

HOSPITAL PANDEMIC INFLUENZA GUIDELINES

Acute Care Hospital Settings



Version 1.5
March 1, 2006

**COUNTY OF LOS ANGELES
DEPARTMENT OF HEALTH SERVICES
PUBLIC HEALTH**



EXECUTIVE SUMMARY

The *Hospital Pandemic Influenza Guidelines in Acute Care Hospital Settings* have been prepared by Los Angeles County Department of Health Services (LAC DHS), and now include recommendations from the U.S. Department of Health and Human Services (HHS).

These guidelines are designed to assist those responsible for managing pandemic influenza in traditional health care settings such as acute care (hospitals) settings.

This document presents an overview of infection prevention and control policies and procedures that will be critical to minimize the transmission of pandemic influenza, with or without the availability of immunization or chemoprophylaxis, and for preventing other infectious diseases. It is recognized that certain recommendations may be feasible only in the early phases of the pandemic as they may not be achievable as the pandemic spreads and resources become scarce.

Part A describes a foundation to develop an infection control/occupational health (IC/OH) plan for the management of pandemic influenza with particular focus on influenza transmission, routine practices, pandemic influenza education and public health restrictions. Major attention is given to the management of health care workers during an influenza pandemic. Recommendations for the use of influenza vaccine and antivirals for health care workers (HCWs) and patients are included in these guidelines and they are fully outlined in the vaccine and antiviral sections.

Part A also explains the lack of evidence to support the use of masks to prevent transmission of influenza during previous pandemics. The evidence shows that, in the early phase of an influenza pandemic, it may be prudent for HCWs to wear masks when interacting in close face-to-face contact with coughing individuals to minimize influenza transmission. This use of masks is advised when immunization and antivirals are not yet available but is not practical or helpful when transmission has entered the community. Masks may be worn by HCWs to prevent transmission of other organisms from patients with an undiagnosed cough. For the purpose of this document, the term mask refers to surgical masks, not to special masks such as high efficiency dust/mist masks or respirators. Hand Hygiene is emphasized throughout the guidelines because strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention. Proper hand hygiene may be the only preventative measure available during a pandemic.

Part B describes the Management of Pandemic Influenza in traditional settings such as acute care settings are stand-alone sections and are designed to be used in conjunction with Part A to develop an Infection Control/Occupational Health (IC/OH) plan for the management of pandemic influenza.

Appendix 1. The “World Health Organization Pandemic Influenza Phases” is the outline of the staged plan for responding to a pandemic threat and is based on the WHO influenza surveillance program.

Appendix 2. The Hygiene Procedures, A. How to Wash Hands, B. Decontaminating Hands with an Alcohol-based Hand Rub provide specific details related to hand hygiene and C. Respiratory Hygiene.

Appendix 3. An “Influenza-Like-Illness (ILI) Assessment Tool” is provided to assist with



immediate triage of patients or staff and accommodation/cohort of patients, prior to further OH or clinical management. This ILI triage tool should not be used for clinical management. Clinical management is specified in the “Clinical Care Guideline and Tools” annex of the LAC Pandemic Influenza Plan.

Appendix 4. Table A, “Cleaning Procedures for Common Items” provides examples of how common items are cleaned. Table B, “Directions for Preparing and Using Chlorine Bleach” describes recommendations for dilutions of specific products and their intended use.

Appendix 5. “Frequently Asked Questions” provides the hospital staff and patients with basic information regarding pandemic influenza.

Appendix 6. Health Care Facility Pandemic Influenza Planning Committee.

Appendix 7. Hospital Pandemic Influenza Plan Triggers.

Appendix 8. Hospital Preparedness Checklist.



TABLE OF CONTENTS

Part A: Overview of Pandemic Influenza

1. Background Information.....	1
1.1 World Health Organization Phases for Pandemic Influenza	1
1.2 Los Angeles County Hospital Survey	1
2. Principles of Influenza Transmission	2
2.1 Contact Transmission	2
2.2 Droplet Transmission	3
2.3 Airborne Transmission	3
2.4 Evidence for the Mode of Influenza Transmission	3
2.4.1 Mode of Influenza Transmission.....	3
2.5 Routine Practices and Additional Precautions to Minimize the Transmission of Pandemic Influenza.....	4
2.6 Use of Masks During a Pandemic.....	4
2.7 Infectivity of the Influenza Virus	5
3. Occupational Health and Infection Control Management of Pandemic Influenza in Traditional Health Care Settings.....	5
3.1 Occupational Health and Infection Control Pandemic Planning.....	5
3.1.1 Recommendations	6
3.2 Definitions for Infection Control/Occupational Health Management of Patients/Staff with ILI	7
3.2.1 Influenza-Like-Illness.....	7
3.2.2 Clinical Case Definition	7
3.2.3 Confirmed Cases of Influenza	7
3.2.4 Immunity to Influenza	8
3.3 Use of Influenza Immunization During a Pandemic	8
3.3.1 Priority Groups for Vaccination.....	8
3.4 Use of Antivirals During a Pandemic.....	8
3.5 Management of Health Care Workers During Influenza Pandemic.....	9
3.5.1 Recommendations	9
3.6 Hospital Surveillance for Pandemic	10
4. Pandemic Influenza Education	11
4.1 Health Care Workers.....	11

Part B: Pandemic Influenza in Acute Care Settings

1. Management of Pandemic Influenza in Acute Care Settings.....	13
1.1 Prevention of Pandemic Influenza	13
1.2 Control of Pandemic Influenza	13

Appendices

Glossary of Terms.....	19
Comparison Table of Influenza	23



Appendix 1. World Health Organization (WHO) Pandemic Influenza Phases 24

Appendix 2. Hygiene Procedures 25

 A. How to Wash Hands..... 25

 B. Decontaminating Hands with an Alcohol-Bases Hand Rub 25

 C. Respiratory Hygiene / Cough Etiquette 26

Appendix 3. An Influenza-like Illness (ILI) Assessment Tool 27

Appendix 4. Tables 28

 A. Cleaning Procedures for Common Items 28

 B. Directions for Preparing and Using Chlorine Bleach 29

Appendix 5. Frequently Asked Questions 30

Appendix 6. Health Care Facility Pandemic Influenza Plan Committee..... 37

Appendix 7. Hospital Pandemic Influenza Triggers 39

Appendix 8. Hospital Preparedness Checklist 41

Reference List..... 46



PART A. OVERVIEW OF PANDEMIC INFLUENZA

1. Background Information

The following document provides infection prevention and control guidance for the management of **pandemic influenza** in acute care hospital settings.

Although recommendations to prevent the transmission of infection during the delivery of health care, including during a pandemic are important, it is recognized that certain recommendations may be feasible only in the early phases of the pandemic as they may not be achievable when the pandemic spreads and resources become scarce. For the purpose of this document the term mask refers to surgical masks, not to procedure masks, special masks or respirators.

In this document, individuals who have recovered from or have been vaccinated against the pandemic strain of influenza are considered immune with one important caveat regarding the immune status of the vaccinated individual. Because influenza vaccines are not 100% efficacious, if vaccinated individuals come in contact with influenza patients, the vaccinated individual should be monitored for ILI using the ILI Assessment Tool found in Appendix III.

During a pandemic, it may be necessary to recruit trainees and volunteers to take on specific responsibilities, for example, basic patient care, that is usually reserved for health care workers. The implication is that these workers will need to be considered, for infection control purposes, as being equivalent to health care workers in terms of risk of exposure and ability to transmit disease.

1.1 World Health Organization Phases for Pandemic Influenza

The World Health Organization (WHO) has developed a staged plan, based on its surveillance program, for responding to a pandemic threat. Recognition of a novel influenza strain in humans triggers a series of responses, identified as phases and levels within phases that can ultimately lead to the declaration of a pandemic. Interpandemic activities are designated as Phase 1 and 2. Isolation of a novel virus subtype from a single human case, without evidence of human-to-human spread, or at most rare instances of spread to a close contact will result in WHO declaring pandemic influenza Phase 3. Phase 6 is the confirmation of a pandemic with increased and sustained transmission in general population. Key stages of the WHO response are outlined in Appendix I.

1.2 Los Angeles County Hospital Survey

On June 21, 2005, surveys were sent to 107 hospital Infections Control Practitioners (ICPs) within LAC regarding Pandemic Influenza. The survey was re-sent on July 27, 2005 via fax and again on November 17, 2005. The survey has the following components: vaccination of employees, volunteers, and students; personal protective equipments (PPE); employees illness monitoring system; portable isolation; influenza antiviral medication supply; healthcare professional staff; triage unit; an existing Pandemic Influenza Plan; a Dispensing/Vaccination Plan; and a Nurse Advice Hotline. The purpose of the survey was to assess the needs of the hospitals in terms of Pandemic Influenza preparedness and response. The summary of the findings is as follows:



- Out of 107 hospitals, a total of 70 hospitals responded and completed the survey. Greater than two in four hospitals (67%) **do not** have an existing or modified “Pandemic Influenza Response Plan” and only twenty-two out of sixty-nine (32%) have a “Dispensing/Vaccination Plan.” Ninety percent of the hospitals **do not** have a “Nurse Advice Hotline.”
- In terms of stockpiling influenza antiviral medications, eighteen out of sixty-five (28%) have the antivirals “**on-demand**” basis only and 60% stock antivirals “**every flu season.**” When asked about stockpiling Oseltamivir (Tamiflu), 63% of the hospitals have them on stock. Nearly all hospitals have stocks of Amantadine (93%).
- A good number of hospitals (62 out of 70) responded that they vaccinate their **medical staff** (89%). About 60% of the hospitals responded that they vaccinate their **registry staff**, a proportion of those hospitals (26%) refer their registry staff to their private MD. In addition, 58 out of 70 (83%) vaccinate their **volunteers**. On the other hand, twenty-six (37%) say that they vaccinate their **students** and also 34% gets referred to their private MD.
- When asked about having extra supplies of PPE: 63% have N-95 respirator/mask; 61% have gloves; 63% have regular masks; and 64% have isolation gowns. In addition, 39% of the hospitals expressed that they plan to purchase more PPE, while 35% are not sure of the facilities’ decision to purchase or not.
- In case Emergency Department (ED) becomes overburdened with influenza-like illness (ILI) patients, thirty-six (55%) say they have plans for outside triage unit and 44% say they don’t.

2. Principles of Influenza Transmission

Modes or routes of transmission of infectious agents have been classified as contact, droplet, airborne, common vehicle and vectorborne. Routes pertinent to influenza are contact, droplet and airborne.

2.1 Contact Transmission

Contact transmission includes direct contact, indirect contact and droplet (large droplet transmission). Routine practices should prevent most transmissions by the contact route. Although droplet transmission is a type of contact transmission, it is considered separately as it requires additional precautions.

- **Direct Contact Transmission** occurs when the transfer of microorganisms results from direct physical contact between an infected or colonized individual and a susceptible host.
- **Indirect Contact** involves the passive transfer of microorganisms to a susceptible host via an intermediate object such as contaminated hands that are not washed between patients or contaminated instruments or other inanimate objects in the patient’s immediate environment.



2.2 Droplet Transmission

Droplet transmission refers to large droplets, greater than or equal to 5 m in diameter, generated from the respiratory tract of the source (infected individual) during coughing or sneezing, or during procedures such as suctioning or bronchoscopy. These droplets are propelled a distance of less than one meter through the air and are deposited on the nasal or oral mucosa of the new host (newly infected individual) or in the immediate environment. These large droplets do not remain suspended in the air; therefore, special ventilation is not required since true aerosolization (see below) does not occur.

Patients with known or suspected pandemic influenza should be placed on droplet precautions for a minimum of 5 days from the onset of symptoms. Because immunocompromised patients may shed virus for longer periods, they may be placed on droplet precautions for the duration of their illness. Healthcare personnel should wear appropriate PPE. The placement of patients will vary depending on the healthcare setting. If the pandemic virus is associated with diarrhea, contact precautions (i.e., gowns and gloves for all patient contact) should be added. CDC will update these recommendations if changes occur in the anticipated pattern of transmission (www.cdc.gov/flu).

2.3 Airborne Transmission

Airborne Transmission refers to the dissemination of microorganisms by aerosolization. Organisms are contained in droplet nuclei, airborne particles less than 5 m that result from the evaporation of large droplets, or in dust particles containing skin squames and other debris that remain suspended in the air for long periods of time⁷. Such microorganisms are widely dispersed by air currents and inhaled by susceptible hosts who may be some distance away from the source patients or individuals, even in different rooms or hospital wards. Control of airborne transmission is the most difficult as it requires control of air flow through special ventilation systems.

2.4 Evidence for the Mode of Influenza Transmission

Organisms, especially respiratory viruses expelled in large droplets, remain viable in droplets that settle on objects in the immediate environment of the patient. Both influenza A and B viruses have been shown to survive on hard, non-porous surfaces for 24-48 hours, on cloth paper and tissue for 8-12 hours and on hands for 5 minutes⁸. The virus survives better at the low relative humidity encountered during winter in temperate zones. Contact with respiratory secretions and large droplets, appears to account for most transmissions of influenza. In a report of an outbreak in a nursing home, the pattern of spread was suggestive of contact rather than airborne transmission because patients who were tube fed or required frequent suctioning had higher infection rates than those who did not require such care. Whether or not influenza is naturally transmitted by the airborne route is controversial. An outbreak of influenza on an airliner has been attributed to airborne spread; however, large droplet spread could have been responsible because the passengers were crowded together and moved about for several hours in a small, grounded airplane⁹. Although experimental airborne transmission of influenza A virus to mice has been reported, there is no evidence of such transmission in humans.

2.4.1 Mode of Influenza Transmission

Influenza is directly transmitted primarily by droplet contact of the oral, nasal, or possibly conjunctival mucous membranes with the oropharyngeal secretions of an infected individual.



Influenza is indirectly transmitted from hands and objects freshly soiled with discharges of the nose and throat of an acutely ill and coughing individual.

2.5 Routine Practices and Additional Precautions to Prevent the Transmission of Influenza

Routine practices outline the importance of hand washing before and after caring for patients; the need to use gloves, masks/eye protection/face shields, and gowns when splashes or sprays of blood, body fluids, secretions or excretions are possible; the cleaning of patient-care equipment, the patient's physical environment and soiled linen; the precautions to reduce the possibility of HCW exposure to bloodborne pathogens and patient placement. Routine practices are the infection prevention and control practices for use in the routine care of all patients at all times in all health care settings. Additional precautions are required when routine practices are not sufficient to prevent transmission. In interpandemic years, the LAC DHS recommend that in addition to routine practices, which should be taken for the care of all patients, additional precautions (droplet and contact precautions) should be taken for pediatric and adult patients with influenza (personal communication, Consensus Meeting for infection control measures with patients presenting with acute, respiratory illness, Gatineau, Quebec, November 24, 2003). This recommendation represents a change because, in the past, it was unclear as to whether or not additional precautions were indicated for adults with influenza. Children and adults who have the physical and cognitive abilities, should be encouraged to practice good hygiene: i.e., use disposable, one-use tissues for wiping noses; cover nose and mouth when sneezing and coughing; hand washing/hand antiseptics after coughing, sneezing or using tissues; and, keep hands away from the mucous membranes of the eyes and nose. Therefore, preventing the transmission of influenza is best achieved through strict compliance with routine practices, (i.e., good hygiene) and the use of additional precautions. Routine practices and additional precautions to prevent the transmission of infection during the delivery of health care in all health care settings during a pandemic are important. Certain routine practice and additional precaution recommendations may be feasible only in the early phases of the pandemic as they may not be achievable as the pandemic spreads and resources (equipment, supplies and workers) become scarce. Because the complexity of managing high risk patients will be greatest in acute care hospitals, it seems reasonable that the highest priority for infection control resources should be given to the acute care settings **Strict adherence to hand washing/hand antiseptics recommendations is the cornerstone of infection prevention and may be the only preventive measure available during a pandemic.** Hand hygiene procedures should be reinforced according to Appendix II.

2.6 Use of Masks During a Pandemic

Although there is a lack of evidence that the use of masks prevented transmission of influenza during previous pandemics; in the early phase of an influenza pandemic, it may be prudent for HCWs to wear masks when interacting in close face-to-face contact with coughing individuals to minimize influenza transmission. This use of masks is advised when immunization and antivirals are not yet available but is not practical or helpful when pandemic influenza has entered the community. There is no evidence that the use of masks in general public settings will be protective when the virus is circulating widely in the community. Masks should be worn by HCWs to prevent transmission of other organisms from patients with undiagnosed cough. For the purpose of this document the term mask refers to surgical masks, not to special masks or respirators. Special masks, i.e., high-efficiency dust/mist masks are required for patients with infectious tuberculosis and for non-immune HCWs entering the room of a patient with measles or disseminated varicella.

When using surgical masks:



- They should be used only once and changed if wet (because masks become ineffective when wet).
- They should cover both the nose and the mouth.
- Avoid touching it while it is being worn.
- Discard them into an appropriate receptacle.
- They must not be allowed to dangle around the neck.

2.7 Infectivity of the Influenza Virus

The **incubation period** for influenza is from 1-3 days. The **period of communicability** (duration of viral shedding) continues for up to 7 days after the onset of illness², probably from 3-5 days from clinical onset in adults and up to 7 days in children¹⁰. Individuals infected with influenza tend to shed more viruses in their respiratory secretions in the early stages of the illness and patients are most infectious during the 24 hours before the onset of symptoms and during the most symptomatic period¹¹. Viral shedding may be longer in infants², and prolonged in young children and immunodeficient patients¹⁰. It has not been well established whether elderly long term care residents shed viruses longer than other adult populations. There is no information to determine if the period of communicability will be different with pandemic influenza. The duration of shedding of a novel virus (pandemic strain) is unknown. It is possible that prolonged shedding could occur with pandemic influenza because the immune system would not have had prior experience with related strains. Hands can be contaminated with influenza virus by contact with inanimate surfaces or objects in the immediate environment of a patient with influenza infection. Influenza A and B viruses have been shown to survive for 24-48 hours on hard, nonporous surfaces; for up to 8 to 12 hours on cloth, paper and tissues; and on hands for up to 5 minutes after transfer from environmental surfaces. **“The influenza virus is readily inactivated by hospital germicides, household cleaning products, soap, hand wash or hand hygiene products.”** Therefore, neither antiseptic hand wash products in health care settings nor antibacterial hand wash products in home setting are required because routine products, along with proper hand washing procedures, will inactivate the influenza virus.

Infectivity of the Influenza Virus

1. Incubation period	1-3 days.
2. Period of Communicability:	Infectious 1 day before onset of symptoms and may be longer than 7 days after the onset of symptoms.

3. Occupational Health and Infection Control Management of Pandemic Influenza in Traditional Health Care Settings

3.1 Occupational Health and Infection Control Pandemic Influenza Planning

A broad consensus has emerged regarding plans for pandemic influenza: the plans should be aimed at reducing influenza-related morbidity, mortality and social disruption. It is widely recognized that preparation for the next pandemic requires that an infrastructure be in place during the interpandemic period for the following reasons:



- a. the rapid detection of novel variants and disease caused by them,
- b. the production and delivery of influenza vaccines and antiviral agents to high priority target groups,
- c. the rapid dissemination and exchange of information; and
- d. emergency preparedness.

Pandemic plans should outline the responsibilities of the institutions that will be involved in the pandemic response. The plan should be divided into phases that describe, in detail, a step-wise response to the identification and subsequent spread of a novel virus, as well as the ability to cut back the response if a novel virus fails to spread as occurred in 1976 and 1977.

Planning for and the management of pandemic influenza is directly related to the strength of the strategy in place for the management of interpandemic influenza; a strong interpandemic plan will affect the outcome of the pandemic plan. “The trends of modern society, including the increasing availability of rapid human transportation and the urbanization of the rapidly expanding human population, tend to facilitate the spread of influenza and increase morbidity. Modern medicine can reduce the mortality that resulted from complications of infection with influenza virus during earlier epidemics, but the cost of medical interventions has increased to the point that effective methods of epidemic control should be considered. **This challenge provides an opportunity to develop, test, and have in place a strategy for control of interpandemic influenza before the next pandemic.**”

During an influenza pandemic, adherence to infection prevention and control policies and procedures is critical to minimize the transmission of influenza and other infectious diseases. It is anticipated that neither influenza immunization nor chemoprophylaxis will be available in the early stages of a pandemic and perhaps not even available in later stages, necessitating an emphasis on infection prevention and control practices.

3.1.1 Recommendations

1. All organizations responsible for traditional health care settings (i.e., acute care) should develop an Infection Control and Occupational Health (IC/OH) plan for the management of pandemic influenza. The plan should be developed according to Los Angeles County Acute Communicable Disease Control Guidelines and federal/state contingency plans with a multi-disciplinary group that includes, but is not limited to:
 - a. Representatives from traditional organizations including:
 - medical administration
 - nursing administration
 - physicians
 - nursing services
 - physical plant and housekeeping
 - occupational health
 - infection prevention and control
 - pharmacy services
 - emergency services
 - respiratory services
 - public affairs
 - educational services
 - laboratory services;
 - b. public health personnel;
 - c. community care providers;



- d. local pandemic planners;
 - e. funeral service workers;
 - f. local disaster planners.
2. The IC/OH plan for the management of pandemic influenza for traditional settings should be reviewed every 3 years and updated according to current legislation and relevant publications.
 3. The IC/OH plan for the management of pandemic influenza for traditional settings should include the preparation of educational information for health care workers.
 4. The IC/OH plan for the management of pandemic influenza should include recommendations the use of influenza vaccine and chemoprophylaxis for health care workers according to the vaccine section of the LAC Pandemic Influenza Plan.
 5. **Strict adherence to hand washing/hand antisepsis recommendations (see Appendix II) is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.** Planning should include ensuring that adequate supplies of hand hygiene products are a priority for all health care settings as there may be an interruption to the supply or shortages of hand antisepsis products, soap and hand towels.
 6. Planning should include the priority of maintaining adequate resources for infection control in acute care hospitals (soap, antiseptic products, masks/eye protection/face shields, gloves, and gowns) due to the increased complexity and management issues of hospitalized patients.
 7. Planning should include ensuring all HCWs (see glossary for HCW definition) are offered seasonal influenza immunization. As resources permit, HCWs should also receive Tuberculosis(TB) skin testing, Hepatitis B immunization, should have proof of measles, mumps, rubella (MMR) immunity and receive a tetanus booster if appropriate³.

3.2 Definitions for Infection Control/Occupational Health Management of Patients/Staff with Influenza-Like Illness (ILI)

3.2.1 Influenza-Like-Illness

Refer to Appendix III for an ILI Assessment Tool. An ILI Assessment Tool is to be used for immediate triage of patients or staff and accommodation/cohort of patients, prior to further OH or clinical management.

See glossary term “influenza”.

3.2.2 Clinical Case Definition

See glossary term “influenza”.

3.2.3 Confirmed Case of Influenza

See glossary term “influenza”.

3.2.4 Immunity to Influenza

During a pandemic, it is likely that most cases of influenza will be caused by the pandemic strain. Data from the 1957 and 1968 pandemics show that the previously circulating influenza strain



disappeared from human circulation when the pandemic strain of influenza virus emerged. Therefore, HCWs who have recovered from an ILI during an earlier pandemic phase may be assumed to be immune to the pandemic influenza strain. Individuals who have been immunized against the pandemic strain of influenza will also be considered immune, recognizing that the influenza vaccine may not be fully protective. Therefore, unlike individuals who have recovered from pandemic influenza or ILI, vaccinated individuals should be monitored for ILI using the ILI Assessment Tool found in Appendix III.

3.3 Use of Influenza Immunization During an Influenza Pandemic

Influenza vaccine availability in the early phase(s) of the pandemic is uncertain. When available, vaccine will be provided according to priority groups set by recommendations from the CDC and CA State DHS. In the early stages of a pandemic, there may be no vaccine at all; when vaccine first becomes available the demand will likely exceed the supply. Because influenza vaccine availability will change during the course of a pandemic, response strategies will vary with vaccine supply.

3.3.1 Priority Groups for Vaccination

In view of the likely vaccine shortage, the U.S. Public Health Service, in conjunction with various advisory committees, has formulated recommendations for a rank-order list of high priority target groups for vaccination. The order of these groups is based on a number of objectives, including the need to maintain those elements of community infrastructure that are essential to treating persons severely ill with the flu, limiting mortality among persons at high risk for complications if they get the flu, reducing morbidity in the general population, and minimizing social disruption and economic loss that occur with such catastrophic events. The priority groups might change if there are unique epidemiological characteristics associated with the pandemic strain (e.g., the 1918 pandemic strain caused a large number of deaths among working adults). (See appendix for CDC's current priority list.) One of the highest priority groups will be "health care workers providing direct patient care services." Hospitals will need to prepare a plan for identifying which of their employees who provide direct patient care will be the first to be immunized, as the vaccine will be distributed incrementally, based on the amount available. The Hospital Dispensing and Vaccinating (DVC) planning template that you have already received should assist you in this effort. Only those hospitals that have such plans will be given vaccine during the initial stages of vaccine distribution. Available vaccine will be distributed fairly, based on factors such as a hospital's bed capacity or level of care provided.

3.4 Use of Antivirals During an Influenza Pandemic

Antiviral availability in the early phase(s) of the pandemic is uncertain. When available, antivirals will be provided according to priority groups set by recommendations from the state. At this time, health care workers and those trainees, volunteers, etc. who are recruited to perform the duties of a HCW are considered to be a high priority. Relative priorities regarding target groups and the use of limited supplies for chemoprophylaxis versus therapy have not yet been established. However, WHO is recommending the use of antivirals for **treatment only**. In general, priority groups for receipt of antiviral agents should be consistent with priorities for vaccine administration. (Please see Vaccine Priority Group List above)

3.5 Occupational Health Management of Health Care Workers During an Influenza Pandemic



The phrases “fit for work,” “unfit for work” and “fit to work with restrictions” are used by Occupational Health to communicate a worker’s ability to remain at or return to work depending upon their susceptibility to influenza, immunization status and agreement to use antiviral. During the early phases of a pandemic, vaccine and antiviral availability will be limited and will be provided to priority groups. Health Care Workers, those trainees, volunteers, etc. who are recruited to perform the duties of a HCW, are to be one of the priority groups.

3.5.1 Recommendations

1. Fit for Work

- (a) Ideally, HCWs are fit to work when one of the following conditions apply:
 - i They have recovered from ILI (see glossary for definition and ILI Assessment Tool, Appendix III) illness during earlier phases of the pandemic;
 - ii They have been immunized against the pandemic strain of influenza
 - iii They are on appropriate antivirals.

Such HCWs may work with all patients and may be selected to work in units where there are patients who, if infected with influenza, would be at high risk for complications.

- (b) Whenever possible, well, unexposed HCWs should work in non-influenza areas.
- (c) Asymptomatic HCWs may work even if influenza vaccine and antivirals are unavailable. Meticulous attention should be paid to hand hygiene and HCWs should avoid touching mucous membranes of the eye and mouth to prevent exposure to the influenza virus and other infective organisms.

2. Unfit for Work

Ideally, staff with ILI should be considered “unfit for work” and should not work; nonetheless, due to limited resources, these HCWs may be asked to work if they are well enough to do so (see 3 (b) below).

3. Fit to Work with Restrictions

- (a) Ideally, symptomatic staffs who are considered “fit to work with restrictions” should only work with patients with ILI. Health Care Workers who must work with non-exposed patients (non-influenza areas) should be required to wear a mask if they are coughing and must pay meticulous attention to hand hygiene.
- (b) Symptomatic HCWs who are well enough to work should not be redeployed to intensive care areas, nurseries or units with severely immunocompromised patients, i.e., transplant recipients, hematology/oncology patients, patients with chronic heart or lung disease, or patients with HIV/AIDS and dialysis patients.

3.6 Hospital Surveillance for Pandemic Influenza

- (a) During the Interpandemic and Pandemic Alert Periods, healthcare providers and healthcare facilities play an essential role in surveillance for suspected cases of infection with novel strains of influenza and should be on the alert for such cases. Novel strains may include avian



or animal influenza strains that can infect humans (like avian influenza A [H5N1]) and new or re-emergent human viruses that cause cases or clusters of human disease. For detection of cases during the Interpandemic and Pandemic Alert Periods, hospitals should have:

- Procedures in place to facilitate laboratory testing on-site using proper biosafety levels and reporting of unusual influenza isolates through local health department channels. If appropriate methods or biosafety levels do not exist at the hospital, specimens should be shipped to the county health department. Contact Los Angeles County Health Department Laboratory at (562)-401-8991.
- Predetermined thresholds for activating pandemic influenza surveillance plans (see Appendix VII).

(b) During the Pandemic Period, healthcare providers and healthcare facilities will play an essential role in pandemic influenza surveillance. For detection of cases during the Pandemic Period, hospitals should have:

- Mechanisms for conducting surveillance in emergency departments to detect any increases in influenza-like illness (see box below) during the early stages of the pandemic
- Mechanisms for monitoring employee absenteeism for increases that might indicate early cases of pandemic influenza
- Mechanisms for tracking emergency department visits and hospital admissions and discharge of suspected or laboratory-confirmed pandemic influenza patients. This information will be needed to:
 - support local public health personnel in monitoring the progress and impact of the pandemic
 - assess bed capacity and staffing needs
 - detect a resurgence in pandemic influenza that might follow the first wave of cases
- Updated information on the types of data that should be reported to the health departments (e.g., admissions; discharges/deaths; patient characteristics such as age, underlying disease, and secondary complications; illnesses in healthcare personnel) and plans for how these data will be collected during a pandemic.

The Los Angeles County Health Department Acute Communicable Disease Control Program will provide guidance as follows:

- Influenza is **NOT** a reportable disease in Los Angeles County.
- Individual cases of influenza should not be reported to the Department of Health

Exceptions include:

- **Influenza and respiratory illness outbreaks should be reported immediately by phone. Morbidity Unit 888-397-3993**
- **Influenza-related pediatric ICU cases and pediatric deaths should be reported by phone, as soon as possible after laboratory confirmation of influenza. Acute Communicable Disease Control 213-240-7941 M-F 8am to 5pm.**

Symptoms of influenza include fever, headache, myalgia, prostration, coryza, sore throat, and cough. Nausea and vomiting are also commonly reported among children. Typical influenza (or “flu-like”) symptoms, such as fever, may not always be present in elderly patients, young children, patients in long-term care facilities, or persons with underlying chronic illnesses.



4. Pandemic Influenza Education

4.1 Pandemic Influenza Education for Health Care Workers (Including Emergency Medical Services, mortuary workers, and HCWs in correctional settings)

Recommendations

1. Educational information for workers should be provided as soon as WHO Pandemic Phase 3 is declared (see Appendix I) and repeated at frequent intervals to all staff levels and during all shifts.
2. The pandemic influenza information should be appropriate to the audience and be provided using a variety of methods, e.g., postings in elevators, at facility entrances, brochures, newsletters and web sites.
3. The educational information prepared and provided for workers should include:
 - a. An explanation that pandemic influenza is a novel strain of influenza and what a pandemic is;
 - b. The facility-specific pandemic influenza plan;
 - c. The difference between an upper respiratory infection and influenza;
 - d. The mode of influenza transmission (see Section 2.4);
 - e. The criteria for determining, influenza-like-illness (ILI) (see glossary for definition and Appendix III for an ILI Assessment Tool) and influenza (see glossary for definition);
 - f. The risk of infection and subsequent complications in high-risk groups;
 - g. The message that **strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during early phases of the pandemic** (see Appendix II);
 - h. Information about the importance of hygienic measures (see Section 2.5) to minimize influenza transmission because influenza immunization and/or prophylaxis may not be available until later in the pandemic;
 - i. Information indicating that, during the early phase of an influenza pandemic, it may be feasible for HCWs to wear masks when face-to-face with coughing individuals to minimize influenza transmission (particularly when immunization and antivirals are not yet available) but not practical or helpful when transmission has entered the community (see Section 2.6). Masks may be worn by HCWs to prevent transmission of other organisms from patients with undiagnosed cough;
 - j. Who will be given the highest priority for immunization when vaccine is available;
 - k. The importance of being immunized and safety of immunization;
 - l. Who will be given what priority for prophylaxis when antivirals are available, the importance of prophylaxis and safety of prophylaxis.
4. Information about the importance of routine practices and additional precautions to prevent the transmission of infection during the delivery of health care in all health care settings during a pandemic. This information should include the caveat that some routine practice and additional precaution recommendations may be achievable only in the early phases of the pandemic and other recommendations may not be achievable as the pandemic spreads and resources (equipment, supplies and workers) become scarce.



5. Priority for infection control resources should be assigned to acute care settings because of the complexity of managing high risk patients in acute care settings.
6. HCWs should be provided with the recommendations for Occupational Health Management of workers during a pandemic (See Section 3.5).



PART B. MANAGEMENT OF PANDEMIC INFLUENZA IN ACUTE CARE HOSPITAL SETTINGS

1. Management of Pandemic Influenza in Acute Care Settings

Acute care settings group patients together who have a high risk of developing serious, sometimes fatal, complications related to influenza. In addition, morbidity and mortality related to hospital-acquired (i.e., nosocomial) infections is much greater in acute care populations than in other populations.

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases in the acute care setting with or without availability of immunization or chemoprophylaxis.

Recommendations

1.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to recommendations for vaccine and antivirals for patients and HCWs, as outlined in Vaccine and Antiviral Sections, is of paramount importance.

1.2 Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic Phase 6 is declared (see Appendix I), open Triage Settings in acute care hospitals.
2. When Pandemic Phase 6 is declared (see Appendix I) open cohort areas/units in the hospital (See Sections F. and G. below).

B. Management of Staff

1. Provide education, as outlined in Section 4.1.
2. Adhere to Occupational Health Management, as outlined in Section 3.5.

C. Infection Control Practices

Routine Practices

Using a program to prevent hospital-acquired (i.e., nosocomial) infections, acute care facilities should adhere to own hospital infection control guidelines (routine practices and precautions for preventing transmission of infection).

Surge Capacity Plans



Healthcare facilities should plan ahead to address emergency staffing needs and increased demands for isolation wards, ICUs, assisted ventilation services, and consumable and durable medical supplies. All healthcare facilities should have surge capacity plans according to JCAHO standards.

Additional Precautions

Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic. Routine Practices are summarized below:

- (a) Hand Hygiene Staff, patients and visitors should **recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.**
 - i. Hand hygiene procedures should be reinforced according to Appendix II.
 - ii. Hands should be washed or hand antisepsis performed after direct contact with patients/workers with ILI and after contact with their personal articles or their immediate environment.

- (b) Hygiene Measures to Minimize Influenza Transmission
 - i. Patients, staff and visitors should be encouraged to minimize potential influenza transmission through good hygienic measures, e.g., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

- (c) Personal Protective Equipment (PPE)
 - i. Masks
 1. **Masks to minimize the transmission of influenza may be worn** when face-to-face with coughing individuals during the early phases of the pandemic but are not practical or helpful when influenza transmission has entered the community.
 2. **Masks should be worn to prevent the transmission of other organisms** when HCWs are face-to-face with undiagnosed cough patients.
 3. Masks and eye protection, or face shields **should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose^{5,22,23}.
 4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.
 5. Use masks, as outlined in Section 2.6.

 - ii. Gloves
 1. Gloves are not required for the routine care of patients suspected or confirmed to have influenza. Meticulous hand washing with soap and water or performing hand antisepsis will inactivate the virus.
 2. Gloves **should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous



membranes to reduce the potential transfer of microorganisms from infected patients to HCWs and from patient-to patient via HCWs' hands.

3. Gloves **are necessary** for HCWs with open lesions on their hands when providing direct patient care.
 4. Gloves **should be** used as an additional measure, not as a substitute for hand Hygiene.
 5. Gloves should not be reused or washed.
- iii. Gowns
1. Gowns are not required for the routine care of patients suspected of confirmed to have influenza.
 2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions.
 3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly, but gently with soap and warm running water.

(d) Cleaning, Disinfection, and Sterilization of Patient Care Equipment

- i. Acute care settings should adhere to the recommendations for cleaning, disinfection and sterilization of patient care equipment.
- ii. Follow standard facility procedures for care of the deceased. Practices should include standard precautions for contact with blood and body fluids.

(e) Environmental Control (Housekeeping, Laundry, Waste)

- i. Acute care settings should adhere to the recommendations for housekeeping, laundry and waste management.
- ii. Equipment and surfaces contaminated with secretions from patients suspected or confirmed to have influenza should be cleaned before use with another patient.
- iii. Special handling of linen or waste contaminated with secretions from patients suspected or confirmed to have influenza is not required.

D. Equipment and Supplies

Maintaining equipment and supplies to support key activities during the first stages of a pandemic influenza will be essential for containing the disease and controlling the pandemic. During a pandemic, local supply inventories should be reassessed.

Critical equipment shortages will occur in areas of respiratory care, particularly mechanical ventilation. Hospitals that routinely supplement the number of ventilators they own by renting additional units may find these resources are not available in a pandemic influenza. It may be possible to shift some resources between areas because a pandemic will not affect all areas simultaneously; these may be feasible if a pandemic wave has already passed through a community and ventilators become available.

Supplies important to infection control and supportive care that may be in short supply and should be monitored during a pandemic influenza include the following:

- Hand hygiene
- Gloves



- Gowns
- Goggles
- Surgical masks
- N-95 masks
- Disposable tissues
- Pharmaceuticals such as antivirals and antibiotics (to treat secondary bacterial infections)
- Stethoscopes and BP cuffs
- Sanitary wipes

E. Accommodation

1. Single rooms in acute care settings² are limited and should be for those suspected of having or confirmed to have airborne infections, e.g., tuberculosis, measles, varicella and disseminated zoster and those who visibly soil the environment for whom appropriate hygiene cannot be maintained.
2. Minimize crowding (i.e., maintain a one meter spatial separation) between patients, visitors and workers whenever possible.

F. Patient Triage/Cohorting

1. When Pandemic Phase 6 is declared (see Appendix I) open the following specified *cohort areas/units* in the hospital:
 - a. **Influenza-Like-Illness (ILI), Assessment Area** (see Glossary for definition and Appendix III for an ILI Assessment tool).
 - b. **Non ILI Assessment Area** (patients require acute care assessment for other conditions).
 - c. **Suspected/Exposed to ILI, In-patient Units.**
 - d. **Confirmed Influenza** (see Glossary for definition), In-patient Units.
 - e. **Not Exposed/Immune* to Influenza, In-patient Units.**
 - f. **Not Exposed to ILI but at very high risk of complications, In-patient Units** (e.g., intensive care areas; nurseries¹³⁻¹⁵ or units with severely immunocompromised patients, e.g., transplant recipients hematology/oncology patients, patients with chronic heart or lung disease or patients with HIV/AIDS and dialysis patients).

Note: *Immune are those recovered from the pandemic strain of influenza or those immunized against the pandemic strain of influenza (see Section 3.2.4). As noted, the influenza vaccine may not be 100% efficacious in providing immunity.

2. In acute care settings, (hospitals), triage ILI patients promptly to a separate designated influenza assessment area onsite, to minimize transmission to others in the waiting room.
3. In acute care settings, (hospitals), triage non ILI patients (but requiring acute care assessment) promptly to specific non ILI waiting and examining areas physically separate from the ILI assessment area to prevent their exposure to ILI.

G. Patient Admission



1. When Pandemic Phase 6 is declared (see Appendix I), eliminate or curtail elective medical and surgical acute care (hospital) admissions and restrict cardiovascular and pulmonary surgery to emergency cases.
2. Patients who have recovered from influenza can be moved into the “Non Influenza” cohort areas after the period of communicability of the pandemic strain has passed.
3. As the pandemic progresses, the “Suspect/Exposed” Cohort and the “Confirmed Influenza” cohort may be merged.
4. Maintain cohort principles until the pandemic wave has been declared over.
5. Follow standard facility procedures for care of the deceased. Practices should include standard precautions for contact with blood and body fluids.

H. Patient Activity Restrictions

1. Limit movement/activities of patients including transfers within the hospital, unless the patient has recovered from pandemic influenza.
2. Patients with ILI who are coughing should only leave their room for urgent/necessary procedures.
3. Patients with ILI who are coughing should wear a surgical mask whenever they need to be out of their room until the period of communicability of the pandemic strain has passed.

I. Visitor Restrictions

1. There are no restrictions for asymptomatic visitors who have recovered from pandemic influenza or who have been immunized against the pandemic strain of influenza.
2. Visitors with ILI should not visit until they are asymptomatic. Close relatives of terminally ill patients can be exempt, but should put a mask on upon entry into the facility and their visit shall be restricted to that patient only.
3. Visitors should be informed when the acute care facility has influenza activity. Those who have not yet had the pandemic strain of influenza or who have not been immunized against the pandemic strain should be discouraged from visiting. Close relatives of terminally ill patients can be exempt, but they should restrict their visit to that individual only and they should wash their hands on exit from the patient’s room. Wearing a mask upon entry to the facility is only useful if there is no influenza in the community.

J. Security

1. Healthcare facilities should plan for additional security. This may be required given the increased demand for services and possibility of long wait times for care or their families, and because triage or treatment decisions may lead to people not receiving the care they think they require.



K. Mortuary Issues

1. To prepare for the possibility of mass fatalities during an influenza pandemic, hospitals should do the following:
 - Assess current capacity for refrigeration of deceased persons.
 - Discuss mass fatality plans with the department of coroner.
 - Work with the department of coroner to identify temporary morgue sites.
 - Determine the scope and volume of supplies needed to handle and increased number of deceased persons.

L. Laboratory Specimens and Practices

1. Follow standard facility and laboratory practices for the collection, handling, and processing of laboratory specimens.



Glossary of Terms

Antiseptic hand rub	A waterless, antiseptic hand rub product that is applied to all surfaces of the hands to reduce the number of microorganisms present.
Biomedical waste	Waste that is generated by human or animal health care facilities, medical or veterinary settings, health care teaching establishments, laboratories, and facilities involved in the production of vaccines.
Cleaning	The physical removal of foreign material, e.g., dust, soil, organic material such as blood, secretions, excretions and microorganisms. Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action. In certain settings, (e.g., central service or dietetics), the terms decontamination and sanitation may be used for this process. Cleaning reduces or eliminates the reservoirs of potential pathogenic organisms. Cleaning agents are the most common chemicals used in housekeeping activity.
Cohort	Two or more patients exposed to, or infected with, the same organism who are separated physically (e.g., in a separate room or ward) from other patients who have not been exposed to, or infected with, that organism.
Cohort staffing	The practice of assigning specific personnel to care only for patients/residents known be exposed to, or infected with, the same organism. Such personnel would not participate in the care of patients/residents who have not been exposed to, or infected with, that organism.
Contact transmission	Includes direct contact, indirect contact and droplet transmission as described below: <ul style="list-style-type: none"> • Direct contact occurs when the transfer of microorganisms results from direct physical contact between an infected or colonized individual and a susceptible host (body surface to body surface). • Indirect contact involves the passive transfer of microorganisms to a susceptible host via an intermediate object such as contaminated hands that are not washed between patients, contaminated instruments or other inanimate objects in the patient's immediate environment.
Critical items	Instruments and devices that enter sterile tissues, including the vascular system. Critical items present a high risk of infection if the item is contaminated with any microorganism, including bacterial spores. Reprocessing critical items, such as surgical equipment or intravascular devices, involves meticulous cleaning followed by sterilization.
Droplet	Refers to large droplets, greater than or equal to 5m in diameter, generated from the respiratory tract of the source patient during coughing or sneezing, or during procedures such as suctioning or bronchoscopy. These droplets are propelled a short distance, less than 1 meter, through the air and deposited on the nasal or oral mucosa of the new host.



Decontaminate hands	The reduction of bacterial counts on hands is accomplished by performing an antiseptic hand rub or antiseptic hand wash.
Decontamination	The removal of disease-producing microorganisms to leave an item safe for further handling.
Disinfection	The inactivation of disease-producing microorganisms. Disinfectants are used on inanimate objects; antiseptics are used on living tissue. Disinfection does not destroy bacterial spores. Disinfection usually involves chemicals, heat or ultraviolet light. Levels of chemical disinfection vary with the type of product used.
Exposure	The condition of being subjected to a microorganism or an infectious disease in a manner that enables transmission to occur.
Fit for Work	Terminology used in occupational health to communicate a worker's ability to remain at or return to work. This ability includes three categories: fit for work, unfit for work, fit with restrictions. This categorization allows the occupational health nurse to maintain confidentiality about a worker's diagnosis, symptoms, immune status, etc. <ul style="list-style-type: none"> • Fit for Work - Fit to work with no restrictions • Unfit for Work – Defined as a restriction from patient care tasks, co-worker contact and restriction from the workplace • Fit for work with restrictions - Allows for the re-assignment of duties or re-integration into the workplace in a manner that will not pose an infection risk to the HCW or to the patients and or other individuals in the workplace
Hand antisepsis	This term refers to either antiseptic hand wash or antiseptic hand rub. A process for the removal or reduction of resident and transient microorganisms.
Hand hygiene	A general term that applies either to hand washing, an antiseptic hand wash, an antiseptic hand rub, or a surgical hand antisepsis.
Hand washing	Washing hands with plain (i.e., non-antimicrobial) soap and water. A process for the removal of soil and transient microorganisms from the hands.
Health Care Worker (HCW)	HCWs are professionals, including trainees, and retirees, nonprofessionals and volunteers, involved in direct patient care; and/or those working/volunteering in designated health care facilities or services. For the purposes of this definition, HCWs are those whose functions are essential to the provision of patient care, and who may have the potential for acquiring or transmitting infectious agents during the course of their work.
High level disinfection	This term refers to the level of disinfection required when processing semi critical items. High level disinfection processes destroy vegetative bacteria, mycobacteria, fungi and enveloped (lipid) and non-enveloped (non-lipid) viruses, but not necessarily bacterial spores. High level disinfectant chemicals (also called chemisterilants) must be capable of sterilization when contact time is extended. Items must be thoroughly cleaned prior to high level disinfection.
Infectious waste	The portion of biomedical waste that is capable of producing



	infectious disease.
Influenza	<p>Clinical Case Definition of Influenza When influenza is circulating in the community, the presence of fever and cough of acute onset are good predictors of influenza. The positive predictive value increases when fever is higher than 38 °C and when the time of onset of the clinical illness is acute (less than 48 hours after the prodromes). Other symptoms, such as sore throat, rhinorrhea, malaise, rigors or chills, myalgia and headache, although unspecific, may also be present.</p> <p>Confirmed Case of Influenza Confirmed cases of influenza are those with laboratory confirmation (i.e., virus isolation from respiratory tract secretions, identification of viral antigens or nucleic acid in the respiratory tract, or a significant rise in serum antibodies) or clinical cases with an epidemiological link to a laboratory confirmed case.</p> <p>Influenza-Like-Illness (ILI) For surveillance purposes, the ILI definition currently used in Canada says:</p> <ul style="list-style-type: none"> • Acute onset of respiratory illness with fever (>38_ C) and cough and with one or more of the following: sore throat, arthralgia, myalgia or postration, which could be due to influenza virus
Intermediate level disinfection	The level of disinfection required for some semi critical items. Intermediate level disinfectants kill vegetative bacteria, most viruses and most fungi but not resistant bacterial spores.
Low level disinfection	The level of disinfection required when processing noncritical items or some environmental surfaces. Low level disinfectants kill most vegetative bacteria and some fungi as well as enveloped (lipid) viruses (e.g., hepatitis B, C, Hantavirus, and HIV). Low level disinfectants do not kill mycobacteria or bacterial spores. Low level disinfectants-detergents are used to clean environmental surfaces.
Mask	A barrier covering the nose and mouth to protect the mucous membranes from microorganisms contained in large droplet particles (> 5 m in size) generated from a source person during coughing, sneezing, or talking and during the performance of certain procedures that generate droplets (e.g., suctioning) or are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Masks may also be used to contain large droplet particles generated by coughing or sneezing persons. The term mask in this document refers to surgical masks, not to special masks, such as high efficiency dust/mist masks or respirators.
Noncritical items	Items that either touch only intact skin but not mucous membranes or do not directly touch the patient/resident/client. Reprocessing of noncritical items involves cleaning and or low level disinfection.
Non traditional	Non-traditional health care settings are those settings that are



health care settings	predetermined for operation prior to an influenza pandemic and operational only when an influenza pandemic is declared by the World Health Organization (WHO).
Plain soap	Products that do not contain antimicrobial agents, or contain very low concentrations of antimicrobial agents that are effective solely as preservatives.
Personal protective equipment (PPE)	Attire used by the worker to protect against airborne or droplet exposure and exposure to blood and bloody body fluids, i.e., masks, eye goggles, face shields, gloves and gowns.
Precautions	Interventions implemented to reduce the risk of transmission of microorganisms from patient to patient, patient to health care worker, and health care worker to patient ² .
Semicritical items	Devices that come in contact with non-intact skin or mucous membranes but ordinarily do not penetrate them. Reprocessing semi critical items involves meticulous cleaning followed preferably by high-level disinfection.
Sterilization	The destruction of all forms of microbial life including bacteria, viruses, spores and fungi. Items must be cleaned thoroughly before effective sterilization can take place.
Traditional health care settings	Traditional settings include acute, long term, ambulatory and community care.



Comparison of seasonal, avian and pandemic influenza

	Seasonal Flu	Avian A (H5N1) Flu	Pandemic Flu	IMPLICATIONS
Transmission	Large droplet and fomites.	Direct, prolonged contact with infected birds.	Large droplet and fomites.	
Infectious Period	<ul style="list-style-type: none"> Adults=1 day prior to symptom onset, 5 days post illness Children=10 days Immune compromised shed for weeks to months 	No human-to-human spread.	??? Likely similar to seasonal flu, but unknown.	Complicates the use of quarantine and isolation and use of masks for protection.
Prevention & Treatment	<ul style="list-style-type: none"> Annual vaccination Respiratory hygiene Four antivirals for treatment and prophylaxis (However, viral strains are becoming resistant.) 	<ul style="list-style-type: none"> Avoid infected birds Antivirals—two types currently effective, but resistance is a pending issue. 	??? No vaccine currently exists; the effectiveness of antivirals is unknown.	Still using a 1950's model for vaccine production. Availability and effectiveness of antivirals for pandemic flu are uncertain.
When occur and how spread?	Winter seasons; Northern/Southern Hemispheres	Following migratory pattern. The number of countries identifying infected birds is constantly increasing.	??? Year-round without warning; rapid worldwide spread.	Most important differentiating factor; pandemic flu will be unpredictable!
Who seriously affected?	<ul style="list-style-type: none"> Elderly Young children Chronic conditions 	Those with contact with infected birds: Poor, young, rural areas. Most have been from Viet Nam and Indonesia.	EVERYONE! Including the young and healthy.	Could greatly impact community infrastructure.
How many affected?	In US... Varies each season, on average 36,000 excess deaths and 200,000 hospitalizations each year.	Since 2003, 169 cases and 91 deaths (WHO report, as of 2/13/06)	In US... 314,000–734,000 hospitalizations and 89,000–207,000 deaths.*	Can have a devastating impact on hospitals, funeral homes, etc.



Appendix 1

World Health Organization (WHO) Definition of Preparedness Levels

Stages of Pandemic Influenza	
Pandemic Phase	Definition
Interpandemic Stage	<p>Phase 1. No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human infection or disease is considered to be low.</p> <p>Phase 2. No new influenza virus subtypes. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.</p>
Pandemic Alert Period	<p>Phase 3. Human infection(s) with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact.</p> <p>Phase 4. Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans.</p> <p>Phase 5. Larger cluster(s) but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fully transmissible (substantial pandemic risk).</p>
Pandemic Period	<p>Phase 6. Pandemic phase: increased and sustained transmission in general population.</p>
Postpandemic Period	Return to interpandemic period.



Appendix 2

Hygiene Procedures

A. How to Wash Hands (using non antimicrobial soap and antimicrobial soap)

Remove jewelry before hand wash procedure ^{56,57} .
Rinse hands under warm running water. Rationale: This allows for suspension and washing away of the loosened microorganisms.
Lather with soap and, using friction, cover all surfaces of the hands and fingers. Rationale: The minimum duration for this step is 10 seconds ⁵⁸ ; more time may be required if hands are visibly soiled. For antimicrobial agents 3-5mL are required ⁵⁶ . Frequently missed areas are thumbs, under nails, backs of fingers and hands.
Rinse under warm running water. Rationale: To wash off microorganisms and residual hand washing agent.
Dry hands thoroughly with a single-use towel. Drying achieves a further reduction in number of microorganisms ^{58,60} . Re-useable towels are avoided because of the potential for microbial contamination.
Turn off faucet without re-contaminating hands, e.g., use single use towel. Rationale: To avoid re-contaminating hands
Keep fingernails short ^{61,62} and do not use fingernail polish or artificial nails. Rationale: Chipped nail polish may increase bacterial load ⁶² . Artificial nails including wraps, acrylics or tips increase bacterial load ⁶³⁻⁶⁵ . Nail polish and artificial nails impede visualization of soil under nails.

Adapted from Health Canada Infection Control Guidelines: Hand Washing, Cleaning, Disinfection and Sterilization in Health Care, 1998³.

B. Decontaminating Hands with an Alcohol-based Hand Rub

To decontaminate hands that are not visible soiled* using an alcohol-based hand rub:

- Follow the manufacturer's recommendations on the volume of product to use;
- Apply product to palm of one hand and rub hands together, covering all surfaces of hands and finger, until hands are dry.

Note: * Hand wash if hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids by washing with either a non-antimicrobial soap and water or an antimicrobial soap and water as outlined in Appendix II A, How to Wash Hands.

Adapted from guideline for hand hygiene in health-care settings: recommendations of the healthcare infection control practices advisory committee and the HICPAC/SHEA/APIC/IDSA hand hygiene task force. MMWR 2002



C. Respiratory Hygiene / Cough Etiquette

Respiratory hygiene/cough etiquette has been promoted as a strategy to contain respiratory viruses at the source and to limit their spread in areas where infectious patients might be awaiting medical care (e.g., physician offices, emergency departments)

The elements of respiratory hygiene/cough etiquette include:

- Education of healthcare facility staff, patients, and visitors on the importance of containing respiratory secretions to help prevent the transmission of influenza and other respiratory viruses
- Posted signs in languages appropriate to the populations served with instructions to patients and accompanying family members or friends to immediately report symptoms of a respiratory infection as directed
- Source control measures (e.g., covering the mouth/nose with a tissue when coughing and disposing of used tissues; using masks on the coughing person when they can be tolerated and are appropriate)
- Hand hygiene after contact with respiratory secretions, and Spatial separation, ideally >3 feet, of persons with respiratory infections in common waiting areas when possible.
- Provide supplies of tissues and alcohol hand rub in common waiting areas of the hospital and Emergency Department with proper disposal receptacles.
- Copies of cover your cough posters may be obtained from the Los Angeles County Public Health website <http://lapublichealth.org/acd/flu.htm>



Appendix 3

An Influenza-like Illness (ILI) Assessment Tool

An ILI assessment tool is to be used for immediate triage of patients or staff and for accommodation/cohort of patients prior to further OH or clinical management. This is not intended to be used as a clinical management tool.

ILI Assessment Tool

Please check the following.

ILI in the general population is determined by the presence of 1, 2 and 3 and any of 4., a–f, which could be due to influenza virus:

- ___ () 1. Acute onset of respiratory illness
- ___ () 2. Fever (>38 C)*
- ___ () 3. Cough
- ___ () 4. One or more of the following:
 - ___ () a. sore throat
 - ___ () b. arthralgia
 - ___ () c. myalgia or prostration
 - ___ () d. diarrhea**
 - ___ () e. vomiting**
 - ___ () f. abdominal pain*

* May not be present in elderly people

** May be present in children

Adapted from the ILI surveillance definition currently used by Flu Watch for the 2002-2003 season⁴.



Appendix 4

Tables

Table A. Cleaning Procedures for Common Items

Surface/object	Procedure	Special considerations
Horizontal surfaces such as over bed tables, work counters, baby weigh scales, beds, cribs, mattresses, bedrails, call bells	<ol style="list-style-type: none"> 1. Thorough regular cleaning 2. Cleaning when soiled 3. Cleaning between patients/clients and after discharge 	Special procedures sometimes called carbolizing are not necessary. Some environmental surfaces may require low level disinfection (e.g., in nurseries, pediatric settings, critical care, burn units, emergency rooms, operating rooms and bone marrow transplantation facilities).
Walls, blinds, curtains	Should be cleaned regularly with a detergent and as splashes/visible soil occur.	
Floors	<ol style="list-style-type: none"> 1. Thorough regular cleaning 2. Cleaning when soiled 3. Cleaning between patients/clients and after discharge. Damp mopping preferred 	Detergent is adequate in most areas. Blood/body fluid spills should be cleaned up with disposable cloths followed by disinfection with a low level disinfectant.
Carpets/upholstery	Should be vacuumed regularly and shampooed as necessary.	
Toys	Should be regularly cleaned, disinfected with a low level disinfectant, thoroughly rinsed, and dried (between patients in acute care setting).	For pediatric settings, toys should be constructed of smooth, nonporous (i.e., not plush) materials to facilitate cleaning and decontamination. Do not use phenolics.
Toilets and commodes	<ol style="list-style-type: none"> 1. Thorough regular cleaning 2. Cleaning when soiled 3. Clean between patients/clients and after discharge. Use a low level disinfectant 	These may be the source of enteric pathogens such as <i>C. difficile</i> and <i>Shigella</i> .



Table B. Directions for Preparing and Using Chlorine-based Disinfectants

Product	Intended use	Recommended dilution	Level of available chlorine
Household bleach (5% sodium hypochlorite solution with 50,000 ppm* available chlorine)	Cleanup of blood spills	Use concentrations ranging from 1 part bleach to be mixed with 99 parts of tap water (1:100) or one part of bleach to be mixed with 9 parts of tap water (1:10), depending on the amount of organic material (e.g., blood or mucus) present on the surface to be cleaned and disinfected.	0.05% or 500 ppm 0.5% or 5,000 ppm
	To add to laundry water	One part (one 8 ounce cup) of bleach to be mixed with about 500 parts (28 gallons) of tap water	0.01% or 100 ppm
	Surface cleaning Soaking of glass-ware or plastic items	One part (one 8 ounce cup) to be mixed with about 50 parts (2.8 gallons) of tap water	0.1% or 1,000 ppm
NaDCC (Sodium dichloroisocyanurate) powder with 60% available chlorine	Cleanup of blood spills	Dissolve 2 Teaspoons in 33 ounces of tap water	0.85% or 5,000 ppm
Chloramine-T powder with 25% available chlorine	Cleanup of blood spills	Dissolve 1 Tablespoon and 1 Teaspoon in 33 ounces of tap water	2.0% or 5,000 ppm

* Parts per million

† Imperial gallon (4.5 liters)



Appendix 5

Frequently Asked Questions

Influenza (Flu)



Protect Yourself & Your Loved Ones

What is pandemic influenza (flu)?

An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or “emerges” in the human population, causes serious illness, and then spreads easily from person to person worldwide. Pandemics are different from seasonal outbreaks or “epidemics” of influenza. Seasonal outbreaks are caused by subtypes of influenza viruses that are already in existence among people, whereas pandemic outbreaks are caused by new subtypes or by subtypes that have never circulated among people or that have not circulated among people for a long time. Past influenza pandemics have led to high levels of illness, death, social disruption, and economic loss.

How does the pandemic influenza emerge?

There are many different subtypes of Influenza or “flu” viruses. The subtypes differ based upon certain proteins on the surface of the virus (the hemagglutinin or “HA” protein and the neuraminidase or the “NA” protein).

Pandemic viruses appear (or “emerge”) as a result of a process called “antigenic shift,” which causes an abrupt or sudden, major change in influenza A viruses. These changes are caused by new combinations of the HA and/or NA proteins on the surface of the virus. This change results in a new influenza A virus subtype. The appearance of a new influenza A virus subtype is the first step toward a pandemic, but the new virus subtype also must spread easily from person to person to cause a pandemic. Once a new pandemic influenza virus emerges and spreads, it normally becomes established among people and moves around or “circulates” for many years as seasonal epidemics of influenza. The U.S. Centers for Disease Control and Prevention and the World Health Organization have large surveillance programs to monitor and “detect” influenza activity around the world, including the emergence of possible pandemic strains of influenza virus.

What is the history of pandemic influenza?

During the 20th century, the emergence of new influenza A virus subtypes caused three pandemics, all of which spread around the world within 1 year of being detected.

- **1918-19, "Spanish flu,"** [A (H1N1)], caused the highest number of known influenza deaths: more than 500,000 people died in the United States, and up to 50 million people may have died worldwide. Many people died within the first few days after infection, and others died of complications later. Nearly half of those who died were young, healthy adults. Influenza A (H1N1) viruses still circulate today after being introduced again into the human population in the 1970s.
- **1957-58, "Asian flu,"** [A (H2N2)], caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957.



- **1968-69, “Hong Kong flu,”** [A (H3N2)], caused about 34,000 deaths in the United States. This virus was first detected in Hong Kong in early 1968 and spread to the United States later that year. Influenza A (H3N2) viruses still circulate today.

Both the 1957-58 and 1968-69 pandemics were caused by viruses containing a combination of genes from a human influenza virus and an avian influenza virus. The origin of the 1918-19 pandemic virus is not clear.

What are the stages of pandemic influenza?

Interpandemic period

Phase 1: No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human infection or disease is considered to be low.

Phase 2: No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.

Pandemic alert period

Phase 3: Human infection(s) with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact.

Phase 4: Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans.

Phase 5: Larger cluster(s) but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fully transmissible (substantial pandemic risk).

Pandemic period

Phase 6: Pandemic: increased and sustained transmission in general population.

Notes: The distinction between **phase 1** and **phase 2** is based on the risk of human infection or disease resulting from circulating strains in animals. The distinction is based on various factors and their relative importance according to current scientific knowledge. Factors may include pathogenicity in animals and humans, occurrence in domesticated animals and livestock or only in wildlife, whether the virus is enzootic or epizootic, geographically localized or widespread, and/or other scientific parameters.

The distinction between **phase 3**, **phase 4** and **phase 5** is based on an assessment of the risk of a pandemic. Various factors and their relative importance according to current scientific knowledge may be considered. Factors may include rate of transmission, geographical location and spread, severity of illness, presence of genes from human strains (if derived from an animal strain), and/or other scientific parameters.



Are there vaccines that can protect us against Pandemic Influenza?

A Vaccine probably would not be available in the early stages of a pandemic. When a new vaccine against an influenza virus is being developed, scientists around the world work together to select the virus strain that will offer the best protection against that virus, and then manufacturers use the selected strain to develop a vaccine. Once a potential pandemic strain of influenza virus is identified, it takes several months before a vaccine will be widely available. If a pandemic occurs, it is expected that the U.S. government will work with many partner groups to make recommendations to guide the early use of vaccine.

Are there enough vaccines available for everyone?

In the early stages of a pandemic, there may be no vaccine at all; when vaccine first becomes available the demand will likely exceed the supply. Because influenza vaccine availability will change during the course of a pandemic, response strategies will vary with vaccine supply. In view of the likely vaccine shortage, the U.S. Public Health Service, in conjunction with various advisory committees, is in the process of formulating recommendations for a rank-order list of high priority target groups for vaccination. The order of these groups will be based on the number of factors.

Once developed, the rank-order list will also be subject to change, potentially on short notice, depending on the epidemiologic and clinical features exhibited by the actual pandemic strain.

Are there antiviral medications to prevent and treat Pandemic influenza?

Four different influenza antiviral medications (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration for the treatment and/or prevention of influenza. All four work against influenza A viruses. However, sometimes influenza virus strains can become resistant to one or more of these drugs, and thus the drugs may not always work. For example, the influenza A (H5N1) viruses identified in human patients in Asia in 2004 and 2005 have been resistant to amantadine and rimantadine. Monitoring of avian viruses for resistance to influenza antiviral medications is continuing.

What are the symptoms of the flu?

Influenza is a respiratory illness. Symptoms of flu include fever, headache, extreme tiredness, dry cough, sore throat, runny or stuffy nose, and muscle aches. Children can have additional gastrointestinal symptoms, such as nausea, vomiting, and diarrhea, but these symptoms are uncommon in adults. Although the term "stomach flu" is sometimes used to describe vomiting, nausea, or diarrhea, these illnesses are caused by certain other viruses, bacteria, or possibly parasites, and are rarely related to influenza.

When is the flu season in the United States?

In the United States, the peak of flu season can occur anywhere from late December through March. The overall health impact (e.g., infections, hospitalizations, and deaths) of a flu season varies from year to year. CDC monitors circulating flu viruses and their related disease activity and provides influenza reports each week from October through May.

How does the flu spread?

The main way that influenza viruses are spread is from person to person in respiratory droplets of coughs and sneezes. (This is called "droplet spread.") This can happen when droplets from a cough or sneeze of an infected person are propelled (generally up to 3 feet) through the air and deposited on the mouth or nose of people nearby. Though much less frequent, the viruses also can be spread when a person touches respiratory droplets on another person or an object and



then touches their own mouth or nose (or someone else's mouth or nose) before washing their hands.

If I got the flu last year, will I have immunity against the flu this year?

In general, a person who is infected with an influenza virus one year will have some immunity to closely related viruses that may persist for one or more years. For example, if someone was infected with the Fujian strain of H3N2 that predominated last season, they are likely to have some natural immunity that will give them protection if they are exposed to that strain or a closely related strain again this season. The degree of protection depends on the health of the person involved. Young and healthy people with normal immune systems will likely have good immunity against the same or related strains of virus from one year to the next. However, people with chronic health problems or weakened immune systems are less likely to have immunity from year to year.

It's important to remember that there are different types of influenza viruses circulating and different variants within virus types, and the same type of flu virus does not necessarily circulate each year. For instance, during the 2003-04 flu season, influenza A (H3N2) viruses predominated; however, infection with an influenza A (H3N2) virus would not provide protection against influenza B or influenza A (H1N1) viruses.

Does the flu have complications?

Yes. Some of the complications caused by flu include bacterial pneumonia, dehydration, and worsening of chronic medical conditions, such as congestive heart failure, asthma, or diabetes. Children may get sinus problems and ear infections as complications from the flu. Those aged 65 years and older and persons of any age with chronic medical conditions are at highest risk for serious complications of flu.

How do I find out if I have the flu?

It is very difficult to distinguish the flu from other viral or bacterial causes of respiratory illnesses on the basis of symptoms alone. A test can confirm that an illness is influenza if the patient is tested within the first two to three days after symptoms begin. In addition, a doctor's examination may be needed to determine whether a person has another infection that is a complication of influenza.

How soon will I get sick if I am exposed to the flu?

The time from when a person is exposed to flu virus to when symptoms begin is about one to four days, with an average of about two days.

How long is a person with flu virus contagious?

The period when an infected person is contagious depends on the age of the person. Adults may be contagious from one day prior to becoming sick and for three to seven days after they first develop symptoms. Some children may be contagious for longer than a week.

How many people get sick or die from the flu every year?

Each flu season is unique, but it is estimated that, on average, approximately 5% to 20% of U.S. residents get the flu, and [more than 200,000 persons are hospitalized](#) for flu-related complications each year. About 36,000 Americans die on average per year from the complications of flu.

What is Avian Flu?



Influenza viruses that infect birds are called “avian influenza viruses.” Only influenza A viruses infect birds. All known subtypes of influenza A virus can infect birds. However, there are substantial genetic differences between the subtypes that typically infect both people and birds. Within subtypes of avian influenza viruses there also are different strains (described in “Strains”).

How does the avian flu spread?

Influenza A viruses are found in many different animals, including ducks, chickens, pigs, whales, horses, and seals. However, certain subtypes of influenza A virus are specific to certain species, except for birds which are hosts to all subtypes of influenza A. Subtypes that have caused widespread illness in people either in the past or the current period are H3N2, H2N2, H1N1, and H1N2. H1N1 and H3N2 subtypes have caused outbreaks in pigs and H7N7 and H3N8 viruses have caused outbreaks in Influenza A viruses normally seen in one species sometimes can cross over and cause illness in another species. For example, up until 1998, only H1N1 viruses circulated widely in the U.S. pig population. However, in 1998, H3N2 viruses from humans were introduced into the pig population and caused widespread disease among pigs.

Avian influenza viruses may be transmitted to humans in two main ways:

- Directly from birds or from avian virus-contaminated environments to people.
- Through an intermediate host, such as pig.

Can Avian Flu infect humans?

Although avian influenza A viruses do not usually infect humans, several instances of human infections and outbreaks of avian influenza have been reported since 1997. Most cases of avian influenza infection in humans are thought to have resulted from contact with infected poultry or contaminated surfaces. However, there is still a lot to learn about how different subtypes and strains of avian influenza virus might affect humans. For example, it is not known how the distinction between low pathogenic and highly pathogenic strains might impact the health risk to humans. Of the documented cases of human infection with avian influenza viruses, illnesses caused by highly pathogenic viruses appear to be more severe.

Because of concerns about the potential for more widespread infection in the human population, public health authorities closely monitor outbreaks of human illness associated with avian influenza. To date, human infections with avian influenza viruses detected since 1997 have not resulted in sustained human-to-human transmission. However, because influenza viruses have the potential to change and gain the ability to spread easily between people, monitoring for human infection and person-to-person transmission is important.

Example of Avian Influenza infections in humans

H5N1, Thailand and Vietnam, 2004 and 2005: Beginning in late June 2004, new lethal outbreaks of H5N1 among poultry were reported by several countries in Asia. The new outbreaks of H5N1 in poultry in Asia were followed by renewed sporadic reporting of human cases of H5N1 infection in Vietnam and Thailand beginning in August and continuing into 2005. Of particular note is one isolated instance of probable limited human-to-human transmission occurring in Thailand in September.

What are the symptoms of Avian Influenza?

The reported symptoms of avian influenza in humans have ranged from typical influenza-like symptoms (e.g., fever, cough, sore throat, and muscle aches) to eye infections (conjunctivitis), pneumonia, acute respiratory distress, viral pneumonia, and other severe and life-threatening complications.



Are there antiviral agents for Avian Influenza?

Like for pandemic influenza, there are four different influenza antiviral drugs (amantadine, rimantadine, oseltamivir, and zanamivir) are approved by the U.S. Food and Drug Administration (FDA) for the treatment and/or prophylaxis of influenza. All four have activity against influenza A viruses. However, sometimes influenza strains can become resistant to these drugs, and therefore the drugs may not always be effective. For example, analyses of some of the 2004 H5N1 viruses isolated from poultry and humans in Asia have shown that the viruses are resistant to two of the medications (amantadine and rimantadine). Monitoring of avian viruses for resistance to influenza antiviral medications is ongoing.

When do experts expect the next pandemic influenza?

Anytime. Pandemics are unpredictable in their timing but most experts agree that another one is likely to occur within the next 5 to 10 years. This is based on the historical patterns of pandemics - the average time elapsed between each of the last four pandemics was 25 years. It has been 34 years since the last pandemic.

What would happen during an Influenza Pandemic?

It is very difficult to estimate what might occur in the event of an influenza pandemic. Experts believe that pandemic influenza could reach United States within three months of being detected anywhere in the world. It would have its maximum effect on the U.S. population within 5-7 months.

What can we do to prevent an Influenza Pandemic?

With current knowledge, there is no way to prevent a pandemic from occurring. There are, however, ways to lessen the impact and to decrease the number of deaths.

A global network of laboratories and surveillance systems coordinated by the World Health Organization (WHO) is keeping a watchful eye for new influenza strains. When a suspected pandemic strain emerges, international surveillance will provide Canada with an early warning so that we can start vaccine production.

Immunization is the most effective way to minimize the impact of the pandemic on Angelenos.

Does LAC have a Pandemic Influenza Plan?

Yes. LAC DHS is working with federal, state, and local health partners to finalize the Pandemic Influenza Plan. It provides the basis for coordinated and collaborative preparations and action by LAC DHS, state, and other federal agencies in the event of a pandemic. If the plan is approved, it will be made available to the public shortly thereafter.

Is LAC's Public Health System as up to date as it could be?

Public health involves anticipation, readiness planning, careful monitoring and surveillance, effective research and diagnosis, as well as quarantine systems and medical care to contain an outbreak.

SARS in Canada and Asia showed us where the gaps are. The system is continually working on measures that will result in more support for frontline workers so that LAC has the tools needed to do the jobs effectively, better surveillance measures, stronger laboratory capacity and more research.



Will LAC have sufficient vaccine if there is a pandemic event?

In the early stages of a pandemic, there may be no vaccine at all; when vaccine first becomes available the demand will likely exceed the supply. Because influenza vaccine availability will change during the course of a pandemic, response strategies will vary with vaccine supply. The initial vaccine supply will be used to vaccinate the highest priority groups, as identified ahead of time by CDC and the California State Immunization Branch, during pre-pandemic planning.



Appendix 6

Health Care Facility Pandemic Influenza Planning Committee / Suggested by Health and Human Services (HHS)

Representatives for a hospital pandemic influenza planning committee may include:

- Hospital staff
- Administration/senior management (including fiscal officer)
- Legal counsel/risk management
- Infection control/hospital epidemiology
- Hospital disaster/emergency coordinator
- Engineering/physical plant/industrial hygiene/institutional safety
- Nursing administration
- Medical staff (including outpatient areas)
- Intensive-care unit
- Emergency department
- Laboratory services
- Respiratory therapy
- Nutrition and food services
- Pharmacy
- Environmental services (housekeeping, laundry)
- Public relations
- Security
- Materials management
- Education/training/staff development
- Occupational health
- Diagnostic imaging
- Information technology

- **Adjunct staff members**
- Infectious diseases
- Mental health (psychiatry, psychology)
- Union representatives
- Human resources
- Social work
- Director of house staff/fellowship and other training programs
- Critical care medicine
- Pathology

- **Local health departments**
- Communicable disease division
- Laboratory services
- Coroner

- **Community partners**
- Emergency medical technicians (“first responders”)
- Local law enforcement
- Funeral service personnel
- Community service agencies
- Coroner



- Federally qualified health centers (FQHC)* and other healthcare safety net providers**

*A federally qualified health center (FQHC) is a type of provider defined by the Medicare and Medicaid statutes. FQHCs include health centers receiving grants under section 330 of the Public Health Service Act, certain tribal organizations, and clinics designated by HHS as FQHC Look-Alikes. More information may be found at: <http://www.cms.hhs.gov/providers/fqhc/>

**Health care safety net providers deliver care to low income and other vulnerable populations, including the uninsured and those covered by Medicaid. Many of these providers have either a legal mandate or an explicit policy to provide services regardless of a patient's ability to pay (<http://www.ahcpr.gov/data/safetynet/faq.htm>). Major safety net providers include public hospitals and community health centers as well as teaching and community hospitals, and private physicians.



Appendix 7

Hospital Pandemic Influenza Plan Triggers / Suggested by Health and Human Services (HHS)

Interpandemic Period Phase 1 & 2

- Conduct planning
- Conduct education/training
- Conduct hospital surveillance for influenza

Pandemic Alert Period Phase 3

- Increase preparation
- Continue hospital surveillance for influenza
- **Influenza and respiratory illness outbreaks should be reported immediately by phone. Morbidity Unit 888-397-3993**
- **Influenza-related pediatric ICU cases and pediatric deaths should be reported by phone, as soon as possible after laboratory confirmation of influenza. Acute Communicable Disease Control 213-240-7941.**

Pandemic Period Outside the United States Phase 4 & 5

- Maintain contact with public health, healthcare, & community partners
- Implement hospital surveillance for pandemic influenza
- Implement a system for early detection and treatment of healthcare workers
- Reinforce infection control practices
- Review pandemic education/training

Pandemic Period Inside the United States Phase 5

- Implement surge capacity plan
- Increase supplies: hand hygiene supplies, disposable N95 masks, face shields, gowns, gloves, facial tissues, central line kits, morgue packs, ventilator, IV pumps, beds, respiratory care equipment
- Maintain contact with public health, healthcare, & community partners
- Post signs for respiratory hygiene/cough etiquette
- Maintain high suspicion that patients presenting with influenza could be infected with pandemic strain

Pandemic Period - Local Area Phase 6

- Emergency Department
 - Establish segregated waiting areas for patients with influenza symptoms
 - Implement phone triage to discourage ED/Outpatient visits
 - Enforce respiratory hygiene/cough etiquette
- Access Controls
 - Limit number of visitors
 - Screen visitors for signs & symptoms of influenza
 - Limit points of entry to facility
- Hospital Admissions
 - Defer elective admissions and procedures
 - Discharge patients as soon as possible



- Cohort patients admitted with influenza
- Monitor for nosocomial transmission
- Staffing Practices
 - Consider reassignment of pregnant & high risk staff for complications of influenza
 - Cohort staff caring for influenza patients
 - Consider assigning staff recovering from influenza to care for influenza patients
 - Implement system for detection and reporting signs & symptoms of influenza in staff reporting for duty
 - Provide staff with antiviral prophylaxis, according to HHS recommendations (supplement 7)
- Nosocomial Transmission
 - Close units where there has been nosocomial transmission
 - Cohort staff and patients
 - Restrict new admissions to affected units
 - Restrict visitors
- Widespread Transmission in community and hospital;
Patient admissions at surge capacity
 - Redirect personnel resources to support patient care
 - Recruit community volunteers
 - Consider placing on administrative leave all non-essential personnel who cannot be reassigned to support critical hospital services.



Appendix 8

HOSPITAL PREPAREDNESS CHECKLIST / Suggested by Health and Human Services (HHS)

1. Structure for planning and decision making

- An internal, multidisciplinary planning committee for influenza preparedness has been created.
- A person has been designated as the influenza preparedness coordinator.
(Insert name) _____
- 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 services _____
 - Respiratory therapy _____
 - Psychiatry _____
 - Environmental services _____
 - Public relations _____
 - Security _____
 - Materials management _____
 - Staff development _____
 - Occupational health _____
 - Diagnostic imaging _____
 - Pharmacy _____
 - Information technology _____
 - Other members _____
- A state or local health department person has been identified as a committee liaison.
(Insert name) _____
- A linkage with local or regional emergency preparedness groups has been established
(Planning organization) _____

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 organization 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

- A **surveillance plan** has been developed.
- Syndromic surveillance has been established in the emergency room.
- Criteria for distinguishing pandemic influenza is part of the syndromic surveillance plan.
- Responsibility has been assigned for reviewing global, national, regional, and local influenza activity trends and informing the pandemic influenza coordinator of evidence of an emerging problem. (Name _____)
- Thresholds for heightened local surveillance for pandemic influenza have been established.
- A system has been created for internal review of pandemic influenza activity in patients presenting to the emergency department.
- A system for monitoring for nosocomial transmission of pandemic has been implemented and tested by monitoring for non-pandemic influenza

- A **communication plan** has been developed.
- Responsibility for external communication has been assigned.
Person responsible for updating public health reporting _____
Clinical spokesperson for the facility _____
Media spokesperson for the facility _____
- Key points of contact outside the facility have been identified.
State health department contact _____
Local health department contact _____
Newspaper contact(s) _____
Radio contact(s) _____
Public official(s) _____
- A list of other healthcare facilities with whom it will be necessary to maintain communication has been established.
- A meeting with local healthcare facilities has been held to discuss a communication strategy.
- A plan for updating key facility personnel on a daily basis has been established. The person(s) responsible for providing these updates are:

A system to track pandemic influenza admissions and discharges has been developed and tested by monitoring non-pandemic influenza admissions and discharges in the community.
- A strategy for regularly updating clinical, ED, 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.
- Language and reading level-appropriate materials for educating all personnel about pandemic influenza and the facility's pandemic influenza plan, have been identified.



- Current and potential sites for long-distance and local education of clinicians on pandemic influenza have been identified.
 - Means for accessing state and federal web-based influenza training programs have been identified.
 - A system for tracking which personnel have completed pandemic influenza training is in place.
 - A plan is in place for rapidly training non-facility staff brought in to provide patient care when the hospital reaches surge capacity.
- The following groups of healthcare personnel have received training on the facility's influenza plan:
- Attending physicians
 - House staff
 - Nursing staff
 - Laboratory staff
 - Emergency Department personnel
 - Outpatient personnel
 - Environmental Services personnel
 - Engineering and maintenance personnel
 - Security personnel
 - Nutrition personnel
- A **triage and admission plan** has been developed.
- A specific location has been identified for triage of patients with possible pandemic influenza.
 - The plan includes use of signage to direct and instruct patients with possible pandemic influenza on the triage process.
 - Patients with possible pandemic influenza will be physically separated from other patients seeking medical attention.
 - A system for phone triage of patients for purposes of prioritizing patients who require a medical evaluation has been developed.
 - Criteria for determining which patients need a medical evaluation are in place.
 - 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.
- A **facility access plan** has been developed.
- 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.
- An **occupational health plan** has been developed.
- A system for rapidly delivering vaccine or antiviral prophylaxis to healthcare personnel has been developed.
 - The system has been tested during a non-pandemic influenza season.



- A method for prioritizing healthcare 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 healthcare 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 healthcare workers) has been developed.
 - Mental health and faith-based resources who will provide counseling to personnel during a pandemic have been identified.
 - A strategy for housing healthcare 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 **vaccine and antiviral use** plan has been developed.
 - A contact for obtaining influenza vaccine has been identified.
(Name) _____
 - A contact for obtaining antiviral prophylaxis has been identified.
(Name) _____
 - A priority list (based on HHS guidance for use of vaccines and antivirals in a pandemic when in short supply) and estimated number of patients and healthcare personnel who would be targeted for influenza vaccination or antiviral prophylaxis has been developed.
 - Number of first priority personnel _____
 - Number of second priority personnel _____
 - Number of remaining personnel _____
 - Number of first priority patients _____
 - Number of second priority patients _____
 - A system for rapidly distributing vaccine and antivirals to patients has been developed.
- Issues related to **surge capacity** have been addressed.
 - 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 has 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 healthcare personnel with out-of-state licenses.
- Legal counsel has made sure that any insurance and other liability concerns have been resolved.
- Criteria for declaring a “staffing crisis” that would enable the use of emergency staffing alternatives have been defined.
- The plan includes linking to local and regional planning and response groups to collaborate on addressing widespread healthcare staffing shortages during a crisis.
- A priority list for reassignment and recruitment of personnel has been developed.
- A method for rapidly credentialing newly recruited personnel has been developed.
- Mutual AID Agreements (MAAs) and Memoranda of Understanding/Agreement (MOU/As) have been signed with other facilities that have agreed to share their staff, as needed.
- Strategies to **increase bed capacity** have been identified
- A threshold has been established for canceling elective admissions and surgeries
- MOAs have been signed with facilities that would accept non-influenza patients in order to freeup bed space
- 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
- Anticipated **durable and consumable resource** needs have been determined
- A primary plan and contingency plan to address supply shortages has been developed
- Plans for obtaining limited resources have been discussed with local and regional planning and response groups.
- A strategy for handling increased numbers of deceased persons has been developed.
- Plans for expanding morgue capacity have been discussed with local and regional planning groups.
- Local morticians have been involved in planning discussions.
- Mortality estimates have been used to estimate the number of body bags and shrouds.
- Supply sources for postmortem materials have been identified.



Reference List

1. Boyce JM, Pittet D. Guideline for hand hygiene in health-care settings: recommendations of the healthcare infection control practices advisory committee and the HICPAC/SHEA/APIC/IDSA hand hygiene task force. *MMWR* 2002; 51(RR-16):1-47.
2. Valenti WM, Menegus MA. Nosocomial viral infections: IV. Guidelines for cohort isolation, the communicable disease survey, collection and transport of specimens for virus isolation, and considerations for the future. *Infect Control* 1981; 2(3):236-245.
3. Health Canada. Infection control guidelines for the prevention and control of occupational infections in health care. *CCDR* 2002; 28S1:1-264.
4. Health Canada. Fluwatch: definitions for the 2002-2003 seasons. *Fluwatch 2002-2003*, 1-2. 9-13-2002. Ref Type: Internet Communication.
5. Health Canada. Infection control guidelines for preventing the transmission of bloodborne pathogens in health care and public services settings. Part of the Infection Control Guidelines Series. *Canada Communicable Disease Report* 23S3, 1-42. 1997. Ref Type: Report.
6. Glezen WP. Emerging infections: pandemic influenza. *Epidemiol Rev* 1996;18(1):64-76.
7. Couch RB, Cate TR, Douglas RG, Gerone PJ, Knight V. Effect of route of inoculation on experimental respiratory viral disease in volunteers and evidence for airborne transmission. *Bacteriol Rev* 1966; 30:517-529.
8. Bean B, Moore BM, Sterner B, Peterson LR, Gerding DN, Balfour HH. Survival of influenza viruses on environmental surfaces. *J Infect Dis* 1982; 146:47-51.
9. Moser MR, Bender TR, Margolis HS, Noble GR, Kendal AP, Ritter DG. An outbreak of influenza aboard a commercial airliner. *Am J Epidemiol* 1979; 110(1):1-6.
10. Control of communicable diseases manual. 17th ed. ed. Washington, DC: American Public Health Association, 2000.
11. Committee on Infectious Diseases, American Academy of Pediatrics, Pickering LK, Peter G, Baker CJ, Gerber MA et al. 2000 Red Book: report of the committee on infectious diseases. 25 ed. Elk Grove Village, IL: American Academy of Pediatrics, 2000.
12. Centers for Disease Control and Prevention. Guidelines for prevention and control of pandemic influenza in healthcare institutions - draft - 03/23/00. 1-11. 3-23-2000. Ref Type: Report.
13. Munoz FM, Campbell JR, Atmar RL, Garcia-Pratz J, Baxter BD, Johnson LE et al. Influenza A virus outbreak in a neonatal intensive care unit. *Pediatr Infect Dis J* 1999; 18(9):811-815.
14. Meibalane R, Sedmak GV, Sasidharan P, Garg P, Grausz JP. Outbreak of influenza in a neonatal intensive care unit. *J Pediatr* 1977; 91(6):974-976.



15. Cunney RJ, Bialachowski A, Thornley D, Smaill F, Pennie RA. An outbreak of influenza A in a neonatal intensive care unit. *Infect Control Hosp Epidemiol* 2000; 21(7):449-454.
16. Keen-Payne R. We must have nurses. Spanish influenza in America 1918-1919. *Nur Hist Rev* 2000; 8:143-156.
17. Reichert TA, Sugaya N, Fedson DS, Glezen WP, Simonsen L, Tashiro M. The Japanese experience with vaccinating schoolchildren against influenza. *N Eng J Med* 2001; 344(12):889-896.
18. Jordan WS. The mechanisms of spread of Asian influenza. *Am Rev Respir Dis* 1961; 83(2S):29-40.
19. Glezen WP, Loda FA, Denny FW. A field evaluation of inactivated, zonal-centrifuged influenza vaccines in children in Chapel Hill, North Carolina, 1968-69. *Bull World Health Org* 1969; 41:566-569.
20. Glezen WP. Serious morbidity and mortality associated with influenza epidemics. *Epidemiol Rev* 1982; 4:25-44.
21. Munoz FM, Galasso GJ, Gwaltney JM, Hayden FG, Murphy B, Webster R et al. Current research on influenza and other respiratory viruses: II International Symposium. *Antiviral Res* 2000; 46(2):91-124.
22. Ricketts M, Deschamps L. Reported seroconversions to human immunodeficiency virus among workers worldwide - a review. *Can J Infect Control* 1992; 7(3):85-90.
23. Centers for Disease Control and Prevention. Update: human immunodeficiency virus infections in health care workers exposed to blood of infected patients. *MMWR* 1987; 36(19):285-289.
24. Olsen RJ, Lynch P, Coyle MB, Cummings J, Bokete T, Stamm WE. Examination gloves as barriers to hand contamination in clinical practice. *J Am Med Assoc* 1993; 270(3):350-353.
25. Doebbeling BN, Pfaller MA, Houston AK, Wenzel RP. Removal of nosocomial pathogens from the contaminated glove: implications for glove reuse and Hand washing. *Ann Intern Med* 1988; 109(5):394-398.
26. Simmons B, Trusler M, Roccaforte J, Smith P, Scott R. Infection control for home health. *Infect Control Hosp Epidemiol* 1990; 11(7):362-370.
27. Vandembroucke-Grauls CMJE, Baars ACM, Visser MR, Hulstaert PF, Verhoef J. An outbreak of *Serratia marcescens* traced to a contaminated bronchoscope. *J Hosp Infect* 1993; 23:263-270.
28. Kjolen H, Andersen BM. Handwashing and disinfection of heavily contaminated hands—effective or ineffective? *J Hosp Infect* 1992; 21:61-71.
29. Wade JJ, Desai N, Casewell MW. Hygienic hand disinfection for the removal of epidemic vancomycin-resistant *Enterococcus faecium* and gentamicin-resistant *Enterobacter cloacae*. *J Hosp Infect* 1991; 18:211-218.



30. Larson EL, Eke PI, Laughon BE. Efficacy of alcohol-based hand rinses under frequent-use conditions. *Antimicrob Agents Chemother* 1986; 30(4):542-544.
31. Immunizations and the vaccine-preventable diseases. In: O'Connell JJ, Groth J, editors. *The Manual of Common Communicable Diseases in Shelters*. Boston, MA: The Boston Foundation, 1991: 202-218.
32. A primer of communicable diseases. In: O'Connell JJ, Groth J, editors. *The Manual of Common Communicable Diseases in Shelters*. Boston, MA: The Boston Foundation, 1991: 29-47.
33. Drinka PJ, Krause P, Schilling M, Miller BA, Shult P, Gravenstein S. Report of an outbreak: nursing home architecture and influenza-A attack rates. *J Am Geriatr Soc* 1996; 44(8):910-913.
34. Bettin K, Clabots C, Mathie P, Willard K, Gerding DN. Effectiveness of liquid soap vs chlorhexidine gluconate for the removal of *Clostridium difficile* from bare hands and gloved hands. *Infect Control Hosp Epidemiol* 1994; 15(11):697-702.
35. Ehrenkranz NJ, Alfonso BC. Failure of bland soap hand wash to prevent hand transfer of patient bacteria to urethral catheters. *Infect Control Hosp Epidemiol* 1991; 12:654-662.
36. Larson E. A casual link between hand washing and risk of infection? Examination of the evidence. *Infect Control Hosp Epidemiol* 1988; 9:28-36.
37. Doebbeling BN, Stanley GL, Sheetz CT, Pfaller MA, Houston AK, Annis L et al Comparative efficacy of alternative hand-washing agents in reducing nosocomial infections in intensive care units. *N Eng J Med* 1992; 327(2):88-93.
38. Spach DH, Silverstein FE, Stamm WE. Transmission of infection by gastrointestinal endoscopy and bronchoscopy. *Ann Intern Med* 1993; 118(2):117-128.
39. Cryan EMJ, Falkiner FR, Mulvihill TE, Keane CT, Keeling PWN. *Pseudomonas aeruginosa* cross-infection following endoscopic retrograde cholangiopancreatography. *J Hosp Infect* 1984; 5:371-376.
40. O'Connor BH, Bennett JR, Sutton DR, Alexander JG, Leighton I, Mawer SL et al. Salmonellosis infection transmitted by fibreoptic endoscopes. *Lancet* 1982;864-866.
41. Kaczmarek RG, Moore RM, Jr., McCrohan J, Goldmann DA, Reynolds C, Caquelin C et al. Multi-state investigation of the actual disinfection/sterilization of endoscopes in health care facilities. *Am J Med* 1992; 92(3):257-261.
42. Rutala WA, Shafer KM. General information on cleaning, disinfection, and sterilization. In: Olmsted RN, editor. *APIC infection control and applied epidemiology: principles and practice*. St. Louis: Mosby, 1996:1-16.
43. Maki DG, Botticelli JT, LeRoy ML, Thielke TS. Prospective study of replacing administration sets for intravenous therapy at 48- vs 72-hour intervals: 72 hours is safe and cost-effective. *J Am Med Assoc* 1987; 258:1777-1781.



44. Gordon SM, Tipple M, Bland LA, Jarvis WR. Pyrogen reactions associated with the reuse of disposable hollow fibre hemodialyzers. *J Am Med Assoc* 1988; 260:2077-2081.
45. Rhame FS. The inanimate environment. In: Bennett JV, editor. *Hospital infections*. Philadelphia: Lippincott -Raven, 1998: 299-324.
46. Martin MA. Nosocomial infections related to patient care support services: dietetic services, central services department, laundry, respiratory care, dialysis, and endoscopy. In: Wenzel RP, editor. *Prevention and control of nosocomial infections*. Baltimore: Williams & Wilkins, 1997: 647-688.
47. Pugliese G, Huntstiger CA. Central services, linens and laundry. In: Bennett JV, editor. *Hospital infections*. Toronto: Little Brown and Co., 1992: 335-344.
48. Steere AC, Mallison GF. Handwashing practices for the prevention of nosocomial infections. *Ann Intern Med* 1975; 83:683-690.
49. Rutala WA. Selection and use of disinfectants in health care. In: Mayhall CG, editor. *Hospital Epidemiology and Infection Control*. Baltimore: Williams & Wilkins, 1996:913-936.
50. Rutala WA. APIC guidelines for selection and use of disinfectants. *Am J Infect Control* 1990; 18(2):99-117.
51. Favero MS, Bond WW. Chemical disinfection of medical and surgical materials. In Block SS, editor. *Disinfection, sterilization and preservation*. Philadelphia: Lea and Febiger, 1991: 617-641.
52. Prince DL, Prince HN, Thraenhardt O, Muchmore E, Bonder E, Pugh J. Methodological approaches to disinfection of human hepatitis B virus. *J Clin Microbiol* 1993;31(12):3296-3304.
53. Joint Committee on Healthcare Laundry Guidelines. *Guidelines for healthcare linen service - 1994*. Hallandale, Florida: Joint Committee on Healthcare Laundry Guidelines, 1994.
54. Health Canada. *Laundry/linen services for health-related facilities*. Minister of Supply and Services, 1994 Cat. No. H39-304/1994E. Unknown 1994.
55. Health Canada. *Laboratory biosafety guidelines*. 2 ed. Ottawa: Health Canada, 1996.
56. Larson E. Hand washing: it's essential — even when you use gloves. *Am J Nurs* 1989; 89:934-939.
57. Salisbury DM, Hutfilz P, Treen LM, Bollin GE, Gautam S. The effect of rings on microbial load of health care workers' hands. *Am J Infect Control* 1997; 25(1):24-27.
58. Noskin GA, Stosor V, Cooper I, Peterson LR. Recovery of vancomycin-resistant enterococci on fingertips and environmental surfaces. *Infect Control Hosp Epidemiol* 1995; 16(10):577-581.



59. Gould D. The significance of hand-drying in the prevention of infection. *Nurs Times* 1994; 90(47):33-35.
60. Hanna PJ, Richardson BJ, Marshall M. A comparison of the cleaning efficiency of three common hand drying methods. *Applied Occupational and Environmental Hygiene* 1996; 11(1):37-43.
61. Louie M, Low DE, Feinman SV, McLaughlin B, Simor AE. Prevalence of bloodborne infective agents among people admitted to a Canadian hospital. *Can Med Assoc J* 1992; 146(8):1331-1334.
62. Baumgardner CA, Maragos CS, Walz J, Larson E. Effects of nail polish on microbial growth of fingernails: dispelling sacred cows. *AORN J* 1993; 58(1):84-88.
63. Pottinger J, Burns S, Manske C. Bacterial carriage by artificial versus natural nails. *Am J Infect Control* 1989; 17(6):340-344.
64. Foca M, Jakob K, Whittier S, Della-Latta P, Factor S, Rubenstein D et al. Endemic *Pseudomonas aeruginosa* infection in a neonatal intensive care unit. *N Eng J Med* 2000; 343(10):695-700.
65. McNeil SA, Foster CL, Hedderwick SA, Kauffman CA. Effect of hand cleansing with antimicrobial soap or alcohol-based gel on microbial colonization of artificial fingernails worn by health care workers. *Clin Infect Dis* 2001; 32(3):367-372.
66. United States Health Department and Human Services. HHS Pandemic Influenza Plan November 2005.