Appendix K – Infection Control: Excerpts from Federal Documents

The following comments are excerpted from the HHS Pandemic Influenza Plan, Supplement 4: Infection Control (pp 220-225)[90]:

The following infection control principles apply in any setting where persons with pandemic influenza might seek and receive healthcare services (e.g. hospitals, emergency departments, out-patient facilities, residential care facilities, homes), according to the CDC.

- Limit contact between infected and non-infected persons
- Isolate infected persons
- Limit contact between nonessential personnel and other persons and patients who are ill with pandemic influenza.

Protect persons caring for influenza patients in healthcare settings from contact with the pandemic influenza virus. Persons who must be in contact should:

- Wear a surgical or procedure mask for close contact with infectious patients.
- Use contact and airborne precautions, including the use of NIOSH-certified N95 respirators, when appropriate.
- Wear gloves (gown if necessary) for contact with respiratory secretions.
- Perform hand hygiene after contact with infectious patients.

Contain infectious respiratory secretions:

- Instruct persons who have "flu-like" symptoms to use respiratory hygiene/cough etiquette.
- Promote use of masks by symptomatic persons in common areas (e.g., waiting rooms in physician offices or emergency departments) or when being transported (e.g., in emergency vehicles).

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.

The impact of covering sneezes and coughs and/or placing a mask on a coughing patient on the containment of respiratory secretions or on the transmission of respiratory infections has not been systematically studied. In theory, however, any measure that limits the dispersal of respiratory droplets should reduce the opportunity for transmission.

Masking may be difficult in some settings, e.g., pediatrics, in which case the emphasis will be on cough hygiene.

[90] US Department of Health and Human Services. 2005. HHS Pandemic Influenza Plan Supplement 4 Infection Control Washington, DC, Department of Health and Human Services retrieved March 20, 2007 at http://www.hhs.gov/pandemicflu/plan/sup4.html

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.

Droplet Precautions

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. 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).

PPE for Standard and Droplet Precautions

PPE is used to prevent direct contact with the pandemic influenza virus. PPE that may be used to provide care includes surgical or procedure masks, as recommended for droplet precautions, and gloves and gowns, as recommended for standard precautions.

Additional precautions may be indicated during the performance of aerosol-generating procedures (see below). Information on the selection and use of PPE is provided at www.cdc.gov/ncidod/hip/isolat/isolat.htm/.

At a minimum, prehospital care providers who directly handle a patient with respiratory disease or who are in the compartment with the patient should wear PPE as recommended for Standard, Contact, and AII Precautions.

These include the following:

- Disposable isolation gown, pair of disposable patient examination gloves, eye protection (i.e., goggles or face shield).
- Respiratory protection (i.e., NIOSH-certified N-95 or higher-level respirator)

Personnel in the driver's compartment who will have no direct patient contact should wear a NIOSH-certified N-95 or higher-level respirator during transport. Drivers who also provide direct patient care (e.g., moving patients on stretchers) should wear the recommended PPE for patient contact. This PPE, with the exception of the respirator, should be removed and hand hygiene performed after completing patient care and before entering driver's compartment to avoid contaminating the compartment. Instructions on how to safely don, use, and remove PPE is available on CDC's website.

Masks

- Wear a mask when entering a patient's room. A mask should be worn once and then discarded. If pandemic influenza patients are cohorted in a common area or in several rooms on a nursing unit, and multiple patients must be visited over a short time, it may be practical to wear one mask for the duration of the activity; however, other PPE (e.g., gloves, gown) must be removed between patients and hand hygiene performed.
- Change masks when they become moist.
- Do not leave masks dangling around the neck.
- Upon touching or discarding a used mask, perform hand hygiene.

Gloves

- A single pair of patient care gloves should be worn for contact with blood and body fluids, including during hand contact with respiratory secretions (e.g., providing oral care, handling soiled tissues). Gloves made of latex, vinyl, nitrile, or other synthetic materials are appropriate for this purpose; if possible, latex-free gloves should be available for healthcare workers who have latex allergy.
- Gloves should fit comfortably on the wearer's hands.
- Remove and dispose of gloves after use on a patient; do not wash gloves for subsequent reuse.
- Perform hand hygiene after glove removal.
- If gloves are in short supply (i.e., the demand during a pandemic could exceed the supply), priorities for glove use might need to be established. In this circumstance, reserve gloves for situations where there is a likelihood of extensive patient or environmental contact with blood or body fluids, including during suctioning.
- Use other barriers (e.g., disposable paper towels, paper napkins) when there is only limited contact with a patient's respiratory secretions (e.g., to handle used tissues). Hand hygiene should be strongly reinforced in this situation.

Gowns

- Wear an isolation gown, if soiling of personal clothes or uniform with a patient's blood or body fluids, including respiratory secretions, is anticipated. Most patient interactions do not necessitate the use of gowns. However, procedures such as intubation and activities that involve holding the patient close (e.g., in pediatric settings) are examples of when a gown may be needed when caring for pandemic influenza patients.

- A disposable gown made of synthetic fiber or a washable cloth gown may be used.
- Ensure that gowns are of the appropriate size to fully cover the area to be protected.
- Gowns should be worn only once and then placed in a waste or laundry receptacle, as appropriate, and hand hygiene performed.
- If gowns are in short supply (i.e., the demand during a pandemic could exceed the supply) priorities for their use may need to be established. In this circumstance, reinforcing the situations in which they are needed can reduce the volume used. Alternatively, other coverings (e.g., patient gowns) could be used. It is doubtful that disposable aprons would provide the desired protection in the circumstances where gowns are needed to prevent contact with influenza virus, and therefore should be avoided. There are no data upon which to base a recommendation for reusing an isolation gown on the same patient. To avoid possible contamination, it is prudent to limit this practice.

Goggles or Face Shield

In general, wearing goggles or a face shield for routine contact with patients with pandemic influenza is not necessary. If sprays or splatter of infectious material is likely, goggles or a face shield should be worn as recommended for standard precautions. Additional information related to the use of eye protection for infection control can be found at http://www.cdc.gov/niosh/topics/eye/eye-infectious.html. [Source: Supplement 4 to the *HHS Pandemic Influenza Plan]*

PPE for Special Circumstances

PPE for Aerosol-Generating Procedures

During procedures that may generate increased small-particle aerosols of respiratory secretions (e.g., endotracheal intubation, nebulizer treatment, bronchoscopy, suctioning), healthcare personnel should wear gloves, gown, face/eye protection, and a N95 respirator or other appropriate particulate respirator. Respirators should be used within the context of a respiratory protection program that includes fit-testing, medical clearance, and training. If possible, and when practical, use of an airborne isolation room may be considered when conducting aerosol-generating procedures.

PPE for Managing Pandemic Influenza with Increased Transmissibility

The addition of airborne precautions, including respiratory protection (an N95 filtering face piece respirator or other appropriate particulate respirator), may be considered for strains of influenza exhibiting increased transmissibility, during initial stages of an outbreak of an emerging or novel strain of influenza, and as determined by other factors such as vaccination/immune status of personnel and availability of antivirals. As the epidemiologic characteristics of the pandemic virus are more clearly defined, CDC will provide updated infection control guidance, as needed.

Precautions for Early Stages of Pandemic

Early in a pandemic, it may not be clear that a patient with severe respiratory illness has pandemic influenza. Therefore precautions consistent with all possible etiologies, including a newly emerging infectious agent, should be implemented. This may involve the combined use of airborne and contact precautions, in addition to standard precautions, until a diagnosis is established.

Caring for Patients with Influenza

Healthcare personnel should be particularly vigilant to avoid:

- Touching their eyes, nose or mouth with contaminated hands (gloved or ungloved). Careful placement of PPE before patient contact will help avoid the need to make PPE adjustments and risk self-contamination during use. Careful removal of PPE is also important. (See also: http://www.cdc.gov/ncidod/hip/ppe/default.htm.)
- Contaminating environmental surfaces that are not directly related to patient care (e.g., door knobs, light switches)

Hand Hygiene

Hand hygiene has frequently been cited as the single most important practice to reduce the transmission of infectious agents in healthcare settings (see http://www.cdc.gov/handhygiene/pressrelease.htm) and is an essential element of standard precautions. The term "hand hygiene" includes both handwashing with either plain or antimicrobial soap and water and use of alcohol-based products (gels, rinses, foams) containing an emollient that do not require the use of water.

- If hands are visibly soiled or contaminated with respiratory secretions, wash hands with soap (either non-antimicrobial or antimicrobial) and water.
- In the absence of visible soiling of hands, approved alcohol-based products for hand disinfection are preferred over antimicrobial or plain soap and water because of their superior microbiocidal activity, reduced drying of the skin, and convenience.
- Always perform hand hygiene between patient contacts and after removing PPE.
- Ensure that resources to facilitate handwashing (i.e., sinks with warm and cold running water, plain or antimicrobial soap, disposable paper towels) and hand disinfection (i.e., alcohol-based products) are readily accessible in areas in which patient care is provided. For additional guidance on hand hygiene see http://www.cdc.gov/handhygiene/.

Disposal of Solid Waste

Standard precautions are recommended for disposal of solid waste (medical and non-medical) that might be contaminated with a pandemic influenza virus:

- Contain and dispose of contaminated medical waste in accordance with facility-specific procedures and/or local or State regulations for handling and disposal of medical waste, including used needles and other sharps, and non-medical waste.
- Discard as routine waste used patient-care supplies that are not likely to be contaminated (e.g., paper wrappers).
- Wear disposable gloves when handling waste. Perform hand hygiene after removal of gloves.

Linen and Laundry

Standard precautions are recommended for linen and laundry that might be contaminated with respiratory secretions from patients with pandemic influenza:

- Place soiled linen directly into a laundry bag in the patient's room. Contain linen in a manner that prevents the linen bag from opening or bursting during transport and while in the soiled linen holding area.
- Wear gloves and gown when directly handling soiled linen and laundry (e.g., bedding, towels, personal clothing) as per standard precautions. Do not shake or otherwise handle soiled linen and laundry in a manner that might create an opportunity for disease transmission or contamination of the environment.
- Wear gloves for transporting bagged linen and laundry.
- Perform hand hygiene after removing gloves that have been in contact with soiled linen and laundry.
- Wash and dry linen according to routine standards and procedures (www.cdc.gov/ncidod/hip/enviro/guide.htm).

Patient-Care Equipment

Follow standard practices for handling and reprocessing used patient-care equipment, including medical devices:

- Wear gloves when handling and transporting used patient-care equipment.
- Wipe heavily soiled equipment with an EPA-registered hospital disinfectant before removing it from the patient's room.
- Follow current recommendations for cleaning and disinfection or sterilization of reusable patient-care equipment.
- Wipe external surfaces of portable equipment for performing x-rays and other procedures in the patient's room with an EPA-registered hospital disinfectant upon removal from the patient's room.

Environmental Cleaning and Disinfection

Cleaning and disinfection of environmental surfaces are important components of routine infection control in healthcare facilities. Environmental cleaning and disinfection for pandemic influenza follow the same general principles used in healthcare settings. [Source: Supplement 4 to the *HHS Pandemic Influenza Plan]*

Postmortem Care

Follow standard facility practices for care of the deceased. Practices should include standard precautions for contact with blood and body fluids.

EMS Infection Control Recommendations

- Screen patients requiring emergency transport for symptoms of influenza.
- Follow standard and droplet precautions when transporting symptomatic patients.
- Consider routine use of surgical or procedure masks for all patient transport when pandemic influenza is in the community. (See mask guidance below.)
- If possible, place a procedure or surgical mask on the patient to contain droplets expelled during coughing. If this is not possible (i.e., would further compromise respiratory status, difficult for the patient to wear), have the patient cover the mouth/nose with tissue when coughing, or use the most practical alternative to contain respiratory secretions.
- Oxygen delivery with a non-rebreather face mask can be used to provide oxygen support during transport. If needed, positive-pressure ventilation should be performed using a resuscitation bag-valve mask. [91]
- Unless medically necessary to support life, aerosol-generating procedures (e.g., mechanical ventilation, nebulized breathing treatments) should be avoided during prehospital care.
- Optimize the vehicle's ventilation to increase the volume of air exchange during transport. When possible, use vehicles that have separate driver and patient compartments that can provide separate ventilation to each area. (See additional guidance below.)
- Notify the receiving facility that a patient with possible pandemic influenza is being transported.
- Follow standard operating procedures for routine cleaning of the emergency vehicle and reusable patient care equipment.

The following information is from *Interim Guidance on Planning for the Use of Surgical Masks and Respirators in Health Care Settings during an Influenza Pandemic*[92]:

Use of Surgical Masks and Respirators in Health Care Settings

Surgical mask and respirator use is one component of a system of infection control practices to prevent the spread of infection between infected and non-infected persons. During an influenza pandemic, surgical masks and respirators—along with other forms of personal protective equipment (e.g., gloves, gowns, and goggles)—should be used by

[91] **Stakeholder note**: Oxygen delivery devices (e.g., masks for patients) are emerging in the equipment marketplace capable of high oxygen flow rates while providing containment and exhaled air and droplet particles through the use of an inline filter. These devices are commonly used in Canada.

[92] *Interim Guidance on Planning for the Use of Surgical Masks and Respirators in Health Care Settings during an Influenza Pandemic*. CDC, October, 2006. Available at: http://www.pandemicflu.gov/plan/healthcare/maskguidancehc.html

healthcare personnel in conjunction with Standard and Droplet Precautions, respiratory hygiene, cough etiquette, vaccination, and early diagnosis and treatment.

Recommendations

National Institute for Occupational Safety and Health (NIOSH)-certified respirators (N95 or higher) are recommended for use during activities that have a high likelihood of generating infectious respiratory aerosols.

- Aerosol-generating procedures (e.g., endotracheal intubation, nebulizer treatment, and bronchoscopy) performed on patients with confirmed or suspected pandemic influenza;
- Resuscitation of a patient with confirmed or suspected pandemic influenza (i.e., emergency intubation or cardiac pulmonary resuscitation); and
- Providing direct care for patients with confirmed or suspected pandemic influenza-associated pneumonia (as determined on the basis of clinical diagnosis or chest x-ray), who might produce larger-than-normal amounts of respirable infectious particles when they cough

In the event of actual or anticipated shortages of N-95 respirators:

- Other NIOSH-certified N-, R-, or P-class respirators should be considered in lieu of the N95 respirator.
- If re-useable elastomeric respirators are used, these respirators must be decontaminated according to the manufacturer's instructions after each use.
- Powered air purifying respirators (PAPRs) may be considered for certain workers and tasks (e.g., high-risk activities). Loose-fitting PAPRs have the advantages of providing eye protection, being comfortable to wear, and not requiring fit-testing; however, hearing (e.g., for auscultation) is impaired, limiting their utility for clinical care. Training is required to ensure proper use and care of PAPRs.

Planning assumptions and projections suggest that shortages of respirators are likely in a sustained pandemic. Therefore, in the event of an actual or anticipated shortage, planners must ensure that sufficient numbers of respirators are prioritized for use during the high-risk procedures. This will require careful planning as well as real-time supply monitoring to ensure that excess respirators are not held in reserve while healthcare personnel are conducting activities for which they would otherwise be provided respiratory protection. Conversely, excessive use of respirators could result in their unavailability for high-risk procedures. Decision guidance for determining respirator wear should consider factors such as duration, frequency, proximity and degree of contact with the patient.

If supplies of N-95 (or higher) respirators are not available, surgical masks can provide benefits against large droplet exposure, and should be worn for all healthcare activities for patients with confirmed or suspected pandemic-influenza.

Guidance for Correct Use

Respirator use should be in the context of a complete respiratory protection program in accordance with Occupational Safety and Health Administration (OSHA) regulations. Detailed information on respiratory protection programs, including fit test procedures, can be accessed at OSHA's Respiratory Protection eTool (www.osha.gov/SLTC/etools/respiratory). Staff with responsibility for direct patient care should be medically cleared, trained, and fit-tested for respirator use. Training topics should include the following:

- Proper fit-testing, wearing, and use of respirators
- Safe removal of respirators
- Safe disposal of respirators
- Medical contraindications to respirator use

Persons who wear surgical masks or respirators should be advised that:

- Surgical mask or respirator use should not take the place of preventive interventions, such as respiratory etiquette and hand hygiene.
- To offer protection, surgical masks and respirators must be worn correctly and consistently throughout the time they are used.
- Wearing a surgical mask or respirator incorrectly, or removing or disposing of it improperly, could allow contamination of the hands or mucous membranes of the wearer or others, possibly resulting in disease transmission.
- Proper surgical mask or respirator use and removal includes the following:
  - Prior to putting on a respirator or surgical mask, wash hands thoroughly with soap and water or use an alcohol-based hand sanitizer to reduce the possibility of inadvertent contact between contaminated hands and mucous membranes.
  - If worn in the presence of infectious persons, a respirator or surgical mask may become contaminated with infectious material; therefore, avoid touching the outside of the device to help prevent contamination of hands.
  - Once worn in the presence of a patient with patient with pandemic influenza, the disposable surgical mask or disposable N95 respirator should be removed and appropriately discarded.
  - After the surgical mask or respirator has been removed and discarded, wash hands thoroughly with soap and water, or use an alcohol-based hand sanitizer.

  - Further information about masks and respirators can be found at http://www.cdc.gov/ncidod/sars/respirators.htm and http://www.cdc.gov/niosh/npptl/topics/respirators/factsheets/respsars.html#F.

Additional information (see referenced sources) regarding ambulance ventilation

Negative pressure isolation is not required for routine patient care of individuals with pandemic influenza. When possible, however, use vehicles that have separate driver and patient compartments that can provide separate ventilation to each area. Close the

door/window between these compartments before bringing the patient on board. Set the vehicle's ventilation system to the non-recirculating mode to maximize the volume of outside air brought into the vehicle. If the vehicle has a rear exhaust fan, use it to draw air away from the cab, toward the patient-care area, and out the back end of the vehicle. Some vehicles are equipped with supplemental recirculating ventilation units that pass air through HEPA filters before returning it to the vehicle. Such units can be used to increase the number of [air changes per hour] (ACH)[93,94].

If a vehicle without separate compartments and ventilation must be used, open the outside air vents in the driver area and turn on the rear exhaust ventilation fans to the highest setting. This will create a negative pressure gradient in the patient area.

[93] Centers for Disease Control and Prevention. ONLINE. 2005. *Public Health Guidance for Community-Level Preparedness and Response to Severe Acute Respiratory Syndrome (SARS) Version 2 Supplement I: Infection Control in Healthcare, Home, and Community Settings Section IV. Infection Control for Prehospital Emergency Medical Services (EMS)* CDC. Available: http://www.cdc.gov/ncidod/sars/guidance/I/index.htm [24 March 2007]

[94] National Institute for Occupational Safety and Health. ONLINE. 1996. Health Hazard Evaluation Report 95–0031–2601. NIOSH Hazard Evaluations and Technical Assistance Branch. Available: www.cdc.gov/niosh/hhe/reports/pdfs/1995-0031-2601.pdf [3 April 2007]