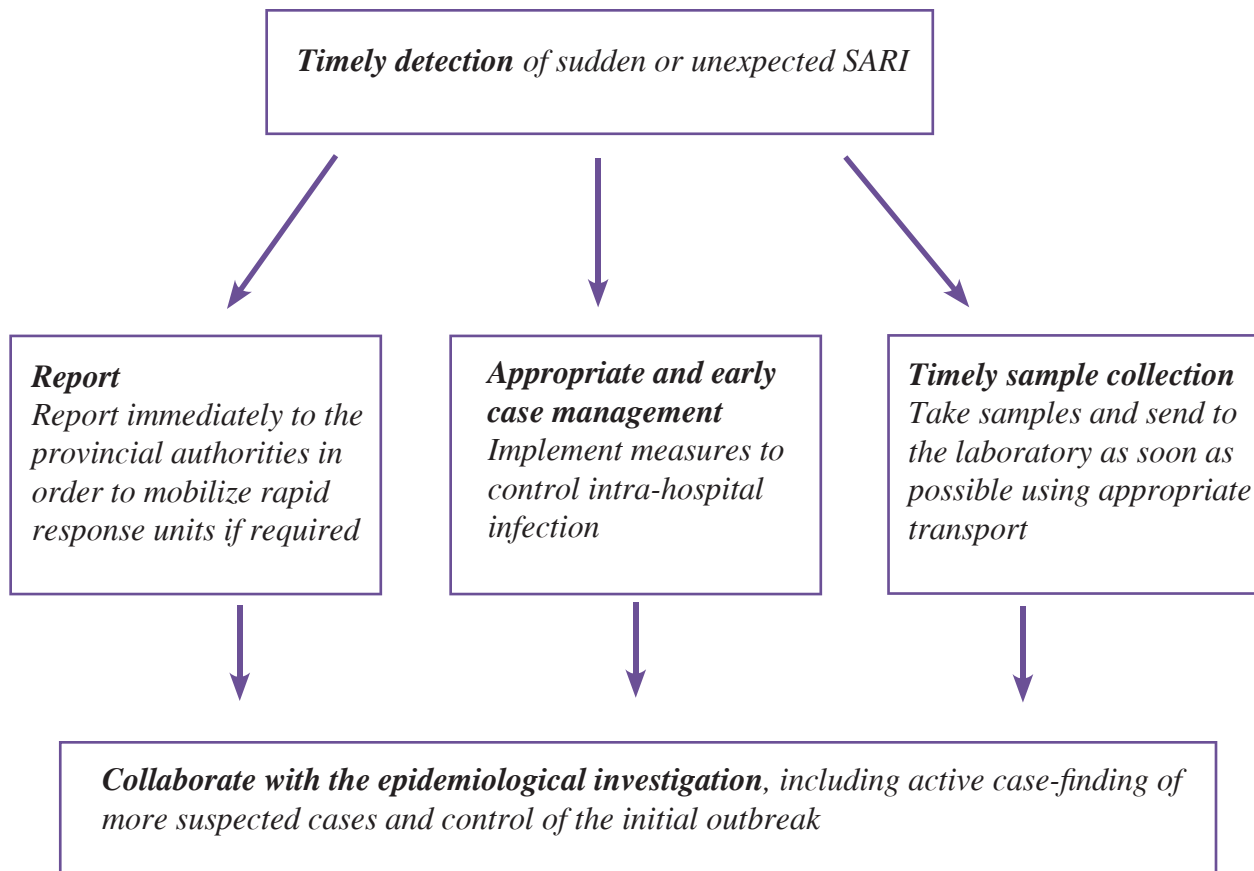


^a As per WHO case definitions.

^b The disease list shall be used only for the purposes of these Regulations.



ANNEX 2. EPIDEMIOLOGICAL SURVEILLANCE ALGORITHM



ANNEX 3. CALCULATING THE PERCENTAGE OF SARI CASES IN THE HEALTH FACILITY

In order to determine the epidemiological curve or pattern of cases of SARI in the population that seeks care at or visits a specific health facility, the weekly percentages of cases of SARI in a single health facility should be calculated and analyzed by age group.⁵



This will facilitate identification of an increase in the number of cases above the usual levels for the facility during a given time period compared to the number of cases found in previous years. This could indicate a SARI outbreak, which may have been caused by a virus with pandemic potential.

Percentage of SARI-related hospital admissions	$\frac{\text{Number of SARI cases hospitalized weekly}}{\text{Total number of weekly hospital admissions}}$
Percentage of SARI-related hospital admissions by age group	$\frac{\text{Number of SARI cases hospitalized weekly by age group}}{\text{Total number of weekly hospital admissions}}$
Percentage of SARI-related deaths	$\frac{\text{Number of weekly SARI-related deaths}}{\text{Total number of weekly deaths}}$
Percentage of SARI-related deaths by age group	$\frac{\text{Number of weekly SARI-related deaths by age group}}{\text{Total number of weekly deaths}}$

5. Epidemiological rates can be calculated only if the population coverage or population assigned to the health facility is known.



ANNEX 4. WEEKLY SARI AND SARI-RELATED MORTALITY CASE REPORT FORMS

																		
Weekly Data Collection Form for Severe Acute Respiratory Infection (SARI) Hospitalizations																		
Health Service, Department of Health, Region										Epidemiologic Week #								
Sentinel Hospital										Date of Report								
Surveillance of Severe Acute Respiratory Infection (SARI)																		
		Number of Visits																
		Total hospitalized	# SARI	Under 6 months Total hospitalized	# SARI	6-23 months Total hospitalized	# SARI	2-4 years Total hospitalized	# SARI	5-14 years Total hospitalized	# SARI	15-49 years Total hospitalized	# SARI	50-64 years Total hospitalized	# SARI	Over 65 Total hospitalized	# SARI	
Monday																		
Tuesday																		
Wednesday																		
Thursday																		
Friday																		
Saturday																		
Sunday																		
Total for Week																		
Population																		
Incidence Rate (per 100,000)																		
Surveillance Coordinator:												Signature						



Severe Acute Respiratory Infection (SARI) Weekly Case Report Form

Health Unit, Health Department, Region

Sentinel Hospital

Epidemiological week no.

Date reported

SARI case-finding: person with sudden fever (over 38°C) and cough or sore throat, dyspnea or breathing difficulty, and need for hospitalization

Number of Visits

Total / Less than 6 months / 6-23 months / 2-4 years / 5-14 years / 15-49 years / 50-49 years / 50-64 years / Over 65 years

Total visits / Cases SARI

Monday / Tuesday / Wednesday / Thursday / Friday / Saturday / Sunday

Total weekly



Population

Incidence rate (per 100,000)

Surveillance coordinator

Signature



																	
Weekly Hospital Deaths Case Report Form																	
Health Unit, Health Department, Region		Epidemiological week no.															
Sentinel Hospital		Date reported															
Surveillance of Severe Acute Respiratory Infection (SARI)-Related Mortality																	
	Total		Less than 6 months		6-23 months		2-4 years		5-14 years		15-49 years		50-64 years		Over 65 years		
	Total deaths	SARI	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	Total deaths	SARI-related deaths	
Monday																	
Tuesday																	
Wednesday																	
Thursday																	
Friday																	
Saturday																	
Sunday																	
Weekly total																	
Population																	
Incidence rate (per 100,000)																	
Surveillance Coordinator																Signature: _____	



ANNEX 5. SARI CASE REPORT FORM. GENERIC PROTOCOL FOR INFLUENZA SURVEILLANCE

Clinical Epidemiological Registry of Sudden or Unexpected SARI

Physician: Address: City/Town: Province: Tel: Fax: E-mail:	Recipient Laboratory:
---	--------------------------------------

Case identification number: (.....).....

First and last name.....

Date of birth:/...../..... Age: Sex:.....

Date of onset of disease:/...../..... Epidemiological week number:

Date sample taken:/...../.....

Influenza vaccine: Yes No Date of vaccination:/...../.....

Clinical characteristics

	Yes	No
Fever >38°C		
Rhinorrhea		
Pharyngitis		
Conjunctivitis		
Otitis		
Bronchitis		
Bronchiolitis		
Pneumonia		
Cough		
Dyspnea		

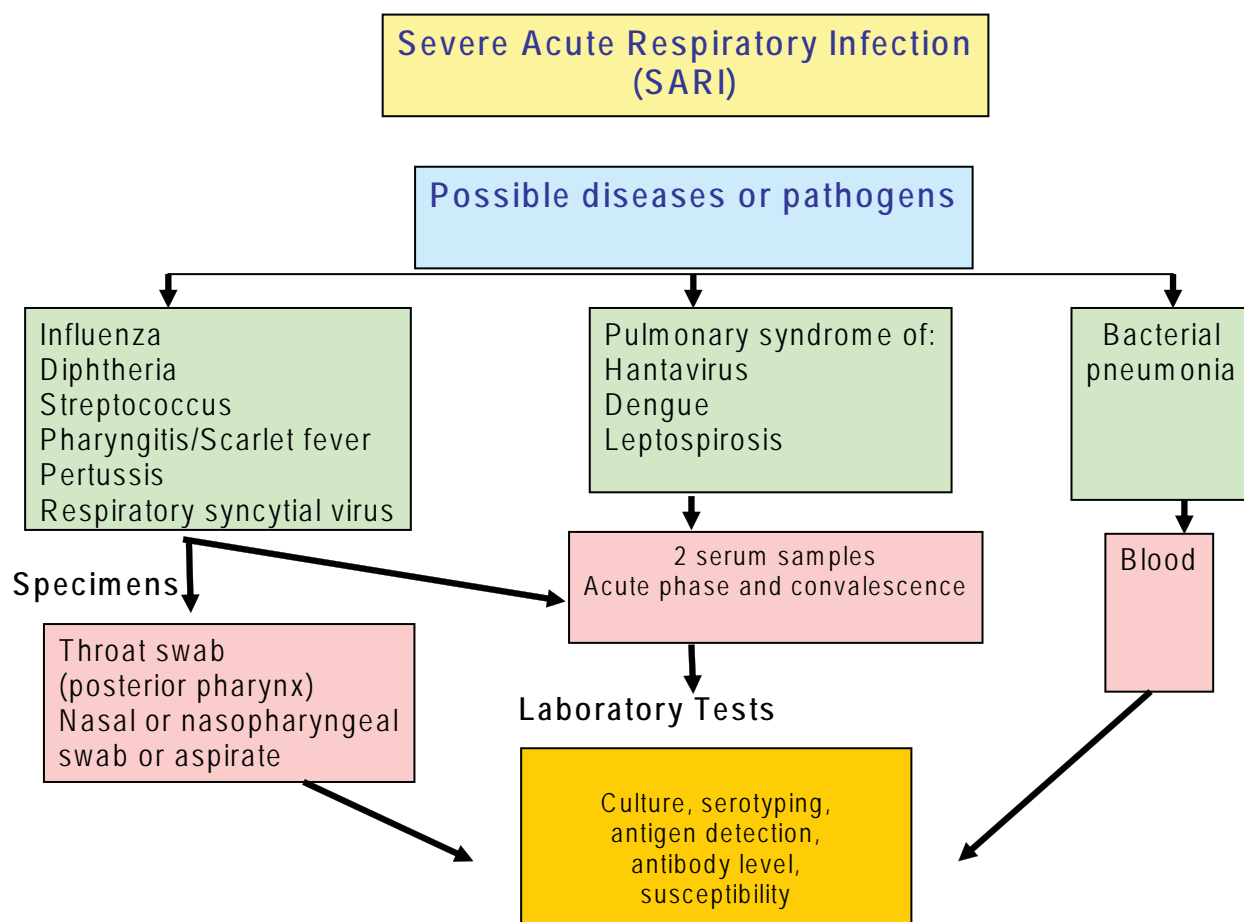
	Yes	No
Adenopathies		
Asthenia		
Headache		
Myalgia		
Vomiting		
Diarrhea		
Rash		
Sporadic case		
Onset of symptoms during the outbreak		

Comments:

Treatment: Antiviral drugs Yes No Type:.....
 Antibiotics Yes No Type:



ANNEX 6. DIFFERENTIAL DIAGNOSIS OF SARI AND DIAGNOSTIC SPECIMENS



Source: Adaptation of guidelines for collection of clinical specimens during field investigation of outbreaks. WHO/CDS/CSR/EDC/2000.4



ANNEX 7. RESPIRATORY TRACT SAMPLING TECHNIQUES

Nasal swab

- Insert a dry polyester or Dacron swab into the nostril, parallel to the palate, using a rotating motion. Apply pressure on the walls of the nasal septum in order to collect as many cells as possible.
- Insert the swab into the tube that contains the transport medium:
 - If a **commercial medium** is used, place the swab in the transport tube and press on or apply pressure to the padding on the bottom of the tube in order to release the medium.
 - If a **laboratory-prepared medium** is used, break off the stick from the swab so that only the part adhered to the swab remains in the tube. Close the tube with the cap. The swabs should always be kept moist during shipping.

Throat swab

- Use a swab to brush the tonsils and the back of the pharynx. Then insert the swab into the transport medium as indicated in the previous section.
- If a laboratory-prepared medium is used, both swabs (nasal and pharyngeal) can be sent in the same transport medium.

Nasopharyngeal aspirate

- **Materials**
 - Nasopharyngeal aspiration kit
 - Test tube rack
 - Cold-storage units
 - Vacuum pump
 - Container with disinfectant solution
- **Method**
 - Open the envelope that contains the aspiration kit and connect the end of the tube with smaller diameter to the aspiration tube.
 - Connect the end with larger diameter to the vacuum pump.
 - Insert the nasogastric tube into the nostril of the patient.
 - Remove the tube with a gentle rotating motion. Then repeat the procedure in the other nostril.
 - Aspirate a volume of approximately 8-10 mL of cold buffer solution at pH 7.2 through the collector tube in order to collect all of the secretions.
 - Change the cap of the sample collection tube and identify it with the patient data.
 - Send the sample to the laboratory immediately with the sample shipment form. Make sure that it is kept in the ice bath until it reaches the laboratory.

Source: PAHO/CDC Generic Protocol for Influenza Surveillance



ANNEX 8. PACKING THE SAMPLES FOR TRANSPORT

- Keep the samples at a temperature of 4°C.
- Fill a refrigerator with packs of ice or coolants.
- Keep the samples in double packing if dry ice is used.

Include a detailed list of the samples with identification numbers and instructions for the laboratory.

Packing the samples for transport

Use three layers of packing.

The first layer should have passed the filtration test.

Use absorbent material in all of the layers.

Do not place more than 500 mL in the packing.

Transport of samples

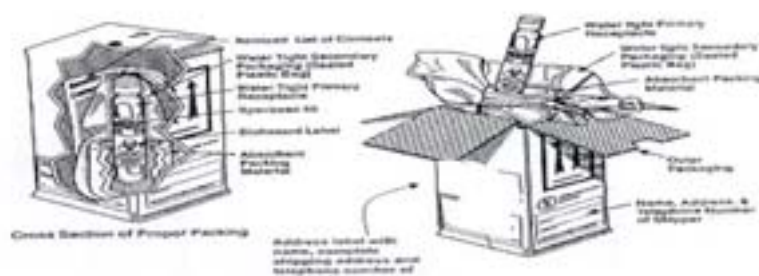
Take into account the WHO guidelines for safe transport of infectious substances and diagnostic samples.

Follow the local standards for transport of infectious materials.

Coordinate with the laboratory.

Transport of samples from the health facility to the laboratory

Proper packing and labeling of the secondary container for shipping of diagnostic



The labeling for contents should include the words:
"UN 3373 Diagnostic Specimens"

Handling infectious material in the health facility

Always use personal protective equipment. Emphasize the importance of hand washing.

Be careful with the sharps.

Handle all of the samples as if they were infected.



ANNEX 9. FORM FOR MONITORING HEALTH WORKERS FOR CASE-FINDING OF INFLUENZA-LIKE ILLNESSES IN HEALTH WORKERS EXPOSED TO PATIENTS WITH SUDDEN OR UNEXPECTED SARI⁶

Name: _____ Home phone: _____

Job: _____ Workplace: _____

Date(s) of exposure (List all dates. Use the back of the sheet if required): ____/____/____ ____/____/____

Type of contact with patient with serious respiratory infection of potential concern, the patient environment, or the virus: _____

Was the following personal protective equipment (PPE) used?

PPE	Yes	No	Do not know
Gown	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Particle respirator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surgical mask	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eye protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other(Please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

List any non-occupational exposure (i.e., exposure to birds or persons with febrile severe acute respiratory disease): _____

Take your temperature twice daily, in the morning (AM) and the afternoon (PM), for 10 days after providing care for a patient infected with an acute respiratory disease of potential concern (including 10 days after the last exposure) and monitor onset of any of the following symptoms of influenza-like illness (ILI), including:

- fever >38 °C
- cough
- sudden onset of respiratory disease
- sore throat
- arthralgia
- myalgia or prostration
- gastrointestinal symptoms (e.g, diarrhea, vomiting, abdominal pain)

If any symptom of ILI occurs, limit your interaction with others immediately. Do not visit public areas and report to _____ in _____

Day 1	Day 2	Day 3	Day 4	Day 5
Date ____/____/____	Date ____/____/____	Date ____/____/____	Date ____/____/____	Date ____/____/____
Temperature AM: _____	Temperature AM: _____	Temperature AM: _____	Temperature AM: _____	Temperature AM: _____
Temperature PM: _____	Temperature PM: _____	Temperature PM: _____	Temperature PM: _____	Temperature PM: _____
Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____

Day 6	Day 7	Day 8	Day 9	Day 10
Date ____/____/____	Date ____/____/____	Date ____/____/____	Date ____/____/____	Date ____/____/____
Temperature AM: _____	Temperature AM: _____	Temperature AM: _____	Temperature AM: _____	Temperature AM: _____
Temperature PM: _____	Temperature PM: _____	Temperature PM: _____	Temperature PM: _____	Temperature PM: _____
Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____	Symptoms of ILI: No ____ Yes ____

6.Prevention and control of acute respiratory diseases with epidemic and pandemic potential during health care. Provisional WHO guidelines. June 2007 (WHO/CDS/EPR/2007.6)



ANNEX 10: TRIAGE

TRIAGE SCALES

PATIENT CLASSIFICATION CRITERIA BY COLOR (1)

Type of Patient	Referral	Treatment
Healthy, no respiratory symptoms	Home	Biosafety measures
Respiratory symptoms not compatible with influenza	Home	Symptomatic and biosafety measures
Influenza-like symptoms, without pulmonary complications and without additional chronic disease	Strict home isolation	Symptomatic and biosafety measures
Clinical symptoms of influenza without pulmonary complications and/or controlled chronic disease	Care and isolation center ^a	Symptomatic and antiviral
Clinical symptoms of influenza with pulmonary complications and/or chronic decompensated disease	Permanent or field hospital medical unit	Compensation of chronic disease and complications
Death due to suspected or confirmed clinical symptoms of influenza	Forensic medical unit	

^aUnits located in alternative treatment centers (e.g., gymnasiums, hotels, schools) with capacity for outpatient care of exclusive cases of influenza-like illness.

The *United States Influenza Pandemic Preparedness Plan and Response* includes other methodologies for defining the immediate destination of the patient, which are described below (2):

For adults

- The preliminary IDSA-ATS guidelines recommend the use of severity scores or scales such as the Pneumonia Severity Index (PSI) or PORT Score and the CURB-65 System in order to determine which patients can be safely treated as outpatients.

For Children

- The current guidelines provide indicators for hospitalization of children with community-acquired pneumonia. For infants the indications include temperature $>38.5^{\circ}\text{C}$, RR >70 breaths/minute, thoracic retraction (inspiration), nasal inflammation, hypoxia, cyanosis, intermittent apnea, snoring, and poor diet. The indications for hospitalization of older children include temperature $>38.5^{\circ}\text{C}$, RR >50 breaths/min, thoracic retraction, nasal inflammation, hypoxia, cyanosis, snoring, and signs of dehydration.



As with pandemic influenza, the decision to hospitalize for community-acquired post-influenza bacterial pneumonia during the pandemic period will be based on clinical assessment of the patient by the physician, as well as the availability of hospital resources and staff. Although unstable patients will be considered high priority, patients with conditions that entail high risk of complications also require special care. Home management with follow-up may be appropriate for young children with satisfactory appearance that only have fever.

Risk groups for influenza complications

The Advisory Committee on Immunization Practices (ACIP) currently recognizes the following groups as those with highest risk for complications of seasonal influenza (e.g., hospitalization, death) compared to healthy older children and young adults (3).

- Persons aged > 65 years
- Residents of nursing homes and other chronic care facilities that house persons of any age with chronic medical conditions.
- Adults and children with chronic disorders of the pulmonary or cardiovascular systems, including asthma.
- Adults and children who have required regular medical follow-up or hospitalization during the previous year due to chronic metabolic diseases (including diabetes mellitus), renal dysfunction, or immunosuppression (including immunosuppression that is caused by medication or by human immunodeficiency virus [HIV]).
- Children and adolescents (aged 6 months to 18 years) who are receiving long-term aspirin therapy and, therefore, are at risk of Reyes syndrome.
- Pregnant women
- All children aged < 2 years
- All persons with conditions that can affect respiratory function or respiratory secretion management, or can increase the risk of aspiration.

CALCULATION OF THE PNEUMONIA SEVERITY INDEX (PORT SCORE)

Characteristic of Patient	Points Assigned
Demographic Factor	
Age	
Male	Age
Female	Age –10
Resident of nursing home or similar institution	+10

**Comorbid disease**

Neoplastic disease	+30
Hepatic disease	+20
Congestive heart failure	+10
Cerebrovascular disease	+10
Kidney disease	+10

Physical examination findings

Altered mental status	+20
Respiratory rate > 30 breaths/min	+20
Systolic blood pressure <90 mm Hg	+20
Temperature <35°C or >40°C	+15
Pulse > 125 bpm	+10

Laboratory and/or X-ray findings

Arterial pH <7.35	+30
Blood urea nitrogen >30 mg/dL	+20
Sodium <130 mmol/L	+20
Glucose >250 mg/dL	+10
Hematocrit <30%	+10
Hypoxemia	+10
Pulse oximetry <90%	
Arterial blood gas <60 mm Hg	
Pleural effusion in baseline X-ray	+10

RISK CLASSIFICATION ACCORDING TO PNEUMONIA SEVERITY INDEX (PSI)

PSI risk class	Characteristics and points	Recommended treatment site
I	Age >50 years + no morbid conditions, vital signs within normal range, normal mental status	Outpatient
II	<70	Outpatient
III	71–90	Outpatient/Brief admission
IV	91–130	Inpatient
V	>130	Inpatient



CURB-65 SCORING SYSTEM

Characteristic	Points
Confusion ^a	+1
Urea >7 mmol/L (20 mg/dL)	+1
Respiratory rate >30 breaths/min	+1
Blood pressure (systolic <90 or diastolic <60 mm Hg)	+1
Age >65 years	+1

^a Based on specific mental assessment or person, time, or place disorientation

Patient score	Recommended treatment site
0 – 1	Outpatient
2	Hospital room admission
3 – 5	Hospital room or ICU admission

CRITICAL CARE TRIAGE PROTOCOL

Another critical point is insufficient availability of the ventilators and intensive care units that will be required for care of serious cases of SARI. The decision-making process can be complex when there are too many cases with similar needs but insufficient capacity to treat them. In these cases, more objective mechanisms of prioritization must be used that allow the clinician to make a decision in critical situations based on scientific evidence.

The protocol that is presented is only one form of addressing the problem. There should be a consensus between the clinicians and the administrators of the health facility that will define the guidelines on this subject in the final analysis. The protocol is based on an adaptation of the Sequential Organ Failure Assessment (SOFA) score (4).



TOOL USED TO ASSIGN PRIORITIES IN THE TRIAGE PROTOCOL FOR ASSESSMENT OF PATIENTS THAT REQUIRE INTENSIVE CARE IN AN INFLUENZA PANDEMIC (5)

Initial assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score $>11^a$	Manage medically Provide palliative care as needed Discharge from critical care
Red	SOFA score ≤ 7 or single-organ failure	High priority
Yellows	SOFA score 8-11	Intermediate priority
Green	No significant organ failure	Referral or discharge from critical care Reassess if needed

^aIf the patient meets the exclusion criteria or the SOFA score is >11 at any time from the initial assessment until 48 hours later, change the triage code to blue and proceed as indicated.

48-hour assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score stable 8–11 with no change	Provide palliative care if needed Discharge from critical care
Red	SOFA score ≤ 11 and decreasing	High priority
Yellow	SOFA score stable at <8 with no change	Intermediate priority
Green	No longer dependent on ventilator	Discharge from critical care

120-hour assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score >11 or SOFA score < 8 with no change ^b	Provide palliative care Discharge from critical care
Red	SOFA score <11 and decreasing progressively	High priority
Yellow	SOFA score < 8 with minimal decrease	Intermediate priority
Green	No longer dependent on ventilator	Discharge from critical care



Instructions for Application of Triage Protocol^c

1. Assess whether the patient meets the inclusion criteria
 - If yes, proceed to step 2.
 - If no, reassess the patient later to determine whether clinical status has deteriorated.
2. Assess whether the patient meets the exclusion criteria
 - If no, proceed to Step 3
 - If yes, assign blue triage code. Do not transfer the patient to critical care. Continue current level of care or provide palliative care as needed.
3. Proceed with application of the protocol (initial assessment).

^b If the patient meets the exclusion criteria or the SOFA score is >11 at any time between 48 and 120 hours after the initial assessment, change the triage code to blue and proceed as indicated.

^c The authors suggest that this protocol be applied in all patients that could require critical care, whether or not they have symptoms of influenza.



Inclusion Criteria

The patient must have one of the following:

A. Criteria for invasive ventilatory support

- Refractory hypoxemia ($\text{SPO}_2 < 90\%$ with no ventilatory mask or $\text{FiO}_2 > 0.85$)
- Refractory acidosis ($\text{pH} < 7.2$)
- Clinical evidence of imminent respiratory failure
- Inability to protect or maintain airway

B. Hypotension (systolic pressure < 90 mm HG or relative hypotension) with clinical evidence of shock (altered state of consciousness, decreased urine output, or other evidence of end-organ failure) refractory to volume resuscitation requiring vasopressor or inotropic support that cannot be managed in a ward setting.

Exclusion Criteria

The patient is excluded from admission or transfer to a critical care unit if any of the following criteria are met:

A. Severe trauma

B. Severe burn with one of the following criteria:

- Age > 60 years
- 40% of body surface area affected
- Inhalation injury

C. Cardiac arrest

- unwitnessed cardiac arrest
- witnessed cardiac arrest that does not respond to defibrillation or pacemaker
- recurrent cardiac arrest

D. Serious cognitive impairment

E. Advanced untreatable neuromuscular disease

F. Metastatic malignant disease

G. Advanced and irreversible immune compromise

H. Severe and irreversible neurological condition or event

I. End-stage organ failure that meets the following criteria:

- Heart
New York Heart Association (NYHA) class III or IV heart failure
- Lungs
COPD with $\text{FEV}_1 < 25\%$ predicted, baseline $\text{PaO}_2 < 55$ mm Hg or secondary pulmonary hypertension
Cystic fibrosis with post-bronchodilatation $\text{FEV}_1 > 30\%$ or $\text{PaO}_2 < 55$ mm Hg
Pulmonary fibrosis with VC or TLC $< 60\%$ predicted, $\text{PaO}_2 < 55$ mm Hg or secondary pulmonary hypertension
Primary pulmonary hypertension with NYHA class III or IV heart failure, right atrial pressure > 10 mm Hg or mean pulmonary artery pressure 50 mm Hg
- Liver
Child-Pugh score ≥ 7

J. Age over 85 years



Sequential Organ Failure Assessment (SOFA) Score

	Score				
Variable	0	1	2	3	4
PaO ₂ /FIO ₂ mm Hg	>400	≤400	≤300	≤200	≤100
Platelet count x 10 ⁶ /L	>150	≤150	≤100	≤50	≤20
Bilirubin levels, mg/dL (μmol/L)	<1.2 (<20)	1.2-1.9 (20-32)	2.0-5.9 (33-100)	6.0-11.9 (101-203)	>12 (>203)
Hypotension ^a	None	MABP <70	Dop ≤ 5	Dop >5 Epi ≤ 0.1 Norepi ≤ 0.1	Dop > 15 Epi > 0.1 Norepi > 0.1
Glasgow coma score	15	13-14	10-12	6-9	<6
Creatinine level, mg/dL (μmol/L)	<1.2 (<106)	1.2-1.9 (106-168)	2.0-3.4 (169-300)	3.5-4.9 (301-433)	>5 (>434)

PaO₂= Partial pressure of arterial oxygen

FIO₂= Fraction of inspired oxygen

MABP= Mean arterial pressure in mm Hg

^aDop (dopamine), Epi (epinephrine), Norepi (norepinephrine) doses in μg/kg /minute

NYHA Functional Classification of Heart Failure

This system relates patient symptoms and everyday activities

Class	Patient symptoms
Class I (mild)	No limitation of physical activity. Ordinary physical activity does not cause fatigue, palpitation, or dyspnea.
Class II (mild)	Slight limitation of physical activity. Comfortable at rest, but ordinary activities can cause fatigue, palpitation, or dyspnea.
Class III(moderate)	Marked limitation of physical activity. Comfortable at rest, but minimal ordinary activity causes fatigue, palpitation, or dyspnea.
Class IV (severe)	Unable to perform any physical activity without discomfort. Symptoms of heart failure at rest. Any physical activity increases the discomfort



Child-Pugh Score

The scale uses five clinical measures of liver disease, each of which established a score from 1 to 3, with 3 as the most abnormal.

Measure	1 point	2 points	3 points	Unit of measurement
Total bilirubin	<34 (<2)	34–50 (2-3)	>50 (>3)	μmol/l (mg/dL)
Serum albumin	>35	28–35	<28	g/L
INR	<1.7	1.71–2.20	> 2.20	No unit
Ascites	None	Responds to medication	Refractory	No unit
Hepatic encephalopathy	None	Grade I-II (or responds to medication)	Grade III-IV (or refractory)	No unit

Interpretation

Points	Class	1 yr survival probability	2 yr survival probability
5-6	A	100%	85%
7-9	B	81%	57%
10-15	C	45%	35%

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SURVEILLANCE EXERCISES

~ Pandemic 1918

~ SARS

~ Madagascar



Pan American
Health
Organization
Regional Office for the Americas
World Health Organization



INFLUENZA PANDEMIC 1918

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Purple Death

The Great Flu of 1918

by Sara Francis Fujimura

**U.S. AT WAR. MYSTERY VIRUS LEAPS AROUND THE GLOBE
KILLING SCORES IN ITS PATH. SCIENTISTS RACE TO FIND A
CURE.**

**Not headlines from March 2003, but from 85 years earlier. In
1918, hundreds of thousands of American troops headed to
Europe for the closing offensives of World War I.**



*Estimates of the number of deaths from the pandemic range from 21 million to 50 million worldwide.
Photo ©Ohio Historical Society*

Meanwhile back home, schoolgirls jumped rope to a new chant:

I had a little bird
And its name was Enza
I opened the window
And in-flew-Enza

Influenza—more specifically the Spanish flu—left its devastating mark in both world and American history that year. The microscopic killer circled the entire globe in four months, claiming the lives of more than 21 million people. The United States lost 675,000 people to the Spanish flu in 1918—more casualties than World War I, World War II, the Korean War and the Vietnam War combined. Pharmaceutical companies worked around the clock to come up with a vaccine to fight the Spanish flu, but they were too late. The virus disappeared before they could even isolate it.



America's Forgotten Pandemic: The Influenza of 1918, by Alfred Crosby, tells the chilling story of the world's deadliest flu pandemic from a U.S. perspective and also offers many details of the epidemic's international reach. The book was first published in 1990, but following the emergence of severe acute respiratory syndrome (SARS) earlier this year, it was rereleased in paperback in September with a new preface.

Crosby's book and other treatments of the 1918 pandemic (see box at end) make enlightening—if alarming—reading as the Northern Hemisphere's new flu season gets under way.

Despite its name, researchers believe the Spanish flu most likely originated in the United States. One of the first recorded cases was on March 11, 1918, at Fort Riley in Kansas. Overcrowding and unsanitary conditions created a fertile breeding ground for the virus. Within one week, 522 men had been admitted to the camp hospital suffering from the same severe influenza. Soon after, the army reported similar outbreaks in Virginia, South Carolina, Georgia, Florida, Alabama and California. Navy ships docked at East Coast ports also reported outbreaks of severe influenza and pneumonia among their crews. The flu seemed to target military personnel and not civilians, so the virus was largely overshadowed by hotter current affairs such as Prohibition, the suffragette movement and the bloody battles in Europe.

By May 1918, influenza began to subside in the United States. But the ordeal was by no means over. Soldiers at Fort Riley, now ready for battle, incubated the virus during their long, cramped voyage to France. Once they hit French shores, the virus exploded, striking the Allied forces and Central Powers with equal force. The Americans fell ill with "three-day fever" or "purple death." The French caught "purulent bronchitis." The Italians suffered "sand fly fever." German hospitals filled with victims of Blitzkatarrh or "Flanders fever."

No matter what they called it, the virus attacked everyone similarly. It started like any other influenza case, with a sore throat, chills and fever. Then came the deadly twist: the virus ravaged its victim's lungs. Sometimes within hours, patients succumbed to complete respiratory failure. Autopsies showed hard, red lungs drenched in fluid. A microscopic look at diseased lung tissue revealed that the alveoli, the lungs' normally air-filled cells, were so full of fluid that victims literally drowned. The slow suffocation began when patients presented with a unique symptom: mahogany spots over their cheekbones. Within hours these patients turned a bluish-black hue indicative of cyanosis, or lack of oxygen. When triaging scores of new patients, nurses often looked at the patients' feet first. Those with black feet were considered beyond help and were carted off to die.

What made this influenza especially baffling to health care workers was that it attacked healthy, strong adults most often. Normally, flu is only life-threatening to the elderly, young children and people with compromised immune systems. Many adults become sick, but very few die. Spanish flu turned the tables on this pattern. Disproportionate numbers of men and women—especially pregnant women—died, leaving their orphaned children behind.



The Spanish lady

Spanish flu, sometimes called the “Spanish Lady,” received its misnomer thanks largely to wartime censorship. Both the Allied forces and Central Powers had amassed huge losses due to Spanish flu, but the warring parties stifled reports to hide information that could be valuable to the enemy. However, uncensored newspapers in Spain openly reported the deaths from flu of millions of Spaniards in May and June of 1918—reports that were picked up by media around the world. Spain, outraged at the unflattering epithet, pointed its finger at France, saying the disease had come from its battlefields and had flown over the Pyrenees mountains carried by the wind. The misnomer, however, endured.

From the battlefields of Europe, the epidemic quickly evolved into a pandemic, as the disease spread north to Norway, east to China, southeast to India and as far south as New Zealand. Even islands weren’t safe. Hitching rides on naval ships and carriers, merchant vessels and trains, the virus traveled to the four corners of the earth. By the summer of 1918, it had hit Puerto Rico, the Caribbean, the Philippines and Hawaii. The epidemic wreaked havoc on Puerto Rico but surprisingly barely touched the Panama Canal Zone, the crossroads of the world at the time. The steamship *Harold Walker* is blamed for bringing Spanish flu to Tampico, Mexico. Within four short months, the virus had rounded the globe and returned once more to U.S. shores.

The second and third waves of Spanish flu slammed the United States in the cold-weather months of 1918. This time civilians were not immune. The country’s indigenous people, particularly Native Alaskans, suffered disproportionately. The flu completely wiped out some villages in Alaska, and others lost most of their adult population. Big-city dwellers fared poorly too. New York City buried 33,000 victims. Philadelphia lost nearly 13,000 people in a matter of weeks. Overwhelmed with bodies, many cities soon ran out of coffins and some had to convert streetcars into hearses to keep up with demand.

Crosby described how overburdened undertakers were:

In some cases the dead were left in their homes for days. Private undertaking houses were overwhelmed, and some were taking advantage of the situation by hiking prices as much as 600 percent. Complaints were made that cemetery officials were charging fifteen-dollar burial fees and then making the bereaved dig the graves for their dead themselves.

Life came to a standstill in some parts of the United States. Boston officials closed public schools, saloons and soda shops. Chicago police officers were ordered to arrest anyone sneezing or coughing in public. In Nashville, all public gatherings—including in movie houses, dance halls and pool parlors—were prohibited. Even ministers were ordered not to hold church services.



In Tokyo, schoolgirls wear face masks to protect them from the Spanish flu virus. Experts say a new mutant influenza strain like the one that caused the 1918 pandemic would likely spread much faster than the coronavirus that caused SARS. Photo © Bettman/Corbis.

Crosby details the desperation: "Many families, especially in the slums, had no adult well enough to prepare food and in some cases had no food at all because the breadwinner was sick or dead."

Jeffery Taubenberger, chief of cellular pathology and genetics at the U.S. Armed Forces Institute of Pathology and a world-renowned leader in Spanish flu research, estimates that about a third of the U.S. population was infected with Spanish flu. "There was a massive shortage of medical care of all kinds," he says. Many cities' health care services were already overtaxed by the war. For example, one-third of Nashville's doctors were treating service people overseas when Spanish flu hit. Nurses became an invaluable asset to communities as the remaining doctors quickly became overwhelmed and in many cases sick themselves with the Spanish flu.

Crosby describes the horrors facing nurses, some fresh out of school and with little practical experience:

Visiting nurses often walked into scenes resembling those of the plague years of the fourteenth century....One nurse found a husband dead in the same room where his wife lay with newly born twins. It had been twenty-four hours since the death and the births, and the wife had had no food but an apple which happened to lie within reach.

Every year, the world catches a new influenza virus. Many people become infected, and many die. But what made the 1918 pandemic so particularly deadly? Like other viruses, the influenza virus changes constantly. This mutation, or antigenic drift, normally causes only minor changes, so pharmaceutical companies are able to counteract each year's strain with the proper flu vaccine. However, as historical records dating from the 1700s show, every 10 to 40 years the world suffers a global flu pandemic, the result of a major antigenic drift. The virus mutates so much that the human body no longer recognizes it and is left defenseless. The resulting epidemic spreads faster than scientists can isolate, produce and distribute a vaccine. This is what happened in 1918.

***America's Forgotten Pandemic: The Influenza of 1918*, by Alfred W. Crosby, Cambridge University Press (paperback, September 2003)**

***Hunting the 1918 Flu: One Scientist's Search for a Killer Virus*, by Kirsty E. Duncan, University of Toronto Press (hardcover, May 2003)**



Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus That Caused It, by Gina Kolata, Simon & Schuster Adult Publishing Group (paperback, January 2001)

For children:

Influenza Pandemic of 1918–1919, by Virginia Aronson, Chelsea House Publishers (hardcover, March 2000)

Purple Death: The Mysterious Flu of 1918, by David Getz, Henry Holt & Co. (hardcover, September 2000)

"History tells us we are ready for another pandemic," says Kirsty Duncan, Spanish flu researcher and author of *Hunting the 1918 Flu: One Scientist's Search for a Killer Virus*. "In many ways we are even more vulnerable now than in 1918. We travel and tour the world more. You can travel from one continent to another in a matter of hours now. Someone unknowingly harboring a disease can bring it from one country to another, passing the disease along to other travelers before they ever show signs of the disease."

Would the world be able to cope with another flu pandemic? Yes, says Robert Webster, chief virologist at St. Jude Children's Research Hospital and an expert on influenza. He cites Taubenberger's pioneering work in developing new techniques for analyzing genetic changes in influenza viruses. His findings suggest that "should something like the Spanish flu return, today's flu drugs—Tamiflu, Flumadine, Symmetrel, and Relenza—would all be effective," Webster says, adding: "With today's technology to add to Taubenberger's results, drug companies could get a vaccine ready very quickly."

What about a new, non-influenza virus, like the one that causes SARS? "Quarantine and hygiene put the SARS virus back in the bottle," says Webster. "It would not have been possible to do so with an influenza. It would travel too fast to be contained by quarantine and hygiene alone."

Sara Francis Fujimura is a freelance writer based in Arizona, USA. She is currently at work on a young adult novel set during the 1918 flu outbreak in Nashville, Tennessee.



Severe acute respiratory syndrome (SARS): Status of the outbreak and lessons for the immediate future

Geneva, 20 May 2003



World Health Organization
Communicable Disease Surveillance and Response

Unmasking a
new disease





Severe acute respiratory syndrome (SARS)

Unmasking a new disease

WHO maintains its position that SARS can and must be contained – pushed back out of its new human host.

One by one, the many puzzling features of this new disease are being unmasked.

One by one, the most severe outbreaks in the initial waves of infection are being brought under control.

Recommended measures – case detection, isolation and infection control, and contact tracing and follow-up surveillance – are working.

With this reassurance, the image of populations masked because of fear, the public face of SARS, can now begin to fade.



World Health Organization, Geneva
Communicable Disease Surveillance and Response



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Further information is available from:
CDS Information Resource Centre,
World Health Organization
1211 Geneva 27, Switzerland
Fax: + (41) 22 791 4285
E-mail: cdsdocs@who.int



Severe acute respiratory syndrome (SARS): Status of the outbreak and lessons for the immediate future

This document describes the evolution of severe acute respiratory syndrome, or SARS, and explains some of the features that make this new disease an especially challenging threat to international public health. Brief examples of economic, social, and political repercussions illustrate the wide-ranging impact a new disease can have in a closely interconnected and highly mobile world. Lessons learned from efforts to contain SARS, particularly concerning the strengths and weaknesses of systems for surveillance and response, are then used to assess global capacity to respond to other infectious disease threats, most notably the next influenza pandemic and the possible deliberate use of a biological agent to cause harm. Priority areas for urgent improvement are identified and discussed.

SARS: a puzzling and difficult new disease

SARS is the first severe and readily transmissible new disease to emerge in the 21st century. Though much about the disease remains poorly understood and frankly puzzling, SARS has shown a clear capacity for spread along the routes of international air travel. At present, the outbreaks of greatest concern are concentrated in transportation hubs or spreading in densely populated areas. WHO regards every country with an international airport, or bordering an area having recent local transmission, as at potential risk of an outbreak.

The first cases of SARS are now known to have emerged in mid-November 2002 in Guangdong Province, China. The first official report

of an outbreak of atypical pneumonia in the province, said to have affected 305 persons and caused 5 deaths, was received by WHO on 11 February. Around 30% of cases were reported to occur in health care workers. Confirmation that cases were consistent with the definition of SARS was made after permission was granted, on 2 April, for a WHO team to visit the province.

In the meantime, SARS was carried out of Guangdong Province on 21 February by an infected medical doctor who had treated patients in his home town. He brought the virus to the ninth floor of a four-star hotel in Hong Kong. Days later, guests and visitors to the hotel's ninth floor had seeded outbreaks of cases in the hospital systems of Hong Kong, Viet Nam, and Singapore. Simultaneously, the disease began spreading around the world along international air travel routes as guests at the hotel flew home to Toronto and elsewhere, and as other medical doctors who had treated the earliest cases in Viet Nam and Singapore travelled internationally for medical or other reasons.

When the disease moved out of southern China, the outbreaks it seeded – in Hanoi, Hong Kong, Singapore, and Toronto – became the initial “hot zones” of SARS, characterized by rapid increases in the number of cases, especially in health care workers and their close contacts. In these areas, SARS first took root in hospital settings, where staff, unaware that a new disease had surfaced and fighting to save the lives of patients, exposed themselves to the infectious agent without barrier protection. All of these initial outbreaks were subsequently characterized by chains of secondary transmission outside the health care environment.

16. NOVEMBER 2002

First known case of atypical pneumonia occurs in Foshan city, Guangdong Province, China.

11. FEBRUARY 2003

WHO receives reports from the Chinese Ministry of Health of an outbreak of acute respiratory syndrome with 305 cases and 5 deaths in Guangdong Province.

12. FEBRUARY

WHO is informed that the outbreak in Guangdong affected six municipalities. Laboratory analyses are negative for influenza viruses.

14. FEBRUARY

The Chinese Ministry of Health informs WHO that the outbreak in Guangdong is clinically consistent with atypical pneumonia. Further investigations rule out anthrax, pulmonary plague, leptospirosis, and haemorrhagic fever.



By 15 March, WHO had received reports of more than 150 cases of a new disease, which it named severe acute respiratory syndrome. Epidemiological analysis indicated that the new disease was spreading along the routes of international air travel. WHO immediately issued emergency travel recommendations to alert health authorities, physicians, and the travelling public to what was now perceived to be a worldwide threat to health. The global alert achieved its purpose. After the recommendations, all countries with imported cases, with the exception of provinces in China, were able, through prompt detection of cases, immediate isolation, strict infection control, and vigorous contact tracing, to either prevent further transmission or keep the number of additional cases very low.

During the last week of April, the outbreaks in Hanoi, Hong Kong, Singapore, and Toronto showed some signs of peaking. On 28 April, Viet Nam became the first country to stop local transmission of SARS. However, new probable cases, including cases in hospital staff, additional deaths, and first cases imported to new areas continued to be reported from several countries. The cumulative total number of cases surpassed 5000 on 28 April, 6000 on 2 May, and 7000 on 8 May, when cases were reported from 30 countries on six continents. At present, most new cases are being reported from Beijing and, increasingly, other parts of mainland China. Of the cumulative global total of 7761 probable cases and 623 deaths reported on 17 May, 5209 cases and 282 deaths had occurred in mainland China. Also of concern is a rapidly growing outbreak in Taiwan, China, with a cumulative total, on 18 May, of 344 cases, including many in hospital staff, and 40 deaths.

A particularly serious threat

SARS demonstrates dramatically the global havoc that can be wreaked by a newly emerging infectious disease. At this moment, public health authorities, doctors, nurses, scientists, and laboratory staff around the world are struggling to cope with SARS at a time when some hope

remains that the disease might still be contained. Economists and market analysts are simultaneously struggling to calculate the present and future costs, initially estimated at US\$ 30 billion in the Far East alone. Public panic is widespread, some government officials have lost their jobs, and social stability has been jeopardized in some of the hardest hit areas. Hospitals, schools, and borders have been closed, and several governments have advised their citizens not to travel to hard-hit areas. In Hong Kong, an electronic tracking system developed by the police force for use in criminal investigations has been adapted for contact tracing and monitoring of compliance with quarantine. In Singapore, military forces have been deployed to assist in contact tracing and to enforce quarantines that have halted the normal lives of thousands of people. No visitors are allowed at any public hospital.

SARS needs to be regarded as a particularly serious threat for several reasons. The disease has no vaccine and no treatment, forcing health authorities to resort to control tools dating back to the earliest days of empirical microbiology: isolation and quarantine. The virus comes from a family notorious for its frequent mutations, raising important questions about the future evolution of outbreaks and prospects for vaccine development. Epidemiology and pathogenesis are poorly understood.

The initial symptoms are non-specific and common. All available diagnostic tests have important limitations. If tests are poorly conducted or results wrongly applied, patients excreting virus and thus capable of infecting others can slip through the safety net of isolation and infection control. The disease continues to show a disturbing concentration in previously healthy hospital staff – the human resource vital to control. A significant proportion of patients require intensive care, thus adding to the considerable strain on hospital and health care systems. Evidence is mounting that certain source cases make a special contribution to rapid spread of infection. The maximum incubation period, currently estimated at 10 days, allows spread via air travel between any two cities in the world. WHO's most recent analysis estimates overall case fatality

20 FEBRUARY

Hong Kong officials inform WHO of an outbreak of 2 cases (1 fatal) of avian influenza following the detection of influenza A(H5N1) in members of a family who had recently travelled to Fujian Province, China.

21 FEBRUARY

A 65-year-old medical doctor from Guangdong checks into the 9th floor of a Hong Kong hotel. He had treated patients with atypical pneumonia prior to departure and is symptomatic upon arrival in Hong Kong.

This medical doctor infects at least 12 other guests and visitors to the 9th floor of the hotel.

26 FEBRUARY

A 48-year-old Chinese-American businessman is admitted to the French Hospital in Hanoi with a 3-day history of respiratory symptoms.

He had previously been in Hong Kong, where he visited an acquaintance staying on the 9th floor of the hotel where the Guangdong physician was a guest.



in the range of 14% to 15%. In persons over the age of 65, the case fatality ratio can exceed 50%.

With the notable exception of AIDS, most new diseases that emerged during the last two decades of the previous century or have become established in new geographical areas have features that limit their capacity to pose a major threat to international public health. Many (avian influenza, Nipah virus, Hanta virus, Hanta virus) failed to establish efficient human-to-human transmission. Others (*Escherichia coli* O157:H7, variant Creutzfeldt-Jakob disease) depend on food as a vehicle of transmission. Diseases such as West Nile fever and Rift Valley fever that have spread to new geographical areas require a vector as part of the transmission cycle. Still others (*Neisseria meningitidis* W135, and the Ebola, Marburg, and Crimean-Congo haemorrhagic fevers) have strong geographical foci. Although outbreaks of Ebola haemorrhagic fever have been associated with a case fatality ratio in the range of 53% (Uganda) to 88% (Democratic Republic of the Congo), person-to-person transmission requires close physical exposure to infected blood and other bodily fluids. Moreover, patients suffering from Ebola during the period of high infectivity are visibly very ill and too unwell to travel.

Chronology of an emerging disease

SARS was first identified in Viet Nam on 28 February, when Dr Carlo Urbani, an epidemiologist from the WHO office in Hanoi, examined a patient with a severe form of pneumonia with no known cause. By 11 March, at least 20 hospital workers in Hanoi's private French Hospital, and 23 at a hospital in Hong Kong, were ill with a similar acute respiratory syndrome.

SARS occurred at a time of heightened surveillance for atypical respiratory disease. From 11 February, the WHO office in Beijing,

which reinforced its staff with two epidemiologists, had been working with the government of China to learn more about the outbreak of atypical pneumonia in Guangdong. Surveillance was heightened further when a 33-year-old man who had travelled with his family to Fujian Province in China died of unknown causes in Hong Kong on 17 February. The next day, Hong Kong authorities announced that avian influenza A(H5N1) virus, the cause of "bird flu", had been isolated from both the man and his nine-year-old hospitalized son. Another member of the family, an eight-year-old daughter, died while in Fujian and was buried there.

On 12 March, after an assessment of the situation in Asia with WHO teams in Hanoi, Hong Kong, and Beijing, a global alert was issued about cases of severe atypical pneumonia with unknown etiology that appeared to place health workers at high risk.

Two days later, on 14 March, WHO received a report from the government of Canada that health authorities had taken steps to alert hospital workers, ambulance services, and public health units across the provinces that there were four cases of atypical pneumonia within a single family in Toronto that had resulted in 2 deaths. At 2 a.m. Geneva time on the following day, 15 March, the government of Singapore notified WHO, by urgent telecommunication, of a similar illness in a 32-year-old physician who had treated cases with a severe respiratory syndrome in Singapore, all subsequently linked to the Hong Kong hotel. This Singapore physician had travelled to the United States for a medical conference, and at the end of the conference boarded a return flight to Singapore in New York. Before departure he had indicated to a colleague in Singapore by telephone that he had symptoms similar to the patients he had treated in Singapore. The colleague notified health authorities. WHO identified the airline and flight, and the physician and his two accompanying family members were removed from the flight at a stopover in Frankfurt, Germany, where the three were immediately isolated and placed under hospital care. As a result of this prompt action,

28 FEBRUARY

Dr Carlo Urbani, a WHO official based in Viet Nam, is alarmed by several cases of atypical pneumonia in the French Hospital, where he has been asked to assist. He notifies the WHO Regional Office for the Western Pacific.

WHO headquarters moves into a heightened state of alert.

1 MARCH

A 26-year-old former flight attendant is admitted to a hospital in Singapore with respiratory symptoms. A resident of Singapore, she was a guest on the 9th floor of the Hong Kong hotel.

4 MARCH

A 26-year-old local Hong Kong resident, who had visited an acquaintance at the hotel while the Guangdong doctor was a guest, is admitted to the Prince of Wales Hospital with respiratory symptoms. Over the next 7 days, he is treated with a jet nebulizer four times daily.



Germany experienced no further spread linked to its first imported cases.

A rare emergency advisory

Later in the morning of 15 March, with this background and chronology of events, a decision was made by WHO to increase the level of the global alert issued on 12 March. The decision was based on five different but related factors. First, the causative agent, and therefore the potential for continued spread, of this new disease were not yet known. Second, the outbreaks appeared to pose a great risk to health workers who managed patients, and to the family members and other close contacts of patients. Third, many different antibiotics and antivirals had been tried empirically and did not seem to have an effect. Fourth, though the numbers were initially small, a significant percentage of patients (25 of 26 hospital staff in Hanoi, and 24 of 39 hospital staff in Hong Kong) had rapidly progressed to respiratory failure, requiring intensive care and causing some deaths in previously healthy persons. Finally, the disease had moved out of its initial focus in Asia and appeared to have spread to North America and Europe.

At this time, the epidemiology of SARS was poorly understood. A virulent strain of influenza had not been ruled out as a possible cause, even though transmission patterns were not characteristic for influenza. There was also some hope that the new disease, like many other new diseases of the recent past, would fail to maintain efficient person-to-person transmission, or that it might attenuate with passage and eventually self-contain. Despite the lack of understanding about the disease, its cause, and future evolution, the need was great to introduce a series of emergency measures to contain SARS outbreaks in the affected areas and prevent further international spread, thus reducing opportunities for the new disease to establish itself. WHO thus decided, on 15 March, to issue a rare emergency travel advisory as a global alert to international travellers, health care professionals, and health authorities.

The global response

The existing system for alert and response

In April 2000, WHO formally launched the Global Outbreak Alert and Response Network (GOARN) as a mechanism to link together, in real time, 112 existing networks which together possess much of the data, expertise, and skills needed to keep the international community alert to outbreaks and ready to respond. By electronically linking together existing networks WHO is able to maintain close vigilance over the evolving infectious disease situation and to mobilize outbreak verification and response activities when needed. From January 1998 through March 2002, WHO and its partners investigated 538 outbreaks of international concern in 132 countries.

One of the most powerful new tools for gathering epidemic intelligence is a customized search engine that continuously scans world Internet communications for rumors and reports of suspicious disease events. This is the Global Public Health Intelligence Network (GPHIN), a computer application developed by Health Canada and used by WHO since 1997. GPHIN operates as a sensitive real-time early warning system by systematically searching for key words in over 950 news feeds and electronic discussion groups around the world. Human review and computerized text mining are used to filter, organize and classify the more than 18 000 items it picks up every day, of which around 200 merit further analysis by WHO. GPHIN provided some of the earliest alerts to the November outbreak in China.

In outbreak alert and response, every hour counts, as the window of opportunity for preventing deaths and further spread closes quickly. GPHIN has brought great gains in timeliness over traditional systems in which an alert is sounded only after case reports at the local level progressively filter to the national level before being formally notified to WHO. GPHIN currently picks up – in real time – the first hints of about

5 MARCH

In Hanoi, the Chinese-American businessman, in a stable but critical condition, is air evacuated to the Princess Margaret Hospital in Hong Kong. Seven health workers in Hanoi who had cared for him are ill.

Dr Urbani continues to treat cases at the Hanoi French Hospital.

An elderly Toronto woman, who had been a guest on the 9th floor of the Hong Kong hotel, dies at Toronto's Scarborough Grace Hospital. Five members of her family are found to be infected and are admitted to the hospital.

7 MARCH

Health care workers at Hong Kong's Prince of Wales Hospital start to complain of respiratory tract infections, progressing to pneumonia.

8 MARCH

Fourteen staff at the French Hospital in Hanoi are ill with an acute respiratory syndrome. A WHO team arrives to provide support.



40% of the roughly 200 to 250 outbreaks subsequently investigated and verified by WHO each year. While the early alert to outbreaks of genuine concern is most important, GPHIN also allows WHO to step in quickly to refute unsubstantiated rumors before they have a chance to cause social and economic disruption.

During outbreak response, WHO uses a custom-made geographical mapping technology to assist in the location of cases and rapid analysis of the epidemic's dynamics. This epidemiological mapping technology is also used to predict environmental and climatic conditions conducive for outbreaks. An event management system, introduced in 2001, is now used to gather and communicate data throughout the course of outbreak investigation and response. The system generates a dynamic picture of operations, aids organization of logistics, and provides a systematic way to prepare better, respond faster, and manage resources more effectively.

SARS: sealing off the opportunities to establish endemicity

SARS has been an extremely demanding test of the effectiveness of WHO and its GOARN partners to mount an adequate response, get teams and supplies into countries, and ensure adequate monitoring and reporting. The urgency of SARS has further challenged WHO to set in motion high-level international scientific and medical collaboration in which natural competition for publication and prestige is set aside in the interest of solving the scientific mysteries of a shared threat.

To date, the global response, coordinated by WHO and strongly supported by its GOARN partners, has been designed to rapidly seal off opportunities for SARS to establish itself as a common disease. The initial emergency plan, mapped out from 12 to 15 March, called for an attack on the ground and in the "air". On the ground, WHO sent teams of experts and specialized protective equipment for infection control in hard-hit hospitals to countries requesting such assistance. In the "air",

WHO used the model of its electronically interconnected global influenza network to quickly establish a similar "virtual" network of 11 leading laboratories, connected by a shared secure website and daily teleconferences, to work around the clock on identification of the SARS causative agent and development of a robust and reliable diagnostic test. This network, in turn, served as a model for similar electronically linked groups set up to pool clinical knowledge and to compare epidemiological data. WHO also decided to issue daily updates on its website to keep the general and travelling publics informed and, to the extent possible, counter rumors with reliable information.

In late March, Chinese authorities issued updated data on cases and deaths for the previously reported outbreak of atypical pneumonia in Guangdong Province, raising the cumulative totals from 305 to 792 cases and from 5 to 31 deaths. Chinese scientists, epidemiologists, and clinicians also became full partners in the three working groups that were studying SARS. On 2 April, a WHO five-person team was given permission to travel to Guangdong Province to confer with officials there about the SARS outbreak. The Chinese government has given highest priority to the SARS response. Visits to assess the situation in several provinces, including some that are likely ill-equipped to manage a health crisis on the magnitude of SARS, have been visited by Ministry of Health and WHO teams. The first joint Ministry of Health-WHO team visited Hebei Province, which borders Beijing municipality, in mid-May.

A system of alert and response for emerging and epidemic-prone diseases is being developed for all of mainland China. Electronic reporting of new cases and deaths, by province, now occurs daily. Equally important, health officials now hold televised press conferences, thus taking the important step of increasing the awareness of the population and hospital staff of the characteristic symptoms, the need to seek prompt medical attention, and the need to manage patients according to the principles of isolation and strict infection control.

10 MARCH

At least 22 staff at the Hanoi hospital are reported ill with respiratory symptoms. The Chinese Ministry of Health asks WHO to provide technical and laboratory support to clarify the cause of the Guangdong outbreak.

11 MARCH

Dr Urbani departs for Bangkok, where he is scheduled to give a presentation on tropical diseases. He is ill upon arrival and is immediately hospitalized.

12 MARCH

WHO issues a global alert about cases of severe atypical pneumonia following mounting reports of cases among staff in the Hanoi and Hong Kong hospitals.

13 MARCH

WHO sends an emergency alert to GOARN partners. The American businessman dies in isolation at the Hong Kong hospital. Altogether, 3 Hong Kong hospitals are now reporting cases of an unusual and severe respiratory disease.



Near the end of March, WHO recommended screening measure at airports for passengers departing from areas with recent local transmission, and issued advice to airlines on steps to take should a suspect case be detected in flight. Twice in April and once in early May, to prevent further international spread, WHO issued the toughest travel advisories in its 55-year history when it recommended postponement of all but essential travel to designated high-risk areas.

WHO teams continue to provide operational support and specialized expertise in the most seriously affected areas. Requests for additional country assistance continue to be received, most notably from authorities in China. Abundant additional support is available to all through information posted at the WHO website (www.who.int/csr/sars). Guidance ranges in nature from forms for collecting and reporting data, through guidelines for clinical management and infection control in hospitals, to the materials for local production of diagnostic tests. The evolution of the outbreak is constantly and closely monitored and daily updates are posted on the website.

Rapid advances in knowledge

On 17 April, exactly a month after its establishment, the laboratory network announced conclusive identification of the SARS causative agent: a new coronavirus unlike any other known human or animal virus in its family. Complete sequencing of its RNA followed shortly. The laboratory reagents needed to calibrate, standardize and assure the quality of laboratory tests are being made available by WHO, at no cost, to laboratories designated by ministries of health. On 4 May, network scientists released the first results of studies on the survival time of the SARS virus on various environmental surfaces and in various bodily specimens, including faeces, respiratory secretions, and urine. The results will provide solid scientific guidance for recommended public health measures and may shed some light on why so many staff in sophisticated and well-equipped hospitals continue to become infected.

Daily teleconferences of epidemiologists, including WHO team members at the main outbreak sites, have refined the case definitions, facilitated daily reporting, confirmed modes of transmission, tracked exported cases, and greatly increased knowledge about the control measures that work best in different country settings. WHO has also sent teams of epidemiologists and other specialists to investigate environmental sources of infection and confer with authorities about the conditions under which the initial cases of SARS may have emerged. From 16 to 17 May, WHO convened the first international consultation on the global epidemiology of SARS and produced a state-of-the-art consensus document on the status of current knowledge to guide firm policy recommendations for containment and control.

Participants in the clinical network have described the clinical course of SARS, compared experiences with different treatments, developed guidelines for isolation and infection control, and explored possible reasons for the spontaneous recovery of many patients and the rapid deterioration of others, and for the very small number of paediatric cases. Despite this progress, many questions remain.

Learning from SARS

The importance of preparedness

When the first suspected SARS cases began appearing in new countries following the mid-March alert, many hospital staff cited the WHO advisory, and their subsequent high-level of awareness, as one reason why cases were quickly detected and isolated, with the result that further transmission was either avoided entirely or kept to a very small number of cases. A second explanation offered for the comparatively mild and well-contained SARS situation in countries such as the USA is the high level of nationwide planning and preparedness that followed the deliberate distribution of anthrax-tainted mail in the US postal system in October 2001.

14 MARCH
The Ministry of Health of Singapore reports 3 cases of atypical pneumonia,

including the former flight attendant who had stayed at the Hong Kong hotel. Contact tracing subsequently will link her illness to more than 100 SARS cases in Singapore.

Health authorities in Ontario, Canada take steps to alert doctors, hospitals, and public health units that there are 4 cases of atypical pneumonia in Toronto that have resulted in 2 deaths.

15 MARCH

WHO intervenes to have a Singaporean physician, who had treated patients with atypical pneumonia in that country, removed from a flight in Frankfurt, Germany, and immediately placed in isolation.

WHO issues a travel advisory as evidence mounts that SARS is spreading by air travel. SARS is declared

"a worldwide health threat".

WHO formulates global response plans, issues case definitions and guidelines for infection control in hospitals, and mobilizes GOARN partners.



The International Health Regulations provide the legal framework for global surveillance and reporting of infectious diseases and a mechanism by which measures to prevent international spread can be enforced. The regulations, which are currently undergoing a substantial revision, will be discussed during the 56th World Health Assembly. The SARS outbreak provides firm evidence of the need for such regulations and concrete examples of the areas in which revision and updating are urgently needed.

The novel nature of the SARS virus created an extra step in the containment response: scientific identification and characterization of the causative agent to allow development of a diagnostic test, treatment protocols, and a scientifically sound basis for recommending control measures. Experience with SARS has shown that, with strong global leadership by WHO, scientific expertise from around the world can work in a very effective collaborative manner to identify novel pathogens. This function would be invaluable in the event of the deliberate release of a biological agent or during future emergence of a novel or poorly understood pathogen.

WHO is continuing its aggressive containment activities aimed at preventing SARS from becoming a widely established threat. The immediate scientific priorities include development of a robust and reliable diagnostic test, improved understanding of the modes of transmission, and identification of effective treatment regimes. If, despite extraordinary efforts, the disease does become endemic, WHO and its international partners will have to settle in for a long and difficult fight. In this case, existing mechanisms developed for other public health emergencies, such as the Medicines for Malaria Venture, the Global Alliance for Vaccines and Immunization, the Global Drug Facility, and the International Coordinating Group for meningitis and yellow fever, would have to be looked to as possible models for ensuring the rapid development of SARS therapies and vaccines and equitable access in all at-risk countries.

Use of the influenza network as a model for the SARS laboratory network suggests that such an approach brings great speed as well as efficiency.

Lessons for the future

Just as the SARS response has been guided by lessons learned during preparedness planning for the next influenza pandemic and for a possible bioterrorist attack, both of these types of potential public health emergencies will benefit from lessons learned as the international response to SARS continues.

The response to SARS has already brought to light a number of positive lessons as well as highlighted a number of challenges for future preparedness planning. The SARS experience has shown the capacity of global alerts, widely supported by a responsible press and amplified by electronic communications, to improve global vigilance and awareness at all levels, from health professionals and national authorities, to politicians and the travelling public. The quick detection and reporting of the first cases in South Africa and India are indicative of the high level of global awareness and the vigilance of the world's health systems. The present climate of high alert also helps explain the speed with which developing countries have readied their health services with preparedness plans and launched SARS campaigns, often with WHO support, to guard against imported cases. In addition, the SARS experience has demonstrated the need to stimulate very rapid, high-level research to generate the scientific basis for recommending sound control interventions.

The SARS experience in Viet Nam has shown that immediate political commitment at the highest level can be decisive. Viet Nam demonstrated to the world how a developing country, hit by an especially severe outbreak, can triumph over a disease when reporting is prompt and open, when WHO assistance is quickly requested and fully supported, and when rapid case detection, immediate isolation and infection control, and vigorous contact tracing are put in place.

16 MARCH

More than 150 suspect and probable cases of SARS are reported from around the world.

17 MARCH

China provides a report to WHO on the Guangdong outbreak, which is said to have tapered off.

WHO sets up 3 virtual networks to expedite research on the SARS causative agent, to promote understanding of epidemiological features, and to develop clinical guidelines.

18 MARCH

A cumulative total of 210 cases with 4 deaths are reported to WHO from 7 countries.

20 MARCH

The cumulative total climbs to 306 cases with 10 deaths.

WHO GOARN teams are now providing support at all the main outbreak sites.



The major challenges to be addressed in future planning are those of transparency and surge capacity. SARS is now known to have begun in mid-November in Guangdong Province. Cases during the earliest phase of the SARS outbreak there were not openly reported, thus allowing a severe disease to become silently established in ways that made further international spread almost inevitable. This is the most important lesson for all nations: in a globalized, electronically connected world, attempts to conceal cases of an infectious disease, for fear of social and economic consequences, must be recognized as a short-term stop-gap measure that carries a very high price – loss of credibility in the eyes of the international community, escalating negative domestic economic impact, damage to the health and economies of neighboring countries, and a very real risk that outbreaks within the country's own territory can spiral out of control.

The report of the first WHO expert team to investigate the SARS situation in Guangdong Province reached the following conclusion:

“If SARS is not brought under control in China there will be no chance of controlling the global threat of SARS. Control of a new and rapidly disseminated disease like SARS is challenging, especially in a country as large and diverse as China. Effective disease surveillance and reporting are key strategies in any attempt to control the spread of a serious new communicable disease such as SARS.”

The next weeks and months will determine whether the current outbreaks of international concern can be contained, thus preventing SARS from becoming another endemic infectious disease in human populations that has no vaccine and no effective treatment. It is already clear, however, that the responsibility for containing the emergence of any new infectious disease showing international spread lies on all countries. In a world where all national borders are porous when

confronted by a microbial threat, it is in the interest of all populations for countries to share the information they may have as soon as it is available. In so doing, they will allow both near and distant countries – all neighbours in a globalized world – to benefit from the understanding they have gained.

Inadequate surge capacity in hospitals and public health systems has clearly been a major problem with SARS, especially since health care workers have themselves been victims of the disease and are the frontline troops at risk. The shortage of expert staff to coordinate national and global responses to a rapidly evolving public health emergency is also an issue needing additional investment and attention. In some areas, hospitals have been closed. In others, the heavy burden imposed by SARS on existing hospitals has necessitated the hasty construction of new facilities. As another lesson, evidence from SARS has shown that local and national capacities can be assisted by coordinated networks such as WHO's GOARN that can and do mobilize additional support during times of public health emergencies. Further strengthening of the surge capacity of the WHO “hub” of the global alert and response system would also assist in preparedness for future infectious disease threats.

Around the world, the SARS experience has shown – once again – the power of a poorly understood new infectious disease to incite widespread public anxiety. As many observers have noted, this fear of SARS has spread faster than the virus, causing great social unease, economic losses, and some political changes. Unwarranted discrimination has been another unfortunate problem. In such cases, clear, factual, and reassuring messages need to be issued by trusted authorities. Panic is fuelled when information is concealed or only partially disclosed. On the whole, however, and particularly as the outbreaks have matured, the transparency of national reporting has been exemplary – even when the economic consequences of doing so were known to be significant.

24 MARCH

In Haroi, WHO epidemiologists determine that 63% of SARS cases are in health care workers. All can be linked to the index case at the French Hospital.

26 MARCH

China reports a cumulative total of 792 cases and 31 deaths in Guangdong Province from 16 November 2002 to 28 February 2003.

A WHO team in China reviews the case definition used during the outbreak of atypical pneumonia and concludes that the cases most likely represent SARS.

With the new data from China, the world cumulative total soars to 1323, with 49 deaths.

27 MARCH

Scientists in the WHO laboratory network report major progress in the identification of the SARS causative agent, with results from several studies consistently pointing to a new coronavirus. Chinese authorities report SARS cases in other parts of China.



The SARS experience also has some lessons about the importance of international collaboration, privileged access to all countries, and strong but politically neutral global leadership. Though exceptional in terms of its impact, severity, ease of international spread, and many puzzling features, SARS is only one of around 50 internationally important outbreaks to which WHO and its partners respond in any given year. The high level of medical, scientific, political, and public attention focused on SARS is helping the world to understand the severity of the infectious disease threat and the importance of international solidarity in the face of this threat. It also underscores the pragmatic value of a leadership role that can inspire the world's best scientists and clinicians to forego competition and collaborate altruistically to combat a shared threat of as yet unknown dimensions.

Finally, the response to the SARS outbreak is helping the public to understand that WHO's activities of global coordination, capacity development, communications, and mobilizing expertise enable rapid response and actually save lives. To date, in the vast majority of countries, these WHO activities have helped health authorities to identify imported SARS cases quickly, prevent a SARS outbreak, and thus avoid the devastating consequences seen elsewhere.

28 MARCH

China joins the WHO collaborative networks. Media reports describe SARS as a greater threat than the war in Iraq.

29 MARCH

Dr Carlo Urbani dies of SARS in Thailand.

30 MARCH

Hong Kong health officials announce a large and almost simultaneous cluster of probable cases among residents in a single building in the Amoy Gardens housing estate, pointing to a possible environmental source of exposure. The cumulative global total reaches 1622 cases and 58 deaths.



APRIL

- 2: WHO recommends that persons planning to travel to Hong Kong and Guangdong Province consider postponing all but essential travel. Chinese authorities give a WHO team permission to travel immediately to Guangdong Province. The cumulative global total of cases surpasses 2000.
- 4: China begins daily electronic reporting of SARS cases and deaths, nationwide by province.
- 6: A 53-year-old Finnish staff member of the International Labour Organisation dies of SARS in Beijing, where he had travelled to attend an international conference.
- 9: The WHO team in Guangdong Province presents its interim report to the Ministry of Health. It expresses serious concern about the capacity of some provinces, which lack the strong health system of Guangdong, to cope with the challenge posed by SARS.
- 15: A WHO team in Beijing is given permission to visit military hospitals, where numerous SARS cases are said to be under treatment.
- 16: One month after its establishment, the WHO laboratory network announces conclusive identification of the SARS causative agent: a new coronavirus, unlike any other human or animal member of the Coronavirus family.
- 20: The WHO team in Beijing estimates that the number of SARS cases in the city may be as high as 200. Official reports place the number at 37. Chinese authorities announce 339 previously undisclosed cases of SARS, bringing the cumulative total of SARS cases in China to 1959.
- 23: WHO advises travellers to Beijing and Shanxi Province, China, and Toronto, Canada to consider postponing all but essential travel.
- 25: Outbreaks in Hanoi, Hong Kong, Singapore, and Toronto show signs of peaking.
- 28: Viet Nam becomes the first country to contain its SARS outbreak. The cumulative total of cases surpasses 5000.
- 30: China, accounting for 3460 probable cases of the global total of 5663, now has more cases than the rest of the world combined. WHO lifts its travel advice for Toronto.

MAY

- 2: The cumulative total of cases surpasses 6000.
 - 3: WHO sends a team to Taiwan, which is now reporting a cumulative total of 100 probable cases.
 - 7: WHO estimates that the case fatality ratio of SARS ranges from 0% to 50% depending on the age group affected, with an overall estimate of case fatality of 14% to 15%.
 - 8: WHO extends its travel advice to include Tianjin and Inner Mongolia, China and to Taipei, Taiwan. The cumulative total of cases surpasses 7000, with cases reported from 30 countries.
 - 13: Outbreaks at the remaining initial sites show signs of coming under control, indicating that SARS can be contained.
 - 17: The first global consultation on SARS epidemiology concludes its work. The consultation confirms that control measures recommended by WHO are supported by available evidence. The experts further confirm the consistent effectiveness of these measures, which include early identification and isolation of patients, vigorous contact tracing, management of close contacts, and public information and education to encourage prompt reporting of symptoms.
- A cumulative total of 7761 probable cases, with 623 deaths, is reported from 28 countries. Of this total, 5209 cases and 282 deaths are reported from mainland China.



MADAGASCAR

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Outbreak report

Flu epidemic in Madagascar, July-August 2002

WHO-GOARN investigation team¹

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Date of submission:

In the name of the research team from WHO-GOARN (Global Outbreak Alert and Response Network)*

Preliminary research showed that a significant flu epidemic happened in Madagascar during the months of July and August 2002 with a total of 30,304 cases and 754 reported deaths. Almost all these cases were reported from the highland regions of the province of Fianarantsoa in the center of Madagascar. Most of them lived in rural areas, and the groups most affected included children under age five and adults over sixty. This epidemic was attributed to a virus similar to A/Panama/2007/99 (H3N2) that had been going all around the world for several years.

Background

In mid-July 2002, Madagascar health authorities were warned about a high number of deaths caused by an acute respiratory illness in the village of Sahafata (with a population of 2,160), located in the rural highland area of the province of Fianarantsoa. This region is some 450-500 kms. south of the capital, Antananarivo. In late July a similar alert was reported from the district of Ikongo, province of Fianarantsoa. Both events were



researched by staff from the Health Ministry (MDS) and the Institut Pasteur of Madagascar (IPM). Pharyngeal swab specimens were taken from ill people for doing virus cultures. The IPM isolated four type A flu viruses, two of which were subtyped as A (H3N2). On August 7 the MDS asked for help from the World Health Organization (WHO). In response to this request, the GOARN network deployed an international team made up of three epidemiologist physicians from the Institute of Health Surveillance (Institut de Veille Sanitaire; InVS), France, and the Centers for Disease Control and Prevention; CDC), U.S.A., two microbiologists from the Pasteur Institute, France, and from the Regional WHO Office for Africa (AFRO), plus a logistics technician from the GAR (Global Alert and Response) network from WHO. The team arrived in Madagascar on August 14. This report summarizes their preliminary epidemiological and virological findings.

Epidemiological Findings

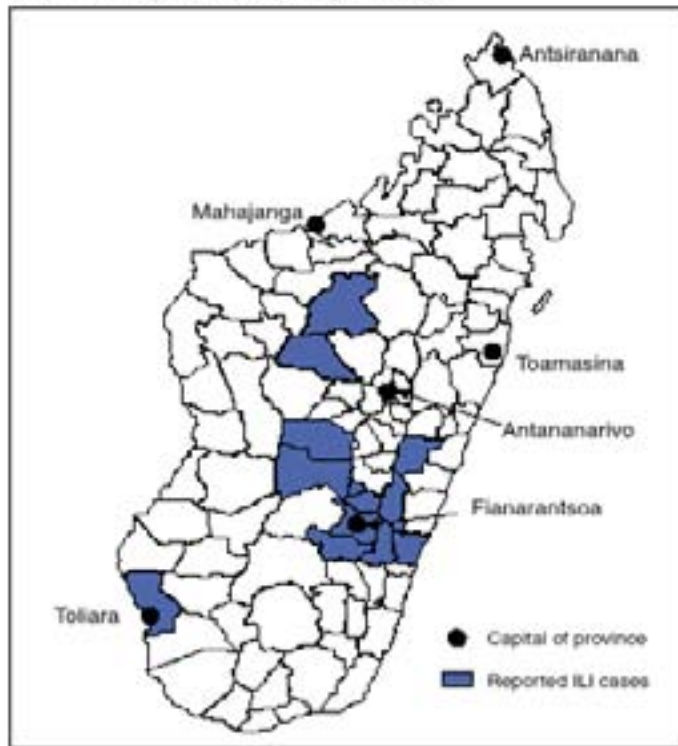
Surveillance data on flu syndrome, collected for the country as a whole by the MDS, revealed that the epidemic reached its peak during the week of August 22. Up to September 19 there had been a cumulative total of 30,304 reported cases and 754 deaths coming from 13 of the 111 health districts and four out of the six provinces (map); 85% of these cases had been reported from the province of Fianarantsoa. Almost all these cases occurred in rural areas and 95% of the deaths happened in locations far from health centers and could not be researched. No standardized case definition had been used and it was not known if there might be over or under-reporting of cases.



Map

Distribution of flu syndrome cases in Madagascar, July-August 2002.

FIGURE 2. Districts reporting cases of influenza-like illness (ILI) — Madagascar, July–August 2002



Field investigations were made in three districts in the province of Fianarantsoa having a large number of reported cases and deaths. The objectives of these investigations were to confirm the etiology of the epidemic and make recommendations based on epidemiological findings. An analysis of data on acute respiratory infection (ARI) collected in 1999-2002 at different health centers showed that ARI cases would reach their annual peak during the winter months in the highland districts. ARI peaks would coincide with mortality peaks from all causes and from respiratory illnesses such as pneumonia during the years for which data were obtained. In the district of Ikongo (with a population of 161,494), the number of ARI cases diagnosed at health centers and deaths from all causes that occurred in July and August of 2002 were substantially higher than for the same period in prior years. However, the proportion of deaths due to ARI was similar to prior years.



In the district of Ikongo, 54% of ARI deaths reported and occurring in July and August 2002 involved children under age five, but the highest death rate was found among persons over age 60. A survey taken in a remote village (population 750) in the district of Ikongo showed a 67% acute febrile respiratory disease attack rate and a mortality rate estimated at 2%. On the other hand, no unusually high morbidity or mortality rates were reported in the capital of the province (the city of Fianarantsoa) or in Antananarivo (with a population of 1.2 million), where the IPM maintains year-long flu morbidity surveillance and surveillance on the circulation of flu viruses.

Virological Data

Between July 19 and August 22, a total of 152 respiratory specimens were collected for isolating the virus, obtained from ill people in three areas of the province of Fianarantsoa (Sahafata, Ikongo and Manandriana) where there had been outbreaks. The international team also used quick screening tests for the flu antigen for field specimen analysis. Type A flu viruses were isolated in specimens obtained from ill people in each of the areas investigated. Twenty-seven flu isolations were characterized by antigens at the IPM and confirmed by the WHO Collaborating Centre for Reference and Research on Influenza, London, United Kingdom, and all isolations were viruses similar to A/Panama/2007/99 (H3N2). The H3N2 component of the flu vaccines from the Southern Hemisphere 2002 and Northern Hemisphere 2002-03 agreed well with the epidemic strain.

The epidemic can be attributed to flu viruses similar to A/Panama/2007/99 (H3N2) that had been going around the entire world for several years. Several factors could have contributed to the unusually high ARI morbidity and mortality reported in rural highland areas of Madagascar. Conditions of overcrowding during a cold, humid winter could have facilitated the transmission of flu among the population of very susceptible villages. In Fianarantsoa, 40% of the children under age five suffer from chronic malnutrition, and access to basic health care is poor in almost all villages. These factors could have been worsened due to the social unrest that has prevailed in the country between December 2001 and June 2002.



Conclusions

This outbreak provided important lessons for controlling flu epidemics in developing countries and for global planning for flu pandemics. Because this happened mostly in remote areas, awareness of the outbreak and response by health authorities were slow. Although the IPM's national reference laboratory for flu, recognized by WHO, coordinates flu surveillance from Antananarivo, it did not have any data available on the areas most affected. In Madagascar, the same as in many developing countries, problems such as malnutrition, poor access to health care, difficulties in reaching the remotest rural villages, limited surveillance of contagious diseases, a scarcity of antibiotics for treating secondary bacterial complications, the unavailability of flu vaccines and a lack of flu awareness are complicating efforts for evaluating and controlling the epidemic (1, 2).

The team's recommendations included: increasing flu surveillance, informing the public and health care professionals on this disease, improving health care access in rural areas and insuring the provision of adequate supplies of antibiotics at health centers for treating the secondary bacterial complications of flu. Flu vaccinations were not recommended because the epidemic had already spread widely by August and there were serious limitations to distributing vaccines in remote areas.

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* WHO-GOARN team members were (alphabetically):

M. Kamel Ait-Ikhlef, CSR/GAR WHO Geneva; Dr. Isabelle Bonmarin; Department of s Infectious Diseases, InVS, France; Pr Bréhima Koumare, WHO AFRO IPC/EMC, Abidjan; Dr Jean-Claude Manuguerra, WHO Collaborating Centre for Reference and Research on Influenza and other Respiratory Viruses, National Flu Reference Center (northern region of France), Institut Pasteur, France; Dr Christophe Paquet (team leader) Department of International Health, InVS, France; Dr Timothy Uyeki, Influenza Unit, Viral and Rickettsial Diseases, CDC, U.S.A.).

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[To top](#) | [Recommend this page](#)

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CASE STUDIES



**Pan American
Health
Organization**
Organización Panamericana de la Salud



CASE STUDIES & EXERCISES SURVEILLANCE, ADDRESSING CASES AND INFECTION CONTROL

CASE STUDY I.

Two people with severe difficult breathing symptoms were taken to the Regional referral hospital of the rural area of Cayo District on 14 July. The two patients are from the same family, woman (grandmother) 65 years and her grandchild of 10 years. The child lives with his mother in San Ignacio, but she works all day outside house. The father of the child was away from home the whole week. The grandmother lives with her husband in a house situated in a rural town 60 kms. from the hospital. She is a chronic respiratory patient and she is who takes care of the child, together with the grandfather since 10 July, on a closely manner for almost two days. The child arrives in the hospital with the following symptoms: fever, cough, diarrhea and breathing difficulties, which started four days before the admission (10 July). A day before the admission the clinical symptoms of the child worsened, with fever of 38C. Then, the family decided to take the child to the hospital in the night of 13 July, being admitted in the morning of 14 July.

A Chest X-RAY done to the child at the admission showed signs of irregular consolidation in the right hemithorax (see figure). After the admission the child decompensate rapidly due to breathing difficulties requiring endo-tracheal intubation and respiratory support. Antibiotic (ceftriaxone) is started.

The grandmother had the same symptoms, fever, cough and dyspnea that initiated on 13 July, with SARI, which worsens progressively and is admitted in the hospital on 15 July.

The mother and the grandfather are asymptomatic. There are also rumors that there are more sick people with similar symptoms in a neighboring town.

On 16 July, despite all the measures taken the child dies.



Clinical samples from the child were taken but the laboratory discarded them because they were not of good quality. Due to cultural convictions the family did not permit an autopsy.

Meanwhile the grandmother remains hospitalized and samples were collected from her for etiological diagnosis. The laboratory has not yet reported the result of the analysis.



Child (AAJ) RX in the admission (10 years)

Surveillance:

- 1. Do you consider these cases as SARI? Do these cases constitute a trigger for an epidemiological investigation?**
- 2. What additional epidemiological information is required in these cases?**
- 3. Taken into account all the factors that could trigger an investigation, excluding those of these cases, what other trigger factors could led to an investigation?**



4. If you detect one of the case mentioned above, who would you notify? Why is this important?

Exercise I. During the night of the 13 July, the child, while waiting for hospitalization in the emergency services, is located in a observation room next to several other patients. Beds are separated more or less 3 fts. (80 cms.) and there is a cloth curtain between them. In that same place the child receive two respiratory nebulizations during the night. The nurse performing them uses a surgical mask as personal protection

Question 1: What were the risks of the actions implemented? Why?

Question 2: What other measures had to be taken to reduce the risks?

Exercise II. During the night of 13 July the child was taken to radiology service of the hospital. At that time there were three pending patients waiting for x-rays to be taken. The radiology technician decided to pass the child first, and immediately passed in the other three patients.

Question 3: What special measures had to be taken there during the realization of the x-rays?

Exercise III. With regard to the previous case study, we present four possible situations below:

Assume that these situations occur in the context that no case of unusual or unexpected SARI has been reported up to this moment and there is no news of confirmed human infection with avian flu.

Question 4: What personal protective equipment (PPE) should be used by the doctor or nurse that sees the child (febrile respiratory disease) when he just arrives to the health facility:

Select one or more of the following possible options:

- | | |
|-------------|---|
| a) - None | d) - Mask Surgical |
| b) - Gloves | e) - Eye Protectors or facial Protector |
| c) - Gown | f) - Respirator N95 |

And, in each of the following situations:

- 1. Extraction of venous blood (sampling for laboratory diagnosis)**



2. Taking of the vital signs, i.e. blood pressure and pulse

3. Cleaning of an incontinent patient with diarrhea

CASE STUDY II

Objective: Considering what we have learned in the sections of surveillance, laboratory, infection control and that of non-pharmacological case management of this module; review the measures that should be taken for the situation presented below.

The degree of complexity of this case gradually evolves. Discuss as a group and determine, based on the reviewed topics, what measures would be the most appropriate for each situation:

1

You are the physician on duty in the Hospital “Carmelita” at Orange County; this is a hospital with a capacity of 25 general beds, 15 pediatric beds, and an isolation ward under construction, since it lacked one. This Health Facility has appropriate human resources and medical supplies.

Today you are called in order to evaluate a case of SARI in a patient of 23 years, the patient does not have any underlying disease, and he is an athlete. The patient says that he has not had any contact with people with respiratory symptoms. The patient is known in the municipal since he earned a bronze medal in Olympic Games 2008 (Beijing), from where he returned 3 days ago.

Question 1: The patient enters the waiting room of the Emergency service of the Hospital Carmelita in Orange County. It is Monday morning and the room is full of patients:

Would you consider this case as an unusual or unexpected SARI case? Why?

Question 2: Make a list of the actions or specific measures that would have to be implemented since the arrival until the departure of this patient from the emergency room:

Question 3:



In the event that you consider that the patient cannot be handled in your HF and you decide to refer him to another institution, ¿what measures would you take?

Question 4:

One of the ambulances available in the HF is transporting another patient to the capital of the District, and is not returning until tomorrow. There is other ambulance available but the driver was partying the previous night and he has not shown up at his duty. The patient cannot be sent immediately and dies.

What measures would you take?

2

While, the above events happen in the Carmelita, in the Regional Referral Hospital of Orange Town, several cases of SARI have been admitted. Samples for laboratory diagnosis were taken and most of them were negative, 6% of the samples were positive for VRS or adenovirus (pediatric samples). The results of the sample culture are not available yet. Although the total bed capacity has not been filled, the HF no longer has more individual rooms for isolation.

Three of nursing staff are presenting influenza-like illness and are dismissed from their duties.

Question 5:

Is this an excess or an abnormal increase on the number of SARI cases?

Question 6:

What information would help you to sustain or rule this out this possibility?

Question 7:

What type of clinical samples should be collected for the investigation of these cases?

Question 8:

What precautions would you take in case you can not send the samples immediately to the national reference laboratory?



Question 9:

From the standpoint of infection control could you indicate what provisions you would take to handle SARI patients, which continue to arrive at Orange Town Hospital (considering there are not more individual rooms)?

Question 10:

What measures should be taken for the health care workers (HCWs) exposed to these cases?

CHECKLIST

~ Checklist
~ Guide for completing
checklist



Pan American
Health
Organization
Organización Panamericana de la Salud



Checklist on the Status of Health Facility Preparedness for an Influenza Pandemic



Pan American Health Organization
HSS/SP

August 2008



CHECKLIST ON THE STATUS OF HEALTH FACILITY PREPAREDNESS FOR AN INFLUENZA PANDEMIC

Health Facility Data Sheet

DATE OF VISIT: _____

CITY: _____ PROVINCE/ REGION: _____

NAME OF HEALTH FACILITY:

ADDRESS: _____

TELEPHONE: _____

TYPE OF FACILITY:

Public ____ Private ____ Other ____

TYPE OF CARE OFFERED:

Ambulatory ____ Hospital ____ Both ____ Other: _____

Number of beds (if hospital): _____

NAME AND POSITION OF PERSON OBSERVING THE VISIT:

The application of the instrument is for:

First time visit ____ Follow-up visit ____

If follow-up visit, indicate date of last visit: _____

NAME OF OBSERVER:

OBSERVATIONS



CHECKLIST OF THE STATUS OF HEALTH FACILITY PREPAREDNESS DURING AN INFLUENZA PANDEMIC

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
1. Coordination Structure:				
1.1 Creation of a multidisciplinary internal committee, which should be made up of representatives of: administration, legal affairs, infection control, coordination of hospital disasters, maintenance and facilities area, nurses, doctors, clinical laboratory, critical care, respiratory therapy, mental health, basic sanitation, public health/epidemiology, public relations/communications, security, inventories, procurement, human resources, occupational health, diagnostic imaging, pharmacy, information technology area				
1.2 Designation of a committee coordinator				
1.3 Designation of a point of contact with the local or municipal health department who sits on the committee				
1.4 Identification of liaisons with hospital management support groups (NGOs, security forces, emergency squads, educational system, the media, public utility companies: water, sewerage, energy, telephone, waste management, suppliers)				

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2. Hospital Preparedness Plan and Response to an Influenza Pandemic (There should be a basic document that includes):				
2.1 Document creating the committee;				
2.2 Directory of committee members that includes their address and telephone numbers;				
2.3 Organizational chart;				
2.4 Responsibilities and duties of the personnel involved.				
2.5 Communications component to include the following items:				
2.5.1 Public health reports;				
2.5.2 Designation and functions of the hospital’s clinical spokesperson;				
2.5.3 Liaisons with national and local health organizations (and with health insurers, where applicable);				
2.5.4 Contacts with the media;				
2.5.5 Contacts with other hospitals or health centers in the area of influence;				
2.5.6 Strategy for daily updating of the situation for hospital personnel;				
2.5.7 Systems to record hospital admissions and discharges for pandemic influenza;				
2.5.8 Strategy to inform patients and visitors at the hospital about the influenza pandemic;				
2.5.9 Strategy of continuous updating of disease activity at the global, national, and local levels.				

Verification Element	Status			Action required
	Complete	Incomplete	Nonexistent	
2.6 Education and Training Component on Pandemic Influenza that includes:				
2.6.1 Identification of pertinent materials and technical documentation;				
2.6.2 Identification of sites for training clinical personnel;				
2.6.3 Definition of a basic training program;				
2.6.4 Monitoring of completion of the basic training program;				
2.6.5 Development of a timely orientation program for additional human resources as support in the care of patients with pandemic influenza;				
2.7 Triage and admissions component:				
2.7.1 Preparation of a protocol for initial care and patient classification, taking clinical and epidemiological criteria into account;				
2.7.2 Identification of specific triage area for patients who may have pandemic influenza;				
2.7.3 Definition of the type of orientation to support patients and/or the people who accompany them during the triage process;				
2.7.4 Strategy for separating patients with influenza-like illness from those who do not;				
2.7.5 Telephone triage system for prioritizing medical care;				
2.7.6 Mechanism for the control of admissions and discharges of patients with influenza-like illness;				



Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2.8 Case management component:				
2.8.1 Adoption of clinical case management guidelines for outpatient and in-patient care;				
2.8.2 Adoption of guidelines for the use, distribution, and administration of antiviral drugs, based on the clinical criteria of availability and priority groups;				
2.8.3 Case management strategy from the standpoint of the mental health of patients and their families;				
2.8.4 Protocols for taking samples, handling specimens, specimen transport, and reporting to the respective public health units;				
2.8.5 Protocol for clinical laboratory analysis, processing of samples, and reporting of results;				
2.8.6 Protocol for managing patients with influenza-like illness or confirmed influenza cases in combination with other acute or chronic illnesses;				
2.8.7 Development of guidelines for the triage of patients who require critical care or mechanical ventilation under circumstances when the capacity for care has been exceeded;				
2.8.8 Adoption of a syndromic surveillance system ¹ in emergency and outpatient consultation services;				

¹ Syndromic surveillance: Monitoring of the frequency of diseases based on a constellation of clinical symptoms (i.e., fever and respiratory problems, rashes, diarrhea) in a given population (residents of a given geographical area, etc.), regardless of the specific diagnosis made by physician [Reingold A. Biosecurity and Bioterrorism 2003, 1: 77-81].

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2.9 Component for managing increased installed capacity due to heavy demand:				
2.9.1 Up-to-date inventory of the existing physical capacity for outpatient and in-patient care;				
2.9.2 Up-to-date inventory of equipment, supplies, materials, and drugs for the care of patients with respiratory illness;				
2.9.3 Up-to-date inventory of the existing human resources;				
2.9.4 Indicators of the supply of ambulatory and/or hospital care;				
2.9.5 Estimates of the increase in demand for ambulatory and/or hospital services;				
2.9.6 Identification of areas of expansion for patient care;				
2.9.7 Identification of the minimum number and type of personnel required to treat patients with pandemic influenza;				
2.9.8 Responsibility for day-to-day evaluation of personnel needs during the influenza pandemic;				
2.9.9 Definition of criteria for declaring a "personnel crisis";				
2.9.10 Evaluation of the strategy to add extra personnel (foreign workers, students, interns, retirees, etc.);				
2.9.11 Strategy to provide logistical support to personnel working extra shifts and to additional personnel;				
2.9.12 Strategy for treating patients in remote and isolated areas;				
2.9.13 Criteria and plan for the recruitment, issuance of ID cards, and training of extra support personnel;				

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2.9.14 Establishment of a threshold for the closing of admissions and cancellation of elective surgeries;				
2.9.15 Agreements with other hospitals to accept patients without influenza;				
2.9.16 Strategy to guarantee the supply of basic services				
2.9.17 Estimate of the increase in equipment, materials, drugs, and supplies required to meet excess demand;				
2.9.18 Strategy to secure the necessary resources under conditions of excess demand;				
2.9.19 Strategy for managing, storing, and distributing inputs and supplies;				
2.9.20 Strategy for the functional reorganization of services;				
2.9.21 Strategy for the utilization and certification of alternative care areas outside the hospital;				
2.9.22 Policies for controlling hospital access (closing admissions, limiting visits).				

Verification Element		Status			Action Required
		Complete	Incomplete	Nonexistent	
2.10 Occupational health component:					
2.10.1 Biosafety protocol or guidelines for health care personnel and staff who may come into contact with patients with influenza-like illness or specimens obtained from them (physicians, nursing staff, clinical laboratory staff, etc.);					
2.10.2 Definition of a policy and guidelines for prophylaxis to hospital personnel using vaccine or antiviral drugs based on their contact with patients and their personal risk for the complications of influenza;					
2.10.3 System for administering antiviral vaccines or prophylaxis to hospital personnel;					
2.10.4 System for detecting symptomatic personnel before they report for duty;					
2.10.5 Policy for managing personnel with symptoms of influenza-like illness or verified pandemic influenza;					
2.10.6 Policies regarding leave or job relocation for personnel at high risk (pregnant women, people with immunodeficiencies);					
2.10.7 Identification of resources for psychological counseling and/or spiritual support services for personnel during the pandemic;					
2.10.8 Strategy to support personnel responsible for the care of elderly or infant family members;					
2.10.9 Mechanism for the rapid and timely distribution of vaccines and antiviral drugs;					

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2.11 Intensified influenza infection control system:				
2.11.1 Adoption of specific infection control guidelines for influenza;				
2.11.2 Establishment of a biosafety protocol for personnel who provide care to patients with influenza-like illness;				
2.11.3 Strategy for the distribution and use of personal protective gear (surgical masks, N95 masks, goggles, gloves, gowns, alcohol solutions, etc .);				
2.11.4 Directives for handling utensils and clothes when caring for patients with confirmed influenza;				
2.11.5 Directives for the disinfection and/or final disposal of medical devices used on patients with confirmed influenza;				
2.11.6 Directives for the prehospital management and transfer of patients with confirmed influenza or those who may be infected;				
2.11.7 Biosafety directives in alternative care sites;				
2.11.8 Biosafety directives for home care;				
2.11.9 Biosafety directives for handling cadavers with confirmed influenza;				
2.11.10 Program for monitoring hospital transmission of influenza;				
2.11.11 Implementation of the Universal Respiratory Tag program in patient care areas;				
2.11.12 Implementation of a handwashing program.				

Verification Element	Status			Action Required
	Complete	Incomplete	Nonexistent	
2.12 Management of over-mortality:				
2.12.1 Development of a protocol for mass cadaver management based on national or local guidelines;				
2.12.2 Review of the maximum capacity of the hospital morgue;				
2.12.3 Strategy for coordination with local and regional authorities to increase morgue capacity in the Region;				
2.12.4 Strategy for coordination with the undertakers' association;				
2.12.5 Estimation of mortality for calculating the need for body bags and shrouds;				
2.12.6 Identification of suppliers of materials for post-mortem management				
3. Execution of simulation exercises:				
3.1 Programming of simulation exercises to assess the level of coordination among members of the pandemic committee;				
3.2 Execution of simulation exercises to assess the level of coordination among members of the pandemic committee;				
3.3 Programming of simulation exercises to assess the level of response to the influenza pandemic;				
3.4 Execution of simulation exercises to assess the level of response to the influenza pandemic.				



GUIDE FOR COMPLETING THE HEALTH FACILITY PREPAREDNESS FOR AN INFLUENZA PANDEMIC CHECKLIST



Pan American Health Organization
HSS/SP

August 2008



GUIDE FOR COMPLETING THE HEALTH FACILITY PREPAREDNESS FOR AN INFLUENZA PANDEMIC CHECKLIST

The *Guide for Completing the of Health Facility Preparedness for Influenza Pandemic Checklist* is an instrument that addresses the need for disaggregating global, national, and regional preparedness but is geared to the operational level of that response, represented by health facilities.

The checklist it contains is a simple tool used to systematically implement a series of tasks toward a common objective. It should be viewed as a set of guidelines, recognizing that the activities described must be adapted to the specific conditions of the hospital and its environment; since several of the items would apply only to facilities of greater complexity and not to primary health care centers.

PURPOSE:

To ensure that health facilities undertake vital preparedness activities to improve their response capacity in the event of an influenza pandemic.

OBJECTIVES:

- Objective 1: To explore the preparedness framework of health facilities for providing care in an influenza pandemic;
- Objective 2: To monitor the progress made by health facilities in preparing for such an event.

UNIT OF OBSERVATION:

The instrument should be implemented in health facilities that meet the following criteria:

- a) The health facility has been identified as an institution with the potential for treating patients in an influenza pandemic; and
- b) The institution must have created at least one preparedness structure and formulated a plan for providing care during an influenza pandemic.

REQUIRED RESOURCES:

Two printed instruments, an instruction guide, and a pen.



APPRAISER'S PROFILE:

The individual who will conduct the assessment should be a health-sector professional with excellent reading comprehension and skills for summarizing but should not be directly affiliated with the health facility in question. This individual should also be very familiar with the National Influenza Pandemic Preparedness Plan.

METHODOLOGY:

Prior consensus building will be done with senior management of the health facility to select an **Observer** who will monitor the observation and processing of the instrument. Ideally, this individual should be the person in charge of preparedness in the facility and have access to the pertinent documentation.

Three basic aspects will be explored:

- 1) the existence of a coordination structure;
- 2) the existence of a plan for hospital preparedness and response to pandemic influenza; and
- 3) the implementation of simulation exercises to test the plan.

It is recommended that several steps in the processes be carried out **before** implementing the instrument:

- a) Confirm that the institution fulfills the criteria as a *unit of observation*;
- b) Confirm that the institution has already begun preparations by creating a preparedness structure and has formulated a preparedness plan;
- c) Select the interviewer (Appraiser) who will complete the instrument;
- d) Ensure that the Appraiser has read National Plan for Pandemic Influenza Preparedness, the instrument to be implemented, and this guide;
- e) Determine, in coordination with the senior management of the health facility, the date and time of the initial visit, understanding that approximately three hours are needed to complete the instrument, provided that the required information is available. It should be emphasized here that the Appraiser who visits the facility should have the requisite knowledge and documents to complete the review (proceedings, plan, protocols, guides, etc.).

The recommended steps to follow at the time the instrument is to be processed are as follows:

- a) Present the instrument's objective; if it is the initial visit, this will be "Objective 1," and if it is the follow-up visit, it will be "Objective 2"; and set out the "Purpose";



- b) Provide a copy of the instrument to the person who is present during the visit (Observer), keeping an additional copy for the Appraiser. If this is the follow-up visit, have a copy of the previous assessment instrument on hand;
- c) Complete the Health Facility Data Sheet (Annex).

Begin reading each item and mark an “X” in the appropriate “Status” column as follows:

- a. *“Complete”* means the item has been fully carried out;
- b. *“Incomplete”* means the item has been partially carried out and that either some degree of progress has been made or that some items have yet to be carried out or are inactive; and
- c. *“Nonexistent”* means that the item has not been considered or, where it has been considered, has yet to be carried out.

The Observer should complete the **“Action Required”** column with information that he/she considers viable, pertinent, and feasible; the Appraiser, in turn, may suggest additional elements that relate specifically to each item.

The way to verify the existence of most of the items is by reviewing the documents presented by the Observer; consequently, it will not be necessary to read each document presented; however, the existence of each item must be confirmed.

The Appraiser should only refer to this instruction guide if he/she considers it necessary for clarifying an item.

It is important to underscore that the purpose of the Checklist is to identify the preparations needed for an influenza pandemic, and, consequently, in reviewing the items, each should relate to the influenza pandemic structure, plan, or simulation exercises. Accordingly, if an item is only developed in a general way by the health facility but not expressly part of preparations for an influenza pandemic, it will be considered “Nonexistent” until such time as it is incorporated, adopted, or adapted for the issue at question. The purpose of this is to ensure that the health facility fully complies with the exercise by identifying the resources that already exist and those yet to be developed.



EXPLANATION OF EACH ITEM

Item	Explanation
1	Item 1 verifies the existence of a structure within the health facility that coordinates aspects related to its response to an influenza pandemic. Hospital management may have delegated this function to a structure that already exists in the health facility, in which case it should be verified that this responsibility has been officially delegated and that the structure has assumed the necessary commitments for this purpose.
1.1	Verifies the existence of a document or procedure authorizing the creation of a committee/commission/working group.
1.2	Verifies that a coordinator or director has been appointed to head the above-mentioned committee/commission/working group.
1.3	Verifies the name, position, and contact information of the staff member to serve as the point of contact between the health facility and the official regional health bureau in charge of the health services' response to an influenza pandemic.
1.4	Verifies the names, positions, and contact data of pertinent staff. This is to ensure timely and direct communication of contingencies or additional requirements in the pandemic phase.
2	Item 2 attempts to verify the Plan's contents with the Annexes and/or documents on the health care, service management, and infection control response to prepare for an influenza pandemic.
2.1	Verifies the committee's composition and whether it conforms to Item 1.1, taking the health facility's level of complexity into account.
2.2	Verifies the existence of the board, including all information on alternates, in the event of the absence of incumbents.
2.3	Verifies the committee's organizational structure created for this purpose. The organizational chart should reflect coordination, the relationship with hospital board members, and the areas involved.
2.4	Verifies the description of responsibilities and specific duties in an influenza pandemic for each committee member and the staff appearing on the organization chart.

Item	Explanation
2.5	Verifies that the Plan includes a communications component; this may be cited explicitly or reflected in separate descriptions within the document. For this reason it is necessary to verify the items explained below:
2.5.1	Verifies that the plan defines the structure, frequency, distribution channels, data sources, purpose of the information, and who is responsible for issuing it, with regard to the epidemiological and public health aspects of an influenza pandemic.
2.5.2	Identification, duties, responsibilities, and constraints or restrictions of the hospital's clinical spokesperson regarding patient information, deaths, hospital operations, diagnoses, bulletins, etc.
2.5.3	Verifies that the point of contact mechanism with the agencies of the regional health bureau is defined, together (where applicable), with the point of contact mechanism with the health insurers that the hospital has contracted with to cover patient care (name and contact information, information the point of contact will handle, authorization processes, schedules, etc.)
2.5.4	Verifies whether a staff member has been designated to provide information to the media, the type of information that, the staff member is authorized to provide, the mechanism used to provide it, and the institutional records documenting all such information provided. In addition, it is important to view the media also a useful tool for getting information to the public. Consequently, it is important to ensure that contacts have been established with the various local and national media to ensure that they serve as a tool for disseminating information during the pandemic phase;
2.5.5	Verifies the identification and location of contact persons at health care centers in the area of influence and/or the services network, who can provide support or who will need support during the pandemic phase. Consider outpatient and hospital facilities, both public and private. Note: certain centers with captive or semi-captive populations (barracks, prisons, convents, etc.) should be regarded as special sources of patients during the pandemic phase, and, consequently, contacts must be established with such entities beforehand.
2.5.6	Verifies the existence of a mechanism to provide hospital personnel with key information daily regarding trends in the pandemic, special control measures, and any modifications of guidelines, protocols, or procedures. Confirm that the strategy takes hospital administrators, committee members, and health care and administrative personnel into account.
2.5.7	Verifies the existence of a mechanism to systematize and make available information on admissions for influenza-like illness and hospital discharges for pandemic influenza.
2.5.8	Verifies how this mechanism will operate to inform patients and visitors to the hospital about the influenza pandemic: instructions, prevention notices, notices, restricted areas, restrictive measures, etc.
2.5.9	Verifies who, how, how often, and through what channel up-to-date information on the pandemic will be disseminated.

Item	Explanation
2.6	Verifies that the Plan includes an education and training component; this can be cited explicitly or provided in separate descriptions within the document. To this end, their verification requires a review of the items explained below:
2.6.1	Verifies the identification and availability of technical documents and information to be used as support for education on the pandemic: review of subject matter, publications, texts, national and international guidelines, and national and local directives, etc.
2.6.2	Verifies whether training centers have been identified for the personnel responsible for care and support in the areas of case management and infection control. These may include programs sponsored by universities, educational institutes, or the regional health authority as the regulatory entity at the national or local levels.
2.6.3	Verifies that training programs have been identified by subject areas and the responsibilities of the health-facility workers involved in providing care, administrative, and support services. Verifies that the content of training programs include aspects that enable these workers to operate in multicultural contexts (i.e., with populations of indigenous or African descent).
2.6.4	Verifies the existence of a mechanism to monitor the completion of the training programs through registries or other measures.
2.6.5	Verifies whether an accelerated orientation program exists for additional support personnel who enter the health facility (i.e., volunteers, retirees, students).
2.7	Verifies that the Plan includes triage and admission components; this can be explicitly cited or reflected in separate descriptions within the document. Accordingly, it is necessary to verify this through a review of the following items explained below:
2.7.1	Verifies that a document exists that defines the initial care protocol and classification of patients with influenza-like illness, based on a case definition, exposure criteria, and severity of clinical symptoms, in order to identify what should be done with the patient in the immediate term (general hospitalization, ICU, home care, home hospitalization, referral to another institution, morgue, etc.). Verifies that the triage protocol includes a procedure entailing what to do when the capacity for care is saturated.
2.7.2	Verifies that an exclusive patient triage area has been designated for patients with influenza-like illness, which ensures a lower risk of contagion for patients entering the health facility with other health problems. Ideally, this area should be located outside the hospital, but must also include separate space for patients requiring emergency services and outpatient consultation.
2.7.3	Verifies that triage support measures have considered providing orientation for patients and those who accompany them during the classification process (signs, information kiosks, facilitators);
2.7.4	Verifies whether a strategy has been developed to separate patients with influenza-like illness from those with other health problems; this is necessary for emergency care, outpatient consultation, clinical laboratory, other diagnostic and therapeutic support services, ambulance transport, hospital wards, dialysis rooms, common areas of the hospital, etc. Note: This item could be reflected in the infection control component, but in any case, should be spelled out in some part of the plan.
2.7.5	Verifies whether its implementation has been considered, and if so, the protocol developed for this purpose. Note: It is possible that institutional policy does not allow for telephone triage; however, some information protocol should exist regarding the demand for information from the community via telephone about influenza-like symptoms and the appropriate action to take.
2.7.6	Verifies the existence of a mechanism for monitoring and controlling patient admissions and discharges with influenza-like illness that provides ongoing support to emergency and outpatient consultation services in the health facility. Note: this item is directly related to Item 2.5.7; however, in this case, the information should be

	spontaneous and ongoing in order to respond quickly and effectively for the patient admission process.
Item	Explanation
2.8	Verifies that the plan includes a case management component; this may be cited explicitly or provided separately in descriptions within the document. Consequently, verification is necessary through a review of the items explained below:
2.8.1	Verifies whether guidelines for the clinical management of patients at the ambulatory, hospital, and, where applicable, home level have been adopted or developed.
2.8.2	Verifies whether a review of the process has been defined, and if so, if the logistics have been identified.
2.8.3	Verifies the strategy and guidelines developed for this purpose. Note: PAHO has developed a guide to protect mental health in the event of epidemics.
2.8.4	Verifies the existence of the procedure defined for this purpose.
2.8.5	Verifies the existence of the procedure defined for this purpose. Ensures there is conclusive proof of the clinical laboratory's capacity to provide an etiological diagnosis of influenza-like illness and provide information for clinical management of the symptoms of the infection (hematology tests, blood chemistry, blood gases, microbiology, etc.).
2.8.6	Verifies how parallel management with other specialties has been considered: surgery, gynecology, obstetrics, orthopedics, dentistry, anesthesiology, etc.
2.8.7	Verifies whether guidelines or methodologies have been developed to perform triage on patients that require ICU care or mechanical ventilation. Note: Legal and ethical issues should be considered. Protocols exist that consider clinical criteria and the chances of survival.
2.8.8	Verifies whether this alternative has been considered. Note: This strategy is useful for monitoring initial outbreaks and a drop in the epidemic wave. Implementation of this strategy is linked to the existence of a sound, reliable information system that provides ongoing support to emergency and outpatient consultation services, and it implies the support of specialized resources in the area of data and trend analysis (epidemiologist).
2.9	Verifies that the plan includes a component for managing increased demand; this can be cited explicitly or reflected in separate descriptions within the document. Consequently, verification is necessary through a review of the items explained below:
2.9.1	Verifies whether up-to-date data on installed capacity are available: number of doctor's offices, number of beds (general hospital, ICU, isolation, rooms with negative pressure, etc.). Information should exist on total data and by service or unit.
2.9.2	Verifies whether information is being collected on oxygen equipment checked out, oxygen cylinders, mechanical ventilators, infusion pumps, oxygen masks, hoses, suction equipment, antibiotics, antiviral drugs, inotropics, etc. NOTE: A list has been compiled of critical supplies for patient care during an influenza pandemic that can serve as support for this purpose.
2.9.3	Verifies the existence of surveys on current human resource supply in terms of hours/day (i.e., per doctor, nurse, respiratory therapist, nursing auxiliary, etc.) that the health facility may have, by service or area;
2.9.4	Verifies whether if there is up-to-date information on care indicators, such as number of outpatient consultations (adult and pediatric), the number of emergency consultations, hospital discharges, average length of hospital stay, and average ICU stay, etc.
2.9.5	Verifies whether any impact assessments have been done on the increase in demand based on calculations made for the health facility's area of influence (i.e., excessive consultations, admissions, deaths, ICU utilization, and mechanical ventilation utilization). NOTE: Software programs (FluAid, FluSurge) are available for estimating the impact on the demand in regions or localities.

2.9.6	Verifies whether areas have been identified that can be used for triage, outpatient consultation, hospitalization, vaccination, drug supply, provision of information, supplies for personal protective gear, etc.
Item	Explanation
2.9.7	Verifies whether estimates have been made to identify extra human resource needs for the specific care of patients with pandemic influenza, taking into account the necessary profile, functions, and the possibility that some health workers may be absent due to the pandemic. NOTE: Software (FluWorkLoss) is available to help estimate the percentage of absenteeism due to the pandemic. It is generally accepted that some 30% of human resources may be absent throughout the pandemic wave.
2.9.8	Verifies whether an individual has been designated to follow-up on staffing needs by service or unit, based on demand.
2.9.9	Verifies whether criteria have been set to alert and declare a situation that poses risks to patient care and to the safety of personnel due to absenteeism and/or exhaustion.
2.9.10	Verifies whether thought has been given to the feasibility of adding extra personnel given the need generated by heavy demand, considering legal, labor, and occupational health concerns, and the proposed roles for such additional personnel.
2.9.11	Verifies whether mechanisms have been identified for mobilization, lodging, transportation, etc.
2.9.12	Verifies whether a strategy is in place to ensure and guarantee care for patients with pandemic influenza in areas with no health centers nearby and that may entail special geographical, cultural, and social conditions. Takes into account aspects related to transportation, communications, and logistical support.
2.9.13	Verifies whether a strategy is in place for the addition of extra personnel, and if so, how it will be implemented in the event that it has been included under Item 2.9.10.
2.9.14	Verifies whether a strategy has been identified to defer or cancel elective procedures that require hospital admission, surgery, etc. Confirm whether a level of demand has been identified that would activate such a strategy.
2.9.15	Verifies whether there are agreements with other health facilities for the referral of patients with illnesses unrelated to pandemic influenza. The institutions should be identified, and the criteria for referring such patients defined.
2.9.16	Verifies whether a plan has been identified to ensure a continuous supply of water, energy, waste management, communications, and of other basic support services to the facility, such as laundry, janitorial services, food services, security, etc.
2.9.17	Verifies whether there are any estimates of requirements when there is an excessive demand for equipment, materials, drugs, personal protective gear, soap for handwashing, etc.
2.9.18	Verifies whether budget lines, resources, contracts with suppliers, etc. have been identified to furnish the necessary supplies and services stemming from the excessive demand generated by an influenza pandemic.
2.9.19	Verifies whether a mechanism has been developed to effectively manage inputs and supplies (i.e., receipt of orders, storage, distribution points, availability, etc.).
2.9.20	Verifies whether strategies have been developed to reassign beds and administrative areas, modify staff duties, etc.
2.9.21	Verifies whether alternative sites have been identified, with the approval of local authorities, for patient care or triage (i.e., schools, churches, theatres, hotels, etc.).
2.9.22	Verifies whether directives have been developed to control access in the event of saturation and/or inadequate resources. Consider the legal, ethical, and community management aspects.
2.10	Verifies whether the plan includes an occupational health component; this can be cited explicitly or provided separately in descriptions within the document. Consequently, verification is necessary through a review of the items explained

	below:
2.10.1	Verifies whether the protocol or guidelines have been defined. NOTE: Documents are available to support this activity (manual on laboratory biosafety, guide for transporting infectious substances, and guide for the control of avian influenza virus infections H5N1).
2.10.2	Verifies whether guidelines have been identified in this area.
2.10.3	Verifies whether the mechanism has been defined.
2.10.4	Verifies whether a mechanism exists to prevent symptomatic personnel potentially infected with pandemic influenza from entering the workplace and infecting other workers or patients.
Item	Explanation
2.10.5	Verifies whether guidelines have been established to remove and reinstate symptomatic workers or those with confirmed cases of infection.
2.10.6	Verifies whether reassignment criteria and worker replacement plans have been identified.
2.10.7	Verifies whether this support is included: modalities, people that carry it out, frequency;
2.10.8	Verifies whether some type of support is planned to help maintain worker well-being and performance (caregivers, care centers, etc.).
2.10.9	Verifies whether a system has been developed to supply workers with treatment or prophylaxis. The health facility may decide to leave this measure in the hands of the existing health system in the locality; workers would then receive these from that health system.
2.11	Verifies that the plan includes a component for intensive control of influenza infection, this can be cited explicitly or provided separately in descriptions within the document. Consequently, verification is necessary through a review of the items explained below:
2.11.1	Verifies whether specific guidelines have been adopted and/or adapted. NOTE: WHO provides a guide for the control of H5N1 infections.
2.11.2	Verifies document.
2.11.3	Verifies how these mechanisms are defined.
2.11.4	Verifies document. Describes eating utensils, household effects, bedclothes, towels, patient gowns;
2.11.5	Verifies document. Refers to orotracheal tubes, nasal cannulas, oxygen masks, hoses, tongue depressors, stethoscopes, sphygmomanometers, nebulizers, suction equipment, etc.
2.11.6	Verifies document.
2.11.7	Verifies whether these are contemplated for sites such as schools, hotels, theatres; and a strategy to ensure that such measures are effective.
2.11.8	Verifies the document and whether it includes measures family contacts.
2.11.9	Verifies document.
2.11.10	Verifies document.
2.11.11	Verifies document. NOTE: Existing models and formats are available and adaptable to the particular features of the health facility.
2.11.12	Verifies document. NOTE: This measure may already be considered within the health facility but should be emphasized as essential in influenza infection control.
2.12	Verifies whether the plan includes a component for the management of overmortality; this can be cited explicitly or provided separately in descriptions within the document. Consequently, verification is necessary through a review of the items explained below:
2.12.1	Verifies the existence of a protocol following national and local guidelines that considers the cultural and religious characteristics of the population. NOTE: Manuals are available (PAHO) for mass cadaver management;
2.12.2	Verifies the maximum number of cadavers that the health facility can store has been estimated.
2.12.3	Verifies how the strategy to increase the number of morgues in the locality

	(refrigerated rooms, stadiums, containers, etc.) is developed and coordinated.
2.12.4	Verifies the coordination mechanism with the undertakers' association for logistical aspects, given high demand and infection control measures;
2.12.5	Verifies estimates.
2.12.6	Verifies information.
3	Item 3 seeks to evaluate the progress of activities for testing the plan and the coordination and response team.
3.1	Verifies whether simulation exercises have been considered by the members of the pandemic committee, with a view to evaluating coordination, the chain of command, and information flows. It should be determined whether such exercises are being considered and which organization has been designated to carry them out.
Item	Explanation
3.2	Verifies the results of simulation exercises with the members of the committee (proceedings, minutes, logbook, etc.).
3.3	Verifies whether response simulation exercises have been included in order to evaluate them in operational terms. It should be determined whether such exercises are under consideration and which organization has been designated to carry them out.
3.4	Verifies the results of simulation exercises (proceedings, minutes, logbook, etc.).

COURSE EVALUATION



Pan American
Health
Organization
Organización Panamericana de la Salud



COURSE EVALUATION

Course for Health Establishments Preparedness for Clusters or Unusual or Unexpected Cases of SARI

Train the Trainers Workshop

WE WOULD BE GRATEFUL FOR YOUR COLLABORATION IN THE EVALUATION OF THIS COURSE. YOUR RESPONSES AND OBSERVATIONS ARE VERY IMPORTANT IN HELPING US IMPROVE THE QUALITY OF THE COURSE. PLEASE USE THE FOLLOWING KEY TO FILL OUT THE CORRESPONDING SPACES IN THE TABLE BELOW.

Key for the evaluation:

horrible

bad

average

good

excellent

PRESENTATION TOPICS	CLARITY PRESENTATION	RELEVANCE OF CONTENT	PRACTICAL USE OF CONTENT
OBJETIVES OF COURSE			
INFLUENZA BASICS			
INTERNATIONAL HEALTH REGULATIONS 2005			
INFLUENZA PANDEMIC PREPAREDNESS			
SURVEILLANCE OF INFLUENZA			
NATIONWIDE ENHANCED SURVEILLANCE			
LABORATORY DIAGNOSIS			
TAKING AND SHIPMENT OF SAMPLES			
PRACTICAL DEMONSTRATION- LABORATORY			
ABC OF INFECTION CONTROL			
INFECTION CONTROL FOR SARI			
PRACTICAL DEMONSTRATION - INFECTION CONTROL			
CASE MANAGEMENT			
VACCINES AND ANTIVIRAL AGENTS			
HOSPITAL PREPAREDNESS PLAN			
TRIAGE			
MANAGEMENT OF BEDS AND RESOURCES			
MANAGEMENT OF EXCESS MORTALITY			
OCCUPATIONAL HEALTH			
RISK COMMUNICATION FOR THE HEALTH FACILITY			



CHECKLIST FOR HEALTH FACILITIES			
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COMMENTS: _____

In general terms,

What has been your general impression of the workshop?

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Simulation exercises: usefulness

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Work groups:

Group dynamic and discussion:

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Working Tools:

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Usefulness of the results and conclusion of the analysis:

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Scoring of small Group work (from 1=horrible to 5=excellent):

Surveillance exercises ☐

Case study ☐

Health services tabletop simulation ☐

COMMENTS: _____

Plenary

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

Logistics of Course (administrative support, materials, work spaces, hotel, food)

horrible ☐ bad ☐ average ☐ good ☐ excellent ☐

COMMENTS: _____

THANK YOU FOR YOUR TIME!