Preventing the Transmission of Avian or Pandemic Influenza in Health Care Facilities with Limited Resources

Editors
Barbara Deller
Galina Stolarsky
Linda Tietjen
Dana Lewison
Preventing the Transmission of Avian or Pandemic Influenza in Health Care Facilities with Limited Resources

Editors
Barbara Deller
Galina Stolarsky
Linda Tietjen
Dana Lewison
Jhpiego is an international, non-profit health organization affiliated with The Johns Hopkins University. For nearly 40 years, Jhpiego has empowered front-line health workers by designing and implementing effective, low-cost, hands-on solutions to strengthen the delivery of health care services for women and their families. By putting evidence-based health innovations into everyday practice, Jhpiego works to break down barriers to high-quality health care for the world’s most vulnerable populations.

www.jhpiego.org

Published by:

Jhpiego
Brown’s Wharf
1615 Thames Street
Baltimore, Maryland, 21231-3492, USA

Copyright © 2008 by Jhpiego. All rights reserved.

The editors gratefully acknowledge the contribution of John Bartlett, MD, Professor of Medicine, Chief of the Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, who reviewed the field-test version of this manual.


In the development of this reference manual, the editors referred to the latest (January 2008) World Health Organization and U.S. Centers for Disease Control and Prevention recommendations for service providers on preventing the transmission of avian influenza in health care facilities.

Desktop publishing: Youngae Kim

TRADEMARKS: All brand names and product names are trademarks or registered trademarks of their respective companies.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PREFACE</th>
<th>....................................................................................................................... v</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER 1: Avian or Pandemic Influenza</td>
<td>Key Facts about Pandemic Influenza............................................................... 1-1</td>
</tr>
<tr>
<td></td>
<td>Key Facts about Avian Influenza..................................................................... 1-1</td>
</tr>
<tr>
<td></td>
<td>Transmission of Avian or Pandemic Influenza (API) in Health Care Facilities... 1-5</td>
</tr>
<tr>
<td></td>
<td>Management of Avian or Pandemic Influenza.................................................. 1-5</td>
</tr>
<tr>
<td>CHAPTER 2: Infection Prevention and Control Practices for Preventing Avian or Pandemic Influenza in Health Care Facilities</td>
<td>Standard Precautions.......................................................................................... 2-1</td>
</tr>
<tr>
<td></td>
<td>Transmission-Based Precautions..................................................................... 2-3</td>
</tr>
<tr>
<td></td>
<td>Combined Precautions..................................................................................... 2-7</td>
</tr>
<tr>
<td>CHAPTER 3: Patient Care during an Outbreak of Avian or Pandemic Influenza</td>
<td>Care of Patients in Isolation ........................................................................... 3-1</td>
</tr>
<tr>
<td></td>
<td>Case Management for Avian or Pandemic Influenza........................................... 3-4</td>
</tr>
<tr>
<td></td>
<td>Care of the Deceased ....................................................................................... 3-5</td>
</tr>
<tr>
<td>CHAPTER 4: Protecting the Health of Staff and Visitors</td>
<td>Protecting the Health of Staff Members.............................................................. 4-1</td>
</tr>
<tr>
<td></td>
<td>Infection Prevention and Control Guidelines for Visitors ................................... 4-3</td>
</tr>
<tr>
<td>CHAPTER 5: Planning and Preparedness for Avian or Pandemic Influenza</td>
<td>Coordination....................................................................................................... 5-2</td>
</tr>
<tr>
<td></td>
<td>Surveillance in the Health Care Facility............................................................ 5-4</td>
</tr>
<tr>
<td></td>
<td>Communication ................................................................................................ 5-5</td>
</tr>
<tr>
<td></td>
<td>Case Identification, Management and Treatment............................................... 5-8</td>
</tr>
<tr>
<td></td>
<td>Infection Prevention and Control in Health Care Settings.................................. 5-9</td>
</tr>
<tr>
<td></td>
<td>Maintaining Essential Health Services ............................................................. 5-10</td>
</tr>
<tr>
<td></td>
<td>Information Dissemination and Communication in the Community .................... 5-14</td>
</tr>
<tr>
<td>APPENDIX A: World Health Organization Advice on the Use of Oseltamivir (Tamiflu®) for Treatment and Prevention of Influenza</td>
<td>................................ A-1</td>
</tr>
<tr>
<td>APPENDIX B: World Health Organization Case Definitions for Human Infections with Influenza A (H5N1) Virus</td>
<td>................................ B-1</td>
</tr>
<tr>
<td>APPENDIX C: The Disease Transmission Cycle, Transmission Types and Prevention</td>
<td>................................ C-1</td>
</tr>
<tr>
<td>APPENDIX D: Hand Hygiene</td>
<td>............................................................... D-1</td>
</tr>
</tbody>
</table>
APPENDIX E: Guidelines for Using Personal Protective Equipment.........................................E-1

APPENDIX F: Guidelines for Processing Instruments, Surgical Gloves and Other Items ..............................................................................................................F-1

APPENDIX G: How to Make a Dilute Chlorine Solution...........................................................G-1

APPENDIX H: Infection Prevention and Control Advice for Family and Friends or Contacts of Patients with Influenza A (H5N1)................................................H-1

APPENDIX I: Checklist for Planning and Preparedness for Avian or Pandemic Influenza ..............................................................................................................I-1

APPENDIX J: Flowsheet for Avian or Pandemic Influenza: Case Detection and Initial Management .....................................................................................................J-1

REFERENCES
PREFACE

This manual was developed to guide clinicians—doctors, nurses, midwives and other health care workers—who are or will be caring for patients with avian or pandemic influenza (API) in implementing effective infection prevention and control practices at their health care facilities. This manual is part of a learning package for a 2-day workshop focused on infection prevention and control practices relevant to API. The package also includes a participant’s handbook, trainer’s notebook and presentation graphics.

This package contains generic information and guidance that managers of health care facilities can use as a starting point to prepare and implement their own site-specific plans and activities. It is assumed that the participants in the workshop who are using this package are qualified service providers who have basic skills in infection prevention and control, and are familiar with the principles of infection prevention and control. It is also assumed that the participants have read, and continue to have access to, the comprehensive Jhpiego manual *Infection Prevention Guidelines for Healthcare Facilities with Limited Resources.*
AVIAN OR PANDEMIC INFLUENZA

KEY FACTS ABOUT PANDEMIC INFLUENZA

Pandemic influenza is virulent human flu that causes a global outbreak (a pandemic) of serious illness. There is little natural immunity to the disease, so it can easily spread from person to person. Pandemic flu is different from common or seasonal flu, to which humans have some immunity and for which a vaccine is available (USDHHS 2007a).

There are three types of influenza viruses: A, B and C. Avian (or bird) flu is caused by the type A virus and occurs naturally among wild birds. The H5N1 variant of this virus, which has caused human deaths in Asia and Africa, is deadly to domestic fowl and can be transmitted from birds to humans. There is no human immunity to it and vaccine availability is very limited (USDHHS 2007a). The major concern about H5N1 is that it may mutate enough to become easily transferable among humans and lead to a pandemic. This reference manual and the accompanying training materials will use the term avian or pandemic influenza, or API, to refer in general to the influenza A virus that could potentially cause the pandemic.

KEY FACTS ABOUT AVIAN INFLUENZA

Transmission of Avian Influenza to Humans

Avian influenza occurs naturally in all birds, especially wild water birds. Birds carrying the virus spread it through their saliva, nasal secretions and feces. Other birds that come in contact with these virus-laden birds can become infected and develop symptoms within 3 to 7 days. If they survive the infection, the birds’ excretions will stay infectious for at least 10 days.

Direct contact with infected poultry or surfaces and objects contaminated by their feces is presently considered the main route for humans to become infected. To date, most human cases have occurred in rural or periurban areas where many households are in close contact with small poultry flocks, which often roam freely, sometimes entering homes or sharing outdoor areas where children play. As infected birds shed large quantities of virus in their feces, opportunities for exposure to infected droppings or to environments contaminated by the virus are abundant under such conditions. For this reason, in the case of an avian influenza outbreak, people should:

- Avoid contact with infected birds or contaminated surfaces,
- Avoid farms where poultry may be present,
- Be careful when handling poultry,
- Cook poultry well, and
- Use hand hygiene.
Most reported cases of human infection by avian influenza have occurred from direct or close contact with infected poultry or contaminated surfaces and have resulted in high mortality. Although there is the potential for human-to-human transmission of the H5N1 virus, and a few cases of human-to-human spread have occurred, so far this has not been a major mode of transmission.

**Low Pathogenic H5N1 vs. Highly Pathogenic H5N1**

There are two types of H5N1 avian influenza: one is classified as low pathogenic (LPAI); the other is highly pathogenic (HPAI). Pathogenicity refers to the disease-producing ability of the virus.

HPAI H5N1 (“high path”), often referred to as the “Asian” H5N1, is the virus type receiving worldwide attention. It spreads quickly and is often fatal in chickens and turkeys. Millions of birds have died in the countries where HPAI H5N1 has been found, and the virus has also infected humans, chiefly people who came into direct contact with infected birds. HPAI H5N1 is the subtype of avian influenza that is spreading rapidly in some parts of the world.

LPAI H5N1 (“low path”) commonly occurs in wild birds throughout the world, causing minor sickness or no evident signs of illness. It is not a human health concern.

**Why H5N1 Is of Particular Concern**

Of the 15 avian influenza virus subtypes, H5N1 is of particular concern for several reasons:

- H5N1 has spread rapidly in Asia in poultry populations since 2003, moving into Europe in 2005, Africa in 2006 and expanding its host range from birds to mammals;
- A high risk for human exposure and infection with H5N1 remains in rural Asia, where poultry is raised in close proximity to the living quarters and is historically free-ranging;
- The virus causes severe disease in humans and has a high mortality rate (currently reported at about 50%, although surveillance data may not be adequate); and—perhaps most important—
- H5N1 mutates rapidly and has the ability to acquire genes from viruses infecting other animal species.

As a type A influenza virus, H5N1 can have frequent changes in the surface antigens or proteins and mutate by “antigenic drift,” which occurs when two different strains of influenza combine to form a subtype, or a combination of the two originals. Usually small, gradual changes occur. This form of mutation is possible in influenza A virus because it affects multiple species.
Avian or Pandemic Influenza

(birds, pigs and humans, for example). An abrupt major change could produce a novel influenza virus. The other way that an influenza virus can evolve is through “antigenic shift,” which occurs over time as a virus tries to evade the immune system of the host organism.

Although not all subtypes of avian influenza have crossed from birds to humans, the current strain, H5N1, is one that has. This creates the opportunity for genetic reassortment of the avian H5N1 strain with genes from a human (H1 or H3) strain, thereby increasing the likelihood that a novel strain will emerge from the current situation in Asia. Moreover, humans and pigs can function as vessels, where the mixing of influenza A virus acquired from the birds with human influenza virus (also called flu virus) can occur. Past influenza pandemics, in 1918, 1957 and 1968, were caused by a new virus subtype that resulted from such reassortment and mixing of various influenza viruses. Because this new viral subtype would have characteristics that are different from the parent viruses, and these viruses do not commonly infect humans, there would be little or no immune protection against it in the human population. This means that in the context of the human population, avian influenza would likely appear as a serious, life-threatening disease.

So far, the spread of H5N1 virus from person to person has been rare and has not continued beyond one person. Nonetheless, because H5N1 has the capacity for rapid mutation and all influenza viruses have the capacity to change, the virus could one day be able to infect humans. And if the H5N1 virus were to gain the capacity to spread easily from person to person, an influenza pandemic (worldwide outbreak of disease) could begin.

Because the worldwide API situation may change rapidly, visit the following Web sites for the latest facts, updates and additional information:

- U.S. Department of Health and Human Services (USDHHS) at: www.hhs.gov.
- Center for Infectious Disease Research and Policy (CIDRAP) at: www.cidrap.umn.edu.
Antiviral Agents for Influenza

Antiviral drugs interfere with the ability of a virus to replicate, so they can aid a person who is already infected by reducing the duration of the symptoms and complications associated with the disease. But they do not actually cure the disease. Antiviral drugs are not specific for a particular strain of influenza (unlike a vaccine) and can theoretically be used to combat a new strain before a vaccine could be produced.

Four different influenza antiviral drugs—amantadine, rimantadine, oseltamivir (Tamiflu®) and zanamivir (Relenza®)—are approved by the U.S. Food and Drug Administration (FDA) for the treatment of influenza; three are approved for prophylaxis. All four have activity against influenza A viruses. However, the H5N1 viruses isolated from poultry and humans in Asia have shown that the viruses are resistant to two of the medications (amantadine and rimantadine). At present, neuraminidase inhibitor drugs such as Tamiflu and Relenza that reduce the severity and duration of human influenza viruses may be helpful in H5N1 infections, but additional studies are still needed to demonstrate their effectiveness. Monitoring of influenza A for resistance to influenza antiviral medications is ongoing. See Appendix A for advice from WHO on the use of oseltamivir (Tamiflu) for treatment for and prophylaxis against influenza.

Although at present there is no vaccine for H5N1 available to the public, according to the CDC and WHO, one is being developed and tested by the National Institutes of Health (NIH).

Avian or Pandemic Influenza Virus Can Infect and Kill Young People

Unlike seasonal human influenza that kills the very young and very old, the API virus tends to infect and kill young people. Most cases have occurred in previously healthy children and young adults (WHO 2007d). However, it is possible that the only cases currently being reported are those in the most severely ill people, and that the full range of illness caused by the API virus has not yet been defined.

Symptoms of API in Humans

Symptoms of API in humans are:

- High fever (> 38°C)
- Cough
- Shortness of breath or respiratory problems

---

3 Caution is advised in prescribing Tamiflu to adolescents (10–19 years), as recent findings from Japan have shown untoward neuropsychiatric side effects (Maxwell 2007). These findings have not been noted in other studies.
Most patients have been previously healthy children or adults. Most patients have initial symptoms of high fever and an influenza-like illness with lower respiratory tract infection. Unlike patients with infection caused by other influenza, patients with API rarely have conjunctivitis. Diarrhea, vomiting, abdominal pain, pleuritic pain and bleeding from the nose and gums have been reported early in the course of illness in some patients (Beigel et al. 2005). Most characteristically with API, an acute respiratory infection in healthy adults or children quickly progresses to Acute Respiratory Distress Syndrome (ARDS) with severe shortness of breath, rapid breathing and pulmonary edema, often accompanied by low blood pressure or shock. This is not seen with other forms of influenza. However, if API is present in the region, everyone with a respiratory syndrome becomes suspect.

**Incubation Period**
The incubation period for human influenza viruses is short: 2 to 3 days (range 1 to 7 days). However, with influenza A (API) the median time between exposure and onset of illness is 3 days (range 2 to 8 days) (Beigel et al. 2005).

**TRANSMISSION OF AVIAN OR PANDEMIC INFLUENZA IN HEALTH CARE FACILITIES**

- The virus may enter the health care facility in the body fluids (mainly respiratory) of a suspect/probable API patient.
- All health care staff, laboratory, radiology and cleaning staff, other patients and visitors to the health care facility may be at risk of exposure to API.
- Based on the current body of knowledge available on avian influenza, WHO and CDC advise using Standard Precautions plus airborne, droplet and contact precautions in care of the patient with API.
- Although experience with API in the hospital setting is limited, previous experiences with Severe Acute Respiratory Syndrome (SARS) have shown that implementation of isolation precautions had a rapid impact on SARS transmission, reducing the number of cases transmitted in the health care facility.

**MANAGEMENT OF AVIAN OR PANDEMIC INFLUENZA**

**Identification and Isolation of Patients with API**
All patients who present to a health care facility with fever and respiratory symptoms should be managed according to Transmission-Based Precautions and respiratory hygiene and cough etiquette (see Chapter 4). Patients with a history of travel within the past 10 days to an area with API activity and who are hospitalized with a severe respiratory febrile illness, or are otherwise
under evaluation for API, should be managed using Standard, contact, droplet and airborne precautions such as those used for SARS patients.

---

Use Standard, Droplet and Airborne Precautions:

For adults: For 7 days after resolution of fever
For children: For 21 days since onset of illness in children under 12
OR
Until an alternative diagnosis is established.

---

Appendix B presents provisional case definitions for the influenza A virus that have been developed by WHO.

**Essential Infection Prevention and Control Practices for Preventing the Spread of Avian or Pandemic Influenza in Humans**

Infection prevention and control practices are similar to those required for infectious respiratory pathogens and were practiced for SARS containment during 2002–2003. These practices are discussed in detail in the following chapters. Prevention of disease transmission in human cases of API in a health care facility will depend on:

- Initial triage of the patient;
- Assignment of patients to private (or cohort if necessary) rooms with negative pressure;
- Use of Standard and Transmission-Based Precautions (airborne, droplet and contact precautions); and
- Availability and proper use of personal protective equipment (PPE), including high-efficiency masks and particulate respirators, goggles or face shields, gloves and gowns, as well as availability of other essential supplies and materials.

**Advance, facility-wide planning is critical** to ensuring that a health care facility is appropriately prepared to manage API cases in humans. It can also help prevent hysteria in the event of potential cases of API. Before a human case of API is diagnosed or even suspected, the health care facility should:

- Appoint a hospital spokesperson who has good communication skills, is a recognized authority and has credibility with the public as well as with hospital personnel;
- Outline procedures for expanding capacity and obtaining additional equipment and supplies that may be needed, such as particulate respirators and ventilators; and
- Increase community awareness prior to initial cases.
Planning for a possible API outbreak can draw upon plans already developed for bioterrorism or disaster situations, and should be conducted in coordination with the appropriate local and national governmental agencies. Additional information on planning and preparedness for pandemic influenza is presented in Chapter 5.
INFECTION PREVENTION AND CONTROL PRACTICES FOR PREVENTING AVIAN OR PANDEMIC INFLUENZA IN HEALTH CARE FACILITIES

Existing infection prevention and control measures include the application of Standard Precautions to all patients receiving care in a health care facility. If the diagnosis of avian or pandemic influenza (API) infection is being considered on the basis of clinical features, additional, Transmission-Based Precautions should be implemented until that diagnosis can be ruled out (CDC 2007e; WHO 2007a).

- Standard Precautions apply to all clients and patients attending health care facilities.
- Transmission-Based Precautions apply to hospitalized patients as well as patients cared for at home.

The disease transmission cycle and types of transmission are described in detail in Appendix C. Infection prevention and control precautions are designed to break the cycle of disease transmission and protect the health care worker, the patient and the community.

STANDARD PRECAUTIONS

Because most people with bloodborne viral infections such as HIV and hepatitis B do not have symptoms, nor can they be visibly recognized as being infected, Standard Precautions are designed for the care of all persons—patients, clients and staff—regardless of whether or not they are infected. Likewise, people newly infected with API who do not yet have symptoms may not be recognized. Standard Precautions apply to respiratory secretions, blood and all other body fluids, other secretions and excretions (except sweat), nonintact skin and mucous membranes. Their implementation is meant to reduce the risk of transmitting microorganisms from known or unknown sources of infection (e.g., patients, contaminated objects, used needles and syringes, etc.) within the health care system.

Standard Precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals.
Key Components of Standard Precautions and Their Use

The key components of Standard Precautions and their use are outlined in Table 2-1. Placing a physical, mechanical or chemical barrier between microorganisms and an individual—whether a client coming for outpatient care, a hospitalized patient or a health care worker—is a highly effective means of preventing the spread of infections (i.e., the barrier serves to break the disease transmission cycle). For example, the following actions create protective barriers for preventing infections in clients, patients and health care workers, and provide the means for implementing Standard Precautions:

- Consider every person (patient or staff) as potentially infectious and susceptible to infection.
- Wash hands—the most important procedure for preventing cross-contamination (person to person or contaminated object to person). (See Appendix D, Hand Hygiene.)
- Wear gloves (both hands) before touching anything wet—broken skin, mucous membranes, blood or other body fluids, or soiled instruments and contaminated waste materials—or before performing invasive procedures.
- Use physical barriers (protective goggles, face masks and gowns) if splashes and spills of any body fluids (secretions and excretions) are likely (e.g., cleaning instruments and other items). (See Appendix E, Guidelines for Using Personal Protective Equipment.)
- Use antiseptic agents for cleansing the skin or mucous membranes prior to surgery, cleaning wounds, or doing handrubs or surgical handscrubs with an alcohol-based antiseptic product.
- Use safe work practices such as not recapping or bending needles, safely passing sharp instruments and suturing, when appropriate, with blunt needles.
- Safely dispose of infectious waste materials to protect those who handle them and prevent injury or spread of infection to the community.
- Process instruments, gloves and other items after use by first decontaminating and thoroughly cleaning them, then either sterilizing or high-level disinfecting them using the recommended procedures. (See Appendix F, Guidelines for Processing Instruments, Surgical Gloves and Other Items and Appendix G, How to Make a Dilute Chlorine Solution.)
### Table 2-1. Standard Precautions: Key Components

| **HANDWASHING (or use of an antiseptic handrub)** | • After touching blood, body fluids, secretions, excretions and contaminated items  
• Immediately after removing gloves  
• Between patient contacts |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MASKS, GOGGLES AND/OR FACE SHIELDS</strong></td>
<td>• Protect mucous membranes of eyes, nose and mouth when contact with respiratory secretions, blood and other body fluids is likely</td>
</tr>
</tbody>
</table>
| **GLOVES** | • For contact with blood, body fluids, secretions, excretions and contaminated items  
• For contact with mucous membranes and non-intact skin |
| **GOWNS** | • Protect skin from blood or body fluid contact  
• Prevent soiling of clothing during procedures that may involve contact with respiratory secretions, blood or other body fluids |
| **LINEN** | • Handle soiled linen to prevent touching skin or mucous membranes  
• Do not pre-rinse soiled linens in patient care areas |
| **PATIENT CARE EQUIPMENT** | • Dedicate equipment for isolated patients  
• Handle soiled equipment in a manner to prevent contact with skin or mucous membranes and to prevent contamination of clothing or the environment  
• Clean reusable equipment prior to reuse |
| **ENVIRONMENTAL CLEANING** | • Routinely care for, clean and disinfect equipment and furnishings in patient care areas |
| **WASTE DISPOSAL** | • Wear full PPE when handling waste |
| **SHARPS** | • Avoid recapping used needles  
• Avoid removing used needles from disposable syringes  
• Avoid bending, breaking or manipulating used needles by hand  
• Place used sharps in puncture-resistant containers |
| **PATIENT RESUSCITATION** | • Use mouthpieces, resuscitation bags or other ventilation devices to avoid mouth-to-mouth resuscitation |
| **PATIENT PLACEMENT** | • Place patients who contaminate the environment or cannot maintain appropriate hygiene in private rooms |

**TRANSMISSION-BASED PRECAUTIONS**

Transmission-Based Precautions, the second level of precautions, are designed for patients documented or suspected to be infected or colonized with highly transmissible or epidemiologically important pathogens, transmitted by air, droplet or contact, for which additional precautions beyond Standard Precautions are needed to interrupt transmission. **Transmission-Based Precautions are to be used in addition to Standard Precautions.**
If there is any question of an infectious process in a patient without a known diagnosis, implementing Transmission-Based Precautions should be based on the patient’s signs and symptoms (empiric basis) until a definitive diagnosis is made. Use of Transmission-Based Precautions, including their empiric use, is designed to reduce the risk of spreading infections between hospitalized patients and health care staff.

To prevent transmission of API, three types of Transmission-Based Precautions are recommended for use at present:

- **Contact Precautions.** Contact precautions are designed to reduce the risk of transmission of pathologic organisms by direct or indirect contact. Direct-contact transmission involves skin-to-skin contact and physical transfer of organisms during patient care activities. Direct-contact transmission can also occur between two patients. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object in the patient’s environment (see Table 2-2).

---

Table 2-2. Contact Precautions

Use in addition to Standard Precautions for a patient known or suspected to be infected or colonized with microorganisms transmitted by direct contact with the patient or indirect contact with environmental surfaces or patient care items.

**Patient Placement**
- Private room; door may be left open.
- If private room not available, place patient in room with patient having active infection with the same microorganism, but with no other infection (cohorting).

**Gloving**
- Wear clean, nonsterile examination gloves (or reprocessed surgical gloves) when entering room.
- Change gloves after contact with infectious material (e.g., feces or wound drainage).
- Remove gloves before leaving patient room.

**Handwashing**
- Wash hands with antibacterial agent, or use a waterless, alcohol-based antiseptic handrub, after removing gloves.
- Do not touch potentially contaminated surfaces or items before leaving the room.

**Gowns and Protective Apparel**
- Wear clean, nonsterile gown when entering patient room if patient contact is anticipated or patient is incontinent, has diarrhea, an ileostomy, colostomy or wound drainage not contained by a dressing.
- Remove gown before leaving room. Do not allow clothing to touch potentially contaminated surfaces or items before leaving the room.

**Patient Transport**
- Limit transport of patient to essential purposes only.
- During transport, ensure precautions are maintained to minimize risk of transmission of organisms.

**Patient Care Equipment**
- Reserve noncritical patient care equipment for use with a single patient if possible.
- Clean and disinfect any equipment shared among infected and noninfected patients after each use.

*Adapted from: ETNA Communications 2000.*

---

**Droplet Precautions.**

Droplet precautions are designed to reduce the risk of transmission of infectious material by droplets. Droplet transmission involves contact of the conjunctivae or the mucous membranes of the nose or mouth of a susceptible person with a large-particle droplet containing microorganisms (more than 5 µm [microns] in size). Talking, coughing, sneezing, and the performance of procedures such as suctioning and bronchoscopy release these organisms. As these

---


Preventing the Transmission of Avian or Pandemic Influenza in Health Care Facilities with Limited Resources
large particles remain in the air for only a short period of time and travel only short distances, health care personnel should use precautions (using masks, goggles or face shields) only when they are within 1 meter (3 feet) of the patient’s respiratory tract (see Table 2-3).

Table 2-3. Droplet Precautions

<table>
<thead>
<tr>
<th>Use in addition to Standard Precautions for a patient known or suspected to be infected with microorganisms transmitted by large-particle droplets (larger than 5 µm).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Placement</strong></td>
</tr>
<tr>
<td>- Private room; door may be left open.</td>
</tr>
<tr>
<td>- If private room not available, place patient in room with patient having active infection with the same disease, but with no other infection (cohorting).</td>
</tr>
<tr>
<td>- If neither option is available, maintain separation of at least 1 meter (3 feet) between patients.</td>
</tr>
<tr>
<td><strong>Respiratory and Eye/Mucous Membrane Protection</strong></td>
</tr>
<tr>
<td>- Wear mask and goggles or face shield if within 1 meter (3 feet) of patient.</td>
</tr>
<tr>
<td><strong>Patient Transport</strong></td>
</tr>
<tr>
<td>- Limit transport of patient to essential purposes only.</td>
</tr>
<tr>
<td>- During transport, patient must wear surgical mask.</td>
</tr>
<tr>
<td>- Notify area receiving patient.</td>
</tr>
</tbody>
</table>

Adapted from: ETNA Communications 2000.

- **Airborne Precautions.** Airborne precautions are designed to reduce the risk of the airborne transmission of infectious particles 5 µm or less in size into the air, either directly or dust particles containing the infectious agents. These particles can be produced by coughing, sneezing, talking or procedures such as bronchoscopy or suctioning; they can remain in the air for up to several hours; and they can be spread widely within a room as well as over longer distances. Special air handling and ventilation are needed to prevent airborne transmission (see Table 2-4).
Infection Prevention and Control Practices for Avian or Pandemic Influenza

Preventing the Transmission of Avian or Pandemic Influenza in Health Care Facilities

with Limited Resources

2-7

Table 2-4. Airborne Precautions

Use in addition to Standard Precautions for a patient known or suspected to be infected with microorganisms transmitted by the airborne route.

<table>
<thead>
<tr>
<th>Patient Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Private room.</td>
</tr>
<tr>
<td>- Door closed.</td>
</tr>
<tr>
<td>- Room air is exhausted to the outside (negative air pressure) using fan or other filtration system.</td>
</tr>
<tr>
<td>- If private room not available, place patient in room with patient having active infection with the same disease, but with no other infection (cohorting).</td>
</tr>
<tr>
<td>- Check all visitors for susceptibility before allowing them to visit.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respiratory Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Wear surgical mask.</td>
</tr>
<tr>
<td>- If TB known or suspected, wear particulate respirator (if available).</td>
</tr>
<tr>
<td>- If chicken pox or measles:</td>
</tr>
<tr>
<td>- Immune persons—no mask required.</td>
</tr>
<tr>
<td>- Susceptible persons—do not enter room.</td>
</tr>
<tr>
<td>- Remove mask after leaving the room and place in a plastic bag or waste container with tight-fitting lid.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Limit transport of patient to essential purposes only.</td>
</tr>
<tr>
<td>- During transport, patient must wear surgical mask.</td>
</tr>
<tr>
<td>- Notify area receiving patient.</td>
</tr>
</tbody>
</table>

Adapted from: ETNA Communications 2000.

When used either singularly or in combination, Transmission-Based Precautions must be used in addition to Standard Precautions.

COMBINED PRECAUTIONS

Respiratory droplets and direct contact account for the great majority of transmission of seasonal influenza, and this applies to API as well. A combination of the three Transmission-Based Precautions in addition to Standard Precautions will give the appropriate level of precaution for API. The precautions should be implemented while the patient is suspected to be or documented to be infectious, as follows:

- Adults > 12 years of age—precautions to be implemented at time of admission and continued until 7 days have elapsed since resolution of fever; and
- Children ≤ 12 years of age—precautions to be implemented at time of admission and continued until 21 days have elapsed since onset of illness. Where this is not feasible (because of a lack of local resources), the family should be educated on personal hygiene and infection

---

prevention and control measures (e.g., handwashing and use of a paper or surgical mask by a child who is still coughing).

A combination of infection prevention and control measures must be used to decrease the risk of transmission of influenza in health care settings (WHO 2007a).

**Hand Hygiene and Gloving**

- Health care workers should wash their hands or use alcohol handrub before and after each patient contact or contact with infected material, and after removing gloves. If their hands are visibly dirty, they should wash them with soap and water.

- Wearing gloves does not replace the need for handwashing, because gloves may have small, unapparent defects or may be torn during use, and hands can become contaminated during use or removal of gloves.

- Health care workers should change gloves between patients as well as when providing care involving different body sites of the same patient (e.g., moving from oral care to checking IV site).

- Health care personnel should remove gloves before leaving the patient’s room and immediately wash their hands or use an alcohol-based handrub.

**Masks, Respiratory Protection, Eye Protection and Face Shields**

- Anyone who comes in direct, close contact with the patient, or enters a room where aerosol-producing procedures are being performed with patients infected with API, must wear appropriate personal protective equipment (PPE): mask (particulate respirators that are at least as protective as U.S. National Institute for Occupational Safety and Health [NIOSH]-certified N95, EU FFP2 or equivalent), gown, face shield or goggles, and gloves.

- Various types of masks, goggles and face shields should be worn alone or in combination to provide barrier protection.

- All persons entering the room should wear N-95 respirators—these can be worn multiple times, if used by the same person. Cover the respirator with a surgical mask, which is disposed of after each use. If particulate respirators are not available, staff should wear a tightly fitting surgical or procedure mask.

- Surgical and procedure masks do not provide protection against small-particle aerosols (droplet nuclei), and aerosol-generating procedures should not be performed if a particulate respirator is not available.
Appropriate procedures should be used to select a particulate respirator that fits well, and a user seal check should be performed each time a disposable particulate respirator is worn.

Persons who are unable to properly fit or use the N-95 respirator should use a powered air-purifying respirator (PAPR), if available.

**Gowns and Other Protective Apparel**

- Gowns and other protective apparel should be worn to provide barrier protection and to reduce opportunities for transmission of pathogens from patients or items in their environment to other patients or environments.
- Gowns should be worn to prevent contamination of clothing and to protect the skin of personnel from blood and body fluid exposures.
- Gowns specially treated to make them impermeable to liquids, and leg coverings or boots that provide greater protection to the skin when splashes or large quantities of infective material are present or anticipated, should be worn when available.
- When health care providers wear PPE, they should remove it before leaving the patient’s environment and washing their hands.

If a staff member temporarily leaves the isolation area, a complete change of PPE and handwashing are required.

**Linen and Laundry**

Although soiled linen may be contaminated with pathogenic microorganisms, the risk of disease transmission is negligible if the linen is handled, transported and laundered in a manner that avoids transfer of microorganisms to patients, personnel and environment. Use Standard Precautions when handling linen:

- Linen should be placed directly into the laundry bag in the isolation room.
- Personnel should not hold linens close to the body or shake them when handling.
- If linen is heavily soiled with large amount of solid waste (feces), remove it from the linen with a gloved hand and tissue, and dispose of into a toilet or leak-proof waste container, prior to placing linen in the laundry bag.
- Wash and dry linen following the health care facility’s routine guidelines.
- Hygienic, common-sense storage of clean linen is recommended.
Dishes, Glasses, Cups and Eating Utensils
Where possible, single-use items should be used for API patients. If dishes and utensils are to be reused, no special precautions, beyond those for Standard Precautions, are recommended for dishes and eating utensils used by a patient with known or suspected API. It is recommended that reusable dishes and utensils be washed in a dishwasher in hot water with a detergent. Health care workers should wear gloves when handling patient trays, dishes and utensils.

Routine and Terminal Cleaning
In addition to thorough cleaning, adequate disinfection of bedside equipment and environmental surfaces (e.g., bedrails, bedside tables, carts, commodes, doorknobs, faucets, light switches, call bells, telephones, TV remote controls) is indicated to prevent the transmission of any influenza virus. The influenza virus is inactivated by many disinfectants: phenols, quaternary ammonia compounds, 70% alcohol, 0.05% sodium hypochlorite and any other disinfectant that is tuberculocidal. The two most commonly used disinfectants are bleach and alcohol. Cleaning of environmental surfaces with a neutral detergent followed by a disinfectant solution is recommended as follows:

- Patient rooms should be cleaned daily, including horizontal surfaces (tables, shelves and floors), and surfaces that are touched frequently (equipment including ventilators, bed rails, call bells, light switches, commodes, faucets, doorknobs).
- All surfaces should be damp-dusted and cleaned using a double bucket method (one bucket for cleaning and one for rinsing).
- Terminal cleaning is performed after the patient is discharged.
- All cleaning equipment should be cleaned and dried between uses.
- Health care workers/housekeepers must remember to continue to use appropriate PPE when cleaning isolation rooms.

See Appendix G for instructions on how to make a dilute chlorine solution from a concentrate or dry powders.

---

Table 2-5. Types of Disinfectants and Their Uses and Precautions

<table>
<thead>
<tr>
<th>DISINFECTANTS</th>
<th>RECOMMENDED USE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM HYPOCHLORITE</td>
<td>Decontamination of items contaminated with blood and body fluids</td>
<td>Should be used in well-ventilated areas</td>
</tr>
<tr>
<td>1:100 dilution of 5% is usual recommendation; use 1 part bleach to 99 parts cold tap water (1:100 dilution) to disinfect surfaces; adjust ratio of bleach to water as needed to achieve appropriate concentration, e.g., for bleach preparations containing 2.5% sodium hypochlorite, use twice as much bleach (i.e., 2 parts bleach to 98 parts water). For bleach preparations containing 5% sodium hypochlorite, a 1:100 dilution will yield 0.05%* or 500 parts per million available chlorine.</td>
<td>Protective clothing required while handling and using undiluted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disinfection by wiping of nonporous surfaces (must be cleaned of all organic material prior to disinfection)</td>
<td></td>
</tr>
<tr>
<td>BLEACHING POWDER</td>
<td>Toilets/bathrooms: may be used in place of liquid bleach if this is unavailable (still a 0.5% solution)</td>
<td>Same as above</td>
</tr>
<tr>
<td>7g/liter with 70% available chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.2g/liter with 35% available chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALCOHOL</td>
<td>Smooth metal surfaces, tabletops and other surfaces on which bleach cannot be used</td>
<td>Flammable, toxic, to be used in well-ventilated area, avoid inhalation</td>
</tr>
<tr>
<td>70% isopropyl alcohol</td>
<td></td>
<td>Keep away from heat sources, electrical equipment, flames and hot surfaces</td>
</tr>
<tr>
<td>70% ethyl alcohol</td>
<td></td>
<td>Can cause discoloration, hardening, and swelling of rubber and some plastics after prolonged use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allow it to dry completely, particularly when using diathermy as this can cause diathermy burns</td>
</tr>
</tbody>
</table>

* Some infection prevention experts recommend using .10% hypochlorite.


Specimen Collection

Following **Standard Precautions**, all specimens should be regarded as potentially infectious, and staff who collect and/or transport clinical specimens should adhere rigorously to protective measures in order to minimize exposure.

Specimens for transport must be placed in leak-proof specimen bags, which have a separate sealable pocket for the specimen (i.e., a **plastic biohazard** bag).
specimen bag). Personnel who transport specimens should be trained in safe handling practices and decontamination procedures in case of a spill. The accompanying request form should be clearly labeled as “avian or pandemic influenza” or “API” and the laboratory notified by telephone that the specimen is “on its way.” Specimens should be hand-delivered where possible. Pneumatic tube systems should not be used to transport specimens.

A register should be kept of all those who have handled specimens of patients being investigated for API.

For further information about collecting and handling specimens, see specimen collection guidelines at: www.who.int/csr/disease/avian_influenza/guidelines/humanspecimens/en/

Patient Placement

Implement and/or reinforce Standard Precautions and Transmission-Based Precautions in placing patients (CDC 2007a; 2007b; 2007d):

- Place patient in a single room. If a single room is not available, where possible, cohort confirmed cases, and those for whom the diagnosis of API virus infection is being considered, separately in designated multi-bed rooms or wards. Where cohorting is being carried out, the distance between beds should be more than 2 meters (6 feet), and beds should preferably be separated by a physical barrier (e.g., curtain or partition).

- If possible, make sure that the room has monitored negative airflow pressure—often referred to as a “negative pressure room”—with 6–12 air changes per hour and appropriate discharge of air outdoors or monitored high-efficiency filtration of room air before circulation to other areas of the hospital (CDC 2007a).

- If there is no “negative pressure room” with a high-efficiency particulate air (HEPA) filter, create negative pressure in a patient’s room (in relation to the common area or hall) by installing an air conditioner or fan at the window so that airflow is directed outside of the building. The window should be external, and the public should be kept away from the window. Test the negative pressure of the room by placing a small amount of baby powder or talc at the threshold to see if it is drawn into the room. Placing an additional fan inside the room will also increase the airflow.

- Keep doors closed at all times and inform the patient of the need for this precaution.

- Ensure that anyone who enters the room wears appropriate PPE: mask (high-efficiency masks should be used where possible, with surgical masks as an alternative), gown (clean, non-sterile), face shield or goggles, and gloves (clean, non-sterile).
Infection Prevention and Control Practices for Avian or Pandemic Influenza

Figure 2-1. Typical Isolation Facility Appropriate for Patients with Avian or Pandemic Influenza

Adapted from: WHO. 2007a. Avian Influenza, Including Influenza A (H5N1), in Humans: WHO Interim Infection Control Guideline for Health Care Facilities. (10 May)

Patient Transport

Limit the movement and transport of patients from the isolation room/area to essential purposes only and inform the receiving area as soon as possible before the patient’s arrival. If transportation is required out of the isolation room/area within the hospital, the patient should wear a mask and a gown where possible. All staff involved in the transportation should wear PPE. If transportation outside the health care facility is required, the patient should wear a surgical mask and gown (CDC 2007b). Where there is contact with surfaces, these surfaces should be cleaned afterwards. For example, if a patient has been transported in an ambulance, the ambulance should be cleaned inside with disinfectants such as 70% alcohol or 0.1% bleach solution.

Waste Disposal

All waste generated in the isolation room/area should be disposed of in suitable containers or bags. All waste from a room/area containing patient(s) with API should be treated as clinical (infectious) waste.

Staff responsible for routinely removing waste from isolation wards/areas should wear full PPE when removing waste.

Liquid waste such as urine or feces can be safely flushed into the sewer system if there is an adequate sewage system in place.

One waste disposal bag is usually adequate, providing that waste can be placed in the bag without contaminating the outside of the bag. If that is not possible, two bags are needed (double bagging). Waste disposal bags should include appropriate biohazard labeling, and be treated and disposed of according to the policy of the hospital and national regulations pertaining to hospital waste (WHO/SEARO 2006).
Infection Prevention and Control Precautions for Aerosol-Generating Procedures for Patients Who Have Suspected/Probable Avian or Pandemic Influenza

Procedures that induce coughing can increase the likelihood of droplet nuclei being expelled into the air. These potentially aerosol-generating procedures include aerosolized medication treatments (e.g., salbutimol), diagnostic sputum induction, bronchoscopy, airway suctioning and endotracheal intubation.

- Health care personnel should ensure that patients have been evaluated for API before initiation of any aerosol-generating procedures.
- Aerosol-inducing procedures should be performed on patients who may have API only when such procedures are medically essential.
- These procedures should be performed using airborne precautions.

Health care personnel should apply Standard (e.g., hand hygiene), airborne (e.g., respiratory protective devices with a filter efficiency of equal to or greater than 95%), and contact (including gloves, gown and eyewear) precautions when aerosol-generating procedures are being performed on patients who may have API.

Discharging the Patient

- The infection prevention and control precautions should remain in place for 7 days after resolution of fever for adults (> 12 years of age), and 21 days after onset of illness for children (≤ 12 years of age).
- Where this discharge policy is not applicable due to lack of local resources, and hospitalized patients are discharged before an appropriate isolation period ends, patients with suspected API should be isolated in the home setting during the time they are symptomatic and for 7 days after the resolution of fever (children < 12 years of age for 21 days after onset of symptoms) or until an alternative diagnosis is established. The family should be educated about personal hygiene and infection prevention and control measures.
- During the discharge procedure, the patient and family should be educated about appropriate precautions to take when in contact with chickens, wet markets, etc. (See Appendix H: Infection Prevention and Control Advice for Family and Friends or Contacts of Patients with Influenza A [H5N1].)
- Appropriate cleaning and disinfection of the room should be carried out after discharge (see “Preparation and Maintenance of the Isolation Room” in Chapter 3).

Safe Instrument Processing

For API patients, general guidelines for instrument processing should be used (see Appendix F).
THREE

PATIENT CARE DURING AN OUTBREAK OF AVIAN OR PANDEMIC INFLUENZA

CARE OF PATIENTS IN ISOLATION

Patients with avian or pandemic influenza (API) should be cared for in single rooms (where possible) to prevent direct or indirect transmission.

The number of staff assigned to care for these patients should be kept to the minimum required by the level of care. Staff should be strictly supervised and be experienced in infection prevention and control practices.

Strict adherence to the infection prevention and control guidelines is essential to prevent transmission of infection between patients and from patients to health care workers and others.

Care of patients in isolation units becomes a challenge when there are inadequate resources, or when the patients have poor hygiene habits, deliberately contaminate the environment, or cannot be expected to assist in maintaining infection prevention and control precautions to limit transmission of microorganisms (children, patients with an altered mental state or elderly persons).

In caring for API patients in isolation, health care personnel should adhere to the following guidelines.

Preparation and Maintenance of the Isolation Room

- Ensure additional precautions through appropriate signage on the door.
- Place a recording sheet at the entrance of the isolation room. All health care workers and visitors entering the isolation area should sign in (name and contact information) on the recording sheet so that if follow-up/contact tracing is required, contact information is available.
- Ensure that everyone who enters the isolation room, including cleaning staff, wears full PPE (WHO/SEARO 2006).
- Remove all non-essential furniture. The remaining furniture should be easy to clean and should not conceal or retain dirt or moisture, either within or around it.
- Collect linen as needed.
- Stock the hand basin with suitable supplies for handwashing (soap and disposable towels) and an alcohol handrub.
- Place appropriate waste bags in the room in a foot-operated bin.
- Place a puncture-proof container for sharps in the room.
Keep the patient’s personal belongings to a minimum. Keep water pitcher and cup, tissue wipes and all items necessary for attending to personal hygiene within the patient’s reach.

Each patient should have his/her own non-critical items of patient care equipment, for example, stethoscope, thermometer and sphygmomanometers. Any item of patient care equipment that is required for other patients should be thoroughly cleaned and disinfected prior to use.

Set up a trolley outside the door to hold PPE. A checklist may be useful to ensure that all equipment is available.

Outside the door, place an appropriate container with a lid for equipment that requires reprocessing. Once equipment has been appropriately cleaned, it can be either sterilized or disinfected.

Keep adequate equipment required for cleaning and disinfection inside the patient’s room.

Clean the patient’s room each day, including damp dusting of all horizontal surfaces and blinds. Curtains should be thoroughly cleaned (by laundering in hot water) at least weekly.

Ensure that the following items and areas are cleaned and disinfected: bedside table, bed stand and accessible areas of bed and floors (use 0.1% sodium hypochlorite as disinfectant) (WHO/SEARO 2006).

Place used linen in a linen bag inside the room and then into another bag outside the room. Take immediately to the laundry collection area and treat as normal soiled/contaminated linen. Use Standard Precautions for handling linen and other laundry that may be contaminated with blood, body fluids, secretions or excretions from suspected or confirmed API-infected patients (WHO 2007a).

Discard all waste into a clinical waste bag inside the room. When waste is to be collected for disposal, place it in another bag outside the room and then treat it as “normal” clinical/contaminated/infectious waste.

Clean and disinfect basins and bedpans after each use.

Prohibit the use of spray disinfectant.

Clean all cleaning equipment after each use. Mop heads should be sent to the laundry for proper laundering in hot water.

If possible, ensure that the direction of the air flow from the air conditioning is from the outside adjacent space (e.g., the corridor) into the room. This is known as “negative pressure.”

Clean cutlery and crockery in hot, soapy water.

**Entering the Room**
- Collect all equipment needed.
- Use alcohol-based handrub or wash hands.
- Wear PPE (see Appendix E).
- Enter the room and shut the door.

**Leaving the Room**
- At the doorway or in anteroom, remove PPE in the correct order (see Appendix E):
  - Gloves (peel from hands and discard into trash can).
  - Goggles or face shield (place them in the container for cleaning).
  - Gown (not touching outside of the gown, and place in laundry bin).
- Use alcohol-based handrub or wash hands.
- Leave the room.
- Remove mask or respirator by grasping elastic strap or tie behind ears; do not touch front of mask. Dispose into waste container. (If using particulate respirator that can be reused, make sure it is labeled with user's name prior to first use. Usually a second surgical mask is worn over the particulate respirator if it must be reused.)
- Once outside the room, use alcohol handrub again or wash hands.
CASE MANAGEMENT FOR AVIAN OR PANDEMIC INFLUENZA

Figure 3-1. Case Management for Avian or Pandemic Influenza: When to Initiate Infection Prevention and Control Precautions in Health Care Facilities

<table>
<thead>
<tr>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient enters triage with symptoms of acute febrile respiratory illness</td>
</tr>
<tr>
<td>Plus exposure history</td>
</tr>
<tr>
<td>Patient admitted for investigation of influenza A/H5</td>
</tr>
<tr>
<td>Patient confirmed as having A/H5 infection (see case definition)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infection control measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow standard and droplet precautions</td>
</tr>
<tr>
<td>⇒ HCWs should use facial protection (surgical/procedural mask, goggles/face shield)</td>
</tr>
<tr>
<td>⇒ Place a surgical/procedure mask on the patient when in the waiting room; if no masks are available, ask the patient to cover mouth and nose with a tissue when sneezing or coughing</td>
</tr>
<tr>
<td>⇒ If possible, accommodate patient in a place that is separate from other patients</td>
</tr>
<tr>
<td>⇒ Single room adequately ventilated (≥12 air changes per hour) room, if possible</td>
</tr>
<tr>
<td>⇒ If single room is not possible, cohort patients</td>
</tr>
<tr>
<td>⇒ Staff should use barrier precautions*</td>
</tr>
<tr>
<td>Report to public health authorities</td>
</tr>
<tr>
<td>Other diagnosis</td>
</tr>
<tr>
<td>Reassess precautions</td>
</tr>
</tbody>
</table>

Other diagnosis

Infection control precautions to remain in place for 7 days after the resolution of fever

Adult > 12 years

Infection control precautions to remain in place for 21** days after the onset of illness

Child ≤ 12 years

** Young children can shed virus at high titres for up to 21 days

* Barrier precautions = adequate hand hygiene, use of gowns, clean gloves, medical mask and eye protection if splashes are anticipated. If aerosol-generating procedures are performed, PPE should include particulate respirator instead of medical mask.

Source: WHO. 2007a. Avian Influenza, Including Influenza A (H5N1) in Humans: WHO Interim Infection Control Guideline for Health Care Facilities. (Updated 10 May)
CARE OF THE DECEASED

- Health care workers must follow Standard Precautions when caring for the deceased patient.
- Full PPE must be worn if the patient died during the infectious period (i.e., within 7 days after resolution of fever in adults and 21 days after the onset of symptoms in children).
- The body should be fully sealed in an impermeable body bag before transfer to the mortuary.
- No leaking of body fluids should occur and the outside of the bag should be clean.
- Transfer to the mortuary should occur as soon as possible after death.
- If the family of the patient wishes to view the body, they may be allowed to do so. If the patient died in the infectious period, the family members should wear gloves and gowns.

Post-Mortem Examination

A post-mortem examination of someone who had or probably had API should be performed with caution if the patient died during the infectious period. Therefore, when any procedure is performed on the cadaver, PPE should be worn, including high-efficiency mask, gloves, gown and goggles.

Minimizing the Risk from an Infected Cadaver

Prevent the production of aerosols, especially when excising the lung, by:
- Avoiding the use of power saws,
- Conducting procedures under water if there is a chance of aerosolization, and
- Avoiding splashing when removing lung tissue.

As a general guide, follow Standard Precautions and:
- Use the minimal amount of equipment in the autopsy.
- Use safe handling of sharps.
- Never pass instruments and equipment by hand; always use a tray or neutral zone.
- If possible, use disposable instruments and equipment.
- Keep the number of staff present to a minimum.

Mortuary Care/Funeral Director’s Premises

- Staff of the mortuary or funeral home should be informed that the deceased had API. It should be explained that Standard Precautions are all that are required in the event of exposure to the body.

- Embalming may be conducted as routine.

- Hygienic preparation of the deceased (e.g., cleaning, tidying of hair, trimming of nails, shaving) may also be done.

PROTECTING THE HEALTH OF STAFF AND VISITORS

PROTECTING THE HEALTH OF STAFF MEMBERS

Health care workers who are involved in caring for a patient with API should receive training on the mode of transmission, the appropriate infection control precautions and the exposure protocol. Staff not involved in direct patient care should be given general advice about API.

Influenza Vaccination and Antiviral Prophylaxis

It is recommended that all health care workers who are expected to have contact with the API virus, an API patient or an environment that is likely to be contaminated with the virus should take the following steps:

- They should be vaccinated with the current WHO-recommended seasonal influenza vaccine as soon as possible. Protective levels of antibodies are usually detectable between 2 and 4 weeks after vaccination with an inter-pandemic influenza vaccine. This will not protect against influenza A (H5N1), but it will help to avoid simultaneous infection by human influenza and avian influenza. This will minimize the possibility of re-assortment (WHO 2007b).

- For possible exposure to API: If unprotected exposure to a person with undocumented API occurs, the health care worker should be provided antiviral prophylaxis: 75 mg oseltamivir (Tamiflu®) once a day for at least 7 days beginning immediately or as soon as possible after unprotected exposure (WHO 2006a) (see Appendix A).

- For known exposure to API: If unprotected exposure occurs to a person with documented API, the health care worker should monitor her/his temperature twice daily. In case of fever, the health care worker should be removed from patient care and undergo diagnostic testing. If an alternative cause of fever is not identified, the health care worker should undergo treatment with oseltamivir: 75 mg two times a day for 5 days as soon as possible after unprotected exposure (WHO 2006a) (see Appendix A).

(Note: With widespread oseltamivir resistance, the recommendations for its regimen may be revised in the near future; some authorities now recommend higher doses [150 mg] for a longer period of time. Also, clinical trials have shown that Relenza may become an effective prophylaxis, although it is not approved by the U.S. Food and Drug Administration at this time.)
Self-Management
Health care personnel should observe good respiratory and hand hygiene at all times and:

- Check their temperatures twice daily and monitor themselves for respiratory symptoms, especially cough.
- Whenever possible, keep a personal diary of contacts. The diary should not be taken into isolation areas.
- In the event of fever, immediately limit interactions and exclude themselves from public areas. Notify the infection control team, occupational health team and/or health care provider that they may have been exposed to influenza A.

Infection Prevention and Control Guidelines for Contacts of API Cases (Health Care Workers)
The possibility remains that health care workers may develop API after caring for patients with the disease. Although human-to-human transmission of avian influenza is not fully understood, at least one case of transmission to a health care worker appears to have occurred after close contact with symptomatic individuals (i.e., persons with fever or respiratory symptoms) before recommended infection prevention and control precautions for API were implemented (i.e., unprotected exposure had occurred).

- To prevent transmission of API in health care settings, health care workers should use PPE appropriate for Standard, contact, droplet and airborne precautions (e.g., hand hygiene, gown, gloves and N-95 respirator in addition to eye protection).
- All health care facility workers should receive education about the symptoms of API.
- Health care personnel with influenza-like illness should be evaluated to confirm whether the causative agent is influenza and determine whether they should be removed from duties that involve direct patient contact, especially those who work in certain patient care areas, such as intensive care units (ICUs), nurseries, organ-transplant (protective environment) units and long-term care facilities.
- If a health care worker develops fever or respiratory symptoms during the 10 days following an unprotected exposure to an API patient, he/she should be excluded from duty.
- The health care worker’s exclusion from duty should continue for 7 days after the resolution of fever and respiratory symptoms, unless an alternative diagnosis is established or diagnostic tests are negative for API. During this period, the infected worker should avoid contact with persons both in the facility and in the community.
Exclusion from duty is not recommended for an exposed health care worker if he/she does not have either fever or respiratory symptoms. However, the worker should report any unprotected exposure to any patient with influenza to the infection prevention and control supervisor or other authority at the health care facility immediately. The worker can then be evaluated for post-exposure prophylaxis and monitoring.

Health care workers who develop such symptoms should not report for duty, but should seek medical care. Prior to arrival, they should notify their health care provider that they might have been exposed to API. In addition, employees should notify occupational health and infection prevention and control personnel at their facility immediately.

Active surveillance should be carried out for fever and respiratory symptoms (i.e., daily screening) on health care workers with unprotected exposure, and health care workers should be instructed to be vigilant for the development of fever, respiratory symptoms and/or conjunctivitis (i.e., eye infections) for 10 days after their last exposure to API-infected patients.

During influenza season, health care workers who develop influenza-like symptoms should be advised to stay home until 24 hours after resolution of fever, unless an alternative diagnosis is established or diagnostic tests are negative for API. While at home, ill persons should practice good respiratory hygiene and cough etiquette to lower the risk of transmission of the virus to others.

INFECTION PREVENTION AND CONTROL GUIDELINES FOR VISITORS

Visitors with Respiratory Symptoms during an API Outbreak

- Visitors with fever and respiratory symptoms should not visit patients in the health care facility.
- Furthermore, even after visitors who were sick no longer have symptoms, there are limitations on their visits to patients. Adults who were sick should not visit for 7 days from the resolution of their fever, and children who were sick should not visit for 21 days following the onset of illness.
- Visitors should be informed about this policy (e.g., via posted notices, posters or broadcasts).

Visitors to API Patients

- Service providers should educate the visitors of patients known to have API about its infectiousness and encourage them to avoid contact with the patients during the infectious period of the patients’ illness. The infectious period is 7 days after resolution of fever in adults and 21 days after onset of illness in children.
Protecting the Health of Staff and Visitors

- A list with contact information for all visitors, including family members, should be maintained.
- If the family member or a friend must visit a patient who is suspected or confirmed to have API, the visitor must follow the infection prevention and control precautions in place in the hospital for the required period. He/she will need to wear PPE if direct contact with the patient or the patient’s environment is expected (mask, gown, gloves and goggles).
- The staff member should make sure that the PPE is put on in the correct way, and that the mask fits correctly.
- When the visitor leaves the room, she/he must remove the PPE and thoroughly wash her/his hands.
- If a close contact (family member) is visiting an API patient, a staff member should interview this person to determine whether the visitor has a fever or respiratory symptoms, since close contacts of API patients may be at risk for infection. If fever or respiratory symptoms are present, the visitor should be evaluated for API and managed appropriately.
- Health care facilities should educate all visitors about use of infection prevention and control precautions when visiting API patients and about their responsibility for adhering to them.

Respiratory Hygiene and Cough Etiquette in Health Care Settings

To prevent the transmission of respiratory infections in health care settings, respiratory hygiene/cough etiquette should be incorporated into basic practice. This is especially true in areas where API—or any influenza—may be present.

Anyone who has the signs and/or symptoms of a respiratory infection (coughing, sneezing) should:
- Cover the nose/mouth when coughing or sneezing.
- Use tissues to contain respiratory secretions and dispose of the tissues in the nearest waste receptacle.
- Wash hands immediately after having contact with respiratory secretions.

Health care facilities should ensure the availability of:
- Tissues in all waiting areas and service provision areas
- No-touch waste receptacles in all above areas

---

- Conveniently located dispensers of alcohol-based handrub (where sinks are available, ensure that water, soap and disposable towels are available)

- Masks for all people who are coughing

When possible, encourage persons who are coughing in common waiting areas to sit at least 1 meter (or 3 feet) away from others.

Post visual alerts at the entrance to and inside the outpatient facilities (e.g., emergency departments, physicians’ offices, outpatient clinics) with instructions to the patients and the persons who accompany them to practice respiratory hygiene/cough etiquette, and inform a staff member of their symptoms as soon as possible. A person with a cough should be provided with a mask. Cough etiquette posters may be available at the local CDC office.
Protecting the Health of Staff and Visitors
Planning for pandemic influenza is critical. Pandemic preparedness consists of much more than a plan on paper or an intention to stockpile antiviral drugs. The need for preparations is clear. It is difficult to predict the chances of avian influenza developing into a pandemic in humans. Based on experience in previous influenza pandemics, if it did develop into a severe pandemic, the clinical disease attack rate would likely be 30% or higher in the overall population. Illness rates would be highest among school-aged children (about 40%) and decline with age. Among working adults, an average of 20% would become ill at the same time during a community outbreak (USDHHS 2006), and might need to be hospitalized—usually the number of people needing hospitalization is much greater than the current capacity of health care facilities.

This chapter provides guidance for health care providers, facility managers and local health administrators in preparing for a potential pandemic outbreak of API. More sophisticated planning tools are available on the Internet at: www.pandemicflu.gov/plan/tools.htm. Two of these tools are:

- **FluAid**: Software designed by the Centers for Disease Control and Prevention (CDC) to help state and local-level planners to prepare for the next influenza pandemic by providing estimates of potential impact (e.g., number of deaths, hospitalizations, outpatient visits) specific to their locality

- **FluSurge**: Spreadsheet-based model that provides hospital administrators and public health officials estimates of the surge in demand for hospital-based services that would occur during the next influenza pandemic

The recommendations in this chapter are based on the WHO Global Influenza Preparedness Plan, the WHO Checklist for Influenza Pandemic Preparedness Planning, the “Hospital Preparedness Checklist” from the U.S. Health and Human Services Pandemic Influenza Plan, Supplement 3: Healthcare Planning, and the CDC Pandemic Influenza Toolkit. The guidance in this chapter can

---


Supplementary Sources:


become the basis for the specification of “standards” if a quality improvement approach is applied to planning and preparing for pandemic flu.

To complement this chapter, Appendix I contains a comprehensive checklist, adapted from the U.S. Department of Health and Human Services tool for hospital preparedness. The detailed checklist captures the content of this chapter and presents it in an easy-to-use format that managers, providers and administrators can apply or adapt to the specific situation in their facility.

Although many of the steps and activities recommended in this chapter are specific to API, some also pertain to any public health emergency that involves the health care facility. They are not intended to set forth mandatory requirements. It is important to carefully assess the facility’s capacity and identify gaps between the requirements for preventing transmission of API and managing an outbreak, and the actual situation at the facility. The facility management and local health administration will need to assess the cascading consequences of response to a pandemic now: for example, school closures will affect workplaces, movement restrictions will affect provision of food and supplies, and shortages of supplies will mean setting priorities. Health care providers and administrators must work together to develop a preparedness plan for their facility, and ensure clear communication, consensus and commitment.

COORDINATION

Rationale
To be able to make clear and timely decisions, to know how the team will function in an emergency and to have a uniform policy with which all concerned will comply, it is essential to know who is in charge of the following activities within the facility, and how that situation might change if a limited outbreak becomes a major emergency:

- Infection prevention and control
- Drug supplies
- Communication
- Treatment
- Security
- Quarantine

All planning at the facility level must be coordinated with the local government’s plans and preparations.
Questions to Be Addressed
Who is making the decisions in case of a pandemic: the medical director or the head of infection prevention and control? Who is reporting to and coordinating with government planning bodies, local partners, practitioners, government and private health care facilities, and other institutions? What is the status of such coordination? Does everybody know what to do?

Things to Do Now

- Establish a coordination committee (or designate individuals) to facilitate quick and adequate response during a crisis. The committee should include technical experts, persons with decision-making authority and representatives of all essential stakeholders. All individuals should know what they are responsible for, what to do and in what order.

- Advocate for the importance of pandemic planning to relevant decision-makers to secure necessary support and finances.

- Ensure that local planning takes into consideration the planning efforts at regional and national levels, as well as other local health care facilities and entities.

- Work with the local health administration to develop criteria for mandatory closing of schools or other public places based on incoming information from facility surveillance (clusters of influenza-like illness or respiratory deaths among school-age children).

- Obtain copies of pandemic influenza plans from other local or regional facilities to use as models and ensure that your plans are consistent with those of the other facilities in your area.

- Develop training plans for health care workers who will come into contact with API patients.

- Develop job aids for each staff category (e.g., nurses, cleaning staff, lab workers) on important infection control measures. Make sure that job aids are disseminated and that staff members know how to use them.

- Work in close collaboration with relevant partners, including those providing essential services outside the health sector, such as transportation and food services. Consider development of alternatives for supplying the health care facility with power and drinking water; develop back-up transport and telecommunications plans.

- Regularly update emergency plans, especially those of large hospitals, where personnel and policies may change.
SURVEILLANCE IN THE HEALTH CARE FACILITY

Rationale
Surveillance consists of ongoing collection, interpretation and dissemination of data to enable the development of evidence-based interventions. The objectives of surveillance may differ according to the seriousness of the disease and the possibilities for intervention. Each surveillance activity should have clear objectives.

Questions to Be Addressed
What type of surveillance is considered to be necessary and feasible in the current situation and would help identify an emerging pandemic at the earliest possible stage? How would that system change once a pandemic is confirmed? Is there a standard system for data collection and analysis? Who will collect and interpret data, and share results? How is the health care facility surveillance system connected with the regional or national surveillance system and with WHO?

Things to Do Now
- Establish hospital-wide syndromic surveillance (with initial attention to the emergency room and outpatient department). Job aids (for example, signage) should clearly indicate syndromic definitions of “suspected,” “probable” and “confirmed” cases of influenza A as described in Appendix B. All first-line health care workers should be trained to detect cases and identify clusters of cases.
- Develop or ensure a system to report routine and unusual surveillance findings (clusters of influenza-like illness or respiratory deaths) to relevant local health authorities.
- Develop a system for reporting unusual surveillance findings for school-age children to relevant authorities so that they can make timely and appropriate decisions about school closings.
- Develop necessary laboratory capacity, or systems for utilizing central or regional laboratory facilities, to confirm early cases as rapidly as possible.
- Establish a system for monitoring for nosocomial transmission of API and test by monitoring for non-pandemic influenza.
- Ensure that a system for reporting to central/national surveillance authorities is in place and is understood by relevant committee members.

Pandemic Surveillance and Management of Information
The need for surveillance will change during the course of a pandemic. Rigorous systems are needed to identify potential outbreaks early, in order to initiate a timely response. Once an outbreak is confirmed, surveillance needs will diminish and be replaced by the need for the minimal information required to manage the outbreak. Once the brunt of the emergency is past,
the need for surveillance may increase again with the need to monitor for possible re-emergence or new outbreaks.

During a pandemic, many services will be overwhelmed. Data collection should be maintained only if it serves a clear objective. One reason could be to support planning of the use of scarce resources such as health care facilities. It may be possible to adjust data collection to characteristics of the virus and/or the epidemic and make it less labor-intensive. For example: laboratory confirmation may not be needed for cases once the existence of the pandemic is confirmed, since clinical symptoms are sufficient to plan for health care demand.

**COMMUNICATION**

**Rationale**

Communication should focus on the health team, as well as communication with the community and public. Communication strategies are an important component in managing any infectious disease outbreak, and are essential in the event of a pandemic. Accurate and timely information at all levels is critical in order to minimize unwanted and unforeseen social disruption and economic consequences and to maximize the positive outcome of the response. The ability to respond quickly and effectively can be greatly influenced by the extent to which the people who will be needed during the response, as well as the general public, are informed before an emergency arises. Leaders have a great impact on how a community—whether a medical community or a geographical community—responds and recovers from a crisis. In a serious crisis, all affected people take in, process and act on information in different ways. The clarity, timeliness and sincerity of the messages are important.

**Questions to Be Addressed**

Is there a clear operational plan for communication that addresses all levels, from media debriefings, where applicable, to informing relatives about the patient’s status? What is the chain of responsibility, and who are the designated spokespersons? What kind of community organizations can help provide information and support at each level, and how can they be prepared in advance?

**Things to Do Now**

- Develop a communication plan that addresses: a) various target groups (e.g., press, general public, health care workers, government authorities, specific risk groups); b) key messages to be communicated; c) possible materials that are needed (Web sites, leaflets, information in different languages, etc.); and d) distribution mechanisms to reach the target groups.

- Follow the list below when developing a statement:
Planning and Preparedness for Avian or Pandemic Influenza

- Express empathy (acknowledge fears and shared misery)
- Clarify facts:
  - Who
  - What (action)
  - Where
  - When
  - Why
  - How
- What we don’t know
- Process to get answers
- Statement of commitment
- Referrals:
  - For more information
  - Next scheduled update
- Ensure that your message is honest in tone; says “we,” not “I”; avoids jargon; avoids humor; avoids judgmental phrases; and avoids extreme speculation.
- Keep transparent and open communication with facility staff, the community and the health administration, and provide regular updates and briefings; these will help to contain fear and hysteria caused by the pandemic. The briefing may be a weekly or monthly meeting, before the pandemic, but may become daily during the pandemic.
- Be the first source for information. Operationalize this by: a) instituting a weekly meeting; b) researching information before you communicate it; and c) calling a meeting or issuing a statement at the earliest moment possible.
- Nominate pandemic spokesperson(s) to represent the health care facility in case of outbreak before the community and media. Ensure good relationships with professional specialists able to help with the development of accurate and timely messages, before and during a pandemic. A good spokesperson should:
  - Be respected by the community with whom he/she is communicating
  - Be sincere and trusted
  - Have good relationships with the media and local officials
  - Be clear, accurate and timely
- Ensure that during a pandemic the materials and messages are regularly reviewed and updated with new (relevant) knowledge that may become available. Review materials regularly to be sure that the facts are correct,
and all sources of information are providing the same facts. Use job aids. Be consistent in all messages.

- Develop a written procedure and agreement on clearance of messages so that the procedures:
  - Take less than 15 minutes to accomplish
  - Ensure that accurate information is released
  - Have been tested in drills/exercises
  - Allow for delegation of authority to speed the response

- Identify a system to answer questions and requests from patients’ relatives and inform them about the visiting policy. Plan to establish telephone hotlines, and identify and train hotline staff.

- If use of telephones is not feasible, train receptionists, guards/gatekeepers and local religious leaders to be accessible to patients’ relatives and other key stakeholders.

- Avoid communications that prevent operational success:
  - Mixed messages from multiple experts
  - Information released late—the speed at which information is released may indicate to the public your preparedness
  - Paternalistic attitudes—Never tell people “don’t worry”
  - Messages that fail to counter myths and rumors in time
  - Messages reflecting public power struggles and spreading confusion

### Tips for Effective Communication in a Pandemic

- Express empathy; acknowledge fears and shared misery.
- Clarify facts: Who, what (action), where, when, why, how.
- Admit what is not known.
- Explain how and where people can get answers to their questions.
- Make statements of commitment.
- Explain to listeners how to get more information and when the next update is scheduled.
- Make sure that the message is honest and open; says “we,” not “I”; avoids jargon and humor; avoids judgmental phrases; avoids extreme speculation.
CASE IDENTIFICATION, MANAGEMENT AND TREATMENT

Rationale
To ensure effective and safe treatment of (suspected and confirmed) human cases of a new influenza strain, it is important that clinical guidelines are ready, supplies are available and staff are aware of admission criteria and management protocols. Moreover, staff should be aware of and trained in infection control measures.

Questions to Be Addressed
How was this person exposed? Should this person be treated? If so, where and how? Is additional diagnostic testing needed? If so, how should samples be taken and how should they be transported?

Things to Do Now
- Implement a hospital/clinic-wide routine for identification of new cases. (See Appendix I.)
- Identify a specific location for triage of patients with possible API. This plan should include use of signage to direct and instruct patients with possible API on the triage process. These patients under investigation should be separated from other patients seeking medical attention.
- Ensure the development or rapid adaptation and implementation of clinical management guidelines for patients with suspected and confirmed API. These guidelines should address at least the following aspects:
  - Where patients should be managed—whether in the community (school, gymnasium, village center) or hospital setting—and admission criteria
  - Measures for infection prevention and control (see Chapters 2–4)
  - Appropriate specimen collection, transport of specimens to the laboratory and appropriate laboratory investigations
  - Treatment protocols, including antiviral drugs, antibiotics and other supportive treatment (ventilation, fever reduction)
- Develop a method for tracking the admission and discharge of patients with API. This method should be tested with non-pandemic influenza patients.
INFECTION PREVENTION AND CONTROL IN HEALTH CARE SETTINGS

Rationale
Guidelines for infection prevention and control are critically important to preventing secondary infections in patients, medical personnel and other community members. Infection prevention and control is an essential part of patient management. (The most relevant technical aspects of infection prevention and control are covered in Chapters 2–4.)

Questions to Be Addressed
Are the people most at risk of infection, especially health care workers, aware of the main routes of transmission? Are they familiar with infection control measures to prevent spread of the disease, and do they know how to implement these measures? Does the facility have enough infection prevention supplies and can it cover increased needs during the pandemic?

Things to Do Now
- Refine existing infection prevention and control guidelines and procedures for use at all levels of health care facilities, including:
  - Health centers
  - Clinical laboratories
  - Community health clinics
  - General practice facilities
  - Hospitals
  - Long-term care facilities
  - Mortuaries

If resources are limited, the following infection prevention and control interventions should be considered priorities:
- Ensure handwashing facilities and supplies are present in all patient care areas for health care workers and patients.
- Ensure that cough etiquette signage, as well as handwashing/handrub supplies, is in place in all patient/visitor waiting areas.
- Ensure that PPE is available for all staff caring for suspected or confirmed cases of pandemic influenza.
- Adapt infection control guidelines for use in alternative health care facilities (e.g., schools, community buildings) utilized as part of pandemic emergency measures.
- Check availability and currency of laboratory biosafety guidelines.
Use the protocols for specimen collection and transport of respiratory specimens and blood that have been developed by WHO (see www.who.int/csr/disease/avian_influenza/guidelines/en/). Protocols should be made available in all clinical settings where patients are likely to be managed.

Consider infection prevention and control training needs of health care workers, laboratory personnel, volunteers and others who may be working outside their area of competence and training.

Prepare facilities, as necessary, to ensure that appropriate treatment areas are identified and ready for use, as specified in the guidelines.

Ensure availability of equipment needed to implement recommended infection control and biosafety measures, e.g., PPE.

Ensure that contact tracing, confinement and quarantine, if proposed, can be implemented both legally and practically. Define criteria for implementation and revocation:

- Consider designation of places where persons can be held in quarantine.
- Ensure medical care, food supply, social support and psychological assistance for these people. Ensure adequate transport of persons to these places, and from there to hospitals or mortuaries.

MAINTAINING ESSENTIAL HEALTH SERVICES

Rationale
To minimize the morbidity and mortality caused by a pandemic, it is crucial that health services be kept functioning as long as possible. Several emergency steps should be developed to ensure rational personnel management, and to make optimal use of facilities and available pharmaceutical products and supplies. In general, activities in this area should be based on a general health emergency preparedness plan.

Questions to Be Addressed
How will a widespread pandemic affect the health services? Are there contingency plans in place for coping with shortages of health care workers and facilities such as hospital beds during a pandemic? Has every facility implemented effective infection control policies? Is there a system in place for obtaining and maintaining stocks of essential drugs and supplies?
Things to Do Now

For Health Care Personnel

- Identify key trained staff to be the first to respond.
- Protect staff by ensuring the infection prevention and control procedures are in place and followed.
- Determine if the local health department/office will have supplies of antiviral prophylaxis or vaccine and determine how to obtain these if needed.
- Determine who will have priority in obtaining vaccines and antiviral prophylaxis (e.g., staff with direct patient contact, staff of emergency room and inpatient wards, pregnant staff or others depending on local situation).
- Develop a system for screening staff as they report to duty and a policy for when they can or cannot work.
- Develop a system that delineates which personnel will be pulled from which (non-essential) departments to cover shortages of staff in more critical areas such as emergency rooms, critical care areas and obstetrics areas.
- Involve personnel in planning for on-site accommodations for critical personnel who may need to be on duty or on call for long periods.
- Involve personnel and local neighborhoods and social organizations in identifying accommodations and support for personnel who have child or elder care responsibilities. Volunteers or village health committees may be willing to provide help at a minimal or no fee.
- Identify, brief regularly and train individuals to be mobilized to replace current key staff in case of illness due to pandemic.
- Develop “phone trees” and alternative contact routes for contacting administration and staff. Individuals (volunteers) who have cell phones may be willing to provide contact services to staff and administration. Local taxi or phone companies may be willing to volunteer services to communicate with critical staff.
- Determine sources from which additional health care workers could be recruited, for instance, among those who have retired or who have changed careers, community volunteers or organizations, or skilled tradespeople. Coordinate with local professional associations (medical, midwifery, nursing) and pre-service training institutions.
- Develop a set of health care roles for which volunteers may be suitable, and discuss these roles with professional organizations and associations. Volunteers may be able to provide some initial triaging and can facilitate communication with family and visitors concerning cough etiquette and hygiene. They can also provide infection prevention and control
Planning and Preparedness for Avian or Pandemic Influenza

instruction and support to staff and families, and comfort measures to hospitalized patients to minimize traffic from families and visitors.

- Identify local organizations (local communities, professional associations, Red Cross/Crescent associations, churches, mosques or other religious communities, or NGOs) that may be able to provide volunteers, and define a protocol for deciding on their suitability for designated roles outside their area of training and competence; develop relationships and plans now.

- Develop protocols for accepting and training volunteers for defined health care roles.

- Ensure that liability, insurance and temporary licensing issues for retired health care workers and volunteers are addressed. Coordinate with professional associations and local and district health offices. Consult with a legal representative on the coordination committee. (See “Coordination” above.)

- Consider the provision of psychosocial support targeted at health care workers (clinical and laboratory) who may be occupationally exposed to the new pandemic virus.

- Meet with local community leaders and social or faith-based organizations and determine their willingness and ability to provide counsel to staff and citizens during a pandemic.

For Health Care Facilities

- Protect health care staff by ensuring that all procedures for infection prevention and control in the facility are in place and adhered to.

- Identify areas of the health care facility where patients should ideally be treated during a pandemic situation, and assess the availability of these areas (including emergency and intensive care unit capacity).

- Develop a strategy for triage of potential influenza patients (see Appendix J: Flowsheet for Avian or Pandemic Influenza: Case Detection and Initial Management). This strategy may include establishing a site outside of the emergency department where persons can be seen initially and identified as needing emergency care, or may be referred to an outpatient care site for diagnosis and management.

- Identify potential alternative overflow facilities for expansion of medical care. Possible sites could include schools, gymnasiums, nursing homes, daycare centers or tents on the hospital grounds or at other sites.

- Develop triage criteria to manage overflow. Designate individuals with less severe, or less certain, symptoms to be cared for in alternative facilities (e.g., schools, churches).

- Develop a plan for setting up and staffing overflow facilities.
Develop a policy on when to stop taking new patients. Establish a maximum number of patients who can be cared for in various areas of the facility. Establish a minimum number of staff who must be present to care for a maximum surge of patients.

Develop alternative plans with relevant partners, including those outside the health sector, such as transportation and food services (examples: couriers, such as FedEx or DHL services, food distributors).

Develop a mechanism for reviewing services and their utilization, and prioritizing the use of facilities, staff and resources as the pandemic evolves.

Identify critical health services that should be maintained even in the face of a pandemic (e.g., trauma and emergency care, childbirth, severe illness, etc.), and those that could be closed if it became necessary (e.g., optional and non-emergent medical procedures, wellness clinics, etc.).

Address how essential medical services will be maintained for persons with chronic medical problems served by the facility (e.g., patients on long-term antiretroviral therapy for HIV/AIDS or TB, dialysis).

Coordinate clinical care and health service plans with bordering local authorities to avoid migration to centers where enhanced services are perceived to exist.

Review areas of hospital operations where the demand may increase significantly but continuing operation is critical, such as engineering, sewerage, electricity, water and natural gas supply, air conditioning/air flow (air flow operation is essential in preventing the spread of influenza) and security. Determine which areas are critical in the facility, and how to keep them operational.

For Health Care Supplies

Evaluate the existing system for tracking available medical supplies in the health care facility to determine whether it can detect rapid consumption, including items that provide personal protection (e.g., gloves, masks). Improve the system as needed to respond to growing demands for resources during an influenza pandemic.

Consider stockpiling enough consumable resources such as masks and gloves for the duration of a pandemic wave (6–8 weeks).

Develop a strategy for ensuring uninterrupted provision of medicines to patients who might not be able to (or should not) travel to hospital pharmacies.

Assess the need and explore the options for stockpiling additional medical supplies, and identify their sources.

Determine a range of antibiotics that will be useful for treatment of influenza complications. Develop contingency plans for producing or buying increased supplies of these antibiotics.
Determine the level of care that might be delivered in alternative health care facilities, and develop a contingency plan for providing these alternative facilities with the equipment and supplies adequate for the level of care that will be provided.

Develop a strategy for the distribution of stockpiled supplies and medication.

Consider obtaining two-way radios to ensure communication in case phone lines are damaged or to augment communication by telephone.

Establish a contingency plan for situations in which primary sources of basic supplies become limited. If you cannot ensure access to the national stockpile, consider development of an appropriate stockpile in the facility, and at least an 8-week supply of potable water.

Stockpile fuel for health care facility transport and generators.

**Excess Mortality**

Determine the maximum capacity for the disposal of corpses, using culturally appropriate methods.

Identify emergency capacity for storage of corpses before burial, where applicable.

Ensure development and implementation of protocols for the safe handling of corpses, respecting cultural and religious beliefs.

Work with community leaders to ensure their support and assistance in a “worst case scenario” in which local practice comes into conflict with necessary public safeguards.

**INFORMATION DISSEMINATION AND COMMUNICATION IN THE COMMUNITY**

**Rationale**

As the access to vaccines and antiviral drugs during a pandemic will be extremely limited, especially in countries with limited resources, non-medical interventions may be the only way to delay the spread of the disease. Transparent and frank information-sharing should go hand in hand with community education.

**Questions to Be Addressed**

Does the general public know how to achieve protection and contribute to limiting the spread of the disease? Is there a system in place for providing relevant information to the community in case of an outbreak or pandemic? Who is in a position to influence the community most effectively? How would you handle a large-scale panic reaction?
Things to Do Now

- Begin working with community leaders (traditional, religious and civic) early to ensure that they are well-informed on the critical issues and prepared to help out as necessary.

- Strengthen general knowledge on personal respiratory hygiene in the community.

- Promote respiratory hygiene/cough etiquette measures in all places where people are likely to be in close proximity to each other, such as health care waiting rooms and health centers, schools, churches, etc.

- Ensure that personal advice about reducing the risk of transmission is easily available to the public.

- Develop health messages for families, visitors and the community, and ensure that health information is distributed in appropriate languages used in the community; if needed, develop a program to provide information to the community members in their language.
WORLD HEALTH ORGANIZATION ADVICE ON THE USE OF OSELTAMIVIR (TAMIFLU®) FOR TREATMENT AND PREVENTION OF INFLUENZA

The World Health Organization recommends oseltamivir (Tamiflu®) for both treatment for and prophylaxis against influenza.

TREATMENT

There is no direct clinical evidence that oseltamivir is effective against avian influenza because studies of its effectiveness for this use have not been conducted. Therefore, the optimal dose and duration of use of oseltamivir for cases of avian influenza are the same as those recommended for seasonal influenza. Studies of oseltamivir are needed to determine the optimal dose and duration of treatment for avian influenza. Currently recommended doses for treatment are:

- Adults: Should receive 75 mg twice a day for 5 days
- Children 1 year of age and older: Should receive weight-adjusted doses
- Children up to 1 year of age: Should not take the drug

PREVENTION

The evidence of oseltamivir’s effectiveness in preventing avian influenza is based on results of trials of preventing ordinary influenza. For prevention of disease in household contacts of a person with avian influenza, the recommended doses are:

- Adults: 75 mg/day for 7–10 days from the last day of possible exposure
- Children: Weight-adjusted doses for the same length of time recommended for preventing ordinary influenza

For people with repeated or prolonged exposure, such as health care workers or workers involved in bird culls, pre-exposure or repeat post-exposure or continuous courses of treatment may be necessary. People who undergo continuous treatment with 75 mg/day for up to 6 weeks usually tolerate it well.

There is no evidence at this time to suggest that increasing the prophylactic dose or duration of use for people with a single exposure to avian influenza is beneficial. If the contact already has a fever or other symptoms that suggest avian influenza, the person should receive full therapeutic doses of oseltamivir.
WORLD HEALTH ORGANIZATION CASE DEFINITIONS FOR HUMAN INFECTIONS WITH INFLUENZA A (H5N1) VIRUS

WHO, in collaboration with partners, has developed standardized case definitions of H5N1 influenza. These case definitions are intended to facilitate: a) reporting and classification of cases by national and international authorities; b) standardization of terminology to be used in communication about the virus; and c) comparison of data from different outbreaks and geographic areas.

PERSON UNDER INVESTIGATION

Definition: Any person being investigated by public health authorities for possible H5N1 infection.

SUSPECTED CASE OF INFLUENZA A (H5N1)

Any individual presenting unexplained respiratory illness with fever (temperature > 38°C),

AND/OR

- Cough, and/or
- Shortness of breath or difficulty breathing;

AND/OR

One or more of the following in the 7 days before onset of symptoms:

- Close contact (within 1 meter) with a person who is a suspected, probable or confirmed case of H5N1;
- Exposure to wild birds or poultry or their remains, or to environments that have been contaminated by their feces or where H5N1 infections have been suspected or confirmed in humans or animals during the past month;
- Consumption of raw or undercooked poultry products where H5N1 infections have been suspected or confirmed in humans or animals during the past month;
- Close contact with an animal other than poultry or wild birds that is confirmed to be infected with H5N1; or

WHO Case Definitions

- Handling of samples suspected of containing H5N1 virus in a laboratory or other setting.

PROBABLE CASE OF INFLUENZA A (H5N1) (WORLD HEALTH ORGANIZATION SHOULD BE NOTIFIED)

Definition #1
A person meeting the criteria for a suspected case,

**AND**

One of the following additional criteria:

- Infiltrates or evidence of acute pneumonia plus evidence of respiratory failure,

**OR**

- Positive laboratory confirmation of infection with influenza A but insufficient evidence for infection with H5N1.

Definition #2
A person who is dying from an unexplained, acute respiratory illness who is considered to be linked epidemiologically to a probable or confirmed case of H5N1 by time, place or exposure.

CONFIRMED CASE OF INFLUENZA A (H5N1) (WORLD HEALTH ORGANIZATION SHOULD BE NOTIFIED)

An individual meeting the criteria for a suspected or probable case (described above),

**AND**

A positive result from an international, regional or national laboratory whose H5N1 test results are accepted by WHO as confirmatory. For details about the four possible positive results, see WHO case definitions at: www.who.int/csr/disease/avian_influenza/guidelines/case_definition2006_08_29/en/print.html.
Microorganisms live everywhere in our environment. Humans normally carry them on their skin and in the upper respiratory, intestinal and genital tracts. In addition, microorganisms live in animals, plants, soil, air and water. Some microorganisms, however, are more pathogenic than others, that is, they are more likely to cause disease. Given the right circumstances, all microorganisms may cause infection, such as when transmitted to an immunocompromised patient with AIDS.

All humans are susceptible to bacterial infections and also to most viral agents. The number (dose) of organisms necessary to produce infection in a susceptible host varies with the location. When organisms come in contact with bare skin, infection risk is quite low, and all of us touch materials that contain some organisms every day. When the organisms come in contact with mucous membranes or nonintact skin, infection risk increases. Infection risk increases greatly when organisms come in contact with normally sterile body sites, and the introduction of only a few organisms may produce disease.

For bacteria, viruses and other infectious agents to survive and spread, certain factors or conditions must exist. The essential factors in the transmission of disease-producing microorganisms from person to person are illustrated and defined in Figure C-1.

**Figure C-1. The Disease Transmission Cycle**

As shown in the above figure, a disease must have certain conditions in order to spread (be transmitted) to others:

- There must be an **agent**—something that can cause illness (virus, bacteria, etc.).

- The agent must have a place it can live (host or reservoir). Many microorganisms that cause disease in humans (pathogenic organisms) multiply in humans and are transmitted from person to person. Some are transmitted through contaminated food or water (typhoid), fecal matter (hepatitis A and other enteric viruses) or the bites of infected animals (rabies) and insects (malaria from mosquitoes).

- The agent must have the right environment outside the host to survive. After the microorganism leaves its host, it must have a suitable environment in which to survive until it infects another person. For example, the bacteria that cause tuberculosis can survive in sputum for weeks, but will be killed by sunlight within a few hours.

- There must be a person who can catch the disease (susceptible host). People are exposed to disease-causing agents every day but do not always get sick. For a person to catch an infectious disease (e.g., mumps, measles or chicken pox), he or she must be susceptible to that disease. The main reason most people do not catch the disease is that they have been previously exposed to it (i.e., vaccinated for it or previously had the disease) and their body’s immune system now is able to destroy the agents when they enter the body.

- An agent must have a way to move from its host to infect the next susceptible host. Infectious (communicable) diseases are spread mainly in the following ways:
1. **CONTACT TRANSMISSION**, the most important and frequent mode of transmission of nosocomial infections, is divided into two subgroups: direct-contact transmission and indirect-contact transmission.

   a) **Direct-contact transmission** involves a direct body surface-to-body surface contact and physical transfer of microorganisms between a susceptible host and an infected or colonized person, such as occurs when a person turns a patient, gives a patient a bath or performs other patient care activities that require direct personal contact. Direct-contact transmission can also occur between two patients, with one serving as the source of the infectious microorganisms and the other as a susceptible host.

   b) **Indirect-contact transmission** involves contact of a susceptible host with a contaminated intermediate object, usually inanimate, such as contaminated instruments, needles or dressings, or contaminated hands that are not washed and gloves that are not changed between patients.

2. **DROPLET TRANSMISSION**, theoretically, is a form of contact transmission. However, the mechanism of transfer of the pathogen to the host is quite distinct from either direct- or indirect-contact transmission. Droplets are generated from the source person primarily during coughing, sneezing and talking, and during the performance of certain procedures such as suctioning and bronchoscopy. Transmission occurs when droplets containing microorganisms generated from the infected person are propelled a short distance (within 1 meter or 3 feet) through the air and deposited on the host's conjunctiva, nasal mucosa or mouth. Because droplets do not remain suspended in the air, special air handling and ventilation are not required to prevent droplet transmission; that is, droplet transmission must not be confused with airborne transmission.

3. **AIRBORNE TRANSMISSION** occurs by dissemination of either airborne droplet nuclei (small-particle residue [5 µm or smaller in size] of evaporated droplets containing microorganisms that remain suspended in the air for long periods of time) or dust particles containing the infectious agent. Microorganisms carried in this manner can be dispersed widely by air currents and may become inhaled by a susceptible host within the same room or over a longer distance from the source patient, depending on environmental factors; therefore, special air handling and ventilation are required to prevent airborne transmission.

Microorganisms are transmitted in hospitals by several routes, and the same microorganism may be transmitted by more than one route. Transmission-Based Precautions are designed to prevent transmission of microorganisms by these routes in hospitals. Because agent and host factors are more difficult to control, interruption of transfer of microorganisms is directed primarily at transmission.

**PREVENTING TRANSMISSION OF INFECTION**

Preventing the spread of infectious diseases requires removing one or more of the conditions necessary for transmission of the disease from host or reservoir to the next susceptible host by:

- Inhibiting or killing the agent (e.g., applying an antiseptic agent to the skin before surgery);
- Blocking the agent's means of getting from an infected person to a susceptible person (e.g., handwashing or using a waterless, alcohol-based antiseptic handrub to remove bacteria or viruses acquired through touching an infected patient or contaminated surface);
The Disease Transmission Cycle

- Making sure that people, especially health care workers, are immune or vaccinated; and
- Providing health care workers with the appropriate protective equipment to prevent contact with infectious agents (e.g., masks, face shields, gowns, heavy-duty gloves for housekeeping and waste removal staff).
HAND HYGIENE

Failure to perform appropriate hand hygiene is considered to be the leading cause of nosocomial (health care facility-acquired) infections and the spread of multiresistant microorganisms, and has been recognized as a significant contributor to outbreaks (Boyce and Pittet 2002).

From the point of view of infection prevention and control, hand hygiene practices are intended to prevent hand-borne infections by removing dirt and debris and inhibiting or killing microorganisms on skin. These include not only most of the organisms acquired through contact with patients and the environment, but also some of the permanent ones that live in the deeper layers of the skin. In addition to understanding the guidelines and recommendations for hand hygiene, health care workers need to understand the value, and especially the limitations, of glove use.

DEFINITIONS

- **Antiseptic** or antimicrobial agent (terms used interchangeably). Chemicals that are applied to the skin or other living tissue to inhibit or kill microorganisms (both transient and resident), thereby reducing the total bacterial counts. Examples include alcohols (ethyl and isopropyl), dilute iodine solutions, iodophors, chlorhexidine and triclosan.

- **Clean water**. Natural or chemically treated and filtered water that is safe to drink and use for other purposes (e.g., handwashing and cleaning of medical instruments) because it meets specified public health standards. At a minimum, clean water should be free of microorganisms and have low turbidity (be clear, not cloudy).

- **Emollient**. Organic liquid, such as glycerol, propylene glycol or sorbitol, which when added to handrubs and hand lotions softens the skin and helps prevent skin damage (cracking, drying, irritation and dermatitis) due to frequent handwashing with soap (with or without antiseptic agent) and water.

- **Handwashing**. Process of mechanically removing soil and debris from the skin of hands using plain soap and water.

- **Nosocomial** or health care facility-acquired infection (terms used interchangeably). Infection that is neither present nor incubating at the time the patient came to the health care facility. (Nosocomial refers to the association between care and the subsequent onset of infection. It is a time-related criterion that does not imply a cause and effect relationship.)

- **Soaps and detergents** (terms used interchangeably). Cleaning products (bar, liquid, leaflet or powder) that lower surface tension, thereby helping remove dirt, debris and transient microorganisms from hands. **Plain** soaps require friction (scrubbing) to mechanically remove...
microorganisms, while antiseptic (antimicrobial) soaps also kill or inhibit growth of most microorganisms.

- **Transient and resident flora.** Terms that refer to where bacteria and other microorganisms are located in the layers of the skin. Transient flora are acquired through contact with patients, other health care workers or contaminated surfaces (e.g., examination tables, floors or toilets) during the course of the normal workday. These organisms live in the upper layers of the skin and are partially removed by washing with plain soap and clean water. Resident flora live in the deeper layers of the skin, as well as within hair follicles, and cannot be completely removed, even by vigorous washing and rinsing with plain soap and clean water. Fortunately, in most cases, resident flora are less likely to be associated with infections such as avian influenza. The hands or fingernails of some health workers, however, can become colonized in the deep layers with organisms that cause infections, such as *S. aureus*, gram-negative bacilli or yeast.

- **Waterless, alcohol-based antiseptic handrub or antiseptic handrub (terms used interchangeably).** Fast acting antiseptic handrubs that do not require use of water to remove transient flora, reduce resident microorganisms and protect the skin. Most contain 60–90% alcohol, an emollient and often an additional antiseptic (e.g., 2–4% chlorhexidine gluconate) that has residual action (Larson et al. 2001).

**HANDWASHING**

Proper handwashing is the single most important and effective component of preventing the transmission of infection, including avian influenza. Ideally, running water and soap with friction should be used for 15 to 20 seconds. It is important to dry hands after washing. An alcohol-based handrub solution after handwashing can be used.

The use of soap and water remains important when hands are visibly soiled. For routine hand hygiene in the absence of dirt or debris, however, alternatives such as antiseptic handrubs, which are fast-acting, inexpensive and easy to make, are gaining acceptance, especially where access to sinks and clean water is limited.

If tap water is contaminated, use water that has been boiled for 10 minutes and filtered to remove particulate matter (if necessary), or disinfect water by adding a small amount of sodium hypochlorite (commercial bleach) solution to make the final concentration up to 0.001%. Please refer to Appendix G to see how to make a dilute chlorine solution from any concentrated hypochlorite solution.

The purpose of handwashing is to mechanically remove soil and debris from the skin and reduce the number of transient microorganisms. Handwashing with plain soap and clean water is as effective as washing with antimicrobial
soaps (Pereira, Lee and Wade 1997). In addition, plain soap causes much less skin irritation (Pereira, Lee and Wade 1990).

Handwashing should be done before:

- Examining (direct contact with) a patient;
- Putting on sterile or high-level disinfected surgical gloves prior to an operation, or examination gloves for routine procedures; and
- Eating and preparing food.

Handwashing should be done after:

- Any situation in which hands may become contaminated, such as:
  - Handling soiled instruments and other items;
  - Touching mucous membranes, blood or other body fluids (secretions or excretions);
  - Having prolonged and intense contact with a patient;
  - Taking samples;
  - Taking blood pressure or vital signs from a patient;
- Removing gloves; and
- Leaving the isolation unit.

Hands should be washed with soap and clean water (or an antiseptic handrub can be used) after removing gloves because the gloves now may have tiny holes or tears, and bacteria can rapidly multiply on gloved hands due to the moist, warm environment within the glove (CDC 1989; Korniewicz et al. 1990).

If paper towels are not available, dry hands with a clean towel or air dry. Shared towels quickly become contaminated and should not be used. Carrying one's own small towel or handkerchief can help to avoid using dirty towels. If you use your own towel, it should be washed every day.

To encourage handwashing, program managers should make every effort to provide soap and a continuous supply of clean water, either from the tap or a bucket, and single-use towels.

The steps for routine handwashing are (see “Handwashing Technique with Soap and Water” below):

---

16 If tap water is contaminated, however, handwashing with plain soap is effective only in removing dirt and debris.
Hand Hygiene

STEP 1: Thoroughly wet hands.
STEP 2: Apply plain soap (antiseptic agent is not necessary).
STEP 3: Vigorously rub all areas of hands and fingers together for at least 15 to 20 seconds, paying close attention to areas under fingernails and between fingers.
STEP 4: Rinse hands thoroughly with clean water.
STEP 5: Dry hands with a paper towel and use the towel to turn off the faucet.

Because microorganisms grow and multiply in moisture and in standing water:

- When soap dispensers are reused, thoroughly clean them before filling.
- If bar soap is used, provide small bars and soap racks that drain.
- Avoid dipping hands into basins containing standing water. Even with the addition of an antiseptic agent, such as Dettol® or Savlon®, microorganisms can survive and multiply in these solutions (Rutala 1996).
- Do not add soap to a partially empty liquid soap dispenser. This practice of “topping off” dispensers may lead to bacterial contamination of the soap.
- When no running water is available, use a bucket with a tap that can be turned off to lather hands and turned on again for rinsing, or use a bucket and pitcher.
- Collect used water in a basin and discard it in a latrine if a drain is not available.
Hand Hygiene

Handwashing Technique with Soap and Water

0. Wet hands with water
1. apply enough soap to cover all hand surfaces
2. rub hands palm to palm
3. right palm over left dorsum with interlaced fingers and vice versa
4. palm to palm with fingers interlaced
5. backs of fingers to opposing palms with fingers interlocked
6. rotational rubbing of left thumb clasped in right palm and vice versa
7. rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa
8. rinse hands with water
9. dry thoroughly with a single use towel
10. use towel to turn off faucet

...and your hands are safe.

Modified according to EN1500

Even where there is no running water, handwashing is possible and is required!

If there is no running water, consider using a:
- Bucket with a tap
- Pitcher or jug to pour water over hands
- Waterless, alcohol-based solution (antiseptic handrub)

ANTISEPTIC HANDBRUB

Use of an antiseptic handrub is more effective in killing transient and resident flora than handwashing with antimicrobial agents or plain soap and water, is quick and convenient to perform, and gives a greater initial reduction in hand flora (Girou et al. 2002). Antiseptic handrubs also contain a small amount of an emollient such as glycerine, propylene glycol or sorbitol that protects and softens the skin.

The technique for performing antiseptic handrub is described below (see “Hand Hygiene Technique with Alcohol-Based Formulation”):

STEP 1: Apply enough antiseptic handrub to cover the entire surface of hands and fingers (about a teaspoonful).

STEP 2: Rub the solution vigorously into hands, especially between fingers and under nails, until dry.

To be effective, an adequate amount of handrub solution should be used. For example, by increasing the amount of handrub from 1 mL to 5 mL per application (about 1 teaspoonful), the effectiveness increased significantly (Larson 1988).

Since antiseptic handrubs do not remove soil or organic matter, if hands are visibly soiled or contaminated with blood or body fluids, handwashing with soap and water should be done first. In addition, to reduce the “build up” of emollients on hands after repeated use of antiseptic handrubs, washing hands with soap and water after every 5–10 applications is recommended. Finally, handrubs containing only alcohol as the active ingredient have limited residual effect (i.e., ability to prevent growth of bacteria after being applied).
compared with those containing alcohol plus an antiseptic such as chlorhexidine.

As shown below, an effective antiseptic handrub solution is inexpensive and simple to make.

---

**Alcohol-Based Solution for Handrub**

A non-irritating, antiseptic handrub can be made by adding either glycerine, propylene glycol or sorbitol to alcohol (2 mL in 100 mL of 60–90% ethyl or isopropyl alcohol).

---

**Hand Hygiene Technique with Alcohol-Based Formulation**

1a. Apply a palmful of the product in a cupped hand and cover all surfaces.

1b. Rub hands palm to palm.

2. Right palm over left dorsum with interfaced fingers and vice versa.

3. Palm to palm with fingers interfaced.

4. Backs of fingers to opposing palms with fingers interlocked.

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

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

7. 20-30 sec...

...once dry, your hands are safe.

---

Hand Hygiene

IMPROVING HAND HYGIENE PRACTICES: WHAT WORKS

Handwashing has been considered one of the most important measures for reducing transmission of microorganisms and preventing infection for more than 150 years. For example, the studies of Semmelweiss (1861) and numerous others since then have demonstrated that it is possible to transmit infectious diseases from patient to patient on the hands of health care workers. Equally well-documented is the fact that good hand hygiene can prevent transmission of microorganisms and decrease the frequency of nosocomial infections (Boyce 1999; Larson 1995).

The continuing problem, however, is making sure that health care workers follow recommended handwashing practices. Although it is difficult to change behavior in this area, there are certain steps that increase the likelihood of success. These include:

- Widely disseminate current guidelines for hand hygiene practices, the evidence supporting their effectiveness in preventing disease and the need for health workers to adhere to the guidelines.
- Involve hospital administrators in promoting and enforcing the guidelines by convincing them of the cost benefits of handwashing and other hand hygiene practices.
- Use effective educational techniques including role modeling (especially by supervisors), mentoring, monitoring and positive feedback.
- Use performance improvement approaches targeted to all health care staff, not just physicians and nurses, to promote compliance.
- Consider the needs of staff for convenient and effective options for hand hygiene that make compliance easier.

One promising example of how to make compliance easier is providing staff with small, individual-use containers of an antiseptic handrub. Development of this product stems from the observation that improper handwashing techniques and low compliance make current hand hygiene recommendations ineffective. Use of an inexpensive, simple-to-prepare antiseptic handrub, however, minimizes many of the factors limiting better use of recommended hand hygiene guidelines. In addition, handrubs are more effective compared to washing hands with plain or medicated soaps, can be made much more available (no sink or running water needed), require less time to use and are less likely to irritate the skin (less drying, cracking or chapping). As a consequence, antiseptic handrubs soon may replace handwashing with plain or medicated soap and water as the primary procedure for improving compliance (Larson et al. 2000; Pittet et al. 2000). It must be recognized, however, that making a handrub available to staff without ongoing educational and motivational activities may not result in long-lasting improvement in hand hygiene practices. Just installing dispensers of a rapid acting, antiseptic handrub, for example, is not sufficient (Muto et al. 2000).
A second example is encouraging staff to use hand care products (moisturizing lotions and creams) that help prevent skin irritation and contact dermatitis associated with frequent handwashing, especially with a soap or detergent containing an antiseptic agent. Not only were staff highly satisfied with the results but, most important, in the study by McCormick et al. (2000), improved skin condition resulting from use of a hand lotion led to a 50% increase in handwashing frequency!

In summary, although improving compliance with hand hygiene guidelines has been difficult, some programs and institutions are beginning to have success. The key to success appears to hinge on a variety of interventions that involve behavior change, creative education, monitoring and feedback, and, above all, involvement of the supervisors as role models and the support of the administration.

**OTHER CONSIDERATIONS REGARDING HAND HYGIENE**

**Fingernails**
Research has shown that the area around the base of nails (subungual space) contains the highest microbial count on the hand (McGinley, Larson and Leydon 1988). In addition, several recent studies have shown that long nails may serve as a reservoir for gram-negative bacilli (P. aeruginosa), yeast and other pathogens (Hedderwick et al. 2000). Moreover, long nails, either natural or artificial, tend to puncture gloves more easily (Olsen et al. 1993). Therefore, it is recommended that nails be kept moderately short, not extending more than 3 mm (or 1/8 inch) beyond the fingertip.

**Artificial Nails**
Artificial nails (nail wraps, nail tips, acrylic lengtheners, etc.) worn by health care workers can contribute to nosocomial infections (Hedderwick et al. 2000). In addition, because there is evidence that artificial nails may serve as a reservoir for pathogenic gram-negative bacilli, their use by health workers should be restricted, especially by surgical team members, and those who:

- Work in specialty areas such as neonatal ICUs,
- Care for patients highly susceptible to infection, or
- Manage patients who have infections with resistant organisms (Moolenaar et al. 2000).
Nail Polish
Although there is no restriction to wearing nail polish, it is suggested that surgical team members and staff working in specialty areas who wish to wear nail polish wear freshly applied, clear polish. Chipped nail polish supports the growth of larger numbers of organisms on fingernails compared to freshly polished or natural nails. Also, dark colored nail polish may prevent dirt and debris under fingernails from being seen and removed (Baumgardner et al. 1993).

Jewelry
Although several studies have shown that skin under rings is more heavily colonized than comparable areas of skin on fingers without rings (Jacobson et al. 1985), at the present time it is not known whether wearing rings results in greater transmission of pathogens. It is suggested that surgical team members not wear rings because it may be more difficult for them to put on surgical gloves without tearing them.
GUIDELINES FOR USING PERSONAL PROTECTIVE EQUIPMENT

PERSONAL PROTECTIVE EQUIPMENT

Protective barriers, now commonly referred to as personal protective equipment (PPE), have been used for many years to protect patients from microorganisms present on staff working in the health care setting. More recently, with the emergence of AIDS and hepatitis C, and the resurgence of tuberculosis in many countries, use of PPE has become important for protecting staff as well. And now with the emergence of infections such as avian influenza and SARS, the use of PPE becomes even more crucial.

To be effective, PPE must be used correctly. For example, gowns and drapes have been shown to prevent wound infection only when dry. When wet, cloth acts as a wick or sponge to draw bacteria from skin or equipment up through the fabric, which can then contaminate a surgical wound.

Figure E-1. Bacterial Transfer through Fabric

As a consequence, hospital administrators, supervisors and health care workers need to be aware not only of the benefits and limitations of specific PPE, but also of the actual role PPE plays in preventing infection so that they can use them effectively and efficiently.

WHAT IS PERSONAL PROTECTIVE EQUIPMENT?

Personal protective equipment includes: gloves, masks/respirators, eyewear (face shields, goggles or glasses), caps, gowns, aprons and other items. In many countries caps, masks, gowns and drapes are made of cloth or paper. The most effective barriers, however, are made of treated fabrics or synthetic materials that do not allow water or other liquids (blood or body fluids) to penetrate them. These fluid-resistant materials are not widely available, however, because they are expensive. Lightweight cotton cloth (with a thread count of 140/square inch) is the material most commonly used for surgical clothing (masks, caps and gowns) and drapes in many countries.
Unfortunately, lightweight cotton does not provide an effective barrier because moisture can pass through it easily, allowing contamination. Denims, canvas and heavy twill, on the other hand, are too dense for steam penetration (i.e., they cannot be sterilized), are hard to wash and take too long to dry. When fabric is used, it should be white or light in color in order to show dirt and contamination easily. Caps or masks made from paper should never be reused because there is no way to properly clean them. **If you can’t wash it, don’t reuse it!**

In the following sections, the PPE that has proven to be effective is described, as well as some commonly used items not shown to be effective.

**TYPES OF PERSONAL PROTECTIVE EQUIPMENT**

**Gloves** protect hands from infectious materials and protect patients from microorganisms on staff members’ hands. They are the most important physical barrier for preventing the spread of infection, but they must be changed between each patient contact to avoid cross-contamination.

**Remember:** Wearing gloves does **not** replace handwashing or the use of antiseptic handrubs.

**Masks** should be large enough to cover the nose, lower face, jaw and facial hair. They are worn in an attempt to contain moisture droplets expelled as health care workers or surgical staff speak, cough or sneeze, as well as to prevent accidental splashes of blood or other contaminated body fluids from entering the health care workers’ nose or mouth. Unless the masks are made of fluid-resistant materials, however, they are not effective in preventing either very well.

Masks are made from a variety of materials ranging from lightweight cotton, gauze or even paper to synthetics, some of which are fluid-resistant. Masks made from cotton or paper are very comfortable but not fluid-resistant or effective as a filter. Masks made from synthetics can provide some protection from large-particle droplets (> 5 µm in size) spread by coughs or sneezes to a person who is close (less than 1 meter/3 feet) to a patient. Even the best surgical masks, however, are not designed to provide a tight enough fit (face seal) to prevent air leakage around the edges. Thus, they do not effectively filter inhaled air (Chen and Welleke 1992) and should no longer be recommended for that purpose.
When removing a mask, handle it by the strings because the center of the mask contains the most contamination (Rothrock, McEwen and Smith 2003).

In the care of a patient with known or suspected avian influenza, it is imperative that the mask prevent particles from reaching the mucous membranes of the care provider.

**Particulate respirators and high-efficiency masks** are specialized types of masks recommended when filtering inhaled air is deemed important (e.g., for the care of a person with known or suspected avian influenza or SARS, or with pulmonary tuberculosis). Particulate respirators protect a person from airborne particles (5 or less microns in size). They contain multiple layers of filter material and fit the face snugly without leakage. They are considerably more difficult to breathe through and more expensive than surgical masks.

When caring for a patient with known or suspected avian influenza, health care providers should use high-efficiency masks or particulate respirators. Those are the N-95 certified by the US National Institute for Occupational Safety and Health (NIOSH), European CE-approved respirators, or of a comparable national/regional standard applicable to the country of manufacture. Higher-level particulate respirators may also be used. High-efficiency masks or particulate respirators, and the N-95 in particular, must be fit-tested to guarantee a correct fit.
Use of Respirators

Staff should:

- Examine the face piece of the respirator to determine whether it is functional and has structural integrity. If the filter material is physically damaged or soiled, discard the respirator. Also dispose of respirators that have nicks, abrasions, cuts or creases in the face piece-to-face sealing material.

- Check the respirator straps to be sure they are not cut or otherwise damaged. The straps should be attached at all connection points.

- Make sure that the metal nose clip (if applicable) is in place and functions correctly.

Respirator Fit

The usefulness of a respirator is compromised when conditions prevent a good face seal. The following should be considered by staff utilizing respirators:

- A growth of beard, sideburns, a skullcap that projects under the face piece, or temple pieces on eyeglasses can prevent a good seal.

- The absence of one or both dentures can seriously affect the fit of a face piece.

- Do not pinch the metal noseband; it will create a leak. Smooth it over the bridge of the nose after you put on the mask.

Precaution

Some respirators contain a latex component and should not be worn by people who are allergic to latex.

No generally accepted criteria inhibit workers from wearing respirators. However, staff should be provided with the opportunity to handle the
respirators and have them fitted properly prior to events that could expose them to patients.

**Eyewear** protects staff in the event of an accidental splash of blood or other body fluid by covering the eyes. Eyewear includes clear plastic goggles, safety glasses, face shields and visors. Prescription glasses or glasses with plain lenses also are acceptable, but only if worn with side shields. Health care workers should wear masks and eyewear or face shields when performing any task in which an accidental splash into the face is likely. If face shields are not available, health care workers can use goggles or glasses and a mask together.

![Figure E-4. Eyewear and Face Shields](image)

**Caps** are used to keep the hair and scalp covered so that flakes of skin and hair are not shed into the wound during surgery. Caps should be large enough to cover all hair. While caps provide some protection to the patient, their primary purpose is to protect the wearer from blood or body fluid splashes and sprays.

**Gowns**, in the care of patients with known or suspected avian influenza, are worn over, or instead of, street clothes or other uniforms. The main use of cover gowns is to protect the health care workers’ clothing and skin from respiratory secretions. When caring for a patient with known or suspected avian influenza, the health care provider should wear a gown when entering the room at any time that patient care activities are likely to generate splashes or sprays of blood, body fluids, secretions or excretions. The cuffs of the gloves should completely cover the end of the sleeves. Remove the gown before leaving the patient’s environment. After gown removal, ensure that clothing and skin do not contact potentially contaminated environmental surfaces, and wash hands immediately to avoid transfer of organisms.
Aprons made of rubber or plastic provide a waterproof barrier along the front of the health care worker’s body (Figure E-5). The health care worker should wear an apron under the cover gown when giving direct care to a patient, cleaning, or performing a procedure in which blood, body fluid or secretion spills are anticipated. This is especially important if the gown is not waterproof. Aprons keep contaminated fluids off of the health care worker’s clothing and skin.

Figure E-5. Apron

Footwear is worn to protect feet from injury by sharps or heavy items that may accidentally fall on them. For this reason, sandals, “thongs” or shoes made of soft materials (cloth) should not be worn. Rubber boots or leather shoes provide more protection, but they must be kept clean and free of contamination from blood or other body fluid spills. Shoe covers are unnecessary if clean, sturdy shoes are available for use only in the surgical area. One study suggests that cloth or paper shoe covers may increase contamination because they allow blood to soak through to shoes and they are often worn outside the operating room, where they are then removed with ungloved hands, which then become contaminated (Summers et al. 1992).

WHEN TO WEAR GLOVES

Hand hygiene, coupled with the use of protective gloves, is a key component in minimizing the spread of disease and maintaining an infection-free environment (Garner and Favero 1986). In addition, understanding when sterile or high-level disinfected gloves are required and, equally important, when they are not, can reduce costs while maintaining safety for both patients and staff.

Although the effectiveness of gloves in preventing contamination of health care workers’ hands has been repeatedly confirmed (Tenorio et al. 2001), wearing gloves does not replace the need for handwashing. For example, even the best quality latex surgical gloves may have small,
unapparent defects, gloves may be torn during use and hands can become contaminated during glove removal (Bagg, Jenkins and Barker 1990; Davis 2001).

\[ \text{Remember: Wash hands or use an antiseptic handrub before putting on gloves and after removing them.} \]

Depending on the situation, clean examination or utility gloves should be worn by all staff when:

- There is reasonable chance of hand contact with blood or other body fluids, mucous membranes or nonintact skin;
- They perform invasive medical procedures (e.g., inserting vascular devices such as peripheral venous lines);
- They handle contaminated waste items or touch contaminated surfaces; or
- They are using contact precautions (as is necessary in the event of a known or suspected case of avian influenza), which require that health care workers \textit{wear clean, non-sterile gloves whenever entering the patient’s room}. They should remove these gloves before leaving the patient’s room and wash their hands with soap and water or a waterless handrub.

A separate pair of gloves must be used for each patient to avoid cross-contamination (CDC 1987). Wearing the same pair of gloves and washing gloved hands between patients or between dirty to clean body site care is not a safe practice. Doebbeling and colleagues (1988) recovered significant amounts of bacteria on the hands of staff who were only washing their gloved hands, and not changing gloves between patients.

\section*{WHAT TO DO WHEN SUPPLIES OF GLOVES ARE LIMITED}

When resources are limited and examination gloves are in short supply, soiled disposable surgical gloves can be reprocessed for reuse if they are:

- Decontaminated by soaking in 0.5\% chlorine solution for 10 minutes,
- Washed and rinsed, and
- Sterilized (by autoclaving) or high-level disinfected (by steaming).\footnote{In the past, boiling has been recommended as a method for high-level disinfection of surgical gloves; however, it is difficult to dry gloves without contaminating them using this method. Because steaming is easier to do and equally effective, it is the recommended method for high-level disinfection of surgical gloves.}

Do not reprocess gloves that are cracked, peeling or have detectable holes or tears (Bagg, Jenkins and Barker 1990).
Where utility gloves are not available, putting on two pairs of examination or reprocessed surgical gloves (double gloving) provides some protection for cleaning staff and for staff handling and disposing of contaminated medical waste.

SOME DO’S AND DON’TS ABOUT GLOVES

- Do wear the correct size glove, particularly surgical gloves. A poorly fitting glove can limit your ability to perform the task and may be damaged (torn or cut) more easily.
- Do keep fingernails trimmed moderately short (less than 3 mm or 1/8 inch beyond the fingertip) to reduce the risk of tears.
- Do pull gloves up over cuffs of gown (if worn) to protect the wrists.
- Do use water-soluble (non fat-containing) hand lotions and moisturizers often to prevent hands from drying, cracking and chapping due to frequent handwashing and gloving.
- Don’t use oil-based hand lotions or creams, because they will damage latex rubber surgical and examination gloves.
- Don’t use hand lotions and moisturizers that are very fragrant (perfumed) as they irritate the skin under gloves.
- Don’t store gloves in areas where there are extremes in temperature (e.g., in the sun, or near a heater, air conditioner, ultraviolet light, fluorescent light or X-ray machines). These conditions may damage the gloves (cause breakdown of the material they are made of), thus reducing their effectiveness as a barrier.

ALLERGIC REACTIONS TO GLOVES

Allergic reactions to latex rubber gloves are being increasingly reported among health care workers of all types, including housekeepers, laboratory workers and dentists. (Allergic reactions to nitriles also occur, but less frequently.) If possible, latex-free (nitrile) or low-allergen latex gloves should be used if allergy is suspected. In addition, wearing powder-free gloves is recommended. (Powdered gloves may result in more reactions because the powder from the gloves carries the latex particles in the air.) If this is not possible, wearing cloth or vinyl gloves beneath latex gloves may help to prevent skin sensitization. It will not, however, prevent sensitization of the mucous membranes of the eyes and nose if these gloves are powdered (Garner and HICPAC 1996).

For most sensitized people, the symptoms are skin rashes, runny nose and itchy eyes that may persist or get progressively worse (e.g., cause breathing problems such as asthma). An allergic reaction to latex can develop within 1 month of use. Even in people who are susceptible, however, reactions generally take longer to develop (within 3–5 years) and may not develop for
as long as 15 years (Baumann 1992). No therapy or desensitization exists for latex allergy; therefore, the only option is to avoid contact.

PPE USE IN HEALTH CARE SETTINGS: HOW TO SAFELY DON, USE AND REMOVE PPE

Key Points about PPE

- Don before contact with the patient, generally before entering the room.
- Use carefully—don’t spread contamination.
- Remove and discard carefully, either at the doorway or immediately outside the patient’s room; remove a respirator outside of the room.
- Immediately perform hand hygiene.

Donning PPE

**Sequence** for Donning PPE
1. Gown first
2. Mask or respirator
3. Goggles or face shield
4. Gloves

*Combination of PPE will affect sequence—be practical!

1. Gown

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back.
- Fasten in back of neck and waist.

---

Guidelines for Using Personal Protective Equipment

2. Mask or Respirator
   - Secure ties or elastic bands at middle of head and neck.
   - Fit flexible band to nose bridge.
   - Fit snugly to face and below chin.
   - Check fit of respirator.

3. Goggles or Face Shield
   Place over face and eyes and adjust to fit.

4. Gloves
   Extend to cover wrist of isolation gown.

Removing PPE

Except for the respirator, remove PPE at doorway or in anteroom. Remove respirator after leaving the patient’s room and closing the door.
Guidelines for Using Personal Protective Equipment

Sequence* for Removing PPE
1. Gloves
2. Goggles or face shield
3. Gown
4. Mask or respirator

*Follow the sequence to minimize the spread of disease!

1. Gloves
   - Remember that the outside of the gloves is contaminated!
   - Grasp outside of glove with opposite gloved hand; peel off.
   - Hold removed glove in gloved hand.
   - Slide fingers of ungloved hand under remaining glove at wrist.
   - Peel glove off over first glove.
   - Discard gloves in waste container.

2. Goggles or Face Shield
   - Remember that the outside of the goggles or face shield is contaminated!
   - To remove, handle by headband or ear pieces.
   - Place in designated receptacle for reprocessing or in waste container.
3. Gown
- Remember that the gown front and sleeves are contaminated!
- Unfasten ties.
- Pull away from neck and shoulders, touching inside of gown only.
- Turn gown inside out.
- Fold or roll into a bundle and discard.

4. Mask or Respirator
- Remember, the front of the mask or respirator is contaminated—DO NOT TOUCH!
- Grasp the bottom, then the top ties or elastics and remove.
- Discard in waste container.
APPENDIX F

GUIDELINES FOR PROCESSING INSTRUMENTS, SURGICAL GLOVES AND OTHER ITEMS\(^9\)

<table>
<thead>
<tr>
<th>Process</th>
<th>Decontamination</th>
<th>Cleaning</th>
<th>Sterilization</th>
<th>High-Level Disinfection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INSTRUMENTS OR OTHER ITEMS</strong></td>
<td><strong>DECONTAMINATION</strong></td>
<td><strong>CLEANING</strong></td>
<td><strong>STERILIZATION</strong></td>
<td><strong>HIGH-LEVEL DISINFECTION</strong></td>
</tr>
<tr>
<td>AIRWAYS (PLASTIC)</td>
<td>Soak in a 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse and wash immediately.</td>
<td>Wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>AMBU BAGS AND CPR FACE MASKS</td>
<td>Wipe exposed surfaces with gauze pad soaked in 60–90% alcohol or 0.5% chlorine; rinse immediately.</td>
<td>Wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>APRONS (HEAVY PLASTIC OR RUBBER)</td>
<td>Wipe with 0.5% chlorine solution. Rinse with clean water. Between each procedure or each time they are taken off.</td>
<td>Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>BED PANS, URINALS OR EMESIS BASINS</td>
<td>Not necessary.</td>
<td>Using a brush, wash with disinfectant solution (soap and 0.5% chlorine). Rinse with clean water.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>BLOOD PRESSURE CUFF</td>
<td>If contaminated with blood or body fluids, wipe with gauze pad or cloth soaked with 0.5% chlorine solution.</td>
<td>If soiled, wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INSTRUMENTS OR OTHER ITEMS</th>
<th>DECONTAMINATION</th>
<th>CLEANING</th>
<th>STERILIZATION*</th>
<th>HIGH-LEVEL DISINFECTION*b</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAPHRAGMS OR FITTING RINGS (USED FOR SIZING WITH CLIENTS)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.</td>
<td>Wash with soap and water. Rinse with clean water. Air or towel dry.</td>
<td>Not necessary but can be autoclaved at 121°C (250°F) 106 kPa (15 lbs/in²) for 20 minutes (unwrapped).</td>
<td>• Steam or boil for 20 minutes. • Chemically high-level disinfect by soaking in 8% formaldehyde, or a 2–4% glutaraldehyde for 20 minutes. Rinse well in water that has been boiled.</td>
</tr>
<tr>
<td>EXAM OR OPERATING ROOM TABLES OR OTHER LARGE SURFACE AREAS (CARTS AND STRETCHERS)</td>
<td>Wipe off with 0.5% chlorine solution.</td>
<td>Wash with soap and water if organic material remains after decontamination.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>FOOTWEAR (RUBBER SHOES OR BOOTS)</td>
<td>Wipe with 0.5% chlorine solution. Rinse with clean water. At the end of the day or when visibly soiled.</td>
<td>Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>HYPODERMIC NEEDLES AND SYRINGES (GLASS OR PLASTIC)</td>
<td>While holding needle under the surface of 0.5% chlorine solution, fill assembled needle and syringe with solution and soak for 10 minutes prior to cleaning. Rinse by flushing three times with clean water.</td>
<td>Disassemble, and then wash with soap and water. Rinse with clean water, air or towel dry syringes (only air dry needles).</td>
<td>Preferable (glass only): • Dry heat for 2 hours after reaching 160°C (320°F) (glass syringes only), or • Autoclave at 121°C (250°F) and 106 kPa (15 lbs/in²) for 20 minutes (30 minutes if wrapped).</td>
<td>Acceptable (glass or plastic): • Steam or boil for 20 minutes. (Chemical HLD is not recommended because chemical residue may remain even after repeated rinsing with boiled water. These residues may interfere with the action of drugs being injected.)</td>
</tr>
<tr>
<td>INSTRUMENTS OR OTHER ITEMS</td>
<td>DECONTAMINATION</td>
<td>CLEANING</td>
<td>STERILIZATION*</td>
<td>HIGH-LEVEL DISINFECTIONb</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
<td>----------</td>
<td>----------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>LAPAROSCOPES</td>
<td>Wipe exposed surfaces with gauze pad soaked in 60–90% alcohol; rinse immediately.</td>
<td>Disassemble, then use a brush to wash with soap and water. Rinse with clean water, towel dry.</td>
<td>Sterilize daily using chemical sterilization. Soak in: • A glutaraldehyde (usually 2%) for 10 hours, or • 8% formaldehyde for 24 hours. Rinse with sterile water or water that has been boiled for 20 minutes three times.</td>
<td>Between cases, soak for 20 minutes in: • A glutaraldehyde (usually 2–4%), or • 8% formaldehyde, or • 0.1% chlorine solution with boiled and filtered (if necessary) water. Rinse three times with water that has been boiled for 20 minutes.</td>
</tr>
<tr>
<td>PERSONAL PROTECTIVE EQUIPMENT (PPE) (CAPS, MASKS, COVERGOWNS)c</td>
<td>Not necessary. (Laundry staff should wear plastic aprons, gloves and protective foot and eyewear when handling soiled linen.)</td>
<td>Wash with soap and hot water. Rinse with clean water, air or machine dry. Wrap for reuse.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>STETHOSCOPES</td>
<td>Wipe with gauze pad soaked in 60–90% alcohol.</td>
<td>If soiled, wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>STORAGE CONTAINERS FOR INSTRUMENTS (METAL OR PLASTIC)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.a</td>
<td>Wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>• Dry heat for 1 hour after reaching 170°C (340°F), or • Autoclave at 121°C (250°F) and 106 kPa (15 lbs/in²) for 20 minutes (30 minutes if wrapped).</td>
<td>Boil container and lid for 20 minutes. If container is too large: • Fill container with 0.5% chlorine solution and soak for 20 minutes. • Rinse with water that has been boiled for 20 minutes and air dry before use.</td>
</tr>
<tr>
<td>SUCTION BULBS (RUBBER)</td>
<td>Soak in a 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse and wash immediately.</td>
<td>Wash with soap and water. Rinse with clean water, air or towel dry.</td>
<td>Not necessary.</td>
<td>Not necessary.</td>
</tr>
<tr>
<td>SUCTION CANNULAE (PLASTIC) FOR MANUAL VACUUM ASPIRATION (MVA)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.</td>
<td>Pass soapy water through cannulae three times, removing all particles.</td>
<td>Not recommended. (Heat from autoclaving or dry-heat ovens will damage cannulae.)</td>
<td>Steam or boil for 20 minutes.</td>
</tr>
<tr>
<td>INSTRUMENTS OR OTHER ITEMS</td>
<td>DECONTAMINATION</td>
<td>CLEANING</td>
<td>STERILIZATION</td>
<td>HIGH-LEVEL DISINFECTION</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
<td>----------</td>
<td>---------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>SUCTION CATHETERS (RUBBER OR PLASTIC)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.</td>
<td>Pass soapy water through catheter three times. Rinse three times with clean water (inside and outside).</td>
<td>Not recommended. (Heat from autoclaving or dry-heat ovens will damage plastic catheters; rubber catheters can be autoclaved.)</td>
<td>Steam or boil for 20 minutes. (Chemical HLD is not recommended because chemical residue may remain even after repeated rinsing with boiled water.)</td>
</tr>
</tbody>
</table>
| SURGICAL GLOVES | Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately. | Wash with soap and water. Rinse with clean water and check for holes. If to be sterilized, dry inside and out (air or towel dry) and package. | If used for surgery:  
• Autoclave at 121°C (250°F), and 106 kPa (15 lbs/in²) for 20 minutes.  
• Do not use for 24–48 hours. | Steam for 20 minutes and allow to dry in steamer. |
| SURGICAL GOWNS, LINEN DRAPES AND WRAPPERS | Not necessary. (Laundry staff should wear plastic aprons, gloves and protective foot and eyewear when handling soiled linen.) | Wash with soap and hot water. Rinse with clean water, air or machine dry. | Autoclave at 120°C/250°F and 106 kPa (15 lbs/in²) for 30 minutes. | Not practical. |
| SURGICAL INSTRUMENTS (METAL) | Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately. | Using a brush, wash with soap and water. Rinse with clean water. If to be sterilized, air or towel dry and wrap in packs or individually. | Preferable:  
• Dry heat for 1 hour after reaching 170°C (340°F), or  
• Autoclave at 121°C (250°F) and 106 kPa (15 lbs/in²) for 20 minutes (30 minutes if wrapped).  
For sharp instruments: Dry heat for 2 hours after reaching 160°C (320°F). | Acceptable:  
• Steam or boil for 20 minutes.  
• Chemically high-level disinfect by soaking for 20 minutes. Rinse well with boiled water and air dry before use or storage. |
<p>| THERMOMETERS (GLASS) | Not necessary. | Wipe with disinfectant solution (soap and 0.5% chlorine). Rinse with clean water, air or towel dry. | Not necessary. | Not necessary. |</p>
<table>
<thead>
<tr>
<th>INSTRUMENTS OR OTHER ITEMS</th>
<th>DECONTAMINATION</th>
<th>CLEANING</th>
<th>STERILIZATION&lt;sup&gt;a&lt;/sup&gt;</th>
<th>HIGH-LEVEL DISINFECTION&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSFER FORCEPS (CHITTLE) AND CONTAINER (METAL)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.&lt;sup&gt;c&lt;/sup&gt; (Reprocess per shift or when contaminated.)</td>
<td>Using a brush, wash with soap and water. Rinse with clean water. If to be sterilized, air or towel dry.</td>
<td>Preferable:  - Dry heat for 1 hour after reaching 170°C (340°F), or  - Autoclave at 121°C (250°F) and 106 kPa (15 lbs/in&lt;sup&gt;2&lt;/sup&gt;) for 20 minutes (30 minutes if wrapped).</td>
<td>Acceptable:  - Steam or boil for 20 minutes. Chemically high-level disinfect by soaking for 20 minutes. Rinse well with boiled water and air dry before use.</td>
</tr>
<tr>
<td>URINARY CATHETERS (RUBBER AND STRAIGHT METAL)</td>
<td>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning. Rinse or wash immediately.&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Using a brush, wash with soap and water. Rinse with clean water (inside and outside).</td>
<td>Preferable (metal only):  - Dry heat for 2 hours after reaching 160°C (320°F), or  - Autoclave at 121°C (250°F) and 106 kPa (15 lbs/in&lt;sup&gt;2&lt;/sup&gt;) for 20 minutes (30 minutes if wrapped).</td>
<td>Acceptable (rubber or metal):  - Steam or boil for 20 minutes.</td>
</tr>
<tr>
<td>VENTILATOR TUBING OR CIRCUITS</td>
<td>Not necessary.</td>
<td>Using a brush, wash with soap and water. Rinse with clean water and air dry.</td>
<td>Not possible using an autoclave or dry heat oven.</td>
<td>Acceptable  - Steam or boil for 20 minutes.  - Air dry before use.</td>
</tr>
</tbody>
</table>

<sup>a</sup> If unwrapped, use immediately; if wrapped, reprocess if package becomes damaged or contaminated.
<sup>b</sup> If sterilization (dry-heat or autoclave) is not available, these items can be high-level disinfected either by boiling, steaming or soaking in a chemical disinfectant.
<sup>c</sup> Paper or plastic gowns, caps or masks. Place in a plastic bag or leakproof, covered waste container for disposal.
<sup>d</sup> Avoid prolonged exposure (> 20 minutes) to chlorine solution (> 0.5%) to minimize corrosion (rusting) of instruments and deterioration of rubber or cloth products.
<sup>e</sup> Instruments with cutting edges or needles should **not** be sterilized at temperatures above 160°C to avoid dulling.
HOW TO MAKE A DILUTE CHLORINE SOLUTION

Chlorine solutions made from sodium hypochlorite generally are the least expensive and the most rapid acting and effective products to use for decontamination.

FORMULA FOR MAKING A DILUTE SOLUTION FROM A CONCENTRATED SOLUTION

- Check concentration (% concentrate) of the chlorine product you are using.
- Determine total parts water needed using the formula below.

\[
Total \ Parts \ (TP) \ water = \left[ \frac{\% \ Concentrate}{\% \ Dilute} \right] - 1
\]

- Mix 1 part concentrated bleach with the total parts water required.

Example: Make a dilute solution (0.5%) from 5% concentrated solution.

STEP 1: Calculate TP water:

\[
\left[ \frac{5.0\%}{0.5\%} \right] - 1 = 10 - 1 = 9
\]

STEP 2: Take 1 part concentrated solution and add to 9 parts water.

Table G-1 below describes how to make 0.1% and 0.5% chlorine solutions using commercially available liquid bleach products.

---

How to Make a Dilute Chlorine Solution

Table G-1. Preparing Dilute Chlorine Solutions from Liquid Bleach (Sodium Hypochlorite Solution) for Decontamination and High-Level Disinfection

<table>
<thead>
<tr>
<th>TYPE OR BRAND OF BLEACH (BY COUNTRY)</th>
<th>CHLORINE % AVAILABLE</th>
<th>PARTS WATER TO 1 PART BLEACH*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.5%</td>
</tr>
<tr>
<td>JIK (Kenya), Robin Bleach (Nepal)</td>
<td>3.5%</td>
<td>6</td>
</tr>
<tr>
<td>Household bleach (USA, Indonesia), ACE (Turkey), Eau de Javel (France) (15 °chlorum)</td>
<td>5%</td>
<td>9</td>
</tr>
<tr>
<td>Blanquedor, Cloro (Mexico)</td>
<td>6%</td>
<td>11</td>
</tr>
<tr>
<td>Lavandina (Bolivia)</td>
<td>8%</td>
<td>15</td>
</tr>
<tr>
<td>Chloros (UK)</td>
<td>10%</td>
<td>19</td>
</tr>
<tr>
<td>Chloros (UK), Extrait de Javel (France) (48 °chlorum)</td>
<td>15%</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Read as one part (e.g., cup or glass) concentrated bleach to x parts water (e.g., JIK [0.5% solution]—mix 1 cup bleach with 6 cups water for a total of 7 cups).

b Use boiled water when preparing a 0.1% chlorine solution for HLD because tap water contains microscopic organic matter that inactivates chlorine.

c In some countries, the concentration of sodium hypochlorite is expressed in chlorometric degrees (°chlorum); one °chlorum is approximately equivalent to 0.3% available chlorine.

Adapted from: WHO 1989.

FORMULA FOR MAKING CHLORINE SOLUTIONS FROM DRY POWDERS

- Check concentration (% concentrate) of the powder you are using.
- Determine grams bleach needed using the formula below.

\[
\text{Grams/Liter} = \left( \frac{\text{% Dilute}}{\text{% Concentrate}} \right) \times 1000
\]

- Mix measured amount of bleach powder with 1 liter of water.

Example: Make a dilute chlorine-releasing solution (0.5%) from a concentrated powder (35%).

STEP 1: Calculate grams/liter: \[ \left( \frac{0.5\%}{35\%} \right) \times 1000 = 14.2 \text{ g / L} \]

STEP 2: Add 14.2 grams (≈14 g) to 1 liter of water.

The approximate amounts (grams) needed to make 0.1% and 0.5% chlorine-releasing solutions from several commercially available chlorine-releasing compounds (dry powders) are listed in Table G-2.
### Table G-2. Preparing Dilute Chlorine Solutions from Dry Powders

<table>
<thead>
<tr>
<th>AVAILABLE CHLORINE REQUIRED</th>
<th>0.5%</th>
<th>0.1%&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium hypochlorite (70% available chlorine)</td>
<td>7.1 g/L&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.4 g/L</td>
</tr>
<tr>
<td>Calcium hypochlorite (35% available chlorine)</td>
<td>14.2 g/L</td>
<td>2.8 g/L</td>
</tr>
<tr>
<td>NaDCC&lt;sup&gt;c&lt;/sup&gt; (60% available chlorine)</td>
<td>8.3 g/L</td>
<td>1.5 g/L</td>
</tr>
<tr>
<td>Chloramine tablets&lt;sup&gt;d&lt;/sup&gt; (1 g of available chlorine per tablet)</td>
<td>20 g/L (20 tablets/liter)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4 g/L (4 tablets/liter)&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>NaDCC-based tablets (1.5 g of available chlorine per tablet)</td>
<td>4 tablets/liter</td>
<td>1 tablet/liter</td>
</tr>
</tbody>
</table>

<sup>a</sup> For dry powders, read x grams per liter (example: Calcium hypochlorite—7.1 grams mixed with 1 liter water).

<sup>b</sup> Use boiled water when preparing a 0.1% chlorine solution for HLD because tap water contains microscopic organic matter that inactivates chlorine.

<sup>c</sup> Sodium dichloroisocyanurate

<sup>d</sup> Chloramine releases chlorine at a slower rate than does hypochlorite. Before using the solution, be sure the tablet is completely dissolved.

*Adapted from:* WHO 1989.
How to Make a Dilute Chlorine Solution
INFECTION PREVENTION AND CONTROL ADVICE FOR FAMILY AND FRIENDS OR CONTACTS OF PATIENTS WITH INFLUENZA A (H5N1)21

- You should avoid contact with patients known to have influenza A (H5N1) during the infectious period of their illness.
- The infectious period is 7 days after resolution of fever in adults and 21 days after onset of illness in children under 12.
- If you must visit a patient who is suspected of having influenza A (H5N1) or confirmed to have influenza A (H5N1), you should follow the infection prevention and control precautions in place in the hospital for the required period.
- You will need to wear PPE if you have direct contact with the patient or the patient’s environment.
- You should receive advice on the proper way to put on the PPE, especially on how to fit the mask to your face.
- The PPE that you will have to wear includes mask, gown, gloves and goggles. Make sure the mask fits correctly.
- When you leave the patient’s room, you must remove these items and wash your hands very well.
- If you do have contact with the patient during the infectious period of the illness (7 days after resolution of fever in adults and 21 days after onset of illness in children), you should see your doctor for advice about antiviral treatment. You should also monitor your health for 7 days after you have had this contact; watch for increase in your temperature and a sore throat.
- If your illness becomes severe, you should seek medical advice immediately and inform the doctor that you have been in contact with influenza A (H5N1).

GENERAL ADVICE ABOUT RESPIRATORY ILLNESS

- Cover the nose and mouth when coughing or sneezing; use a tissue and dispose of it in the waste receptacle.
- Always wash hands after having any contact with respiratory secretions.

Infection Prevention and Control Advice

- Be careful with respiratory secretions (e.g., coughing and sneezing) when around other people, especially small children. It may be best to avoid contact with individuals at risk (small children or people with illnesses) until respiratory symptoms have resolved.
- Avoid contact with secretions of people who have respiratory illnesses.
- Ask people to use a tissue and cover their nose and mouth when coughing or sneezing.
- Seek medical advice if the illness is severe.

ADVICE ABOUT CONTACT WITH CHICKENS, DUCKS OR OTHER ANIMALS

- Avoid contact with chicken farms, duck farms or any farm where animals have been ill, slaughtered or are thought to harbor avian influenza.
- If you inadvertently come into contact with an environment that has had sick or dead poultry, wash your hands thoroughly and monitor your temperature for 7 days. If you develop a sudden high fever (> 38°C) or signs of respiratory illness, consult your doctor about whether or not you should receive antiviral medication.
- If you have had contact with any dead poultry that have died from avian influenza or if you have had contact with the feces of these poultry, consult your health care adviser for guidance regarding prophylaxis using antiviral medication.
- If you have poultry that have died in your backyard, be sure you know how to decontaminate your yard:
  - Ideally, wear PPE; at least, cover your face and wear gloves or plastic bags over your hands.
  - Bury the dead poultry to at least 2.5 meters, and away from water supplies.
  - Clean the area of all chicken droppings. Scrape or use a rake and bury the chicken droppings.
  - Clean the chicken shed or area where droppings have been with soap and water.
## CHECKLIST FOR PLANNING AND PREPAREDNESS FOR AVIAN OR PANDEMIC INFLUENZA

<table>
<thead>
<tr>
<th>ELEMENTS TO PLAN AND PREPARE FOR</th>
<th>ACTIONS NEEDED</th>
</tr>
</thead>
</table>

### COORDINATION

#### 1. Structure for Planning and Decision-Making
- An internal, multidisciplinary coordination committee for influenza preparedness has been created.
- A person has been designated as the influenza preparedness coordinator. (Insert name) _____________________________________________
- (Illustrative) Members of the planning committee include the following hospital staff members (insert names):
  - Administration ____________________________________________
  - Legal counsel _____________________________________________
  - Infection control __________________________________________
  - Hospital disaster coordinator ______________________________
  - Risk management __________________________________________
  - Facility engineering _______________________________________
  - Nursing administration _____________________________________
  - Medical staff ______________________________________________
  - Intensive care ______________________________________________
  - Emergency Department _______________________________________
  - Laboratory service __________________________________________
  - Respiratory therapy _________________________________________
  - Psychiatry _________________________________________________
  - Public relations ____________________________________________
  - Security __________________________________________________
  - Materials management _______________________________________
  - Staff development __________________________________________
  - Occupational health _________________________________________
  - Food services ______________________________________________
  - Pharmacy __________________________________________________
  - Telecommunications/IT ______________________________________
  - Other members ______________________________________________
  - Other members ______________________________________________
- A state or local health department person has been identified as a committee liaison (Insert name) _____________________________________________
- A linkage with local transportation services has been established. (Planning organization) _____________________________________________

---

## Checklist for Planning and Preparedness

### 2. Development of a Written Pandemic Influenza Plan
- A written plan has been completed or is in progress that includes the elements listed in #3 below.
- The plan specifies the circumstances under which the plan will be activated.
- The plan describes the organizational structure that will be used to operationalize the plan.
- Responsibilities of key personnel related to executing the plan have been described.
- A simulation exercise has been developed to test the effectiveness of the plan.
- A simulation exercise has been performed. (Date performed ______________________)

### 3. Elements of an Influenza Pandemic Plan

#### SURVEILLANCE
- Hospital-wide syndromic surveillance has been established (with initial focus in the emergency room and outpatient department).
- Criteria for detecting/identifying clusters of cases have been established hospital-wide (with initial focus in emergency room and outpatient departments).
- Responsibility has been assigned for reviewing national, regional and local influenza activity trends and informing the pandemic influenza coordinator of evidence of an emerging problem. (Name___________________________________________)
- A system has been developed and tested for using central, regional, or national laboratory facilities to confirm early cases as soon as possible.
- A system for monitoring for nosocomial transmission of avian flu has been implemented and tested by monitoring for non-pandemic influenza.
- A system for reporting to central/national surveillance authorities has been established.

#### COMMUNICATION
- A pandemic spokesperson(s) has been assigned to represent the health care facility in case of outbreak before the community and media:
  - Person responsible for updating public health reporting ______________________
  - Clinical spokesperson for the facility _____________________________________
  - Media spokesperson for the facility ______________________________________
- Relationship has been established with professional specialists to help with the development of accurate and timely messages, before and during a pandemic:
  - Specialist___________________________________________________________
  - Specialist___________________________________________________________
- Key points of contact outside the facility have been identified:
  - Regional health department contact ________________________________
  - Local health department contact ____________________________________
  - Newspaper contact(s) ________________________________________________
  - Radio contact(s) _____________________________________________________
  - Public official(s)____________________________________________________
- A list of other health care facilities with which it will be necessary to maintain communication has been established:
  - A plan for updating key facility personnel on a daily basis has been established.
  - The person(s) responsible for providing these updates is/are:

- A strategy for regularly updating clinical, emergency department, and outpatient staff on the status of pandemic influenza, once detected, has been established.
  (Responsible person: ____________________________)
  - A plan for informing patients and visitors about the level of pandemic influenza activity has been established.

- An education and training plan on pandemic influenza has been developed for personnel:
  - Language and reading level-appropriate materials for educating all personnel about pandemic influenza and the facility’s pandemic influenza plan have been identified.
  - Means for accessing global and local Web-based influenza information sites has been identified and communicated to personnel.
  - A system for tracking which personnel have completed avian influenza training is in place.
  - A plan is in place for rapidly training non-facility staff brought in to provide patient care when insufficient numbers of personnel are available.

**CASE IDENTIFICATION AND MANAGEMENT**

- A specific location has been identified for triage of patients with possible avian influenza.
- The plan includes use of signage to direct and instruct patients with possible avian influenza on the triage process.
- A system has been established to separate patients with possible avian influenza from other patients seeking medical attention.
- Clinical management guidelines for patients with suspected and confirmed avian influenza infection have been adapted for local use.
- A method for tracking the admission and discharge of patients with pandemic influenza has been developed.
- The tracking method has been tested with non-pandemic influenza patients.
**INFECTION PREVENTION AND CONTROL**
- Infection prevention and control guidelines and procedures have been adapted to the local situation (in facilities and in alternative care areas).
- Laboratory biosafety guidelines, including collection and transport of specimens, are in place and current.
- Health care workers have adequate training in infection prevention and control, including Standard and Transmission-Based Precautions.
- Equipment, e.g., personal protective equipment, is available to implement recommended infection prevention and control guidelines.
- Contact tracing and confinement, if proposed, can be implemented.

**MAINTAINING ESSENTIAL HEALTH SERVICES**
- **Health services personnel:**
  - Key trained staff to be “first responders” have been identified.
  - A contact for obtaining influenza vaccine, if available, has been identified.
  - A contact for obtaining antiviral prophylaxis, if available, has been identified.
  - A system for rapidly delivering vaccine or antiviral prophylaxis to health care personnel has been developed.
  - A method for prioritizing health care personnel for receipt of vaccine or antiviral prophylaxis based on level of patient contact and personal risk for influenza complications has been established.
  - A system for detecting symptomatic personnel before they report for duty has been developed.
  - This system has been tested during a non-pandemic influenza period.
  - A policy for managing health care personnel with symptoms of or documented pandemic influenza has been established. The policy considers:
    - When personnel may return to work after having pandemic influenza
    - When personnel who are symptomatic but well enough to work will be permitted to continue working
  - A method for furloughing or altering the work locations of personnel who are at high risk for influenza complications (e.g., pregnant women, immunocompromised health care workers) has been developed.
  - Mental health and faith-based resources that will provide counseling to personnel during a pandemic have been identified.
  - A strategy for housing health care personnel who may be needed on-site for prolonged periods of time is in place.
  - A strategy for accommodating and supporting personnel who have child or elder care responsibilities has been developed.
  - A plan is in place to address unmet staffing needs in the hospital.
  - The minimum number and categories of personnel needed to care for a group of patients with pandemic influenza have been determined.
  - Responsibility for assessing day-to-day clinical staffing needs during an influenza pandemic has been assigned.
  - Persons responsible are: (names and/or titles)
  - Legal counsel has reviewed emergency laws for using health care personnel with out-of-state licenses.
- Sources from which additional health care workers might be recruited have been identified.
- A priority list for reassignment of personnel has been developed.
- A set of health care roles for which volunteers may be suitable has been developed.
- Local organizations have been identified and notified for seeking volunteers.
- Protocols have been developed for training volunteers for defined health care roles.

- **Health facility capacity:**
  - An area of the facility where patients should ideally be treated during a pandemic situation has been identified.
  - A threshold has been established for canceling elective admissions and surgeries.
  - Facilities that would accept non-influenza patients in order to free up bed space have been identified, and agreements reached.
  - Areas of the facility that could be utilized for expanded bed space have been identified.
  - The estimated patient capacity for this facility is _____________________________.
  - Plans for expanded bed capacity have been discussed with local and regional planning groups.
  - Potential alternative overflow facilities for expansion of medical care have been identified (may include gymnasiums, schools, tents on hospital grounds, etc.).
  - Alternative care plans with relevant partners, including those outside of the health sector, such as transportation and food services (e.g., FedEx, DHL, bread or milk distributors) have been developed.
  - Critical health services (e.g., trauma, childbirth, severe illness, etc.) that should be maintained even in the face of a pandemic have been identified.
  - Mechanism for maintaining essential medical services for persons with chronic medical problems serviced by this facility (e.g., hemodialysis, HIV/AIDS, TB) has been addressed.
  - Areas of hospital operations where the demand may increase significantly, but continuing operation is critical (e.g., sewerage, electricity, water supply, security) have been identified and plans developed on how to keep them operational.
  - Criteria and protocols for closing the facility to new admissions are in place.
  - Criteria and protocols for limiting visitors have been established.
  - Hospital Security has had input into procedures for enforcing facility access controls.
  - Clinical care and health service plans have been coordinated with bordering local authorities to avoid migration to centers where enhanced services may be perceived to exist.

- **Consumable resources/health service supplies:**
  - A primary plan and contingency plan to address supply shortages have been developed.
  - The existing system for tracking available medical supplies in the health care facility to determine whether it can detect rapid consumption, including items that provide personal protection (e.g., gloves, masks), has been evaluated.
  - Necessary improvements in the above system have been made to respond to growing demands for resources during an influenza pandemic.
  - A plan has been developed to stockpile, as possible, enough consumable resources (masks, gloves, etc.) for the duration of a pandemic wave (6–8 weeks).
  - A strategy has been developed for ensuring uninterrupted provision of medicines to patients who might not be able to (or should not) travel to hospital pharmacies.
**Checklist for Planning and Preparedness**

- Need for stockpiling additional medical supplies has been assessed and sources identified.
- A range of antibiotics that will be useful for treatment of influenza complications has been identified, and contingency plans for producing or buying increased supplies of these antibiotics have been developed.
- The level of care that might be provided in alternative health care facilities has been identified and a contingency plan developed for providing these alternative facilities with the equipment and supplies adequate for the level of care that will be provided.
- A strategy has been developed for the distribution of stockpiled supplies and medication.
- If possible, two-way radios have been obtained to ensure communication in case phone lines are damaged.
- A contingency plan has been established for situations in which primary sources of basic supplies become limited. If you cannot ensure access to the national stockpile, consider development of an appropriate stockpile in the facility, and at least an 8-week supply of potable water.
- Fuel has been stockpiled for health care facility transport and generators.
- Plans for obtaining limited resources have been discussed with local and regional planning and response groups.

**Excess mortality:**

- Plans for expanding morgue capacity have been discussed with community leaders, religious leaders and/or other key stakeholders.
- Emergency capacity for storage of corpses before burial, in a culturally appropriate way, has been identified.
- Protocols have been developed for safe handling of corpses in a culturally appropriate way.
- Community leaders have been involved in all planning to ensure their support and assistance in worst case scenario where practice comes in conflict with necessary public safeguards.
- Mortality estimates have been used to estimate the number of body bags and shrouds.

**INFORMATION DISSEMINATION AND EDUCATION OF THE COMMUNITY**

- Community leaders have been involved to ensure that they are well-informed on critical issues and prepared to help as needed.
- Signs have been posted in health care waiting rooms, schools, churches and other areas where people are in close proximity to describe respiratory etiquette and cough hygiene.
- Advice on reducing the risk of transmission of avian influenza has been made available to the public.
- Health messages have been developed for families, visitors and communities in appropriate languages and literacy levels.
- Common myths and misconceptions have been addressed in written and verbal communication.
**FLowsheet for Avian or Pandemic Influenza: Case Detection and Initial Management**

Avian Influenza A (H5N1): Case Detection & Initial Management During the Pandemic Alert Period*

---

**Laboratory Testing for Novel Influenza Virus Recommended for:**
- Hospitalized patients with severe influenza-like illness (ILI) including pneumonia who meet epidemiologic criteria
- Non-hospitalized patients with less severe ILI & *strong epidemiologic suspicion* for exposure to novel influenza virus

**Clinical Criteria**
ILI with temperature > 38° C AND one or more of the following: cough, sore throat or dyspnea

**Epidemiologic Criteria**
Ask the patient about the following within 10 days of symptom onset:
- History of recent travel to an affected area AND at least one of the following:
  - Direct contact with poultry or poultry products, or
  - Close contact with a person with suspected or confirmed novel influenza, or
  - Close contact with a person who died or was hospitalized due to a severe respiratory illness
- Employment in an occupation at particular risk for novel influenza exposure, i.e.:
  - A health care worker in direct contact with a suspected or confirmed novel influenza case, or
  - A worker in a laboratory that contains live novel influenza virus, or
  - A worker in a poultry farm, live poultry market, or poultry processing operation with known or suspected avian influenza infection

If YES to either epidemiologic criterion
- Initiate Standard and Droplet Precautions
- Collect and submit specimens for influenza virus testing after consultation with Public Health
- Initiate general work-up as clinically indicated
- Begin empiric antiviral treatment
- Help identify contacts, including HCWs

If NO to both epidemiologic criteria
- Treat as clinically indicated; re-evaluate if suspicion increases

**Novel Influenza Positive by RT-PCR or culture**
- Continue Standard and Droplet Precautions
- Continue antivirals
- Do not cohort with seasonal influenza patients
- Treat complications, such as 2° bacterial pneumonia
- Provide clinical updates to Public Health

**Seasonal influenza positive by culture or RT-PCR**
- Continue Standard and Droplet Precautions
- Continue antiviral treatment for a minimum of 5 days
- Treat complications, such as secondary bacterial pneumonia, as indicated

---

*No human cases of novel influenza are present in the community. Human cases might be present in another country or another region of the United States. Adapted from HHS Pandemic Influenza Plan Supplement 5, available at: http://www.hhs.gov/pandemicflu/plan/

---

**Adapted with permission from:** Public Health – Seattle and King County (Washington). 2005. Avian Influenza (H5N1): Case Detection and Initial Management during the Pandemic Alert Phase. (22 November). Note: Many of the laboratory investigations and protocols indicated on this flowchart may not be available in every facility."
Footnotes (HHS Pandemic Influenza Plan and Supplements are available at: http://www.hhs.gov/pandemicflu/plan/)

1. Further evaluation and diagnostic testing should be considered for outpatients with strong epidemiologic risk factors and mild or moderate illness: CONSULT WITH PUBLIC HEALTH.

2. Updated information on areas where novel influenza virus transmission is suspected or documented is available on the CDC website at www.cdc.gov/travel/other/avian_flu_ah5n1_031605.htm and on the WHO website at www.who.int/en/.

3. For persons who live in or visit affected areas, close contact includes touching live poultry (well-appearing, sick or dead) or touching or consuming uncooked poultry products, including blood. For animal or market workers, it includes touching surfaces contaminated with bird feces. In recent years, most instances of human infection with a novel influenza A virus having pandemic potential, including influenza A (H5N1), are thought to have occurred through direct transmission from domestic poultry. A small number of cases are also thought to have occurred through limited person-to-person transmission or consumption of uncooked poultry products. Transmission of novel influenza viruses from other infected animal populations or by contact with fecally contaminated surfaces remains a possibility. These guidelines will be updated as needed if alternate sources of novel influenza viruses are suspected or confirmed.

4. Close contact includes direct physical contact, or approach within 3 feet of a person with suspected or confirmed novel influenza.

5. Standard and Droplet Precautions should be used when caring for patients with novel influenza or seasonal. Information on infection precautions that should be implemented for all respiratory illnesses (i.e., Respiratory Hygiene/Cough Etiquette) is provided at: www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm.

6. Hospitalization should be based on all clinical factors, including the potential for infectiousness and the ability to practice adequate infection control. If hospitalization is not clinically warranted, and treatment and infection control is feasible in the home, the patient may be managed as an outpatient: CONSULT WITH PUBLIC HEALTH before discharging patients with suspected novel influenza virus infection. The patient and his or her household should be provided with information on infection control procedures to follow at home. The patient and close contacts should be monitored for illness by Public Health staff.

7. The general work-up should be guided by clinical indications. Depending on the clinical presentation and the patient's underlying health status, initial diagnostic testing might include:

- Pulse oximetry
- Chest radiograph
- Complete blood count (CBC) with differential
- Blood cultures
- Sputum (in adults), tracheal aspirate, pleural effusion aspirate (if pleural effusion is present) Gram stain and culture
- Antibiotic susceptibility testing (encouraged for all bacterial isolates)
- Multivalent immunofluorescent antibody testing or PCR of nasopharyngeal aspirates or swabs for common viral respiratory pathogens, such as influenza A & B, adenovirus, parainfluenza viruses, and RSV, particularly in children
- In adults with radiographic evidence of pneumonia, Legionella and pneumococcal urinary antigen testing
- If clinicians have access to rapid and reliable testing (e.g., PCR) for M. pneumoniae and C. pneumoniae, adults and children <5 yrs with radiographic pneumonia should be tested.
- Comprehensive serum chemistry panel, if metabolic derangement or other end-organ involvement is suspected

8. Guidelines for novel influenza virus testing can be found in HHS Plan Supplement 2. All of the following respiratory specimens should be collected for novel influenza A virus testing: nasopharyngeal swab; nasal swab, wash, or aspirate; throat swab; and tracheal aspirate (for intubated patients), stored at 4°C in viral transport media; and acute and convalescent serum samples.

9. Strategies for the use of antiviral drugs are provided in HHS Plan Supplement 7.

10. Guidelines for the management of contacts in a healthcare setting are provided in HHS Plan Supplement 3.

11. Given the unknown sensitivity of tests for novel influenza viruses, interpretation of negative results should be tailored to the individual patient in consultation with the local health department. Novel influenza directed management may need to be continued, depending on the strength of clinical and epidemiologic suspicion. Antiviral therapy and isolation precautions for novel influenza may be discontinued on the basis of an alternative diagnosis. The following criteria may be considered for this evaluation:

- Absence of strong epidemiologic link to known cases of novel influenza
- Alternative diagnosis confirmed using a test with a high positive-predictive value
- Clinical manifestations explained by the alternative diagnosis

REFERENCES


Preventing the Transmission of Avian or Pandemic Influenza in Health Care Facilities
with Limited Resources

References


**FOR ADDITIONAL INFORMATION, VISIT THE FOLLOWING WEB SITES:**


The U.S. Centers for Disease Control and Prevention: www.cdc.gov.

