PANDEMIC INFLUENZA PREPAREDNESS AND RESPONSE PLAN

ANNEX TO THE MASS ILLNESS PLAN

Public Health Preparedness
Nevada State Health Division
Department of Health and Human Services

Approved: February 9, 2007
Revision Scheduled: January 2008

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NEVADA STATE HEALTH DIVISION
Pandemic Influenza Response Plan

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Pandemic Influenza Preparedness and Response Plan

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Purpose of the Plan

This Pandemic Influenza Preparedness and Response Plan is a guide on how to prepare, detect, and respond to an influenza pandemic in the state of Nevada. This plan is written in accordance with guidelines set forth by the Centers for Disease Control and Prevention (CDC) and describes the emergency management concepts and structure under which the Nevada State Health Division (NSHD) may operate. The plan outlines the roles and strategies of NSHD in coordinating the public health response to a pandemic with local health authorities, the healthcare community, the federal government, and other key partners.

Consistent with NSHD's mission "to promote, preserve and protect the health of all Nevadans and visitors to the state through its leadership in public health and enforcement of laws and regulations pertaining to public health," this plan provides a framework for NSHD pandemic influenza preparedness and response activities. The goal of these activities is to reduce the morbidity, mortality, and social and economic disruption caused by pandemic influenza. The plan is an annex to the NSHD Comprehensive Emergency Management Plan (CEMP) and is consistent with the U.S. Department of Health and Human Services Pandemic Influenza Plan, November 2005.

Additionally, this plan may be utilized by local public health authorities as a guide for local pandemic influenza response. Finally, it may inform those who review it of the assumptions used for the development of this plan, the planning activities that must take place in developing a pandemic influenza response, the policies and authorities that regulate a pandemic influenza response and the appropriate actions that must be taken during each of the six phases of a pandemic. These actions include activities in the following areas:

- Command, control, and management;
- Surveillance;
- Vaccine delivery;
- Antiviral use;
- Communication; and
- Emergency response.

The Pandemic Influenza Response Plan should be shared, read, and understood prior to an influenza pandemic by those individuals within the NSHD, as well as its public health partners, who may be involved in the response to such an event.

Maintenance of the Plan

The NSHD Pandemic Influenza Preparedness and Response Plan is a dynamic document and will be updated at least annually to reflect new developments in understanding of a novel influenza virus with potential to cause a pandemic, its transmission, prevention, and treatment. It may be exercised to identify operating challenges and promote effective implementation. Plan updates may also incorporate changes in response roles and improvements in response capability developed through ongoing planning efforts.

Introduction

Influenza, also known as the flu, is a contagious viral disease. Seasonal influenza is a yearly occurrence that kills primarily persons aged 65 and older and those with chronic health conditions, and causes significant economic impact. Individuals develop immunity to the strain circulating each year, when they are exposed to the virus but do not succumb to it. The influenza virus has the ability to mutate into new subtypes, or strains. A worldwide pandemic of influenza may occur when such mutation causes a novel and highly contagious strain of the influenza virus to emerge for which the population has little or no immunity.

Public health experts are now concerned about the risk of a pandemic arising from the current epidemic of avian influenza that is spreading rapidly and has affected domestic and wild birds in Asia, Africa, and Europe. When strains of avian influenza interact with the common strains of human influenza, a mutation can occur, creating a virus capable of human-to-human transmission and possibly initiating a pandemic. Depending on the pathogenicity of such a virus, between 25 to 35 percent of the world's population may become ill and over 14,000 Nevadans may die. This level of disease activity would disrupt all aspects of society and severely affect the economy.

Characteristics of an influenza pandemic that must be considered in preparedness and response planning include: 1) simultaneous impacts in communities across the state and the U.S., limiting the ability of any jurisdiction to provide support and assistance to other areas; 2) an overwhelming burden of ill persons requiring hospitalization or outpatient medical care; 3) shortages and delays in the availability of vaccines and antiviral medications; 4) disruption of national and community infrastructures including health care, transportation, commerce, utilities and public safety; and 5) global spread of infection with outbreaks throughout the world.

The impact of a pandemic cannot be predicted precisely because it may depend on the virulence of the virus, how rapidly it spreads, the availability of vaccines and antiviral medications, and the effectiveness of pharmaceutical and non-pharmaceutical community containment measures.

Pandemic Influenza: A High Priority for Planning in Nevada

With Nevada's significant and transient tourist population, the likelihood of an emerging strain of influenza entering the state may be increased. For example, if a new strain of influenza originates in Asia, a likely point of entry into the United States would be the West coast. This makes it more likely that Nevada would be one of the earliest states affected by a pandemic, particularly with Nevada's close ties to California and other Pacific coast states. Furthermore, Nevada is home to several heavily visited cities, particularly, Las Vegas, Lake Tahoe, and Reno, which may increase the risk of transmission from national and international visitors. In addition to civilian air traffic, there is a sizeable number of military personnel entering Nevada from overseas locations who may transmit disease unknowingly.

Table 1: Illustrates the potential impact of an influenza pandemic on Nevada's base population. These estimates were obtained using FluAid software available online through the National Vaccine Program office. Estimates are based on Nevada's 2003 population of 2,241,154 (United States Bureau of the Census data), and represent the most likely numbers of deaths, hospitalizations, and outpatient visits among Nevada residents.

Table 1: Potential Impact of Pandemic Influenza on Nevada

		Attack Rates		
	Age Group (High Risk + Non-High Risk)	**Minimum**	**Mean**	**Maximum**
Deaths	0-18 Years	78	137	4,342
	19-64 Years	179	4,227	8,334
	65+ Years	749	1,138	1,521
	Total deaths	**1,006**	**5,502**	**14,197**
Hospitalizations	0-18 Years	1,289	1,905	6,667
	19-64 Years	1,449	6,390	11,317
	65+ Years	1,356	2,650	3,944
	Total hospitalization	**4,094**	**10,945**	**21,928**
Outpatient Visits	0-18 Years	254,371	299,474	354,663
	19-64 Years	155,783	246,715	335,647
	65+ Years	30,564	40,430	50,292
	Total outpatient visits	**440,718**	**586,619**	**740,602**

Assumptions

This plan should be utilized in conjunction with the Nevada State Comprehensive Emergency Management Plan (SCEMP), the Health Division Comprehensive Emergency Management Plan (CEMP), as well as their annexes, as appropriate. The following assumptions were considered in the preparation of this plan:

- An influenza pandemic in Nevada may present a large-scale test of the emergency preparedness system. Advance planning for Nevada's public health response may save lives and prevent substantial economic loss.
- Although pandemic influenza strains have emerged mostly from areas of Eastern Asia, variants with pandemic potential could emerge in Nevada or elsewhere in the United States.
- Many geographic areas within Nevada and its neighboring jurisdictions may be affected simultaneously.
- Due to absenteeism, a pandemic could pose threats to human infrastructure responsible for critical community services (health and non-health sectors).
- The likelihood of shortages of medical resources may increase.
- Surveillance of influenza disease and virus may provide information needed for an effective response.
- Local officials, the health-care community, and the general public may look to local and state public health authorities to provide information and a coordinated response.
- There may be widespread circulation of conflicting information, misinformation, and rumors. Communication should be coordinated among all responding agencies to ensure development of consistent, accurate, and timely messages.

- Isolation and quarantine procedures may be invoked in case of infectious disease or a pandemic emergency.
- Public health authorities may coordinate the distribution and/or administration of pharmaceuticals, vaccines and/or other medical supplies and equipment in their respective jurisdictions.
- Local public health and health-care systems may be overwhelmed by community requests for information, chemoprophylaxis, and treatment once the influenza pandemic becomes public knowledge.
- The federal government may not assume the cost for purchase of vaccines, antiviral medications, and related supplies. Furthermore, the federal government may become overwhelmed by requests for assistance at both a national and international level, and, therefore, may be slow to respond to requests from smaller, less populated states such as Nevada.

The Planning Process

Prior to the occurrence of an influenza pandemic, it is important that plans for detection and response are in place at the federal, state, Tribal and local levels of government.

A committee was utilized to oversee the pandemic influenza planning process, in cooperation with local health agencies and other partners. This committee includes participants from the following state agencies:

- NSHD, Public Health Preparedness (PHP);
- NSHD, Office of Epidemiology;
- NSHD, Immunization Program;
- State of Nevada, Department of Public Safety;
  - Division of Homeland Security (DHS);
  - Division of Emergency Management (DEM); and
- State of Nevada, Department of Agriculture.

Concept of Operations

The State Health Officer, NSHD Administrator, Deputy Administrator or designee may assume command for directing the response to an influenza pandemic. Once all necessary data has been obtained to confirm the onset of an influenza pandemic, the State Health Officer, or his designee, may activate the NSHD's Public Health Coordinating Center (PHCC). Furthermore, the NSHD may coordinate personnel, facilities, supplies and equipment, as appropriate, to augment local emergency medical, public health, and health-care services. At the point where resources outside the NSHD are needed, or the basic infrastructure of the state is being affected as a result of the pandemic, the assistance of the Division of Emergency Management (DEM) may be sought through activation procedures detailed in the SCEMP. DEM may activate the State Emergency Operations Center (SEOC). In the event of an influenza pandemic, the NSHD may have the lead responsibility in health related response activities, and the SEOC may have a supporting role.

If an Emergency Powers Act is needed, DEM, in consultation with the NSHD, may draft a Governor's Executive Order declaring that a state of emergency exists and specifying the emergency powers that may be necessary or appropriate to cope with the emergency. If it appears that significant expenditures may be required to respond to the pandemic influenza emergency, DEM may recommend, and the Governor may request, a Presidential Disaster Declaration. If granted, this declaration may make federal funding available on a matching reimbursement basis.

In the event that an influenza pandemic affects multiple jurisdictions, the NSHD may request the Strategic National Stockpile (SNS) be deployed to the state. The SNS is comprised of pharmaceuticals, vaccines and medical supplies used to augment depleted state and local resources. More information about the SNS can be found at the CDC website www.bt.cdc.gov/stockpile, in the NSHD Plan for Receiving, Distributing, and Dispensing the Strategic National Stockpile, and in the NSHD Mass Dispensing Plan.

In addition to public health, the general strategy of the Pandemic Influenza Response Plan is to protect the infrastructure to ensure that the health and medical community, as well as government and business, will continue to function. This may require the allocation and redirection of scarce resources toward those programs, agencies, and organizations that are needed to maintain the functioning and health of society.

The NSHD may continue day-to-day operations, making recommendations to aid in controlling the spread of influenza throughout the course of a pandemic event. The NSHD also has the responsibility for keeping the public informed of unusual disease outbreaks. The NSHD's Public Information Officer (PIO) may assist in establishing a communications structure to ensure that accurate and consistent information is distributed. In the event the SEOC is activated, the Governor may request the Joint Information Center (JIC) be activated as well. If this occurs, the JIC assumes the responsibility of disseminating information to the public and the media. The NSHD PIO may then act as a liaison between the PHCC and the JIC. For more information on the JIC, please see the NSHD Risk Communication Plan.

Pandemic Phases

This plan rests on a conceptual framework of public health functions coupled to WHO's pandemic phases described below.[1] The World Health Organization (WHO) has defined the phases of a pandemic to assist with planning and response activities (Table 2). Identification and declaration of the following phases will be done at the national level for purposes of consistency, comparability, and coordination of the local, state and national response.

Table 2: Defined Pandemic Phases

Pandemic Phase	WHO Definition	Activities
Phase 1	**Inter-pandemic Period** 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.	Activities during this phase are directed at maintaining the infrastructure of health and medical resources and strengthening those resources where possible to prepare for years of higher incidence of influenza.
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.	Minimize the risk of transmission to humans; detect and report such transmission rapidly if it occurs.
Phase 3	**Pandemic alert period** Human infection(s) with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact.	Ensure rapid characterization of the new virus subtype and early detection, notification and response to additional cases.
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.	Activities in this phase will focus on preparing for a potential pandemic, planning for infection control and informing the public of a potential threat and necessary precautions.
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).	Activities in this phase will focus on monitoring and responding to pandemic events in the state, ensuring that the necessary components of the NSHD Mass Dispensing Plan have been or are ready to be activated, and keeping the public informed without causing panic.
Phase 6	**Pandemic Period** Pandemic phase: increased and sustained transmission in general population	These phases will be characterized by further spread of influenza disease with involvement of multiple continents. Activities attempt to minimize the impact of the pandemic.
	Post-pandemic period Return to inter-pandemic period	

[1] In May 2006, WHO announced that it is reviewing and may revise the pandemic influenza phase definitions. For current definitions, see the WHO website at www.who.org .

Health Information Portability and Accountability Act (HIPAA)

Privacy Decision Tool for Emergency Preparedness Planning

Purpose

The U.S. Department of Health and Human Services (HHS) Web-based interactive decision tool designed to assist emergency preparedness and recovery planners in determining how to access and use health information about persons with disabilities consistent with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) Privacy Rule. The HHS Office for Civil Rights (OCR) is responsible for the HIPAA Privacy Rule.

Situation

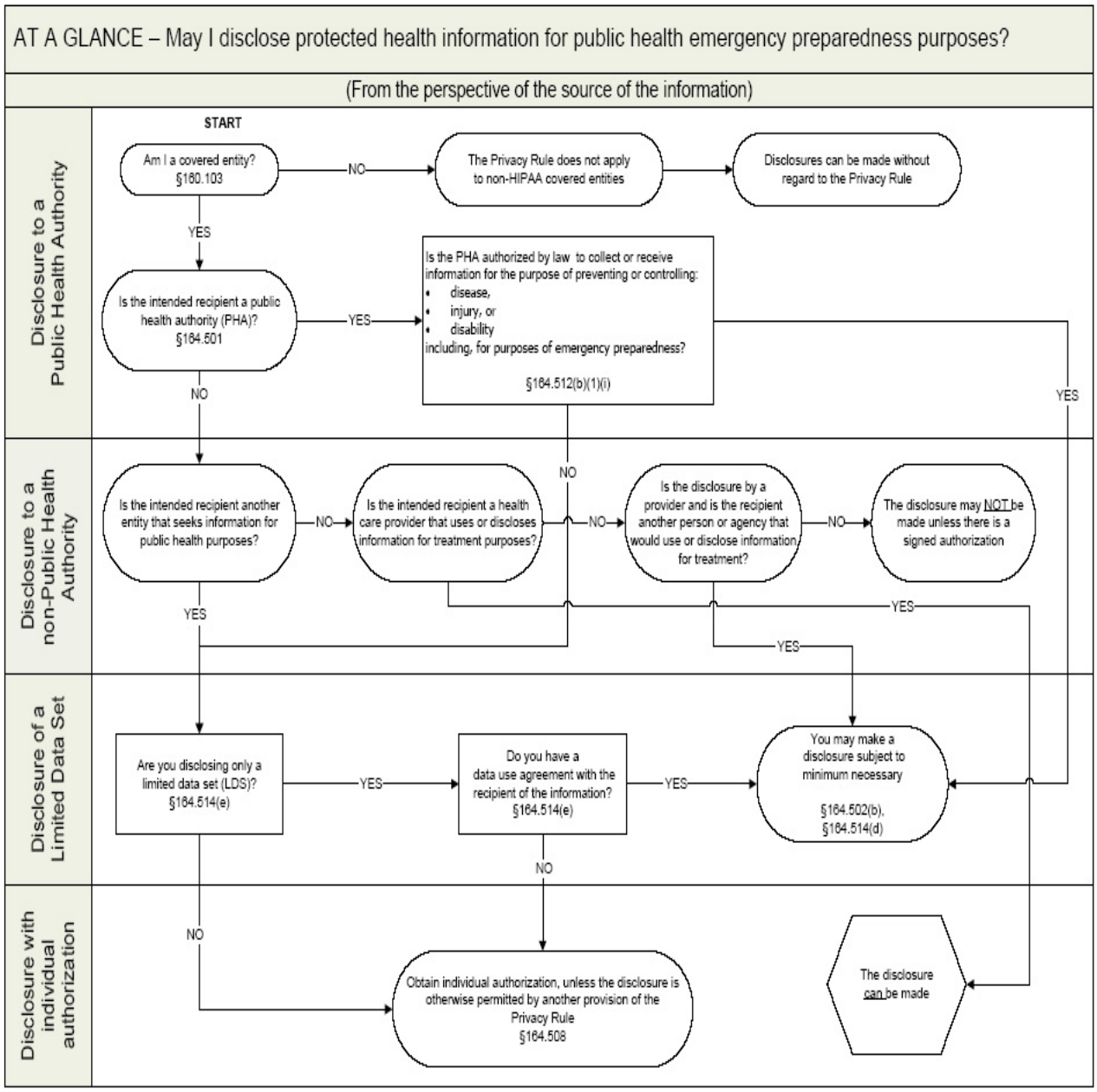
The tool may guide Nevada's state and local jurisdictional emergency preparedness and recovery planners through a series of questions regarding how the HIPAA Privacy Rule applies to a particular disclosure. For example, by helping users focus on the source of the information being disclosed, to whom it is being disclosed, and for what purpose, users may better meet the needs of the elderly or persons with disabilities in the event of an evacuation (Figure 1).

Assumption

While the tool was designed initially for emergency planning actions for persons with disabilities, it is applicable to most emergency planning efforts. The intended audiences include covered entities as well as emergency preparedness and recovery planners at the local, state and federal levels. The NSHD may use this tool as appropriate to be in compliance with HIPAA and privacy information disclosure.

The Decision Tool: HIPAA Privacy Rule & Disclosures for Public Health -- Emergency Preparedness is readily accessible on the OCR Web site at: http://www.hhs.gov/ocr/hipaa/decisiontool/.

Figure 1


AT A GLANCE – May I disclose protected health information for public health emergency preparedness purposes?
(From the perspective of the source of the information)
Disclosure to a Public Health Authority
START
Am I a covered entity? §160.103
NO
The Privacy Rule does not apply to non-HIPAA covered entities
Disclosures can be made without regard to the Privacy Rule
YES
Is the intended recipient a public health authority (PHA)? §164.501
YES
Is the PHA authorized by law to collect or receive information for the purpose of preventing or controlling:
• disease,
• injury, or
• disability
including, for purposes of emergency preparedness?
§164.512(b)(1)(i)
YES
NO
Disclosure to a non-Public Health Authority
Is the intended recipient another entity that seeks information for public health purposes?
NO
Is the intended recipient a health care provider that uses or discloses information for treatment purposes?
NO
Is the disclosure by a provider and is the recipient another person or agency that would use or disclose information for treatment?
NO
The disclosure may NOT be made unless there is a signed authorization
NO
YES
YES
YES
Disclosure of a Limited Data Set
Are you disclosing only a limited data set (LDS)? §164.514(e)
YES
Do you have a data use agreement with the recipient of the information? §164.514(e)
YES
You may make a disclosure subject to minimum necessary
§164.502(b), §164.514(d)
NO
Disclosure with individual authorization
NO
Obtain individual authorization, unless the disclosure is otherwise permitted by another provision of the Privacy Rule
§164.508
The disclosure can be made

Influenza Pandemic Preparedness and Response Activities

As previously stated, this plan may be used in conjunction with other corresponding NSHD response plans as appropriate. The following sections outline some of the response activities that may be specific to an influenza pandemic. An influenza pandemic may dictate that additional response measures be taken; however, such activities remain unknown until the event occurs. In such instances, the NSHD may act in accordance with corresponding emergency response and recovery protocols. Appendix B provides a matrix outlining basic influenza pandemic response activities.

Section A: Command, Control and Management Procedures

Statutory and Operational Authority

The State of Nevada has in place legal authority necessary for preparedness for and response to an influenza pandemic. Operational authority is also in place for public health and other health-related emergency response entities at the local and state levels of government. The federal government has been granted authority to support affected states or jurisdictions as necessary; however, all requests for assistance must originate from the state. Appendix C provides an outline of some of the specific roles and responsibilities of local, state, and federal authorities during an influenza pandemic.

- The statutory authority for responding to an influenza pandemic can be found in the Nevada Revised Statutes (NRS):
  - NRS 414 – Emergency management;
  - NRS 439 – Administration of public health;
  - NRS 439.170 – Prevention of sickness and disease; legal action for enforcement of laws and regulations;
  - NRS 441A.150 – Reporting occurrences of communicable diseases to the health authority;
  - NRS 441A.190 – Control of disease within schools, child care facilities, medical facilities and correctional facilities; and
  - NRS 441A.500-720 – Isolation and quarantine of a person or group of persons.
- In general, the federal government has primary responsibility for preventing the introduction of communicable diseases from foreign countries into the United States, and the state and local jurisdictions have primary responsibility for isolation and quarantine within their respective borders (Appendix D contains more information on isolation and quarantine).
- By statute, the federal Department of Health and Human Services (DHHS) Secretary may accept local and state assistance in the enforcement of federal quarantine and other health regulations and may assist local and state officials in the control of communicable diseases. Public health officials at the local, state, and federal levels may seek the assistance of their respective law enforcement counterparts to enforce public health orders related to isolation and quarantine.
- A response to an influenza pandemic may require coordinated efforts of a wide variety of both public and private, as well as health and non-health related organizations.

State and Local Operational Authority

- While this plan serves as a guide for specific influenza intervention activities, during a pandemic the judgment of public health leadership, based on knowledge of the specific virus, may alter the strategies that have been outlined.
- Local and state public health officials provide the first line of response with respect to preparing and planning for a pandemic in their respective jurisdictions, including:
  - Identifying and managing local resources to respond to a pandemic;
  - Appropriately isolating ill persons and recommending appropriate resources within mass quarantine measures; and
  - Imposing other community containment measures as required.

Federal Operational Authority during an Influenza Pandemic

- The federal DHHS released a draft version of the national Pandemic Influenza Response and Preparedness Plan in September 2004; this plan is available at http://www.hhs.gov/nvpo/pandemicplan/.
- The DHHS is the U.S. Government's lead agency for the preparation, planning and response to an influenza pandemic. As such, the DHHS will:
  - Coordinate the U.S. Government's response to the public health and medical requirements of an influenza pandemic;
  - Provide the DHHS Secretary's Command Center (SCC) as the national incident command center for all health and medical preparedness, response and recovery activities; and
  - Authorize CDC, the agency within DHHS responsible for disease prevention and control, primary responsibility for tracking a pandemic outbreak and managing the operational aspects of the public health response.
  - To this end, CDC will augment local and state resources for a pandemic response, as available, in the following areas:
    - Disease surveillance;
    - Epidemiological response;
    - Diagnostic laboratory services and reagents;
    - Education and communication; and
    - Disease containment and control.

Planning for Command and Control of Pandemic-related Activities

- The State Comprehensive Emergency Management Plan (SCEMP) will be used to respond to a widespread public health threat posed by pandemic influenza.
- An influenza pandemic may affect and involve a variety of public and private agencies and organizations at the local, state, and federal levels. These agencies must coordinate their activities and resources and share information in real time. To sustain coordinated

efforts, the NSHD may lead the public health response efforts, and DEM will provide support as needed.

- The success of efforts to rapidly detect, respond to, and contain an outbreak depends on the availability of information systems. These systems can support and coordinate the activities within an Incident Command System (ICS). The PHCC functions under the guidelines set forth by the National Incident Management System (NIMS). For more information, see the PHCC Standard Operating Policy (SOP).
- In a pandemic, Nevada's public health workforce may be overwhelmed. As such, the NSHD is compiling the numbers of individuals in various groups whose assistance may be necessary in a pandemic. These include emergency medical responders, hospital health care workers, laboratory technicians, environmental health personnel, mental health personnel and vaccination clinicians. (These resources may be maintained and regularly updated by the NSHD Public Health Preparedness (PHP) Health Resource Analyst.) The NSHD may coordinate with Local Health Authorities (LHAs) to utilize established Medical Reserve Corps, Volunteer Corps and others to meet additional personnel needs during a pandemic.
- Within Nevada, the Public Health Information Network (PHIN) includes the following components that are in use or under development:
    - Health Alert Network (HAN) – Currently in use;
    - Epi-X – Currently in use;
    - National Electronic Death Registry – Currently in use;
    - National Electronic Disease Surveillance System (NEDSS) – Currently in use;
    - NSHD Immunization Program Immunization Registry – Currently in use;
    - Web IZ – Currently in use for tracking of patient immunizations, may be adapted to include influenza antiviral and prophylaxis information; and
    - Electronic Laboratory Reporting

Command, Control and Management Activities by WHO Pandemic Phase

WHO Inter-Pandemic Period

Phase 1: No New Influenza Subtypes Detected in Humans

- The NSHD continuously coordinates planning activities with local communities, bordering jurisdictions and special populations.
- The NSHD continuously identifies crucial gaps in infrastructure, resources, laws, and/or statutes.
- The NSHD may work to develop or conduct public information activities to inform key government officials, legislators, and various stakeholders of the need to address and resolve these gaps prior to an influenza pandemic.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- The NSHD Office of Epidemiology continuously monitors reports of disease progress and surveillance to detect a case of novel virus in Nevada. The NSHD Office of Epidemiology also communicates with the Nevada Department of Agriculture and the Nevada State Public Health Laboratory System (NSPHLS) to monitor avian influenza status in the

state. International and national surveillance for novel virus is coordinated by WHO and CDC, respectively.

- NSHD personnel meet with internal and external partners and stakeholders, as necessary, to review major elements of this Pandemic Influenza Response Plan and modify the plan as needed based on increases or decreases in pandemic status. External partners may include but are not limited to representatives from Nevada Department of Agriculture, DEM, the NSPHLS, Nevada Division of Mental Health and Developmental Services (MHDS), Nevada Hospital Association (NHA), and Local Health Authorities (LHAs).

WHO Pandemic Alert Period
Phase 3, 4, 5: Human Infection Confirmed with Progression to Human-to-Human Spread

- The NSHD Office of Epidemiology will monitor reports of disease spread and activate enhanced surveillance involving the NSPHLS and other laboratory agencies as necessary.
- The NSHD may assist local jurisdictions in distributing vaccine and antivirals, if necessary.
- NSHD representatives may notify key government officials and legislators, if appropriate, of the need for additional funding, if not readily available.
- The NSHD may prepare for PHCC activation at this time.
- The NSHD may prepare to activate its Risk Communication Plan for Public Health Emergencies at this point.

WHO Pandemic Period
Phase 6: Pandemic Phase

- The NSHD may fully activate this Pandemic Influenza Response Plan and recommend that LHAs, local emergency management agencies and DEM either activate their respective plans or utilize the NSHD plan, if they do not have jurisdiction-specific plans.
- The NSHD may activate the PHCC at this time, if deemed appropriate.
- The NSHD will monitor, as needed, internal staffing needs and assist facilities responding to the emergency in finding additional staffing, if deemed necessary.
- The NSHD will coordinate public health activities with neighboring jurisdictions, if needed.
- NSHD representatives will interface with counterparts at the national level to obtain best practices and evolving treatment protocols.
- NSHD representatives will document expenses associated with the pandemic response.

WHO Post-pandemic period

- NSHD may continue command, control, and management procedures described in WHO Phase 1.
- NSHD representatives may review and update response procedures as appropriate.
- NSHD may continue providing assistance with vaccination efforts, as needed.

- The NSHD Office of Epidemiology and the NSPHLS will enhance community-based infection control measures, as needed, based on outcomes of WHO Phases 1 through 3
- The NSHD may deactivate PHCC and withdraw involvement with SEOC functions when appropriate.
- NSHD representatives may be involved in debriefing response activities.
- NSHD PIOs may communicate status of response activities to LHAs and the public as appropriate.
- The NSHD may provide additional technical assistance to LHAs, as needed or requested.
- The NSHD may review and update the Pandemic Influenza Response Plan based on lessons learned during the pandemic.

Section B: Surveillance

Throughout the year, the NSHD Office of Epidemiology oversees the state's influenza surveillance activities as outlined by the CDC, including laboratory surveillance through the NSPHLS, surveillance of influenza-like illness by sentinel providers, and the "122 Cities Pneumonia and Influenza Mortality Reporting System" (whereas Las Vegas is the designated city for the State of Nevada). In addition, statewide surveillance includes investigation of significant outbreaks, monitoring influenza-like illness of hospital emergency departments, and evaluation of severe illness and death cases associated with influenza. Influenza surveillance has been delegated to the local health authorities for their respective jurisdictions: Carson City Health and Human Services, Southern Nevada Health District, and Washoe County District Health Department submit their weekly results to the state. Influenza surveillance for the remaining fourteen rural counties is managed by the NSHD Office of Epidemiology. Surveillance for the local health authorities also includes monitoring of respiratory illness (including influenza) in major health care facilities as part of their syndromic surveillance system.

In the event of an influenza pandemic, routine surveillance systems may have to be rapidly adapted to respond to the challenges presented. For instance, in the early phases of a pandemic, surveillance will need to be sensitive enough to detect early cases of new strains of influenza in Nevada. Surveillance systems may also need to be able to collect and analyze large amounts of data to determine age-specific attack rates, morbidity and mortality.

Assumptions

- WHO and CDC will coordinate surveillance at the international and national levels, respectively.
- Routine influenza surveillance systems may be overwhelmed, particularly just before and during the pandemic onset.
- National and local resources for controlling the impact of a novel flu virus (e.g., antivirals, vaccine) may not be readily available in the event of a pandemic, so surveillance will be critical in guiding how local resources manage the crisis.
- Influenza surveillance systems will need to be flexible; they may need to be readily adapted to assess and monitor the pertinent epidemiology of a pandemic influenza virus.

Surveillance Activities by Pandemic Phase

The State Epidemiologist, in consultation with the State Health Officer and other public health colleagues, may coordinate the following activities:

WHO Inter-Pandemic Period

Phase 1: No New Influenza Subtypes Detected in Humans

Maintain routine influenza surveillance year round, which may include the following activities and requirements:

- Conduct influenza laboratory surveillance through the NSPHLS. Specimens submitted by sentinel sites and other health care providers may be typed at the state lab and the results sent to the requestor as soon as available. At least 10% of all specimens submitted will be sent to CDC or other appropriate lab for antigenic characterization if the capability does not exist in the state lab.
- Encourage NSPHLS to report influenza data electronically to CDC and state and local health departments through a secure Laboratory Information Management System (LIMS).
- Sentinel providers[2] regularly conduct disease-based surveillance for influenza-like illness (ILI) in collaboration with Local Health Authorities (LHAs), the NSHD, and the Centers for Disease Control and Prevention (CDC). Sentinel providers report the total number of patient visits each week and number of patient visits for ILI by age group (0-4 years, 5-24 years, 25-64 years, >65 years). They also submit a representative proportion of possible flu specimens to the NSPHLS weekly during influenza season.
- Continue reporting pneumonia and influenza deaths (Las Vegas) for "122 Cities Pneumonia and Influenza Mortality Reporting System."
- Report to the State Health Officer weekly, levels of flu activity conveyed by local health districts:
    - Investigate significant influenza outbreaks in schools, child care centers, long term care facilities, and areas that house other high risk populations.
    - Investigate deaths and severe illness (encephalopathy) in children less than 18 years of age, and report findings to CDC.
    - Conduct influenza-like illness surveillance in hospital emergency departments based on reports submitted weekly by hospital infection control nurse or designee. Conduct investigations on unusual clinical syndromes or severe morbidity associated with influenza.
    - Receive and report information on trends detected through syndromic surveillance in Clark County. (Additional syndromic sites are projected for the end of 2005.) Data will be stored in a central database, maintained by the NSHD Office of Epidemiology that can be accessed by LHAs.
    - Collect reports from the Nevada Department of Agriculture regarding animal influenza outbreaks in poultry, swine, or wild birds in the state.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- Continue routine influenza surveillance and expand surveillance to include high-risk populations and those which might provide early indicators of disease (e.g., schools, nursing homes, and poultry and swine workers). Conduct active surveillance when appropriate.
- Monitor syndromic surveillance data in Clark County and other areas of the state where such surveillance has been implemented.

[2] Sentinel providers are a designated group of medical providers that through their regular practice will sample their patients for ILI.

- Monitor ILI and influenza strains occurring in military personnel and their dependents stationed on military bases in Nevada.
- Increase medical intelligence activities regarding domestic and international influenza activity via sources such as Pro-Med, Epi-X, WHO, CDC, and USDA.
- Monitor bulletins from CDC regarding virologic, epidemiologic, and clinical findings associated with new flu variants isolated within or outside of U.S.
- Notify NSPHLS, other pertinent laboratories and the Nevada Department of Agriculture (State Veterinarian) regarding appearance of new strains of influenza detected in other countries, the U.S. and/or Nevada.
- Encourage the NSPHLS to maintain an adequate supply of appropriate reagents to test for novel strains of influenza and a plan to accommodate test surges.
- Ensure that specimens of unusual virus isolates identified in Nevada be submitted to CDC by the NSPHLS for further testing and confirmation.
- Advise NSPHLS when to begin genetic sequencing of influenza specimens of the same type as a newly identified novel strain.
- Set up a secure website which can be used by laboratory and epidemiology personnel to rapidly post sensitive laboratory and epidemiological information needed by public health personnel and health-care providers. Health-care providers and infection control personnel who deal with influenza should have access to this site. Currently all Nevada influenza cases, with the exception of those in Clark County, are being tracked by the Nevada Electronic Disease Surveillance System (NEDSS).
- Notify health-care providers and LHAs of the appearance, clinical description, and location of novel strains of influenza.
- Request submission of specimens from laboratory directors, physicians, emergency departments (EDs), and urgent care centers for viral cultures from patients presenting with ILI or unusually severe symptoms, especially those with a recent travel history to or from a region of novel virus circulation.
- Notify health care providers and sentinel sites to submit isolates to NSPHLS for sub-typing when significant ILI increases occur outside the peak period of influenza activity. Conduct investigation of lab-confirmed influenza cases occurring during non-peak periods.
- Conduct epidemiological investigations of cases of influenza in Nevada involving novel strains. Increase information sharing with Nevada Department of Agriculture regarding the presence and activity of avian, swine, and human influenza in Nevada.
- Monitor ILI in a subset of poultry and swine workers if a novel virus is identified that appears to be of animal origin.

WHO Pandemic Alert Period

Phase 3, 4, 5: Human Infection Confirmed with Progression to Human-to-Human Spread

- Continue previously described surveillance activities.
- Assemble a Pandemic Influenza Coordinating Committee to review existing surveillance activities and evaluate possible enhanced surveillance plans.

- Develop and distribute a surveillance case definition for influenza caused or suspected to be caused by the novel virus.
- Review and update the procedure for the collection, testing, and reporting of influenza laboratory specimens.
- Conduct active surveillance for ILI in travelers and military personnel returning from areas where a novel virus has been isolated or confirmed in humans.
- Conduct active surveillance of school absenteeism due to influenza-like illness.
- Provide frequent reports to health-care providers, public health personnel, the Department of Agriculture, NSPHLS and other laboratories on the surveillance status of the novel virus in Nevada, the nation, and worldwide.
- Develop contingency plans for procurement of laboratory equipment, supplies, and additional staff to assist with laboratory and epidemiological functions.

WHO Pandemic Period

Phase 6: Pandemic Phase

- Continue all previous surveillance activities as described above.
- Verify that surveillance systems have been activated and facilities are reporting.
- Analyze incoming patient data to determine populations at greatest risk; provide reports to LHAs and DEM.
- Consider special studies to characterize the outbreak. These include such things as documenting influenza-attack rates in certain groups, such as health-care providers; analyzing age-specific attack rates and morbidity and mortality rates in those groups; defining unusual clinical syndromes and defining risk factors and appropriate treatment for those syndromes.
- NSHD Immunization Program, in conjunction with the NSHD Office of Epidemiology, may conduct vaccine efficacy studies.
- Monitor effectiveness of traditional control measures such as school and business closures.
- Make recommendations for control of outbreak based on previous epidemiological information and assess effectiveness of new interventions.
- Request assistance from CDC, as needed with regard to manpower, equipment and medications. Federal support may or may not be available.
- Monitor surveillance reports from WHO and CDC on international and national morbidity and mortality data.
- Focus NSPHLS surveillance on detection of antigenic drift variants or re-assortment viruses; if virus has been identified and appears to be only one new strain, decreased lab surveillance is warranted except as noted above.
- ILI sentinel surveillance may be overwhelmed. If sentinel providers cannot keep records of numbers of cases, ask them to provide weekly estimates (e.g., 50-100 cases, 100-200 cases). Extrapolate age-specific attack rates from types of providers reporting.
- Emphasize monitoring hospital ED ILI rates. Also, obtain as much inpatient data as possible, including age-specific attack rates, morbidity and mortality rates for analysis.
- Assess surveillance activities and eliminate or modify, as needed.

WHO Post-pandemic period

- Continue previous surveillance activities; reactivate methods conducted during the phases prior to the pandemic. This level of activity can help to detect a second wave.

- Encourage sentinel providers to continue reporting even though the pandemic appears to be subsiding or ends outside normal flu season.
- Continue to monitor ILI in hospital EDs.
- Conduct virologic surveillance at levels used prior to pandemic.
- Prepare health care providers and LHAs for possibility of a second wave.
- Review and assess pandemic influenza surveillance activities of previous phases and determine whether to continue or modify.
- Determine and implement surveillance based on conditions in the post-pandemic environment.
- The NSHD Office of Epidemiology will review and analyze epidemiologic data, and prepare a summary report, including lessons learned and recommendations for the future. A report will be sent to appropriate parties, including the NSHD Administrator, State Health Officer, PHP Health Program Manager, and LHAs. The report will include at a minimum:
  - Age-specific morbidity and mortality rates;
  - Descriptive data on clinical symptomology;
  - Antiviral and vaccine efficacy; and
  - Effectiveness of community containment measures.
- Prepare a report for health care providers summarizing relevant epidemiological findings of potential interest to clinicians.

Section C: Vaccine Delivery

Surveillance, isolation, and vaccination are the primary control measures to prevent influenza. Flu vaccines cause antibodies to develop in the body, which provide protection against influenza virus infection. It is assumed that vaccine against a pandemic strain of influenza will not be available at the start of a pandemic. Furthermore, when a vaccine does become available, the demand may exceed the supply for some time. The purpose of this section is to outline the key steps in delivering vaccine. For additional details and a description of vaccine delivery, see the NSHD Mass Dispensing Plan.

Although the overarching goal may be to vaccinate the entire population, this may need to be done in stages. CDC has recommended that priority groups be defined in advance of a pandemic so that vaccine can be administered in a way that minimizes the morbidity and mortality of the pandemic influenza strain, as well as its impact on the community infrastructure (see Appendix E for pre-determined priority groups). The federal DHHS has listed the following goals of vaccination in its Pandemic Influenza Preparedness and Response Plan:

- Goal 1: Maintain the ability to provide quality health care, implement pandemic response activities and maintain vital community services;
- Goal 2: Protect persons at highest risk for influenza mortality;
- Goal 3: Decrease transmission of infection to those at highest risk for influenza mortality;
- Goal 4: Maintain other essential community services; and
- Goal 5: Protect the susceptible population at large.

Vaccine Delivery Activities by Pandemic Phase
WHO Inter-Pandemic Period
Phase 1: No New Influenza Subtypes Detected in Humans

- The NSHD Immunization Program maintains a system for distribution of vaccines during regular influenza seasons.
- NSHD will continue to support the Immunization Program's plan to provide increased influenza and pneumococcal vaccine coverage levels in traditional high-risk groups through state and local associations.
- The NSHD may encourage the Nevada State Medical Association and other physician and health-care professional associations and organizations to promote increased influenza and pneumococcal vaccine coverage levels in high-risk groups.
- The NSHD Mass Dispensing Plan details the management of vaccine delivery and administration during a pandemic.
- The State Health Officer, in consultation with CDC and other public health personnel, may review and update the description of prioritized administration of influenza vaccine in the event of inadequate supplies. (Appendix E)
- Develop a plan on how persons in priority groups would be identified at vaccination clinics and how vaccine would be provided most efficiently to those groups.
- The NSHD Immunization Program, LHAs and others as appropriate, identify and maintain sufficient vaccine storage capability.
- PHP will continue to maintain and update contact lists of partners in the community who can assist with mass immunizations, such as volunteer systems, local hospitals, local clinics, and retired nurse and physician associations.

- Throughout the course of a pandemic, the NSHD Immunization Program and the NSHD Office of Epidemiology will ensure that adverse events following vaccination are reported through the Vaccine Adverse Events Reporting System (VAERS).

- NSHD will continuously monitor pandemic influenza information provided by CDC, WHO, and other sources, as appropriate.
- The NSHD may communicate pandemic vaccine updates to LHAs via the (NVHAN) or other appropriate mechanisms.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- The NSHD will continue to research and communicate new pandemic developments to all stakeholders.
- The NSHD Office of Epidemiology and Immunization Program will follow progress in development of effective vaccine for the novel virus.
- PHP may review the Mass Dispensing Plan to ensure existing methods of distributing vaccine are appropriate for the pending pandemic.

WHO Pandemic Alert Period

Phase 3, 4, 5: Human Infection Confirmed with Progression to Human-to-Human Spread

- The NSHD may prepare to activate the NSHD Mass Dispensing Plan and/or the NSHD Plan for Receiving, Distributing, and Dispensing the Strategic National Stockpile in order to ship and distribute vaccine to LHAs and other community sites. The NSHD may coordinate through PHP, the Immunization Program, LHAs and local public health partners, to establish massive immunization efforts directed at high-priority groups.

WHO Pandemic Period

Phase 6: Pandemic Phase

- The NSHD may provide technical assistance to LHAs upon request, to assist in their readiness level for receipt of vaccine.
- The Immunization Program may submit vaccine orders to the appropriate distribution vendor.
- PHP may modify plan for vaccine distribution to ensure optimal coverage.
- Priority groups for receiving vaccination may be identified based on the characteristics of the causative virus (e.g., transmissibility, virulence, initial geographic distribution, age-specific attack rates, and complication rates) and on vaccine effectiveness.
- The NSHD may activate the Mass Dispensing Plan if needed.
- The NSHD may provide technical assistance to LHAs, if requested, regarding redistribution of vaccine to providers outside of their respective jurisdictions.
- Based on administration and redistribution of vaccine during WHO Phases 1 through 5, the NSHD may assess the need for additional vaccine.
- Depending upon need, NSHD may order additional vaccine for distribution to local jurisdictions.
- The NSHD may assist LHAs in the distribution and use of vaccines, as needed, based on the jurisdiction's infection rate.

WHO Post-pandemic period

- The Immunization Program will assess supply status and address any additional needs regarding vaccine.
- The Immunization Program will calculate total amounts of vaccine ordered, shipped, administered, and wasted.

- PHP will review and revise the Vaccine Delivery Section of the Pandemic Influenza Response Plan and the Mass Dispensing Plan based upon effectiveness during Phases 1 through 6.

Section D: Antivirals Preparedness and Response

The main goals of chemoprophylaxis and treatment are to reduce the human influenza rate of infection and to reduce human morbidity and mortality associated with the pandemic strain. Antiviral drugs are most often used to control influenza outbreaks in areas where people at high risk for complications from flu are in close contact with each other. In the event of an outbreak, public health practice is to combine the use of flu vaccine and antivirals. While antivirals can be used for preventing and reducing the infection rate of influenza, it should be the last preventive option and should follow implementation of other recommended or indicated preventive efforts (e.g., restrictions on travel and communal events, isolation of ill persons, quarantine of exposed persons, implementation of infection control measures such as the use of masks, diligent hand washing, and vaccination).

If sufficient stockpiles of antivirals exist at the time the pandemic reaches the United States, chemoprophylaxis efforts in Nevada may prioritize those persons considered to be indispensable in carrying out public health, clinical, and public safety-related functions. In addition, chemoprophlaxis efforts may also prioritize those individuals at high risk of exposure during the early stages of the pandemic while vaccine is being produced and vaccination clinics are being established and placed in operation. If there are insufficient stockpiles of antiviral agents for chemoprophylaxis, treatment should be directed toward those targeted groups at increased risk of morbidity and mortality.

The purpose of this section is to outline key steps in antiviral preparedness and response. For additional details and a logistical description of antiviral delivery, refer to the NSHD Mass Dispensing Plan.

Antiviral Activities by Pandemic Phase
WHO Inter-Pandemic Period
Phase 1: No New Influenza Subtypes Detected in Humans

- The NSHD may provide technical assistance to LHAs for planning and policy development to include:
  - Sharing of CDC's guidelines and recommendations for chemoprophylaxis and treatment, including prioritization of specific target populations/groups, which can be accessed at: http://www.cdc.gov/flu/professionals/treatment/0405antiviralguide.htm;
  - Assisting in the calculation and review of county specific target population data;
  - Assisting in the calculation and review of county-specific antiviral doses required for chemoprophylaxis or treatment of identified high-risk populations and other target populations identified to receive chemoprophylaxis or treatment;
  - Training on the receipt, handling, and storage of antivirals;
  - Reviewing and assessing of county plans for antiviral receipt and storage; and
  - Reviewing and assessing of county distribution plans for antivirals to hospitals, private health-care providers, and clinics.
- The NSHD may develop an antiviral allocation plan for counties or assist counties in plan development based on the CDC guidelines and recommendations for antiviral chemoprophylaxis and treatment, the number of doses of antivirals allocated or available to Nevada and the county-specific target populations.
- The NSHD may review the influenza antiviral receipt and distribution plans: NSHD Mass Dispensing Plan and NSHD Plan for Receiving, Distributing, and Dispensing via the Strategic National Stockpile (SNS). Both may be updated as necessary.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- The NSHD will maintain weekly/daily electronic and/or telephone contact with CDC, WHO and other organizations, as necessary, for updates on the epidemiology of emerging or re-emerging strains and antiviral efficacy against the strains.

WHO Pandemic Alert Period

Phase 3, 4, 5: Human Infection Confirmed with Progression to Human-to-Human Spread

- NSHD personnel from Administration (State Health Officer, Administrator, and/or Deputy Administrator), the Office of Epidemiology, the Immunization Program, and PHP may maintain daily/weekly electronic and/or phone contact with CDC, WHO and other organizations, as necessary, for updates on the epidemiology of the pandemic strain, antiviral efficacy against the strain and vaccine development timetable.
- The NSHD Office of Epidemiology may review updated national/international geographic distribution and determine, to the extent possible, the estimated arrival date (or window) of the pandemic to Nevada.
- The NSHD Office of Epidemiology may review the county-specific priority population data, amending the list if analysis of early epidemiologic and morbidity and mortality data suggests other priority groups.
- PHP, in coordination with the Immunization Program, will assess preparedness and response capacity/readiness for vaccination of high-risk groups and the general public once vaccine is available.
- PHP will determine the estimated dates of vaccine availability and the amount allocated/available to Nevada.
- PHP will determine the available supplies of indicated antiviral medications(s) in the public and private sectors.
- PHP may review, update and plan to activate the NSHD Mass Dispensing Plan and/or the NSHD Plan for Receiving, Distributing, and Dispensing the Strategic National Stockpile, as appropriate.

WHO Pandemic Period

Phase 6: Pandemic Phase

- Based on pandemic status, the NSHD may activate the Mass Dispensing Plan to distribute and control use of antivirals.
- The NSHD may provide technical assistance to LHAs and counties to ensure readiness for receipt, storage, and distribution of antivirals.
- The NSHD may communicate with LHAs the expected delivery date(s) of antivirals.
- The NSHD may distribute and assist LHAs in the redistribution of antiviral medications as needed and available.
- The NSHD Office of Epidemiology and Immunization Program may review available epidemiologic and clinical data on the efficacy of chemoprophylaxis and treatment.
- The NSHD Office of Epidemiology and the Immunization Program may review the type and frequency of any reported adverse reactions and review epidemiologic evidence for causal association.
- PHP may update the Mass Dispensing Plan, as needed, based on information obtained through the previous four activities in preparation for a potential second wave.

- If available epidemiologic and clinical data indicate antiviral medications were efficacious in reducing infection and/or reducing morbidity and mortality, the NSHD may re-order antiviral medications utilizing experience gained from the initial wave.
- NSHD may redistribute antivirals according to the Mass Dispensing Plan and experience gained from the WHO Phases 1 through 6.

WHO Post-pandemic period

- For accounting purposes and to the extent possible, the NSHD will determine total amounts of antivirals ordered, shipped, administered, and wasted.
- The NSHD Office of Epidemiology will determine type and frequency of any reported adverse reactions and review epidemiologic evidence for causal association.
- The NSHD Office of Epidemiology will review epidemiology of the pandemic and data on the efficacy of antiviral chemoprophylaxis and treatment.
- PHP may update the NSHD Mass Dispensing Plan and the NSHD Plan for Receiving, Distributing, and Dispensing the Strategic National Stockpile, as needed, based on information obtained through the previous three activities.

Section E: Communications

The following section identifies communication activities during an emergency response to an influenza pandemic. It also provides recommendations for communication coordination among partner agencies, CDC, WHO, and other entities as appropriate.

The Nevada Health Alert Network (NVHAN)
Utilizing the NVHAN, NSHD has the capacity to disseminate health alert notifications within the public health infrastructure and to health-care partners by email, telephone, cell phones, and pagers. Once the notification has been confirmed as received, the alert can be accessed on the home page of a secure website. Faxing an alert to all the NVHAN members is an option that can be used in addition to the secure website. NVHAN may be a particularly effective means of communication during all phases of a pandemic event, because it can reach specific, targeted groups of public health professionals and health-care providers within the NVHAN database. NVHAN is a web-based system, which may be adapted during an emergency as an Intranet site for responding partners and stakeholders to communicate during the event.

Public Information
The NSHD maintains a risk communication plan for public health emergencies, including influenza pandemic. The purpose of the plan is to outline measures for disseminating health information and communicating risk to the public, news media, businesses, partner organizations and other stakeholders, before, during, and after a public health emergency. The plan further creates a framework for performing the following essential risk communication functions:

- Facilitating the provision of timely, accurate, understandable health information to the public via the news media, the business community, and other local sources;
- Providing partner organizations and stakeholders with timely, accurate information on health issues to allow them to better serve their constituencies;
- Collaborating with state and local Joint Information Centers, if activated; and
- Conducting emergency operations in a manner that increases public confidence in NSHD during day-to-day operations.

Appendix F is an excerpt of the risk communication plan specific to pandemic influenza. All information therein is current at the time of this review (November 2006).

Communication Activities by Pandemic Phase
WHO Inter-Pandemic Period
Phase 1: No New Influenza Subtypes Detected in Humans
(Note that many of the activities described below may continue for the duration of the pandemic, and therefore are not repeated as additional activities in the subsequent WHO phases below.)

- NSHD PIO, with assistance from the PHP PIO, may update the risk communication plan regularly. Communication material, including brochures, flyers and web pages, may be updated to include information specific to pandemic influenza.
- NSHD tests communications systems, including NVHAN and Epi-X, regularly, to assess and maintain the availability of real-time communication among LHAs, NSHD and local health care providers.
- NSHD updates key staff, including the PIO, on the status of pandemic influenza in the state.

- NSHD conducts conference calls with external partners and stakeholders as the pandemic event emerges.
- NSHD staff from Administration, PHP, Office of Epidemiology, and the Immunization Program review updated material and information from CDC, WHO, and other appropriate sources as the pandemic event emerges.
- NSHD PIO, with assistance from the PHP PIO, may develop templates for news releases and non-commercial sustaining announcements pre-event.
- NSHD PIO briefs members of the state PIO JIC group on changes in the influenza pandemic status.
- NSHD PIO, in consultation with other NSHD programs, may communicate to the public about flu season and ways of preventing illness.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- Referencing the risk communication plan, NSHD PIO, with assistance from the PHP PIO, may prepare news releases, fact sheets, FAQs, web pages and other information pre-event, in consultation with the Office of Epidemiology.
- NSHD PIO may collaborate with the Office of Epidemiology and counterparts at LHAs to determine a plan for regular dissemination of relevant, timely surveillance data.
- Office of Epidemiology Staff regularly provides an outbreak status report to NSHD Administration and the NSHD PIO.
- NSHD representatives may regularly provide status reports to LHAs and local health care providers via NVHAN.
- NSHD PIO, with assistance from the PHP PIO, may research educational materials available and distribute them to public health partners.
- PHP staff and NSHD PIO may review procedure for establishing a toll-free hotline.
- NSHD PIO, with assistance from the PHP PIO, may draft fact sheets and information for personnel staffing the toll-free hotline.
- NSHD PIO briefs members of the state PIO JIC group on changes in the influenza pandemic status.

WHO Pandemic Alert Period

Phases 3, 4 and 5: Human Infection Confirmed with Progression to Human-to-Human Spread

At this point, it is likely that the Joint Information Center (JIC) may be activated at the request of the Governor. The JIC may assume responsibility for conducting some of the communication activities detailed below. In the event that the JIC is not activated during WHO Phases 3, 4 or 5, the NSHD PIO and other NSHD representatives may conduct the following activities:

- NSHD PIO establishes contact with LHA media representatives and PIO counterparts.
- NSHD and LHA PIOs, in consultation with the Office of Epidemiology and other NSHD representatives, communicate to the community the influenza disease potential and the local/state plan of action for vaccine/antiviral dissemination and infection control.
- NSHD PIO identifies and coaches spokespersons to conduct media interviews and regularly scheduled news briefings.
- NSHD PIO briefs members of the state PIO JIC group on changes in the influenza pandemic status.
- NSHD representatives, in conjunction with DEM, may include the Nevada Commission on Tourism in developing public information and communication activities.
- NSHD and LHA PIOs disseminate messages to the news media on the following:
  - How to identify influenza, including the symptoms of the current strain;
  - Health risks posed by the current strain;

- Measures to prevent spread of the disease;
- Where to go for treatment.

WHO Pandemic Period

Phase 6: Pandemic Phase

- NSHD PIO activates toll-free hotline, and monitors call reports to determine additional issues that need to be addressed by PIOs and/or NSHD representatives.
- NSHD PIO briefs members of the state PIO JIC group on changes in the influenza pandemic status.
- NSHD PIO, with assistance from the PHP PIO, reviews CDC and WHO websites for updated pandemic status at least twice daily.
- NSHD PIO maintains contact with public information liaisons at the PHCC and SEOC, as they are activated.
- The PHP PIO may feed information to the NSHD PIO while stationed at the PHCC when activated.
- NSHD PIO may hold daily briefings with NSHD key staff for guidance on public information and communication activities.

WHO Post-Pandemic Period

- NSHD representatives involved in pandemic influenza response planning and coordination collaborate on a written report summarizing response efforts and communicating findings "lessons learned" to LHAs, external partners, and other stakeholders. Those findings are incorporated into future drafts of the response plan.
- NSHD PIO, with assistance from the PHP PIO, may lead effort to incorporate lessons learned into future drafts of the risk communication plan.

Section F: Emergency Response

The NSHD is moving towards fully integrating existing emergency response plans and standard operating procedures using a planning model that eliminates duplication, facilitates consistent response and provides a framework for understanding the relationship between plans. All response plans may ultimately be linked either to the (1) Nevada SCEMP or the (2) Health Division's CEMP.

The State Health Officer, NSHD Administrator or Deputy Administrator may implement the Incident Command System by activating the Public Health Coordinating Center (PHCC) during an event of public health significance. In such a case, the State Health Officer, NSHD Administrator, or Deputy Administrator will become the Public Health Coordinating Officer. When the decision is made to activate the PHCC, the level of response appropriate for the event may be determined. This determination may be based on known or projected health risks and on anticipated response required to the event. The activation level may change as a result of changing conditions, and the decision to increase or decrease the level of activation may be made by the Public Health Coordinating Officer. The PHCC may be activated even if the SEOC is not activated.

In a potential pandemic influenza event, initial warning may come from the CDC, WHO, or other federal agency via the HAN or by direct communication to the NSHD. In such case, the State Health Officer, NSHD Administrator or Deputy Administrator may be required to either prepare to activate or partially activate the PHCC. If the NSHD is alerted of confirmed cases of novel virus with human transmission occurring within the state, the PHCC may be fully activated.

For more information on the activation procedures of the PHCC, see the PHCC Standard Operating Policy (SOP).

Emergency services personnel may be engaged in all levels of pandemic planning. While it is expected that the LHA will lead the pandemic response in terms of surveillance, vaccine usage, use of antivirals and public health measures, emergency service providers will play a critical role in coordinating the overall emergency response. The deployment of these services may be staged in accordance with Nevada's SCEMP and may depend on the severity and impact of the pandemic.

Emergency service planning includes collaboration between public health authorities, emergency medical services (EMS) personnel and DEM to ensure that pandemic response and recovery efforts may be coordinated.

Emergency Response Activities by Pandemic Phase
WHO Inter-Pandemic Period
Phase 1: No New Influenza Subtypes Detected in Humans

- NSHD Immunization Program may work with the Bureau of Licensure and Certification (BLC) EMS Program to improve vaccination of staff, emergency medical service providers, Medical Reserve Corps, (MRC) volunteers and other emergency personnel throughout the state.
- BLC EMS Program may coordinate alternate means for transporting non-critically ill patients to medical facilities.
- The NSHD will maintain the PHCC in a state of readiness as described in the PHCC SOP until activation becomes necessary.

Phase 2: Circulating Novel Animal Virus Poses Substantial Human Risk

- NSHD personnel from the Office of Epidemiology, PHP and/or the Immunization Program may notify the BLC EMS program of a novel virus alert. The alert may be distributed to regional EMS providers, as appropriate.
- NSHD may begin the identification and initiation of communications with those agencies required to mobilize in the event that a pandemic influenza response. This may involve briefing or coordinating incident information through LHAs with infection control practitioners, emergency departments, urgent care facilities, laboratory directors, EMS providers, clinics, hospitals, as well as state and volunteer organizations.
- The NSHD may begin regular communications with DEM regarding pandemic status and continue communicating and coordinating throughout the course of the pandemic.

WHO Pandemic Alert Period

Phase 3, 4, 5: Human Infection Confirmed with Progression to Human-to-Human Spread

- NSHD representatives such as the State Health Officer, NSHD Administrator, Deputy Administrator, PHP Program Manager, State Epidemiologist, and other appropriate personnel may meet to review the Pandemic Influenza Response Plan and formulate strategies to detect and manage a pandemic in Nevada.
- Based on current pandemic status in Nevada, the State Health Officer, NSHD Administrator, or Deputy Administrator may prepare to activate the PHCC.

WHO Pandemic Period

Phase 6: Pandemic Phase

- The State Health Officer, NSHD Administrator, or Deputy Administrator may activate the PHCC and deploy NSHD personnel for pandemic influenza response (See the PHCC SOP for the PHCC Call-Down Roster).
- DEM has its own protocols and authority to activate the SEOC. If activated at this point in the pandemic, the Emergency Support Function (ESF) 8 liaison may be requested at the SEOC and would be responsible for assisting in the coordination of public health, and medical services/resources. While serving at the SEOC the ESF 8 Liaison may accept requests from other ESFs. The PHCC assists the ESF 8 Liaison to process requests and it is not uncommon to have other ESF Liaisons serving at the PHCC to assist in the coordination of response efforts throughout the pandemic.
- NSHD staff at the PHCC will document response actions taken throughout the course of the pandemic event.
- NSHD may coordinate the deployment and staffing of Disaster Medical Facilities (DMF) if required. If local hospitals reach surge capacity, the DMF may be used for triage of patients for isolation and quarantine, as well as for setting up mass vaccination clinics. The NSHD maintains the *Nevada Hospital Association (NHA) Disaster Medical Facility Field Manual* for this purpose.
- Emergency shelters may be necessary, for vulnerable populations if medical facilities may become overwhelmed. In accordance with the National Response Plan (NRP), ESF 6 (Mass Care, Housing, and Human Services) will work in coordination with other ESFs at the SEOC, the PHCC and the American Red Cross to provide mass care, housing and other human services as they become necessary. The NSHD through the PHCC and the SEOC may assist in coordinating staffing services for these shelters, as needed. The location of these shelters may be situation dependent. The NSHD Mass Illness Plan

outlines measures that can be taken to address and reach populations with special needs.

- In the event that the number of fatalities exceeds the capacities of state resources, the NSHD may ask for the SEOC to request a federally provided Disaster Mortuary Operational Team (DMORT) which will provide additional supplies, equipment and staff.
- As the need for coordination decreases the Public Health Coordinating Officer may evaluate the activation level of the PHCC and may determine whether or not to begin deactivation, cognizant that a second pandemic wave may or may not follow.

WHO Post-pandemic period

- NSHD may notify involved agencies and LHAs of post-pandemic status once the pandemic has been clearly controlled.
- Public Health Coordinating Officer may deactivate the PHCC.
- NSHD may continue to provide planning and support services to affected locations, as required, while transitioning responsibility back to local communities.
- NSHD will assess the impact, response, and control of the pandemic.
- NSHD may summarize the pandemic response and record lessons learned for future pandemic situations.

Appendix A: Acronyms

ACIP (Advisory Committee on Immunization Practices)
BHPS (Bureau of Health Protection Services)
BLC (Bureau of Licensure and Certification)
CBERN (Chemical, Biological, Explosive, Radiological and Nuclear)
CDC (Centers for Disease Control and Prevention)
DEM (Division of Emergency Management)
DHHS (Department of Health and Human Services)
DHS (Department of Homeland Security)
DMF (Disaster Medical Facility)
DMORT (Disaster Mortuary Operational Team)
ED (Emergency Department)
EIS (Epidemiologic Intelligence Service)
EMS (Emergency Medical Services)
ESF (Emergency Support Function)
HRSA (Health Resources and Services Administration)
ILI (Influenza-like-illness)
JIC (Joint Information Center)
LHA (Local Health Authority)
LIMS (Laboratory Information Management System)
MHDS (Mental Health and Developmental Services)
NAC (Nevada Administrative Codes)
NIMS (National Interagency Incident Management System)
NHA (Nevada Hospital Association)
NRS (Nevada Revised Statutes)
NSHD (Nevada State Health Division)
NSPHLS (Nevada State Public Health Laboratory System)
NV (Nevada)
NVHAN (Nevada Health Alert Network)
PHCC (Public Health Coordinating Center)
PHP (Public Health Preparedness)
PIO (Public Information Officer)
PPE (Personal Protection Equipment)
SCC (Secretary's Command Center)
SCEMP (State Comprehensive Emergency Management Plan)
SEOC (State Emergency Operations Center)
SNS (Strategic National Stockpile)
SOP (Standard Operating Procedures)
WHO (World Health Organization)

Appendix B: NSHD Pandemic Influenza Response Activity Matrix

Response Phases	Inter-Pandemic Phases 1,2	Pandemic Alert Period Phases 3,4,5	Pandemic Period Phase 6	Post Event Recovery
WHO Pandemic Phases	**No New Influenza Subtypes Detected in Humans. Circulating Novel Animal Virus Poses Substantial Human Risk**	**Human Transmission Confirmed**	**Onset of Pandemic**	**Post-pandemic period**
Command, Control and Management	• Maintain PHCC in a state of readiness • Identify private and public sector partners in planning process; foster coordination and participation among private and public sector partners in planning process • Coordinate pandemic influenza planning efforts with local and federal authorities • Identify major gaps in current ability to effectively respond to a pandemic; explore possible avenues for addressing and resolving gaps	• Maintain PHCC in a state of readiness or partial activation • Notify LHAs and all appropriate partners and stakeholders of novel virus alert • Continue to monitor bulletins from CDC or WHO regarding clinical epidemiological and virologic characteristics of novel variant • Disseminate to LHAs, stakeholders and partners as appropriate • Advise hospitals and clinicians of use of control measures, including quarantine and isolation orders for novel virus cases • Prepare to possibly activate PHCC	• Partially or fully activate the PHCC • Review community control measures • Consider mass quarantine measures, i.e., shelter in place. • Implement Community Control Measures including mass quarantine or “snow days”	• Assess state capacity to resume normal public health functions • Stand down the PHCC as event subsides • Review effectiveness of control measures

Surveillance	• Maintain routine voluntary laboratory surveillance of influenza • Improve and maintain virologic surveillance capabilities, including ability to isolate subtype influenza viruses, at levels sufficient to meet anticipated demand for such testing services during a pandemic • Develop a surveillance system to detect influenza among international travelers to Nevada	• Enhance surveillance activities appropriately • Coordinate surveillance activities and findings with other states and local and federal health agencies • Provide a broad dissemination of case definition for active case findings of novel virus in NV resident • Work with CDC to determine which groups are at high risk for morbidity and mortality • Obtain appropriate reagents from CDC to detect and identify novel virus strain • Increase testing for influenza viruses including pandemic strain(s) • Send unusual virus isolates to CDC for appropriate testing when NSPHLS cannot perform testing	• Continue enhanced surveillance activities as appropriate • Conduct case finding of pandemic strain in NV residents and determine age-specific attack rates, morbidity and mortality	• Return to normal surveillance activities • Return to normal case investigation activities
Vaccine	• Devise a strategy for vaccine distribution in such a way as to reduce morbidity, mortality and social disruption (Mass Dispensing Plan)	• Possibly initiate vaccine acquisition according to the Mass Dispensing Plan • Work with LHAs and private sector providers to ensure that identified high risk groups and others	• Continue to identify high risk groups and prepare for mass vaccination • Conduct mass immunization when vaccine is available	• Assess the effectiveness of vaccine

	• Devise procedures to secure and administer vaccine in Nevada	receive vaccine, as appropriate		
Antivirals	• Devise a strategy for antiviral distribution in such a way as to reduce morbidity, mortality and social disruption (Mass Dispensing Plan) • Devise procedures to secure and administer antivirals in Nevada • Develop a system for antiviral adverse event reporting (AVAERS)	• Possibly initiate antiviral acquisition according to the Mass Dispensing Plan • Work with LHAs and private sector providers to ensure that identified high risk groups and others receive antiviral medications, as appropriate	• Continue to identify high risk groups and conduct mass dispensing of antivirals, if necessary • Monitor adverse events through AVAERS	• Assess effectiveness of antivirals
Communication	• Monitor NVHAN for bulletins and other pandemic information from CDC and WHO to detect alerts about new virus variants and for changes in current recommendations for prevention and control • Educate health care	• Notify LHAs and all appropriate partners and stakeholders of novel virus alert • Prepare translated versions of major public information documents for non-English speaking persons and special populations	• Fully activate the Risk Communication Plan • Conduct communications activities as outlined in Pandemic Influenza Response and Risk Communication Plan and stand up JIC, as directed	• Review and revise communication strategies utilized during the pandemic

	providers about appropriate infection control procedures for influenza, as well as how to care for patients suffering from influenza and its complications • Educate health care workers on the interim guidance for appropriate Personal Protection Equipment (PPE) for first responders/ health division staff. (Appendix G) • Prepare drafts and/or standard templates of information documents including fact sheets for general public and guidelines for health care providers on appropriate use of antiviral medications and vaccines			
Emergency Response	• Estimate number of hospitalizations that could be expected during a pandemic and determine extent to which health care	• Work with partners to plan for pandemic response activities	• Coordinate emergency response activities through the PHCC and the SEOC • Request through the SEOC federal DMORT assistance if necessary	• Continue to provide recovery assistance as needed

	organizations might be overwhelmed • Conduct inventory of health care personnel including current and retired MDs, ODs, RNs and other nursing personnel, veterinarians, others with medical training and State National Guard and other potential volunteers • Utilize MRC and other volunteers; define extent of care that each type of provider can perform according to Nevada law			

Appendix C: Local, State and Federal Roles and Responsibilities

Local Roles and Responsibilities during Pandemic Influenza

Local Health Authorities are responsible for planning the local response to an influenza pandemic, in consultation with the state. If a LHA chooses not to develop its own pandemic influenza response plan, it may utilize the state's plan, making adaptations where necessary. In counties where there is no LHA, the state is the public health authority and may conduct the same tasks and have the same responsibilities as a typical LHA. These responsibilities may include the following:

- Ensuring that local level pandemic influenza response plans are developed and adopted and that these plans and appropriate guidelines are regularly updated, and ensuring that LHAs utilize the state plan if local level pandemic influenza response plans are not developed;
- Acting as liaisons with local responders in advance of a pandemic to facilitate a coordinated community response. It is likely that the LHAs, through existing or enhanced surveillance, may be the first ones to detect influenza in their community. It is essential that the lines of communication within the community and up the line to the state and federal levels are clear and established in advance of a pandemic;
- Developing local plans to assess existing health care resources, coordinate responses with key stakeholders in the counties, and development of contingencies for anticipated shortages of essential services;
- Promoting routing of influenza and pneumococcal vaccine to designated priority groups during regular cycles of influenza;
- Participating in state surveillance activities by monitoring and reporting diseases caused by influenza virus and related diseases/conditions;
- Investigating outbreaks and clusters of influenza-like illness, including sending or assuring influenza virus isolates are sent to the appropriate Laboratory Response Network (LRN) laboratories; and
- Recommending post-pandemic studies to assist the state in evaluating the pandemic influenza response capacity including medical, scientific and technical aspects.

State Roles during Pandemic Influenza

The State is responsible for coordination of the pandemic influenza response within and between their jurisdictions. Specific areas of responsibility may include the following:

- Identifying public and private sector partners needed for effective planning and response;
- Developing key components of a pandemic influenza response plan including: command and control procedures, surveillance activities, antivirals and vaccine distribution, risk communication, and emergency response activities;
- Integrating pandemic influenza planning with other planning activities conducted under the CDC and the Health Resources and Services Administration's (HRSA's) bioterrorism preparedness cooperative agreements with states;
- Developing data management systems needed to implement components of the plan;
- Providing assistance, as necessary, to local areas in exercising plans; and
- Coordinating with adjoining jurisdictions.

Federal Roles during Pandemic Influenza

The federal government is responsible for nationwide coordination of the pandemic influenza response. Specific areas of responsibility may include the following:

- Conducting surveillance activities in the U.S. and globally;
- Conducting epidemiological investigations in the U.S. and globally;
- Developing and using diagnostic laboratory tests and reagents;
- Developing strains and reagents for vaccines;
- Conducting vaccine evaluation and providing licensure;
- Determining populations at highest risk of infection and developing strategies for vaccinating those groups;
- Assessing measures to decrease transmission (such as travel restrictions, isolation and quarantine);
- Deploying federally purchased vaccine;
- Deploying antiviral agents in the Strategic National Stockpile;
- Evaluating the efficacy of response measures;
- Evaluating vaccine safety;
- Deploying the Commissioned Corps Readiness Force and Epidemic Intelligence Service (EIS) officers; and
- Developing medical and public health communications.

Appendix D: Community Containment Measures Including Non-Hospital Isolation and Quarantine and Home Care

Pandemic influenza is a unique public health emergency and community disaster. It is considered a highly probable, if not inevitable event, but no one can predict when it will occur. There may be little warning, but most experts agree that there may be one to six months between identification of a novel virus and widespread outbreak in the U.S. Outbreaks may occur simultaneously throughout the U.S., and the effect on individual communities may last from six to eight weeks or more.

Pandemic influenza has the potential of affecting all elements of society. A large number of cases may add burden to hospitals and other health care systems already stressed with the normal day-to-day crisis. Mortality may be markedly increased. Health and medical personnel as well as other infrastructure workers, i.e. law enforcement, fire and public works, will not be immune. The effects on communities could be staggering.

Immunization and respiratory hygiene are the best control measures available for any type of influenza. Because no vaccine against a novel strain would be available initially, and, it is likely that when vaccine does become available, it may be in short supply, there are few community control measures available in a pandemic influenza event. The NSHD will develop a plan for isolation and quarantine which will lay out the logistics for utilizing these infection control procedures. NRS 441A.560 lays forth the procedure for isolation and/or quarantine in the state of Nevada. According to statute, a health authority, a physician, a licensed physician's assistant, a registered nurse, or a medical facility may submit an application to a health authority for an order of emergency isolation of quarantine of a person or a group of persons alleged to have been infected or exposed to a communicable disease. Under this statute:

> *A health authority may take a person or group of persons alleged to and reasonably believed by the health authority to have been infected with or exposed to a communicable disease into custody in any safe location under emergency isolation or quarantine for testing, examination, observation and the provision of or arrangement for the provision of consensual medical treatment; and to transport the person or group of persons alleged to and reasonably believed by the health authority to have been infected with or exposed to a communicable disease to a public or private medical facility, a residence or other safe location for that purpose, or arrange for the person or group of persons to be transported for that purpose by a local law enforcement agency; a system for the non-emergency medical transportation of persons whose operation is authorized by the Transportation Services Authority or an ambulance services that holds a permit issued pursuant to the provisions of Chapter 450B of NRS.*

Further guidance on the state's roles and responsibilities in isolation and quarantine is accessible at http://www.leg.state.nv.us/NRS/NRS-441A.html#NRS441ASec500.

CDC Information on Isolation and Quarantine **(**Unmodified Document)
(http://www.cdc.gov/ncidod/dq/sars_facts/isolationquarantine.pdf)

FACT SHEET

Isolation and Quarantine

To contain the spread of a contagious illness, public health authorities rely on many strategies. Two of these strategies are isolation and quarantine. Both are common practices in public health, and both aim to control exposure to infected or potentially infected persons. Both may be undertaken voluntarily or compelled by public health authorities. The two strategies differ in that isolation applies to persons who are known to have an illness, and quarantine applies to those who have been exposed to an illness but who may or may not become ill.

Isolation: For People Who Are Ill

Isolation refers to the separation of persons who have a specific infectious illness from those who are healthy and the restriction of their movement to stop the spread of that illness. Isolation allows for the focused delivery of specialized health care to people who are ill, and it protects healthy people from getting sick. People in isolation may be cared for in their homes, in hospitals, or in designated healthcare facilities. Isolation is a standard procedure used in hospitals today for patients with tuberculosis (TB) and certain other infectious diseases. In most cases, isolation is voluntary; however, many levels of government (federal, state, and local) have basic authority to compel isolation of sick people to protect the public.

Quarantine: For People Who Have Been Exposed But Are Not Ill

Quarantine refers to the separation and restriction of movement of persons who, while not yet ill, have been exposed to an infectious agent and therefore may become infectious. Quarantine of exposed persons is a public health strategy, like isolation, that is intended to stop the spread of infectious disease. Quarantine is medically very effective in protecting the public from disease.

States generally have authority to declare and enforce quarantine within their borders. This authority varies widely from state to state, depending on state laws. The Centers for Disease Control and Prevention (CDC), through its Division of Global Migration and Quarantine, also is empowered to detain, medically examine, or conditionally release persons suspected of carrying certain communicable diseases.

Additional Information on Isolation and Quarantine*
*This information has been adapted from CDC documents found at http://www.cdc.gov/flu/professionals/infectioncontrol/

Whereas isolation and contact management strategies such as active monitoring are directed to individuals, broader community containment measures may be applied to groups of persons or communities during outbreaks characterized by extensive transmission. These interventions range from measures to increase social distance among community members (e.g., cancellation of public gatherings, use of masks and implementation of community-wide "snow days") to community-wide quarantine.

Although all of these interventions are designed to prevent transmission by limiting social interactions and preventing inadvertent exposures, the less stringent actions may be easier to implement on a large scale. For example, in the "snow day" approach, community members are asked to stay home as they would during a major snowstorm. Schools are closed, work sites are closed or restricted, large public gatherings are cancelled, and public transportation is halted or scaled back. Implementation requires fewer resources than are needed to activate and maintain community-level quarantine. In addition, as snow days are a familiar concept in most communities, implementation can occur quickly. Implementation of quarantine, on the other hand, can be resource intensive, requiring mechanisms for enforcement and provision of necessities. Snow days and other measures to increase social distance are therefore the preferred community-level responses, with quarantine reserved for situations in which less drastic measures have not been successful in containing an outbreak.

Home Care
Home care will be the predominant mode of care for most people infected with influenza. During the Novel Virus Alert, individuals should discuss with their health care provider specific recommendations for both vaccination and chemoprophylaxis.

The single best way to prevent influenza is to get vaccinated each fall. In the absence of vaccine, however, there are other ways to protect against influenza. Four antiviral drugs (amantidine, rimantidine, oseltamivir, and zanamivir) are approved and commercially available for use in treating influenza. Three of them (amantidine, rimantidine, and oseltamivir) are approved for prevention (chemoprophylaxis) against influenza. All of these drugs are prescription drugs, and a physician should be consulted before use.

The public should receive frequent and repetitive health communications that emphasize the simple steps that individuals and families may take to prevent the spread of respiratory illnesses like influenza:

1. Avoid close contact with people who are sick.
2. Wash hands often (hourly). If sick, stay at home and keep at least 3 feet away from others.
3. Cover mouth and nose with a tissue when coughing or sneezing.

Individuals who are cared for at home should:

1. Get plenty of rest.
2. Drink a lot of fluids.
3. Avoid using alcohol and tobacco.
4. Consider taking over-the-counter medications to relieve the symptoms of influenza (but never give aspirin to children or teenagers who have influenza-like symptoms).
5. Stay home and avoid contact with other people.
6. Cover nose and mouth with a tissue when coughing or sneezing.

In a pandemic influenza event, some individuals who are cared for at home may develop complications. Should complications develop, these individuals should seek medical care immediately, either by calling their physician or going to an emergency room. Upon arrival, the receptionist or nurse should be told about the symptoms so that precautions can be taken (providing a mask and or separate area for triage and evaluation).

Warning signs to seek urgent medical care:

In children, these include:

1. High or prolonged fever.
2. Fast breathing or trouble breathing.
3. Bluish skin color.
4. Not drinking enough fluids.
5. Changes in mental status, somnolence, irritability.
6. Seizures.
7. Influenza-like symptoms improve but then return with fever and worse cough.
8. Worsening of underlying chronic medical conditions (for example, heart or lung disease, or diabetes)

In adults, these include:

1. High or prolonged fever.
2. Difficulty breathing or shortness of breath.
3. Pain or pressure in the chest.
4. Near-fainting or fainting.
5. Confusion.
6. Severe or persistent vomiting.
7. Worsening of underlying chronic medical conditions (for example, heart or lung disease, or diabetes)

Additional Infection Control Recommendations

CDC has provided additional guidance for controlling the spread of influenza in areas at high risk of disease spread such as health care settings, nursing homes and child care facilities and schools. This guidance can be accessed at http://www.cdc.gov/flu/professionals/infectioncontrol/.

Appendix E: NVAC/ACIP Recommendations for Prioritization of Pandemic Influenza Vaccine and NVAC Recommendations on Pandemic Antiviral Drug Use

http://www.hhs.gov/pandemicflu/plan/appendixd.html *Last revised: November 8, 2005*

Advisory Committee recommendations are presented in this report to provide guidance for planning purposes and to form the basis for further discussion of how to equitably allocate medical countermeasures that may be in short supply early in an influenza pandemic.
Two federal advisory committees, the Advisory Committee on Immunization Practices (ACIP) and the National Vaccine Advisory Committee (NVAC), provided recommendations to the Department of Health and Human Services on the use of vaccines and antiviral drugs in an influenza pandemic.

Although the advisory committees considered potential priority groups broadly, the main expertise of the members was in health and public health. The primary goal of a pandemic response considered was to decrease health impacts including severe morbidity and death; secondary pandemic response goals included minimizing societal and economic impacts. However, as other sectors are increasingly engaged in pandemic planning, additional considerations may arise. The advisory committee reports explicitly acknowledge the importance of this, for example highlighting the priority for protecting critical components of the military. Finally, HHS has recently initiated outreach to engage the public and obtain a broader perspective into decisions on priority groups for pandemic vaccine and antiviral drugs. Though findings of the outreach are preliminary, a theme that has emerged is the importance of limiting the effects of a pandemic on society by preserving essential societal functions.

Based on this guidance, state, local, and tribal implementation plans should be developed to 1) include more specific definitions of the priority groups (e.g., which functions are indeed critical to maintaining continuity) and their size; 2) define how persons in these groups may be identified; and 3) establish strategies for effectively and equitably delivering vaccines and antiviral drugs to these populations. The committees acknowledged that further work is needed, in particular, to identify the functions that must be preserved to maintain effective services and critical infrastructures and to identify the groups that should be protected to achieve this goal. The committees also acknowledge that the specific composition of some priority groups may differ between states or localities based on their needs and that priority groups should be reconsidered when a pandemic occurs and information is obtained on its epidemiology and impacts.

On July 19, 2005, ACIP and NVAC voted unanimously in favor of the vaccine priority recommendations summarized in Table D-1. These votes followed deliberations of a joint Working Group of the two committees, which included as consultants representatives of public and private sector stakeholder organizations and academic experts. There was limited staff level participation from DoD, DHS, and VA. Several ethicists also served as consultants to the Working Group.

A. Critical assumptions

The recommendations summarized in Table D-1 were based on the following critical assumptions:

- **Morbidity and mortality.** The greatest risk of hospitalization and death—as during the 1957 and 1968 pandemics and annual influenza—will be in infants, the elderly, and those with underlying health conditions. In the 1918 pandemic, most deaths occurred in young adults, highlighting the need to reconsider the recommendations at the time of the pandemic based on the epidemiology of disease.

- **Healthcare system**. The healthcare system may be severely taxed if not overwhelmed due to the large number of illnesses and complications from influenza requiring hospitalization and critical care. CDC models estimate increases in hospitalization and intensive care unit demand of more than 25% even in a moderate pandemic.

- **Workforce.** During a pandemic wave in a community, between 25% and 30% of persons may become ill during a 6 to 8 week outbreak. Among working-aged adults, illness attack rates may be lower than in the community as a whole. A CDC model suggests that at the peak of pandemic disease, about 10% of the workforce may be absent due to illness or caring for an ill family member. Impacts will likely vary between communities and work sites and may be greater if significant absenteeism occurs because persons stay home due to fear of becoming infected.

- **Critical infrastructure**. Only limited information was available from which to assess potential impacts on critical infrastructure sectors such as transportation and utility services. Because of changes in business practices and the complexity of networks, information from prior pandemics was not considered applicable.

- **Vaccine production capacity.** The U.S.-based vaccine production capacity was assumed at 3 to 5 million 15 µg doses per week with 3 to 6 months needed before the first doses are produced. Two doses per person were assumed to be required for protection. Subsequent results of an NIH clinical trial of influenza A (H5N1) vaccine suggest that higher doses of antigen may be needed to elicit a good immune response; thus, the assumptions made by the committee could potentially substantially exceed the amount of vaccine that would be produced.

Table D-1: Vaccine Priority Group Recommendations*

Tier	Sub-tier	Population	Rationale

1	**A**	• Vaccine and antiviral manufacturers and others essential to manufacturing and critical support (~40,000) • Medical workers and public health workers who are involved in direct patient contact, other support services essential for direct patient care, and vaccinators (8-9 million)	• Need to assure maximum production of vaccine and antiviral drugs • Healthcare workers are required for quality medical care (studies show outcome is associated with staff-to-patient ratios). There is little surge capacity among healthcare sector personnel to meet increased demand
	B	• Persons > 65 years with 1 or more influenza high-risk conditions, not including essential hypertension (approximately 18.2 million) • Persons 6 months to 64 years with 2 or more influenza high-risk conditions, not including essential hypertension (approximately 6.9 million) • Persons 6 months or older with history of hospitalization for pneumonia or influenza or other influenza high-risk condition in the past year (740,000)	• These groups are at high risk of hospitalization and death. Excludes elderly in nursing homes and those who are immunocompromised and would not likely be protected by vaccination
	C	• Pregnant women (approximately 3.0 million) • Household contacts of severely immunocompromised persons who would not be vaccinated due to likely poor response to vaccine (1.95 million with transplants, AIDS, and incident cancer x 1.4 household contacts per person = 2.7 million persons) • Household contacts of children <6 month olds (5.0 million)	• In past pandemics and for annual influenza, pregnant women have been at high risk; vaccination will also protect the infant who cannot receive vaccine. • Vaccination of household contacts of immunocompromised and young infants will decrease risk of exposure and infection among those who cannot be directly protected by vaccination
	D	• Public health emergency response workers critical to pandemic response (assumed one-third of estimated public health workforce=150,000) • Key government leaders	• Critical to implement pandemic response such as providing vaccinations and managing/monitoring response activities • Preserving decision-making capacity also critical for managing and implementing a response

2	**A**	• Healthy 65 years and older (17.7 million) • 6 months to 64 years with 1 high-risk condition (35.8 million) • 6-23 months old, healthy (5.6 million)	• Groups that are also at increased risk but not as high risk as population in Tier 1B
	B	• Other public health emergency responders (300,000 = remaining two-thirds of public health work force) • Public safety workers including police, fire, 911 dispatchers, and correctional facility staff (2.99 million) • Utility workers essential for maintenance of power, water, and sewage system functioning (364,000) • Transportation workers transporting fuel, water, food, and medical supplies as well as public ground public transportation (3.8 million) • Telecommunications/IT for essential network operations and maintenance (1.08 million)	• Includes critical infrastructure groups that have impact on maintaining health (e.g., public safety or transportation of medical supplies and food); implementing a pandemic response; and on maintaining societal functions
3		• Other key government health decision-makers (estimated number not yet determined) • Funeral directors/embalmers (62,000)	• Other important societal groups for a pandemic response but of lower priority
4		• Healthy persons 2-64 years not included in above categories (179.3 million)	• All persons not included in other groups based on objective to vaccinate all those who want protection

**The committee focused its deliberations on the U.S. civilian population. ACIP and NVAC recognize that Department of Defense needs should be highly prioritized. DoD Health Affairs indicates that 1.5 million service members would require immunization to continue current combat operations and preserve critical components of the military medical system. Should the military be called upon to support civil authorities domestically, immunization of a greater proportion of the total force will become necessary. These factors should be considered in the designation of a proportion of the initial vaccine supply for the military. Other groups also were not explicitly considered in these deliberations on prioritization. These include American citizens living overseas, non-citizens in the U.S., and other groups providing national security services such as the border patrol and customs service*.

B. Definitions and rationales for priority groups

1. Healthcare workers and essential healthcare support staff

a. Definition

Healthcare workers (HCW) with direct patient contact (including acute-care hospitals, nursing homes, skilled nursing facilities, urgent care centers, physician's offices, clinics, home care, blood collection centers, and EMS) and a proportion of persons working in essential healthcare support services needed to maintain healthcare services (e.g. dietary, housekeeping, admissions, blood collection center staff, etc.). Also included are healthcare workers in public health with direct patient contact, including those who may administer vaccine or distribute influenza antiviral medications, and essential public health support staff for these workers.

b. Rationale

The pandemic is expected to have substantial impact on the healthcare system with large increases in demand for healthcare services placed on top of existing demand. HCW will be treating influenza-infected patients and will be at risk of repeated exposures. Further, surge capacity in this sector is low. To encourage continued work in a high-exposure setting and to help lessen the risk of healthcare workers transmitting influenza to other patients and HCW family members, this group was highly prioritized. In addition, increases in bed/nurse ratios have been associated with increases in overall patient mortality. Thus, substantial absenteeism may affect overall patient care and outcomes.

2. Groups at high risk of influenza complications

a. Definition

Persons 2-64 years with a medical condition for which influenza vaccine is recommended and all persons 6-23 months and 65 years and older. Excludes nursing home residents and severely immunocompromised persons who would not be expected to respond well to vaccination.

b. Rationale

These groups were prioritized based on their risk of influenza-related hospitalization and death and also their likelihood of vaccine response. Information from prior pandemics was used whenever possible, but information from interpandemic years was also considered. Nursing home residents and severely immunocompromised persons would be prioritized for antiviral treatment and/or prophylaxis and vaccination of healthcare workers and household contacts who are most likely to transmit influenza to these high risk groups.

3. Critical infrastructure

a. Definitions and rationale

Those critical infrastructure sectors that fulfill one or more of the following criteria: have increased demand placed on them during a pandemic, directly support reduction in deaths and hospitalization; function is critical to support the healthcare sector and other emergency services, and/or supply basic necessities and services critical to support of life and healthcare or emergency services. Groups included in critical infrastructure are needed to respond to a pandemic and to minimize morbidity and mortality, and include the following sectors:

- Persons directly involved with influenza vaccine and antiviral medication manufacturing and distribution and essential support services and suppliers (e.g., growers of pathogen-free eggs for growth of vaccine virus) production activities
- Key government leaders and health decision-makers who will be needed to quickly move policy forward on pandemic prevention and control efforts
- Public safety workers (firefighters, police, and correctional facility staff, including dispatchers) are critical to maintaining social functioning and order and will contribute to a pandemic response, for example by ensuring order at vaccination clinics and responding to medical emergencies
- Utility service workers (water, power, and sewage management) are prioritized as the services they provide are also essential to the healthcare

system as well as to preventing additional illnesses from lack of these services unrelated to a pandemic.

- Transportation workers who maintain critical supplies of food, water, fuel, and medical equipment and who provide public transportation, which is essential for provision of medical care and transportation of healthcare workers to work and transportation of ill persons for care
- Telecommunication and information technology services critical for maintenance and repairs of these systems are also essential as these systems are now critical for accessing and delivering medical care and in support of all other critical infrastructure
- Mortuary services will be substantially impacted due to the increased numbers of deaths from a pandemic and the fact that impact will be high in the elderly, a growing segment of the population

4. Public health emergency response workers

a. Definition

This group includes persons who do not have direct patient care duties, but who are essential for surveillance for influenza, assessment of the pandemic impact, allocation of public health resources for the pandemic response, development and implementation of public health policy as part of the response, and development of guidance as the pandemic progresses.

b. Rationale

Persons in this sector have been critical for past influenza vaccine pandemics and influenza vaccine shortages and little surge capacity may be available during a public health emergency such as a pandemic.

5. Persons in skilled nursing facilities

a. Definition

Patients residing in skilled nursing facilities. Not included in this group are persons in other residential settings (e.g., assisted living) who are more likely to be mobile, in a setting that is less closed, and have decentralized healthcare.

b. Rationale

This group was not prioritized for vaccine because of the medical literature finding poor response to vaccination and occurrence of outbreaks even in the setting of high vaccination rates. Other studies have suggested that vaccination of healthcare workers may be a more effective strategy to prevent influenza in this group. Further, surveillance for influenza can be conducted in this group and antiviral medications used widely for prophylaxis and treatment. Ill visitors and staff should also be restricted from visiting nursing home facilities during outbreaks of pandemic influenza. This strategy for pandemic influenza vaccine differs from the interpandemic vaccination strategy of aggressively vaccinating nursing home

residents. The rationale considers several factors: 1) these populations are less likely to benefit from vaccine than other groups who are also at high risk; 2) other prevention strategies feasible for this group are not possible among other high-risk groups; 3) the overall morbidity and mortality from pandemic is likely to severely impact other groups of persons who would be expected to have a better response to the vaccine; and 4) a more severe shortage of vaccine is anticipated.

6. Severely immunocompromised persons

a. Definition

Persons who are undergoing or who have recently undergone bone marrow transplantation and others with severe immunodeficiency (e.g., AIDS patients with CD4 counts <50, children with SCID syndrome, recent bone marrow transplant patients). The numbers of persons in these categories is likely much smaller than the anticipated number assumed in tiering above, but sources for more specific estimates have not been identified.

b. Rationale

These groups have a lower likelihood of responding to influenza vaccination. Thus, strategies to prevent severe influenza illness in this group should include vaccination of healthcare workers and household contacts of severely immunocompromised persons and use of antiviral medications. Consideration should be given to prophylaxis of severely immunocompromised persons with influenza antivirals and early antiviral treatment should they become infected.

7. Children <6 months of age

a. Rationale

Influenza vaccine is poorly immunogenic in children <6 months and the vaccine is currently not recommended for this group. In addition, influenza antiviral medications are not FDA-approved for use in children <1 year old. Thus, vaccination of household contacts and out-of-home caregivers of children <6 months is recommended to protect this high-risk group.

C. Other discussion

There was substantial discussion on priority for children. Four potential reasons were raised for making vaccination of children a priority:

- At the public engagement session, many participants felt that children should have high priority for vaccination.
- Children play a major role in transmitting infection, and vaccinating this group could slow the spread of disease and indirectly protect others.
- Children have strong immune systems and will respond well to vaccine whereas vaccination of the elderly and those with illnesses may be less effective.
- Some ethical frameworks would support a pediatric priority.

ACIP and NVAC did not make children a priority (other than those included in tiers, because of their underlying diseases [Tiers 1B and 2A] or as contacts of high-risk persons [Tier 1C]) for several reasons:

- Healthy children have been at low risk for hospitalization and death in prior pandemics and during annual influenza seasons.

- It is uncertain whether vaccination of children will decrease transmission and indirectly protect others. Studies that show this impact or mathematical models that predict it rely on high vaccination coverage that may not be possible to achieve given limited supplies in a pandemic.
- The committees recognize that this is an area for further scientific work; that children may be a good target population for live-attenuated influenza vaccine (FluMist®) if it is available; and that education of the public will be needed to provide the rationale for the recommendations.

NVAC RECOMMENDATIONS ON PANDEMIC ANTIVIRAL DRUG USE

On July 19, 2005, NVAC voted unanimously in favor of the antiviral drug use priority recommendations described here and summarized in Table D-2. These votes followed deliberations of a Working Group, which included as consultants representatives of public and private sector stakeholder organizations and academic experts. There was limited staff level participation from DoD, DHS, and VA. Several ethicists also served as consultants to the Working Group.

The recommendations were made considering pandemic response goals, assumptions on the impacts of a pandemic, and after thorough review of past pandemics, annual influenza disease, data on antiviral drug impacts, and recommendations for pandemic vaccine use.
Recommendations were made to guide planning needed for effective implementation at state and local levels. The committee recognizes that recommendations will need to be reconsidered at the time of a pandemic when information on the available drug supply, epidemiology of disease, and impacts on society are known.

The committee considered the primary goal of a pandemic response to decrease health impacts including severe morbidity and death. Minimizing societal and economic impacts were considered secondary and tertiary goals.

A. Critical assumptions

Assumptions regarding groups at highest risk during a pandemic and impacts on the healthcare system and other critical infrastructures are the same as those underlying the vaccine priority recommendations. Additional assumptions specific for antiviral drugs included:

- Treatment with a neuraminidase inhibitor (oseltamivir [Tamiflu®] or zanamivir [Relenza®]) will be effective in decreasing risk of pneumonia, will decrease hospitalization by about half (as shown for interpandemic influenza), and will also decrease mortality.
- Antiviral resistance to the adamantanes (amantadine and rimantadine) may limit their use during a pandemic.
- The primary source of antiviral drugs for a pandemic response will be the supply of antiviral drugs that have been stockpiled. Before annual influenza seasons about 2 million treatment courses of oseltamivir are available in the U.S. U.S.-based production of oseltamivir is being established; expected capacity is projected at about 1.25 million courses per month.
- Treating earlier after the onset of disease is most effective in decreasing the risk of complications and shortening illness duration. Generally, treatment should be given within the first 48 hours.
- Assumptions for the amount of antiviral drug needed for defined priority groups is based on the population in those groups and assumptions that 35% of persons in the priority

groups will have influenza-like illness and 75% will present within the first 48 hours and be eligible for treatment. For persons admitted to the hospital, the committee assumed that 80% would be treated, as the 48-hour limit may sometimes be relaxed in more ill patients.

- Unlike vaccines, where each tier would be protected in turn as more vaccine is produced, for antiviral drugs, the number of priority groups that can be covered would be known at the start of the pandemic based on the amount of drug that is stockpiled. Additional supply that would become available during the pandemic could provide some flexibility.

Table D-2: Antiviral Drug Priority Group Recommendations*

	Group	Estimated population (millions)	Strategy**	# Courses (millions)		Rationale
				For target group	Cumulative	
1	Patients admitted to hospital***	10.0	T	7.5	7.5	Consistent with medical practice and ethics to treat those with serious illness and who are most likely to die.
2	Health care workers (HCW) with direct patient contact and emergency medical service (EMS) providers	9.2	T	2.4	9.9	Healthcare workers are required for quality medical care. There is little surge capacity among healthcare sector personnel to meet increased demand.
3	Highest risk outpatients —immunocompromised persons and pregnant women	2.5	T	0.7	10.6	Groups at greatest risk of hospitalization and death; immunocompromised cannot be protected by vaccination.
4	Pandemic health responders (public health, vaccinators, vaccine and antiviral manufacturers), public safety (police, fire, corrections), and government decision-makers	3.3	T	0.9	11.5	Groups are critical for an effective public health response to a pandemic.
5	Increased risk outpatients—young children 12-23 months old, persons >65 yrs old, and persons with	85.5	T	22.4	33.9	Groups are at high risk for hospitalization and death.

	underlying medical conditions					
6	Outbreak response in nursing homes and other residential settings	NA	PEP	2.0	35.9	Treatment of patients and prophylaxis of contacts is effective in stopping outbreaks; vaccination priorities do not include nursing home residents.
7	HCWs in emergency departments, intensive care units, dialysis centers, and EMS providers	1.2	P	4.8	40.7	These groups are most critical to an effective healthcare response and have limited surge capacity. Prophylaxis will best prevent absenteeism.
8	Pandemic societal responders (e.g., critical infrastructure groups as defined in the vaccine priorities) and HCW without direct patient contact	10.2	T	2.7	43.4	Infrastructure groups that have impact on maintaining health, implementing a pandemic response, and maintaining societal functions.
9	Other outpatients	180	T	47.3	90.7	Includes others who develop influenza and do not fall within the above groups.
10	Highest risk outpatients	2.5	P	10.0	100.7	Prevents illness in the highest risk groups for hospitalization and death.
11	Other HCWs with direct patient contact	8.0	P	32.0	132.7	Prevention would best reduce absenteeism and preserve optimal function.

**The committee focused its deliberations on the domestic U.S. civilian population. NVAC recognizes that Department of Defense (DoD) needs should be highly prioritized. A separate DoD antiviral stockpile has been established to meet those needs. Other groups also were not explicitly considered in deliberations on prioritization. These include American citizens living overseas, non-citizens in the U.S., and other groups providing national security services such as the border patrol and customs service.*
***Strategy: Treatment (T) requires a total of 10 capsules and is defined as 1 course. Post-exposure prophylaxis (PEP) also requires a single course. Prophylaxis (P) is assumed to require 40 capsules (4 courses) though more may be needed if community outbreaks last for a longer period.*
****There are no data on the effectiveness of treatment at hospitalization. If stockpiled antiviral drug supplies are very limited, the priority of this group could be reconsidered based on the epidemiology of the pandemic and any additional data on effectiveness in this population.*

B. Definitions and rationale for draft priority groups

1. Persons admitted to hospital with influenza infection

a. Definition
Persons admitted to acute care facilities (traditional or non-traditional with a clinical diagnosis of influenza; laboratory confirmation not required). Excludes persons admitted for a condition consistent with a bacterial super infection (e.g., lobar pneumonia developing late after illness onset) or after viral replication and shedding has ceased (e.g., as documented by a negative sensitive antigen detection test)

b. Strategy
Treatment within 48 hours of symptom onset.

c. Rationale
This group is at greatest risk for severe morbidity and mortality. Although there are no data to document the impacts of antiviral drug treatment among persons who already suffer more severe influenza illness, benefit is biologically plausible in persons with evidence of ongoing virally mediated pathology (e.g., diffuse pneumonia, ARDS). Providing treatment to those who are most ill is also consistent with standard medical practices, would be feasible to implement, and would be acceptable to the public.

d. Population size
The number of persons admitted to hospital in an influenza pandemic would vary substantially depending on the severity of the pandemic and on the ability to expand inpatient capacity, if needed.

e. Unresolved issues
More specific guidance should be provided to healthcare workers on implementing antiviral treatment, including when and when not to treat. In some persons with severe illness, the ability to take oral medication or its absorption may be important issues. For infants <1 year old admitted to hospital, decisions about whether to treat with antiviral drugs may depend on the child's age and potential risk versus benefit as the neuraminidase inhibitors are not licensed for use in infants. If possible, data on time from symptom onset to hospital admission, current use of antiviral drug treatment among inpatients, and its impacts should be collected during interpandemic influenza seasons.

2. Healthcare workers and emergency medical service providers who have direct patient contact

a. Definition
Persons providing direct medical services in inpatient and outpatient care settings. Includes doctors, nurses, technicians, therapists, EMS providers, laboratory workers, other care providers who come within 3 feet of patients with influenza, and persons performing technical support functions essential to quality medical care.

b. Strategy
Treatment within 48 hours of symptom onset.

c. Rationale
Maintaining high quality patient care is critical to reduce health impacts of pandemic disease and to prevent adverse outcomes from other health conditions that will

present for care during the pandemic period. Treatment of healthcare providers will decrease absenteeism due to influenza illness and may decrease absenteeism from fear of becoming ill, given the knowledge that treatment can prevent serious complications of influenza. Good data exist documenting the impacts of early treatment on duration of illness and time off work, and on the occurrence of complications such as lower respiratory infections. Treating healthcare providers is feasible to implement, especially for inpatient care providers who can be provided drugs through the occupational health clinic. It also would be acceptable to the public, who would recognize the importance of maintaining quality healthcare and would understand that persons with direct patient contact are putting themselves at increased risk.

d. Population size

There are about 12.6 million persons designated as healthcare workers by the Bureau of Labor Statistics and about 820,000 EMS providers. Among HCWs, two-thirds are estimated to provide direct patient care services.

e. Unresolved issues

Further work is needed to hone definitions and estimate population sizes. Implementation issues include the approach to identifying healthcare providers who would be eligible for treatment and where the treatment would be provided, particularly for outpatient care providers.

3. Outpatients at highest risk for severe morbidity or mortality from influenza infection

a. Definition

The Advisory Committee on Immunization Practices defines groups at high risk (or increased risk) of complications from influenza infection during annual outbreaks based on age (6-23 months and >65 years) and underlying illnesses. Among this population of about 88 million persons, some can be identified who are at highest risk of severe disease and death. These include persons with hematopoetic stem cell transplants (HSCT) and solid organ transplants; those with severe immunosuppression due to cancer therapy or hematological malignancy; persons receiving immunosuppressive therapy for other illnesses (e.g., rheumatoid arthritis); persons with HIV infection and a CD4 count <200; persons on dialysis; and women who are in the second or third trimester of pregnancy.

b. Strategy

Treatment within 48 hours of symptom onset.

c. Rationale

Of the large group of persons who are at increased risk of severe disease or death from influenza, these groups represent the population at highest risk and who are least likely to be protected by vaccination. Studies show that neuraminidase inhibitor therapy decreases complications and hospitalizations from influenza in high-risk persons and one unpublished study shows a significant decrease in mortality among patients who have undergone a hematopoteic stem cell transplant.

d. Population size

About 150,000 persons have had an HSCT or solid organ transplant. Assuming that the period of severe immunosuppression after a cancer diagnosis lasts for 1 year, the population targeted with non-skin, non-prostate cancers would equal the incidence of about 1.35 million persons. Based on a birth cohort of 4.1 million, a 28-week risk period during the second and third trimesters, and an 8-week pandemic outbreak in a community, there would be about 400,000 pregnant women included in this risk group. Further work is needed to estimate the size of other immunosuppressed groups.

e. Unresolved issues
Specific definition of included groups and population sizes.

4. Pandemic health responders, public safety workers, and key government decision-makers

a. Definition
Public health responders include those who manufacture vaccine and antiviral drugs; persons working at health departments who are not included as healthcare workers; and those who would be involved in implementing pandemic vaccination or other response components. Public safety workers include police, fire, and corrections personnel. Key government decision-makers include chief executives at federal, state, and local levels.

b. Strategy
Treatment within 48 hours of symptom onset.

c. Rationale
Preventing adverse health outcomes and social and economic impacts in a pandemic depend on the ability to implement an effective pandemic response. Early treatment of pandemic responders will minimize absenteeism and ensure that vaccination and other critical response activities can be maintained. Implementing early treatment for public health workers and vaccine manufacturers is feasible at workplace settings. Public safety workers prevent intentional and unintentional injuries and death, are critical to maintaining social functioning, and will contribute to a pandemic response, for example by ensuring order at vaccination clinics. A small number of decision-makers at federal, state, and local levels are needed to for an effective pandemic response.

d. Population size
An estimated 40,000 workers who produce pandemic vaccine and antiviral drugs in the U.S.; ~300,000 public health workers who would not be included in the HCW category; 3 million public safety workers; and a small number of government decision-makers.

e. Unresolved issues
Need to define the exact composition and size of this group.

5. Outpatients at increased risk of severe morbidity or mortality from influenza

a. Definition
For planning purposes, this group would include those currently designated as high-risk groups, except for those who have been categorized as being at highest-risk and included in a separate category. This increased-risk group includes persons 6-23 months and >>65 years old, or who have underlying illnesses defined by the ACIP as associated with increased risk. Definition of this group may change based on the epidemiology of the pandemic.

b. Strategy
Treatment within 48 hours of symptom onset.

c. Rationale
Early treatment has been shown to significantly decrease lower respiratory infections and to reduce the rate of hospitalization in elderly and high-risk populations. By extrapolation and based on the results of one small uncontrolled study, significant reductions of mortality can be expected as well. As these risk groups are familiar to the public given recommendations for annual vaccination, communication would be easy and acceptability high.

d. Population size
About 85.5 million persons are included in this group. Although all are at increased risk of annual influenza compared with the healthy under-65 year old population, there are different levels of increased risk for severe complications and death within this category. Further stratification may be possible based on several parameters including number of underlying conditions; recent hospitalization for a high-risk condition, pneumonia, or influenza; and age.

e. Unresolved issues
Stratifying this group into those at greater and lesser risk may be important if antiviral supplies are limited. Implementing treatment will be challenging given that it should be provided at the initial point of care to accrue the greatest benefit from early therapy.

6. Outbreak control

a. Definition
Use of antiviral drugs to support public health interventions in closed settings where an outbreak of pandemic influenza is occurring.

b. Strategy
Treatment of cases and post-exposure prophylaxis of contacts (once daily antiviral medication for 10 days).

c. Rationale
Influenza outbreaks in nursing homes are associated with substantial mortality and morbidity. Nursing home residents also are less likely to respond to vaccination. Post-exposure prophylaxis has been shown to be effective in stopping influenza outbreaks in closed settings.

d. Population size
The number of outbreaks that may occur during a pandemic is unclear. Measures should be implemented to prevent outbreaks including limiting visitors, vaccination of staff, furloughing non-critical staff, and screening and exclusion for illnesses consistent with influenza.

e. Unresolved issues
Should this policy also be implemented in prisons or other settings where explosive spread of illness may occur but the risk for severe complications is not high?

7. Healthcare workers in ER, ICU, EMS, and dialysis settings

a. Definition
Includes all staff in these settings who are required for effective functioning of these health care units.

b. Strategy
Prophylaxis

c. Rationale
Optimally effective functioning of these units is particularly critical to reducing the health impacts of a pandemic. Prophylaxis will minimize absenteeism in these critical settings.

d. Population size
Need to obtain population estimates.

e. Unresolved issues
Population sizes

8. Pandemic societal responders and healthcare workers who have no direct patient contact

a. Definition
This group includes persons who provide services that must be sustained at a sufficient level during a pandemic to maintain public well-being, health, and safety. Included are workers at healthcare facilities who have no direct patient contact but are important for the operation of those facilities; utility (electricity, gas, water), waste management, mortuary, and some transport workers.

b. Strategy
Treatment within 48 hours of symptom onset.

c. Rationale
Maintaining certain key functions is important to preserve life and decrease societal disruption. Heat, clean water, waste disposal, and corpse management all contribute to public health. Ensuring functional transportation systems also protects health by making it possible for people to access medical care and by transporting food and other essential goods to where they are needed.

d. Population size
Within these broad categories, there are about 2 million workers at healthcare facilities who have no direct patient contact; 730,000 utility workers; 320,000 waste management workers; 62,000 in mortuary services; and 2.3 million in transportation. Not all occupations within these categories would be classified as pandemic societal responders. Estimates are that 35% of this population will develop illness and present within 48 hours of onset regardless of pandemic severity.

e. Unresolved issues
Need to stratify within these groups to identify who fills specific pandemic societal response functions and to assess whether those functions could still operate if a substantial proportion of the workforce became ill during a 6-8 week pandemic outbreak within a community. Implementation issues need to be addressed, especially with respect to how persons would be identified as falling within this priority group when presenting for treatment and where that treatment would be provided.

9. Other outpatients

a. Definition
Includes persons not in one of the earlier priority groups.

b. Strategy
Treatment within 48 hours of illness onset.

c. Rationale
Treatment reduces the risk of complications and mortality, reduces duration of illness and shortens time off work, and decreases viral shedding and transmission. If sufficient antiviral supplies are available, providing treatment to all who are ill achieves equity and will be most acceptable to the public.

d. Population size
There are an estimated 180 million persons who are not included in previously targeted groups.

e. Unresolved issues
Consider whether there are any strata that can be defined within this population.

C. Additional NVAC recommendations on antiviral drugs for pandemic influenza

In addition to recommendations for priority groups, NVAC unanimously adopted the following recommendations:

- Sufficient drugs should be stockpiled to address top priorities. NVAC recommends that the minimum stockpile size be about 40 million courses, allowing coverage of the top 7 priority groups.
- Oseltamivir should be the primary drug stockpiled, but some zanamivir also should be obtained as it is effective against some oseltamivir-resistant strains, may be preferred for treatment of pregnant women, and supporting two manufacturers enhances security against supply disruptions. Approximately 10% of the stockpile should be zanamivir if feasible and cost effective. No additional adamantanes should be stockpiled.
- Antiviral drugs can also be used as part of an international effort to contain an initial outbreak and prevent a pandemic. Use to slow disease spread early in a pandemic may be useful but requires large amounts of drug.
- Critical research should be conducted to support development and implementation of recommendations for pandemic influenza antiviral drug use, including:
    - Impact of treatment at hospital admission on outcome
    - Optimal treatment dose for H5N1 and other potential pandemic strains
    - Sensitivity and use of rapid diagnostic tests for H5N1 and other influenza strains with pandemic potential
    - Safety and pharmacokinetics of oseltamivir among infants <1 year old
    - Investigation of the impact of other drugs (new antiviral agents and other classes such as statins) on influenza
- Additional work with public and private sector groups should be done to further hone definitions of target groups and their estimated population sizes, and to provide further guidance on antiviral drug distribution and dispensing.

Appendix F: Risk Communication Topics

Pandemic Influenza

Excerpted from the Nevada State Health Division Risk Communication Plan, draft 2.0, October 2005

A. Frequently Asked Questions

What is pandemic influenza?

Influenza viruses cause infections of the respiratory tract (breathing tubes and lungs). In some persons, complications of influenza can be severe, including pneumonia.

Pandemic influenza is an outbreak of disease from a strain of influenza virus that is unlike past influenza viruses. Because people have not been infected with a similar virus in the past, most or all people will not have any natural immunity (protection) to the new strain.

How is a pandemic different from regular flu season?

A pandemic flu may result from widespread exposure to a new influenza virus, which would be a much more serious flu virus than seen in a typical flu season. Different from the typical strains of flu, humans would have no or little natural resistance to a new strain of influenza. Also, there is a vaccine for seasonal flu, which is prepared each season against new variations of the seasonal influenza. There is no vaccine available at this time for a pandemic flu, and it is expected to take at least six months after a pandemic flu appears to develop a vaccine.

Why is pandemic influenza so serious?

Because most or all people would not have immunity to a new pandemic virus, large numbers of persons around the world can be infected. If the pandemic virus causes severe disease, many people may develop serious illnesses. Once a pandemic virus develops, it can spread rapidly causing outbreaks around the world. According to the CDC, a “medium-level” pandemic could result in as much as 15 to 35 percent of the U.S. population could be affected (or, 20 to 47 million Americans being sick).

Can pandemic flu be prevented?

NSHD is working with federal, state and other local government agencies to respond to pandemic influenza and to maintain essential health care and community services if an outbreak should occur. In fact, governments all around the world are preparing for the possibility of a pandemic outbreak under the leadership of the World Health Organization.

It will not be possible to prevent or stop a pandemic once it begins. A person infected with influenza virus can be contagious for 24 hours before the onset of symptoms, and for seven days thereafter, making it extremely easy for the virus to spread rapidly to large numbers of people.

Although the federal government is stockpiling medical supplies and antiviral drugs, no country in the world has enough antiviral drugs to protect all their citizens. Antiviral drugs (such as Tamiflu) can be used to treat severe cases as long as there was a reasonable chance that the drugs might help save lives. Antiviral drugs might also be prioritized for people who work in essential occupations, such as health care workers.

Other strategies for slowing the spread of a severe influenza outbreak could include temporarily closing schools, sports arenas, malls, restaurants and other public gathering places and facilities.

The very nature of a pandemic flu means that a vaccine cannot be developed to protect humans against unknown (and new) virus strains. However, vaccine development efforts are under way to protect humans against a pandemic influenza virus that might develop from the current avian flu virus in Asia. (See information on bird flu below).

B. Avian Influenza – An Overview

Introduction

Avian flu is an infection caused by avian (bird) influenza viruses. These flu viruses occur naturally among birds. Wild birds worldwide carry the viruses in their intestines, but usually do not get sick from them. However, bird flu is very contagious among birds and can make some domesticated birds, including chickens, ducks and turkeys, very sick and kill them.

Avian flu viruses do not usually infect humans, but several hundred cases of human infection with bird flu viruses have occurred since 1997. The virus was first isolated in birds in South Africa in 1961.

Recent Activity

Cases of avian flu (strain: avian influenza A H5N1) have been reported in poultry in eight Asian countries (Cambodia, China, Indonesia, Japan, Lao, South Korea, Thailand and Vietnam) during late 2003 and early 2004. At that time, more than 100 million birds either died from the disease or were destroyed.

From December 30, 2003 to March 17, 2004, 12 confirmed human cases of the same A H5N1 were reported in Thailand, as well as 23 cases in Vietnam, resulting in a total of 23 deaths.

By late February, however, the number of new human H5 cases being reported in Thailand and Vietnam slowed and then stopped. Within a month, countries in Asia were reporting that the avian influenza outbreak among poultry had been contained. No conclusive evidence of sustained human-to-human transmission was found.

Beginning in late June 2004, however, new lethal outbreaks of avian flu A H5N1 infection among poultry were reported by several countries in Asia: Cambodia, China, Indonesia, Malaysia (first-time reports), Thailand and Vietnam. In late March 2005, state media in the Democratic People's Republic of Korea (North Korea) officially reported the country's first outbreak of avian influenza A H7 in poultry. It is unknown to what extent H5N1 outbreaks in the other countries may be ongoing.

During August to October 2004, sporadic human cases of A H5N1 were reported in Vietnam and Thailand. Of particular note is one isolated instance of probable limited human-to-human transmission occurring in Thailand in September 2004. Since December 2004, a resurgence of poultry outbreaks and human cases has been reported in Vietnam. On February 2, 2005, the first human case of avian influenza A H5N1 infection from Cambodia was reported. On July 21, 2005, the first laboratory-confirmed human case of avian influenza A H5N1 in Indonesia was reported.

As of August 5, 2005, there have been 112 human cases of avian influenza A H5N1 in Vietnam (90), Thailand (17), Cambodia (4), and Indonesia (1), resulting in 57 deaths reported since January 2004.

Risks to Humans

The death rate for reported cases of avian flu has been about 70 percent. Most of these cases occurred from contact with infected poultry or contaminated surfaces—however, it is believed that a few cases of human-to-human spread of this virus have occurred.

Thus far, spread of this virus from person to person has been rare and spread has not continued beyond one person. However, because flu viruses are characterized by their ability to adapt and change, scientists are concerned that the bird flu virus could one day be able to infect humans and spread easily from one person to another.

Because these viruses do not commonly infect humans, there is little or no immune protection against them in the human population. If the bird flu virus changed to infect people and spread easily from person to person, a pandemic flu could break out worldwide.
The current risk to Americans from the bird flu outbreak in Asia is low. The strain of the virus found in Asia has not been found in the United States. There have been no human cases of bird flu in the United States. It is possible that travelers returning from affected countries in Asia could be infected.

Symptoms
Symptoms of bird flu in humans, range from typical flu-like symptoms,(such as fever, cough, sore throat and muscle aches), to eye infections, pneumonia, acute respiratory distress, diarrhea, brain disease and other severe and life-threatening complications.

Controlling the Spread of Disease
If you have recently traveled to a country where bird flu has been reported and are becoming ill with typical flu symptoms, be sure to tell your health care provider about your travel and whether you visited poultry farms or came into close contact with someone who had been diagnosed with avian flu, or with animals in live food markets, or any surfaces that appear to be contaminated with droppings from poultry or other animals.
Touching a surface or object that someone with flu has coughed on and then touching your mouth, nose or eyes can also spread disease.
People infected with avian flu are most likely to be infectious only when they have symptoms, such as fever or cough. As a precaution against spreading the flu, the CDC recommends that people with the flu stay home from work, school, or other areas where they may come into contact with other people until their symptoms have gone away.
The spread of avian flu is not limited to any one geographic area, nor is it linked to a particular ethnic group. Any individual, regardless of their cultural identity or background can get the flu. As with other types of influenza, avian flu is more serious among the very young and older people.

Treatment
There is no proven treatment for avian flu in people, and there is a very high rate of death from this disease. The few who have survived this disease became very ill and required intensive critical care in the hospital. In some cases, doctors may consider using antiviral drugs to treat avian flu, but none of the drugs currently available are proven to be effective. There currently is no vaccine to protect humans against the strain of avian flu that is being reported in Asia. However, vaccine development efforts are underway.

C. News Release: First Cases of Flu (Pandemic/Avian) Announced

The Nevada State Health Division (NSHD) has identified an increase in the number of influenza-like illness reports throughout the state. Confirmatory testing at the Nevada State Public Health Laboratory has determined that the cases include avian influenza A, H5N1, a newer strain of influenza that is *not* covered by this year's flu vaccine.

"No matter what the strain is, influenza characteristically is most often spread when an ill person coughs or sneezes into the air and a healthy person inhales respiratory droplets containing the virus," said Dr. Bradford Lee, state health officer. "With an indication of avian flu activity in our area, we strongly emphasize the need for good health habits to minimize the spread of disease."

The following measures can help prevent getting or spreading germs:

- **Avoid close contact with people who are sick.** Additionally, when you are sick, keep your distance from others to protect their health.
- **Stay home when you are sick.** Staying away from work, school, and errands when you are sick will help prevent others from catching your illness.
- **Cover your mouth and nose** with a tissue when coughing or sneezing. It may prevent those around you from getting sick.
- **Wash your hands.** Cleaning your hands often with soap and water, as well as hand sanitizers, can help protect you from germs.
- **Avoid touching your eyes, nose or mouth.** Germs are often spread when a healthy person touches something that is contaminated with germs then touches his or her eyes, nose, or mouth.

The flu usually comes on suddenly and symptoms may include fever, headache, tiredness, cough, sore throat, nasal congestion and body aches. People who become severely ill with flu-like symptoms should contact their physician immediately.

If you believe you have been exposed to avian flu, please go to the emergency clinic in your area, as soon as locations are announced. If you have had little or no chance of exposure, NSHD advises that you remain at home and avoid public places. If it is necessary to go to public places, respiratory protection (face masks and covering mouth when coughing and sneezing) and frequent hand washing is recommended.

Before heading to the emergency clinic in your area, make sure you have health information for all those in your household you wish to receive medication. Treatment will be given only to the head of a household that provides the following information:

- Name
- Address
- Date of birth
- A list of all medical conditions
- A list of allergies
- The weights of children under 12

Do not call 911. Additional public information will be made available as soon as possible. For more detailed information and updates, call 1-888-608-4623, and go online to: http://www.health2k.state.nv.us.

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D.News Release: Addressing Shortage of Influenza Vaccine During Average Flu Season

Nevada State Health Division today announced the first part of an emergency plan to get the limited supply of flu vaccine in the state out to Nevadans who will need it most.

The emergency plan will enable the Health Division to more effectively follow the CDC recommendations that any available flu vaccine goes only to those who need it most, including the very young, the elderly, those with chronic medical conditions, and medical personnel who work directly with patients. It will ensure that all available vaccine is directed to Nevada's most vulnerable populations who have the highest risk for flu-related complications.

"We're asking physicians to vaccinate the very highest-risk children and senior citizens first, and we're working out details for getting all nursing home residents vaccinated," said state health officer Dr. Bradford Lee. "This will get about 10,000 doses out to protect the most vulnerable before the flu season starts."

Family doctors will have vaccine in their offices on date. Details for distributing vaccine to nursing homes are being determined now.

The Health Division offers these additional vaccination recommendations to Nevada health care providers:

- Physicians should resume making appointments and giving flu shots to children age 6 months to 18 years old who have one or more chronic medical conditions that require frequent or ongoing medical treatment. This includes children on daily aspirin therapy and children who have asthma that requires daily use of control therapy (inhaled or oral steroids or leukotriene antagonists).
- Physicians should establish a waiting list of all other children age 6 to 23 months. These children may be vaccinated should additional vaccine become available.
- Children older than 23 months who do not have a chronic medical condition that requires frequent and/or ongoing medical treatment should NOT be vaccinated this year.

"By next week, we'll have a clearer picture of what vaccine will be available for high-risk adults, and will finalize a distribution plan very soon thereafter," said Dr. Lee. He credited the state's health leaders, insurers, providers and Governor Jim Gibbons for all their work in addressing this state's vaccine shortage.

Health Division Administrator Alex Haartz stated, "Everyone is not going to be able to get a flu shot this year. We have all agreed that our top priority is to get vaccine to those who need it most, wherever they are in the state. We'll continue to work together with local public health authorities on the most equitable way to redistribute the vaccine that remains and to pursue all avenues to secure more vaccine for the state."

An initial inventory of the vaccine supplies this week showed that there are an estimated 36,000 doses of vaccine in the state, some of which has already been administered. Of those 36,000 doses, approximately 10,000 are in the possession of the Health Division. An estimated 50,000 additional doses of vaccine are needed to protect Nevadans who would be most at risk for life-threatening complications or death from influenza.

"I am thankful for the Nevada residents who are holding off on flu shots while we work through this very difficult situation," said Dr. Lee. "Judging from more the calls to our toll-free Health Division hotline, I know Nevadans understand why it's so important we get this done right."

Although a vaccination is the best protection against the flu, it's not the only protection. To stay healthy, avoid close contact with people who are sick, and:

- Wash your hands well and often with soap and water. Use a hand sanitizer if soap and water is not available.
- Keep hands away from your eyes, nose and mouth so that germs don't have a way in.

If you're sick, don't spread your germs to others.

- Cover your mouth and nose with a tissue every time you sneeze or cough.
- Put the tissue into the trash.
- Wash your hands with soap and water.
- Stay home.

For questions about flu or the flu vaccine, call the Nevada State Health Division, 8 am to 5 pm, Monday through Friday, at 1-888-608-4623, and access the Health Division online at http://health2k.state.nv.us

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Appendix G: Interim Guidance on Planning for the Use of Surgical Masks and Respirators in Health Care Settings during an Influenza Pandemic

(October 2006)

http://www.pandemicflu.gov/plan/healthcare/maskguidancehc.html

Contents

I. Introduction

Since the publication of the HHS Pandemic Influenza Plan (www.hhs.gov/pandemicflu/plan/) in November 2005, the U.S. Department of Health and Human Services (HHS) has received numerous comments and inquiries regarding infection control recommendations that relate to surgical mask and respirator use (e.g., N-95 respirator[a]) during an influenza pandemic. Development of authoritative responses is hampered by the lack of definitive data about the relative contributions and importance of short-range inhalational exposure, large droplet mucosal exposure, and direct inoculation via hands or inanimate objects contaminated with virus (i.e., fomites) on influenza transmission There is only limited information on optimal interventions to prevent influenza transmission and the effectiveness of interventions on an individual basis. The lack of scientific consensus has led to conflicting recommendations by public health partners. Moreover, a large amount of incorrect, incomplete, and confusing information about surgical mask and respirator use has been disseminated on the Internet and by other popular media.

The Centers for Disease Control and Prevention (CDC) is aware of no new scientific information related to the transmission of influenza viruses since the drafting of the HHS Pandemic Influenza Plan (www.hhs.gov/pandemicflu/plan/). As stated in the plan, the proportional contribution and clinical importance of the possible modes of transmission of influenza (i.e., droplet, airborne, and contact) remains unclear and may depend on the strain of virus ultimately responsible for a pandemic. Nevertheless, in view of the practical need for clarification, CDC has re-reviewed the existing data, as described below, and has prepared interim recommendations on surgical mask and respirator use. The purpose of this document is to provide a science-based framework to facilitate planning for surgical mask and respirator use in health care settings during an influenza pandemic.

This document synthesizes traditional infection control and industrial hygiene approaches to enhancing protection of health care personnel during an influenza pandemic. It emphasizes that surgical mask and respirator use are components of a system of infection control practices to prevent the spread of infection between infected and non-infected persons. It also reflects concerns that additional precautions are advisable during a pandemic—beyond what is typically recommended during a seasonal influenza outbreak—in view of the lack of pre-existing immunity to a pandemic influenza strain, and the potential for the occurrence of severe disease and a high case-fatality rate. Extra precautions might be especially prudent during the initial stages of a pandemic, when viral transmission and virulence characteristics are uncertain, and medical countermeasures, such as vaccine and antivirals, may not be available.

The prioritization of respirator use during a pandemic remains unchanged: N-95 (or higher) respirators should be worn during medical activities that have a high likelihood of generating infectious respiratory aerosols, for which respirators (not surgical masks) offer the most appropriate protection for health care personnel. Use of N-95 respirators is also prudent for health care personnel during other direct patient care activities (e.g., examination, bathing, feeding) and for support staff who may have direct contact with pandemic influenza patients. If N-95 or other types of respirators are not available, surgical masks provide benefit against large-droplet exposure and should be worn for all health care activities involving patients with confirmed or suspected pandemic influenza. Measures should be employed to minimize the number of personnel required to come in contact with suspected or confirmed pandemic influenza patients.

This document, Interim Guidance on Planning for the Use of Surgical Masks and Respirators in Health Care Settings during an Influenza Pandemic, augments and supersedes recommendations provided in Part 2 of the HHS Pandemic Influenza Plan www.hhs.gov/pandemicflu/plan/#part2). This interim guidance document will be updated and amended as new information about the epidemiologic characteristics of the pandemic influenza virus becomes available.

Guidance documents on planning for surgical mask and respirator use in non-health care occupations and for the general community setting during an influenza pandemic are in preparation. Infection control recommendations related to seasonal influenza (www.cdc.gov/flu/professionals/infectioncontrol/) and avian influenza A (H5N1) (www.cdc.gov/flu/avian/professional/infect-control.htm) remain unchanged. The use of surgical masks by hospitalized patients and other symptomatic persons ("source control") is covered in the CDC's Interim Guidance for the Use of Masks to Control Influenza Transmission (www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm).

II. Background: Influenza Transmission, Pathogenesis, and Control Modes of Influenza Transmission

Influenza is transmitted person to person through close contact. Transmission occurs through multiple routes, including large droplets and direct and indirect contact. Fine droplet inhalational transmission may also occur.

Most information on the modes of influenza transmission from person to person is indirect and largely obtained through analysis of outbreaks in health care facilities and other settings (e.g., cruise ships, airplanes, schools, and colleges). Although the knowledge base is limited, the epidemiologic pattern observed is consistent with transmission through close contact (i.e., exposure to large respiratory droplets, direct contact transfer of virus from contaminated hands to the nose or eyes, or exposure to small-particle aerosols in the immediate vicinity of the infectious individual [known as "short-range exposure to aerosols"]). The relative contributions and clinical importance of the different modes of influenza transmission are unknown. While some observational studies (1, 2) and animal studies (3, 4, 5) raise the possibility of short-range

airborne transmission through small-particle aerosols, convincing evidence of airborne transmission of influenza viruses from person to person over long distances (e.g., through air-handling systems, or beyond a single room) has not been demonstrated. (6, 7, 8). However, one study in mice performed in a room outfitted with a slowly rotating fan to continuously agitate the air found that influenza virus sprayed into the room remained infective for some mice for extended periods (up to 24 hours) at room atmospheres of low humidity (17 to 24%). Room atmospheres with higher humidity into which virus suspension was sprayed were no longer infective in mice after one hour (3).

Droplet Transmission

Droplet transmission involves contact of the mucous membranes of the nose or mouth or the conjunctivae of a susceptible person with large-particle droplets containing microorganisms generated by an infected person during coughing, sneezing, or talking. Transmission via large-particle droplets requires close contact between source and recipient persons because these larger droplets do not remain suspended in the air and generally travel only short distances. Three feet has often been used by infection control professionals as a guide for "short distance" and is based on studies of respiratory infections (9, 10); however, for practical purposes, this distance may range from three to six feet. Special air handling and ventilation are not required to prevent droplet transmission.

On the basis of epidemiologic patterns of disease transmission, large droplet transmission—via coughing and sneezing—has traditionally been considered a major route of seasonal influenza transmission (7, 8).

Airborne Transmission

Airborne transmission occurs by dissemination of small particles or droplet nuclei[b] through the air (see Appendix A: Aerosol Science and Disease Transmission). Some organisms (e.g., Mycobacterium tuberculosis, measles virus, and varicella [chickenpox] virus) can remain infectious while dispersed over long distances by air currents, causing infection in susceptible individuals who have not had face-to-face contact (or been in the same room) with the infectious individual. Special air handling and ventilation systems (e.g., negative-pressure rooms or airborne isolation rooms) are used in health care settings to assist in preventing spread of agents that may be dispersed over long distances.

In contrast to tuberculosis, measles, and varicella, the pattern of disease spread for seasonal influenza does not suggest transmission across long distances (e.g., through ventilation systems); therefore, negative pressure rooms are not needed for patients with seasonal influenza (6, 8). However, localized airborne transmission may occur over short distances (i.e., three to six feet) via droplet nuclei or particles that are small enough to be inhaled. The relative contribution of short-range airborne transmission to influenza outbreaks is unknown.

Several often-cited papers raise concern about short-range aerosol transmission as a possible route of spread for influenza. These include laboratory studies in animals (3, 4, 5, 11), observational studies during the 1957-58 influenza pandemic (1), and an epidemiologic study of transmission on an airplane with an inoperative ventilation system (2). An experimental study in which the infectious dose of influenza virus was found to be as much as 100-fold lower for persons infected with small aerosols than with nasal drops (12) has further raised this concern. Although data are limited, the possibility remains that short-range aerosol transmission is a route of influenza transmission in humans and requires further study (13).

Aerosol-Generating Procedures

It is likely that some aerosol-generating medical procedures (e.g., endotracheal intubation, open suctioning, nebulizer treatment, and bronchosocopy) could increase the potential for generation of small aerosols in the immediate vicinity of the patient. Although this mode of transmission has not been evaluated for influenza, given what is known about these procedures, additional precautions for health care personnel who perform aerosol-generating procedures on influenza patients are warranted.

Contact Transmission (Direct and via Fomites)

Contact transmission of influenza may occur through direct contact with contaminated hands, skin, or fomites followed by auto-inoculation of the respiratory mucosa. Influenza transmission via contaminated hands and fomites has been suggested as a contributing factor in some studies (14). There are insufficient data to determine the proportion of influenza transmission that is attributable to direct or indirect contact. However, it is prudent to reinforce recommendations for thorough and frequent handwashing, which is known to reduce the likelihood of contamination of the environment and to reduce transmission of respiratory infections (15, 16, 17). Surgical mask or respirator use may provide an additional benefit by discouraging facial contact and subsequent autoinoculation.

Pathogenesis of Influenza and Implications for Infection Control

Human influenza is a disease of the respiratory tract. Influenza virus infects respiratory epithelial cells via receptors found principally in non-ciliated cells of the upper respiratory tract; infection also can occur in the lower respiratory tract (18, 19). There is no natural or experimental evidence that human seasonal influenza virus infection of the gastrointestinal tract can occur.

While conjunctivitis may be associated with human infection with some avian influenza viruses (20, 21), ocular infection does not appear to be a primary route for transmission of human influenza viruses, although data are very limited. Nonetheless, it is prudent to prevent exposure of the eyes as well as the mucous membranes of the respiratory tract to possibly infectious material (e.g., as may occur when health care workers perform splash-generating procedures).

Experience from Control of Seasonal Influenza Transmission

Outbreaks of seasonal influenza in hospitals and long-term care facilities have been prevented or controlled through a set of well-established strategies that include the following:

- seasonal influenza vaccination of patients and health care personnel
- early detection of influenza cases in a facility
- antiviral treatment of ill persons and prophylactic treatment of particularly susceptible persons
- implementation of the following administrative measures
    - restricting visitors
    - educating patients and staff
    - cohorting health care personnel assigned to an outbreak unit
- isolation of infectious patients in private rooms or cohorted units
- practicing and emphasizing the importance of good hand hygiene
- use of appropriate barrier precautions (e.g., masks, gloves, and gowns) during patient care, as recommended for Standard and Droplet Precautions (8). Respirators have not been routinely recommended for control of seasonal influenza outbreaks.

Used together, these measures have been successful in controlling outbreaks of seasonal influenza in health care settings; however, the relative contributions of each of the interventions listed above remain unknown, and their specific impact during a pandemic is difficult to predict.

III. Recommendations for Health Care Settings - 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 where pandemic influenza patients might receive health care services (e.g., hospitals, emergency departments, out-patient facilities, residential care facilities, emergency medical services, home health care delivery). 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 health care personnel in health care settings in conjunction with

Standard and Droplet Precautions, respiratory hygiene, cough etiquette, vaccination, and early diagnosis and treatment. Different types of surgical masks and respirators are described in Appendix B.

Recommendations

1. National Institute for Occupational Safety and Health (NIOSH)-certified respirators (N-95 or higher) are recommended for use during activities that have a high likelihood of generating infectious respiratory aerosols,[c] including the following high-risk situations:[d]
    - 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)
    - 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 N-95 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.
2. Use of N-95 respirators for other direct care activities involving patients with confirmed or suspected pandemic influenza is also prudent. Hospital planners should take this into consideration during planning and preparation in their facilities when ordering supplies. In addition, several measures can be employed to minimize the number of personnel required to come in contact with suspected or confirmed pandemic influenza patients, thereby reducing worker exposure and minimizing the demand for respirators. Such measures include the following:
    - Establishing specific wards for patients with pandemic influenza
    - Assigning dedicated staff (e.g., health care, housekeeping, janitorial) to provide care for pandemic influenza patients and restricting those staff from working with non-influenza patients
    - Dedicating entrances and passageways for influenza patients

Planning assumptions and projections suggest that shortages of respirators are likely in a sustained pandemic (22). Therefore, in the event of an actual or anticipated shortage, hospital planners must ensure that sufficient numbers of respirators are prioritized for use during the high-risk procedures described in Recommendation 1. This will require careful planning as well as real-time supply monitoring to ensure that excess respirators are not held in reserve while health care 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. Occupational health and safety professionals can assist with making these site- and activity-specific decisions. For example, a nurse entering a room with a suspected or confirmed pandemic influenza patient to obtain vital signs should wear an N-95 respirator. A housekeeper

entering multiple rooms of confirmed or suspected influenza patients to mop floors or clean patient equipment should be similarly protected. Work activities such as those performed by a receptionist at the entrance of a hospital should be designed to prevent exposure of the worker to large numbers of potentially infected patients. In such situations, the use of transparent barriers or enclosures is preferable to the use of respirators.

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 health care activities for patients with confirmed or suspected pandemic-influenza.

3. Negative pressure isolation is not required for routine patient care of individuals with pandemic influenza. If possible, airborne infection isolation rooms should be used when performing high-risk aerosol-generating procedures. If work flow, timing, resources, availability, or other factors prevent the use of airborne infection isolation rooms, it is prudent to conduct these activities in a private room (with the door closed) or other enclosed area, if possible, and to limit personnel in the room to the minimum number necessary to perform the procedure properly.

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

If a respirator that provides protection from splashes of blood or body fluids is needed, NIOSH-certified, FDA-cleared surgical N-95 (or higher) respirators should be selected. Additional information on N-95 respirators and other types of respirators may be found in Appendix B , at: NIOSH's Respirator Fact Sheet (http://www.cdc.gov/niosh/npptl/topics/respirators/factsheets/respfact.html), and at FDA's Masks and N-95 Respirators (www.fda.gov/cdrh/ppe/masksrespirators.html) fact sheet.

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 surgical mask or disposable N-95 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 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.

References

1. Jordan WS Jr. The mechanism of spread of Asian influenza. Am Rev Respir Dis 1961 83:29-40.
2. Moser MR, Bender TR, Margolis HS, Noble GR, Kendal AP, Ritter DG. An outbreak of influenza aboard a commercial airliner. Am J Epidemiol 1979;110:1-6.
3. Loosli CG, Lemon HM, Robertson OH, Appel E. Experimental airborne influenza infection. I. Influence of humidity on survival of virus in air. Proc Soc Exp Biol 1943;53:205-6.
4. Schulman JL. Experimental transmission of influenza virus infection in mice. IV. Relationship of transmissibility of different strains of virus and recovery of airborne virus in the environment of infector mice. J Exp Med 1967;125:479-88.
5. Schulman JL. The use of an animal model to study transmission of influenza virus infection. Am J Public Health Nations Health 1968;58:2092-6.
6. Blumenfeld HL, Kilbourne ED, Louria DB, Rogers DE. Studies on influenza in the pandemic of 1957-1958. I. An epidemiologic, clinical and serologic investigation of an intrahospital epidemic with a note on vaccination efficacy. J Clin Invest 1959;38:199-212.
7. Bridges CB, Kuehnert MJ, Hall CB. Transmission of influenza: implications for control in health care settings. Clin Infect Dis 2003;37:1094-1101.
8. Salgado CD, Farr BM, Hall KK, Hayden FG. Influenza in the acute hospital setting. Lancet Infect Dis 2002;2:145-55.
9. Hamburger M Jr, Robertson OH. Expulsion of Group A hemolytic streptococci in droplets and droplet nuclei by sneezing, coughing, and talking. Am J Med 1948; 4:690-701.
10. Feigin RD, Baker CJ, Herwaldt LA, Lampe RM, Mason EO, Whitney SE. Epidemic meningococcal disease in an elementary school classroom. N Engl J Med 1982;307:1255-7.
11. Andrews CH, Clover RE. Spread of infection from the respiratory tract of the ferret. 1. Transmission of influenza A virus. Br J Exp Pathol 1941;22:91-7.
12. Alford RH, Kasel JA, Gerone PJ, Knight V. Human influenza resulting from aerosol inhalation. Proc Soc Exp Biol Med 1966;122:800-4.
13. Tellier R. Review of aerosol transmission of influenza A virus. Emerg Infect Dis [serial on the Internet]. 2006 Nov (accessed September 29, 2006). http://www.cdc.gov/ncidod/EID/vol12no11/06-0426.htm
14. Bean B, Moore BM, Sterner B, Peterson LR, Gerding DN, Balfour HH Jr. Survival of influenza viruses on environmental surfaces. J Infect Dis 1982;146:47-51
15. World Health Organization Writing Group. Nonpharmaceutical public health interventions for pandemic influenza, national and community measures. Emerg Infect Dis 2006;12:88-94. www.cdc.gov/ncidod/EID/vol12no01/05-1370.htm
16. 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. Am J Infect Control 2002;30:S1-46.
17. Ryan MA, Christian RS, Wohlrabe J. Handwashing and respiratory illness among young adults in military training. Am J Prev Med 2001;21:79-83.
18. Matrosovich MN, Matrosovich TY, Gray T, Roberts NA, Klenk HD. Human and avian influenza viruses target different cell types in cultures of human airway epithelium. Proc Natl Acad Sci USA 2004;101:4620-4.

19. Shinya K, Ebina M, Yamada S, Ono M, Kasai N, Kawaoka Y. Influenza virus receptors in the human airway. Nature 2006;440:435-6.
20. Du Ry van Beest Holle M, Meijer A, Koopmans M, de Jager C, van de Kamp EEHM, Wilbrink B, Conyn-van Spaendonck MAE, Bosman A. Human-to-human transmission of avian influenza A/H7N7, The Netherlands, 2003. Euro Surveill 2005;10:264-8.
21. Tweed SA, Skowronski DM, David ST, Larder A, Petric M, Lees W, Li Y, Katz J, Krajden M, Tellier R, Halpert C, Hirst M, Astell C, Lawrence D, Mak A. Human illness from avian influenza H7N3, British Columbia. Emerg Infect Dis 2004;10:2196-9.
22. Institute of Medicine. Reusability of facemasks during an influenza pandemic: facing the flu. Report of the Committee on the Development of Reusable Facemasks for Use During an Influenza Pandemic. Washington, D.C.: The National Academies Press, 2006. http://www.nap.edu/catalog/11637.html.

Appendix A

Aerosol Science and Disease Transmission

Pathogen-carrying particles ("infectious" or "contaminated") of many different sizes are generated from various regions of the human airways and respiratory tract when a person with a respiratory infection talks, coughs, or sneezes (1). The smallest particles are generated in the pulmonary region, while larger particles are produced in the nasopharyngeal area. Although a particle's size may determine its behavior and mode of transmission, its infectivity also is affected by host factors, environmental factors, and pathogen-related factors (1, 2, 3, 4, 5).

Airborne pathogens may be divided into three functional types: a) **obligate airborne pathogens**, like M. tuberculosis, b) **preferential airborne pathogens** that are sometimes transmitted via other routes (like measles virus and variola [smallpox] virus), and c) **opportunistic airborne pathogens** that can be transmitted through the air under special circumstances that produce a concentrated source of contaminated small particles (1). Influenza virus is thought to fall into the third category, as a pathogen transmitted via large droplets that may also be inhaled (6, 7) if infectious respirable aerosols are present (e.g., due to an aerosol-generating medical procedure and possibly also due to short-range aerosol transmission during other direct care activities, as discussed in Section II).

Particle Size and Routes of Disease Transmission

Conflicting definitions applied to particles, particularly "large droplets," are a source of continuing confusion. Harmonized definitions and categorizations for these particles are needed to provide unambiguous and robust infection control recommendations. In discussing the relationship between the size of an infectious particle and routes of disease transmission, it may be useful to consider the characteristics of three size ranges (large, intermediate, and small):

- **Large droplets** (greater than 50 – 100 µm in diameter). Large droplets do not remain suspended in the air for significant periods of time, are affected primarily by gravity, have a ballistic trajectory, and travel no further than a few feet from the infected person (2). Disease transmission occurs by direct contact of contaminated large droplets with the mucous membranes of the mouth, eyes, and nasal passageways.
- **Intermediate-size[e] particles** (10 – 50 µm). The dispersion, settling, and respiratory-tract deposition of intermediate-size particles is affected by environmental factors such as temperature, humidity, air velocity, and air currents. As with large droplets, disease transmission via contaminated intermediate-size particles can occur by direct contact with mucous membranes if the particle is able to remain infective while suspended. Some intermediate-size particles may quickly decrease in diameter due to water loss, becoming "droplet nuclei" capable of causing airborne disease transmission (3).
- **Small particles** (less than 10 µm). This category includes small particle aerosols generated directly from a cough or sneeze, as well as droplet nuclei caused by

- desiccation and shrinkage of intermediate-size droplets. Particles that are five µm or less in diameter can remain airborne for an extended period (8) and may cause infection if the organism is able to maintain infectivity during desiccation and suspension in air. These particles reach the pulmonary region with variable efficiency and deposition properties. Their dispersion and deposition is principally affected by air currents.

Data on the proportions of different size particles expelled by an average cough or sneeze are limited (2, 3), and the proportions may change over time due to their desiccation and shrinkage. The point at which a shrinking particle moves out of droplet-transmission size-range and into the aerosol-transmission size-range is unclear. Moreover, the size ranges of the two populations of particles (capable of droplet or airborne transmission) might overlap or shift, depending on environmental conditions.

The characteristics of partially dried droplets and fully dried nuclei are similar to those of smaller particles that are expelled directly. However, infectivity or adherence properties may differ.

Factors That Influence a Particle's Infectivity

The size of a contaminated particle largely determines how quickly it will settle and whether it is likely to be inhaled into the lung (3). However, several other factors affect the likelihood that it will cause an infection, some directly, and some indirectly (2, 3).

Host factors include the following:

- The particle emission rate (frequency of coughing and sneezing)
- The concentration of aerosols in the cough or sneeze
- Susceptibility to infection of the person who comes into contact with the particle (e.g., immune status)

Pathogen-related factors may include the following:

- The initial concentration of the pathogen in the respiratory fluid
- The duration of infectivity of the pathogen suspended in air
- The number of pathogens that must be inhaled to cause infection (the infectious dose)
- Whether a certain size particle is required to carry a particular pathogen

Environmental factors, which can affect the rate of partial desiccation of intermediate size droplets into small respirable particles and the rate of complete desiccation of small respirable particles, include:

- Temperature and humidity
- Air currents
- Sunlight
- Electrostatic conditions
- The rate of removal of particles through exhaust ventilation
- The rate of removal of particles via air disinfection systems (e.g., ultraviolet light, filtration)
- Whether the susceptible person is downwind or upwind from the source

Factors That Influence the Infectivity of Influenza-Virus-Carrying Particles

The fact that M. tuberculosis, measles virus, and varicella virus are able to cause infection over long distances suggests that—as compared with influenza virus—they may have a lower infectious dose, may be present in higher concentrations in respiratory fluid, and/or can remain infective longer in air.

Research is needed to determine the pathogen-related capabilities and characteristics (e.g., persistence of infectivity, infectious dose,, and concentration in respiratory fluid) of an influenza-virus–carrying small particle or droplet nucleus under specific host-related and environmental conditions. This information will help in evaluating the potential efficacy of control measures to prevent infection.

Key Knowledge Gaps and Research Needs

The following research questions must be addressed to improve infection control strategies for influenza viruses:

1. What is the role of localized airborne transmission of small particles and droplet nuclei in the spread of human influenza viruses?
2. What are the relative contributions of large droplets versus small particles and droplet nuclei to disease transmission?
3. What are the efficacy and effectiveness of the use of N-95 respirators and surgical masks in preventing influenza transmission?
4. What strategies are likely to be most effective in promoting adherence to infection control measures during a pandemic?
5. Is there a risk to users from potentially contaminated surgical masks and respirators (e.g., does influenza virus persist in surgical mask/respirator materials)?

References

1. Roy CJ, Milton DK. Airborne transmission of communicable infection—the elusive pathway. N Engl J Med 2004;350:1710-2.
2. Papineni RS, Rosenthal FS. The size distribution of droplets in the exhaled breath of health human subjects. J Aerosol Med 1997;10:105-16.
3. Nicas M, Nazaroff WW, Hubbard A. Toward understanding the risk of secondary airborne infection: emission of respirable pathogens. J Occup Environ Hyg 2005:2:143-54.
4. Yu IT, Li Y, Wong TW, Tam W, Chan AT, Lee JH, Leung DY, Ho T. Evidence of airborne transmission of the severe acute respiratory syndrome virus. N Engl J Med 2004;350:1731-9.
5. Tellier R. Review of aerosol transmission of influenza A virus. Emerg Infect Dis [serial on the Internet]. 2006 Nov (accessed September 29, 2006). http://www.cdc.gov/ncidod/EID/vol12no11/06-0426.htm
6. Henle W, Henle G, Stokes J Jr, Maris EP. Experimental exposure of human subjects to viruses of influenza. J Immunol 1945;52:145 65.
7. Alford RH, Kasel JA, Gerone PJ, Knight V. Human influenza resulting from aerosol inhalation. Proc Soc Exp Biol Med 1966;122:800-4.

Lenhart SW, Seitz T, Trout D, Bollinger N. Issues affecting respirator selection for workers exposed to infectious aerosols: emphasis on healthcare settings. Applied Biosafety 2004;9:20-36.

Appendix B

Types of Surgical Masks and Respirators Used in Health Care Settings

Surgical masks and respirators may be used to protect the respiratory tract from viruses, bacteria, and fungi transmitted through direct contamination of the mucous membranes of the nose and mouth (and sometimes the eyes) or through inhalation of organisms in the air.

Surgical Masks

Masks that provide protection against pathogens carried by large respiratory droplets that can contaminate the mucous membranes are commonly known as **surgical masks** (Figure 1). These masks—which are sometimes also called procedure, isolation, or laser masks—are:

- Designed to cover the mouth and nose loosely
- Usually strapped behind the head
- Made of soft materials and are comfortable to wear

Surgical masks are worn by surgeons and other operating room personnel to prevent organisms in their noses and mouths from falling into the sterile field and potentially causing surgical site infections. Surgical masks also provide protection against body fluid splashes to the nose and mouth. Since surgical masks do not have a sealing surface and only fit loosely, they provide only minimal protection from respirable particles (1).

Respirators

Respiratory filtering devices that provide protection against inhalation of small and large airborne particles are called **particulate respirators** or **air-purifying respirators.** A particulate respirator is worn on the face and fits tightly to cover the nose and mouth.

Particulate respirators include the following:

- Disposable or filtering facepiece respirators are made of filter material designed to remove airborne particles. Disposable filtering facepiece respirators are discarded once they become unsuitable for further use because of soiling, contamination, or physical damage.
- Reusable or elastomeric respirators use replaceable filters. Elastomeric respirator facepieces can be cleaned, disinfected, and fitted with new filters for reuse. Such respirators typically have an exhalation valve and, when worn by an infected person, would not prevent transmission of virus to other persons.
- Powered air-purifying respirators (PAPRs) use a battery-powered blower to provide filtered breathing air. PAPRs can be cleaned, disinfected, and fitted with new filters for re-use.

The respirators most commonly used in hospitals are:

- The N-95 filtering facepiece respirator (Figure 2)
- The powered air purifying respirator (PAPR) (Figure 3)

N-95 respirators. An N-95 respirator is one of nine classes of particulate respirators certified by NIOSH. NIOSH-certified disposable particulate respirators are rated—and named—according to their ability to filter out 95%, 99%, or 99.97% (essentially 100%) of small inhalable particles, as well as according to their resistance to filter degradation from oil. Respirators are rated “N” if they are not resistant to oil, “R” if they are somewhat resistant to oil, and “P” if they are strongly resistant (oil proof).[f] Types of NIOSH-certified respirators include N-95, N-99, and N-100; R-95, R-99, and R-100; and P-95, P-99, and P-100.

N-95 respirators:

- Fit closely to form a tight seal over the mouth and nose
- Must be fit-tested and adjusted to one’s face
- Must be safely removed and discarded

Surgical N-95 respirators are N-95 respirators that are FDA-cleared as surgical masks, as well as NIOSH-certified as respirators. They have all of the qualities of NIOSH-certified N-95 respirators and have been evaluated for fluid resistance, flammability, and biocompatibility (see Masks and N-95 Respirators [www.fda.gov/cdrh/ppe/masksrespirators.html]).

Powered air purifying respirators (PAPRs). A powered air purifying respirator uses its own power source and a HEPA (high-efficiency particulate air) filter to provide the wearer with his or her own filtered air supply. Because a HEPA filter is as efficient as a P-100 filter—and because PAPRs have less face-seal leakage—a PAPR provides a higher level of respiratory protection than a filtering facepiece or a half-mask elastomeric respirator.

If a filtering facepiece respirator (N-95 or higher) is not available or cannot be correctly fitted or safely worn, other appropriate alternatives include PAPRs and half-face or full-face elastomeric respirators. Care must be used to prevent exposure of the wearer to infectious material that may be on the outer surfaces of the face shield and shroud. The reusable parts of a PAPR should be cleaned and disinfected after use and the filters replaced in accordance with manufacturer’s recommendations. All used HEPA filters should be considered possibly contaminated with infectious material and must be safely discarded. An appropriate system should be in place to ensure that backpacks are recharged and maintained according to the manufacturer’s instructions.

Additional Information on Respirators

The NIOSH Certified Equipment List (www.cdc.gov/niosh/npptl/topics/respirators/cel/) includes all types of NIOSH-certified respirators. NIOSH has also posted a list of disposable particulate respirators (http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/).

The Occupational Safety and Health Administration (OSHA) regulates the use of respirators in health care settings by setting standards for operation, maintenance, and care. Detailed information on respiratory protection programs, including fit test procedures, may be found at the Respiratory Protection eTool (www.osha-slc.gov/SLTC/etools/respiratory/index.html) site.

Reuse of Filtering Facepiece Respirators

An Institute of Medicine committee recently reported that disposable masks and respirators do not lend themselves to reuse because they work by trapping harmful particles inside the mesh of fibers of which they are made (2). This hazardous buildup cannot be cleaned out or disinfected without damaging the fibers or other components of the device, such as the straps or nose clip. Moreover, the committee could not identify any simple modifications to the manufacturing of the devices that would permit reuse, or any changes that would dispense with the need to test the fit of respirators to ensure a wearer is fully protected. However, the committee suggested that, if necessary, a disposable N-95 respirator can be reused with the following precautions: 1) a protective covering such as a medical mask or a clear plastic face shield should be worn over the respirator to protect it from surface contamination; 2) the respirator should be carefully stored between uses; and 3) the wearer should wash his or her hands before and after handling the respirator and the device used to shield it. These steps are intended for reuse of a respirator by a single person.

References

1. Lawrence RB, Duling MG, Calvert CA, Coffey CC. Comparison of performance of three different types of respiratory protection devices. J Occup Environ Hyg 2006:3: 465-74.
2. Institute of Medicine. Reusability of facemasks during an influenza pandemic: facing the flu. Report of the Committee on the Development of Reusable Facemasks for Use During an Influenza Pandemic. Washington, D.C.: The National Academies Press, 2006. http://www.nap.edu/catalog/11637.html

Figure 1. Surgical Mask

Figure 2. N-95 Filtering Facepiece Respirators (A-D)

A. Cup style N-95 respirators
Photo courtesy of Moldex

B. Duckbill type N-95 respirator

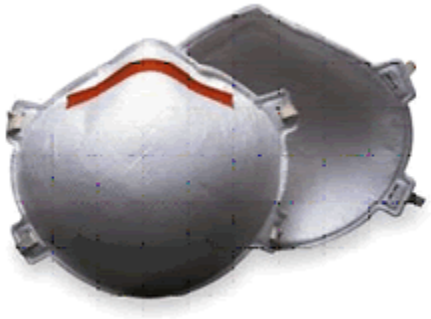

Photo from NIOSH website

C. Fan fold type N-95 respirator

Photos courtesy of Alpha ProTech

D. Flat fold type N-95 respirator

Photos courtesy of 3M
Photos courtesy of AO Safety

Figure 3. Powered Air-Purifying Respirator

Powered air-purifying respirator.

[a]Unless otherwise specified, throughout this document "N-95 respirator" refers to a NIOSH-certified N-95 filtering facepiece respirator.

[b]Droplet nuclei are formed by evaporation of droplets expelled by a cough or sneeze. See also Appendix A.

[c]If protection from splashes of blood or body fluids is also needed, NIOSH-certified, FDA-cleared surgical N-95 (or higher) respirators should be selected. More information is available at www.fda.gov/cdrh/ppe/masksrespirators.html.

[d]Some of the high-risk activities or conditions listed may have a higher potential for generating infectious respiratory aerosols. Site-specific factors, including patient condition, history, experience, work environment, and activity duration, should be considered when assessing risk and priority

[e]Intermediate-size particles include inhalable or inspirable particles and can settle in the bronchi and the bronchioles of the lung but tend not to penetrate into the smaller airways found in the alveolar region. Respirable particles are sufficiently small to penetrate the alveolus, where gas is exchanged.

[f]Resistance to oil is an important quality for some industrial uses of respirators, but is not relevant for health care use.