

*Training the nation's responders for pandemic influenza:  
A Department of Homeland Security planning  
and preparedness initiative*

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**ABSTRACT**

*Communities all over the world are preparing for the next disaster. Lately, the World Health Organization has focused its attention on H5N1, a subtype of the influenza virus. H5N1, which most Americans recognize as "bird flu," has caused massive losses in poultry production, as well as some human fatalities. Public officials have been warned that H5N1 may mutate into a strain that is not only highly pathogenic but also readily transmissible between humans. Should this occur, we might find ourselves on the verge of the next great pandemic. Because of this, community leaders, public health officials, and responders at planning and management levels face one of their most challenging problems: planning and preparing for pandemic influenza. Recently, an initiative at the Center for Domestic Preparedness was undertaken to assemble a training program for community leaders and senior responders that will address the current threat of a pandemic, outline an appropriate response to the problem, and exercise small planning teams using a tabletop model.*

*Key words: pandemic, influenza, planning,*

*preparedness, community response, medical surge, mass prophylaxis, genetic shift, genetic drift*

**INTRODUCTION**

Government officials, community planners, and responders at the planning and management levels are now facing the daunting task of preparing for the next influenza pandemic. The specifics of the pandemic—when it will occur, how it will begin, and how lethal it will become—remain mysteries. Over the previous century, three influenza outbreaks have resulted in pandemics. The most severe, the 1918 Spanish flu, killed an estimated 675,000 people in the United States.<sup>1</sup> In fact, the Spanish flu was responsible for nearly half of all deaths in the United States in 1918. Worldwide, the 1918 Spanish flu killed more people than any other single event in world history.<sup>2</sup>

In the event of an outbreak of a highly pathogenic and transmissible type A influenza virus, community officials, planners, and responders at all skill levels will be called on to protect the public. Recognition of pandemic influenza will most likely come from public health authorities, who have surveillance programs

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in effect in many parts of the world. However, the president of the United States, the secretary of the Department of Health and Human Services (HHS), and state and local officials have already urged community planners to prepare for pandemic influenza.

A recent article in this journal by Grigg et al.<sup>3</sup> raised the question, "Why are we the least prepared for the worst possible disaster?" This lack of preparedness is most likely due to a poorly defined response. When communities fail to define their response to a looming disaster, they can not properly plan or prepare for it. This precept, coupled with the threat from a virulent strain (H5N1) of influenza A that is now circulating in more than 50 countries, provided the motivation for a new instructional course. This course will aim at defining the response to a pandemic so that responders at the planning and management levels can effectively plan and prepare their communities for the threat of pandemic influenza.

Accordingly, this paper will briefly describe and outline the training objectives and content of the Pandemic Influenza Planning and Preparedness (PIPP) course offered by the Center for Domestic Preparedness, a Department of Homeland Security training facility in Anniston, Alabama.

### **PIPP**

#### *Training objectives*

In planning for the PIPP course, a target audience was defined and a thorough needs assessment was conducted.<sup>4</sup> From this research, a program of instruction was written, outlining 11 terminal learning objectives (TLOs). They are as follows:

- Identify the perils associated with pandemics in general and pandemic influenza specifically.
- Describe the various types of influenza and their associated implications for human and animal health.
- Describe the clinical manifestations of pandemic influenza, including epidemiological data, various stages of pandemic

influenza, and measures pertaining to prevention.

- Identify the principles associated with the National Strategy for Pandemic Influenza (NSPI).
- Describe various factors associated with an outbreak of highly pathogenic avian influenza and the effect such an outbreak could have on the economy.
- Describe the response actions of various emergency service disciplines as they relate to crisis communications, social distancing, travel restrictions, and quarantine.
- Identify the principles of mass prophylaxis, especially in relation to mass vaccination with an outbreak of influenza.
- Explain protocols for the management and distribution of medical supplies in the event of a pandemic.
- Explain the importance of rapidly expanding the capacity of the existing healthcare system in order to provide triage and medical care.
- Explain fatality management as it applies to a pandemic situation at its peak.
- Demonstrate the ability to plan and prepare a community for pandemic influenza by considering various factors, including the current threat, clinical manifestations, mass prophylaxis programs, medical surge enhancement, medical supply management and distribution, emergency response actions, and problems relating to containing the contagion and dealing with the massive numbers of sick and dead victims.

Table 1. Breakdown of the three-day PIPP course		
Module #	Module title	Contact hours
<b>Section 1: Defining the Threat</b>		
Module 1	Pandemic Influenza: The Threat	2.0
Module 2	Types of Influenza	1.0
Module 3	Clinical Aspects of Pandemic Influenza	2.0
Module 4	National Strategy for Pandemic Influenza (NSPI)	1.5
Module 5	Avian Influenza	1.5
<b>Section 2: Defining the Response</b>		
Module 6	Community Response to Pandemic Influenza	3.0
Module 7	Mass Prophylaxis	1.0
Module 8	Medical Supply Management and Distribution	1.5
Module 9	Medical Surge	1.0
Module 10	Caring for the Dead and Palliative Care	1.0
<b>Section 3: Exercising the Planning Team</b>		
Module 11	Practical Exercise	8.0
<i>Administrative</i>	<i>Group briefings and after-action reviews</i>	0.5
Total contact hours		24.0

The aforementioned TLOs are supported by enabling objectives, used to construct 11 distinct modules. Enabling objectives are derived from the target capabilities list<sup>5</sup> for each critical function addressed, and all objectives are aligned with numerous emergency support functions outlined in the National Response Plan (2006).<sup>6</sup> In terms of broad organization, the PIPP course is divided into three thematic sections that play out over the three days (24 contact hours) needed to conduct training. The three thematic sections are *defining the threat*, *defining the response*, and *exercising the planning team*.

#### *Defining the threat*

There are five modules in the first thematic section of the PIPP course (Table 1). The opening module, titled “Pandemic Influenza: The Threat,” addresses the potential societal harm that pandemics can bring. This module examines the historical record

of pandemics, the strains that caused them, the morbidity and mortality rates associated with them, and the factors that contributed to the severity of each pandemic. Special emphasis is directed toward discussing and modeling the 1918 Spanish flu, which killed as many as 100 million people worldwide and 675,000 in the United States.<sup>1</sup> These grave statistics are more dramatic when one learns that the Spanish flu was responsible for nearly half of all deaths in 1918<sup>1</sup> and that it lowered the life expectancy of the average adult in the United States by nearly 12 years between 1917 and 1918.<sup>7</sup>

The word “influenza” comes from the Italian word for “influence” (many people believed that stars influenced the start of an epidemic) and now refers to the illness caused by an influenza virus (commonly called “flu”), though many different illnesses cause flu-like systemic and respiratory symptoms such as fever, chills, aches and pains, cough, and sore throat. In

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addition, influenza can cause many different illness patterns, ranging from the mild common-cold symptoms of typical flu to life-threatening pneumonia and other complications, including secondary bacterial infections. The flu is present every winter, and nearly everyone has been infected with some form of it. Although influenza is not a new threat, governments and publications throughout the world didn't begin to address the topic extensively until several years ago.

An epidemic is a disease or condition that affects an especially large percentage of a population, and a pandemic is an epidemic that spreads worldwide. Pandemics end when all or most of the population has been exposed to the disease and has either contracted it, died from it, or developed a subclinical infection that resulted in immunity. Influenza epidemics occur periodically in various geographical areas, but pandemics usually only occur about once every generation.<sup>1</sup> The reason for this is that the influenza virus routinely undergoes "drifts" (subtle changes) and "shifts" (dramatic changes) in its genetic structure. The drifts give rise to increases in seasonal flu and are the primary reason that people can suffer from the flu more than once in a lifetime. Shifts, on the other hand, can be more troublesome for human populations, particularly when the resultant strain is dramatically different from anything that has circulated in many years. When this happens, there is little immunity to the new strain in the world population, and, if certain factors for transmission are present, a pandemic may ensue.

In May 1997, a three-year-old boy in Hong Kong died from a flu-like illness; this served as the trigger for the current flurry of activity in planning and preparedness.<sup>8</sup> The results of a routine analysis of the causative organism performed at the Centers for Disease Control and Prevention (CDC) three months later raised a red flag for many virologists and epidemiologists around the world. The boy had died from an infection caused by a strain of virus that should never have infected a human: avian influenza, type H5N1.<sup>9</sup>

Influenza viruses are divided into three main types—A, B, and C. Type A influenza infects multiple species. Several human influenza strains, as well as

all avian strains, are type A. "Virulence" is a relative term used to describe the pathogenic nature of an organism—the more virulent it is, the more likely it is to cause illness and death. Type A influenza viruses are considered the most virulent, though not all strains cause clinical disease.

Influenza is one of the most contagious diseases known to man. Viruses are spread from person to person via the respiratory route, primarily through the coughing and sneezing of infected people. A virus may remain viable on nonporous surfaces for up to 48 hours.<sup>10</sup> It is not coincidental that infection with the influenza virus causes a person to sneeze and cough; in fact, these symptoms aid in the virus's propagation. The infection irritates the mucosal linings of the respiratory tract. This irritation initiates the coughing and sneezing, thereby releasing millions of virus particles and making the virus highly contagious.

Clinical presentations, particularly the severity of the illness, may vary according to the specific strain of the virus involved. Influenza may present as a mild respiratory illness similar to the common cold, but it can also present as severe prostration without characteristic signs and symptoms. A diagnosis of influenza is based on a cluster of signs and symptoms. Influenza viruses, common cold viruses, and bacteria cause similar upper respiratory tract symptoms, but the intensity, severity, and frequency of the symptoms vary.

Vaccines and antiviral drugs are two medical interventions often discussed for reducing morbidity and mortality during a pandemic, but they will not be available in adequate supply to treat everyone. Vaccines are universally considered the first line of defense. It is assumed that the supply of antiviral drugs will be inadequate in every country at the start of a pandemic. Therefore, antiviral drugs could be critical early in a pandemic, especially if they are expected to protect healthcare professionals and emergency responders engaged in caring for the sick and dying. Authorities in all countries will need to make the most of nonpharmaceutical measures to reduce morbidity, mortality, and social disruption. The problems of inadequate supplies of vaccine and unequal access to medical treatments need to be

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addressed with particular urgency. Citizens should be instructed on remedies and therapies that would be useful and could be carried out at home if hospital-based care and traditional medical remedies are unavailable. The PIPP course was constructed to stress the importance of risk communication, the constructive use of the media, and the importance of being part of the solution to the problem.

#### *Defining community response to pandemic influenza*

Needless to say, one must first define a response before he or she can effectively plan and prepare for an event. Accordingly, the second thematic section of the PIPP course helps students define the community response to a pandemic. This section is composed of five modules (Table 1) that provide an overview of community response to a pandemic. The modules address important issues pertaining to containment, medical surge, mass prophylaxis, medical supply, and fatality management.

There is little chance of preventing the next pandemic. Consequently, we must define the measures our communities will take when the threat presents itself. Current initiatives taken by the World Health Organization (WHO) and those outlined by the HHS Pandemic Influenza Plan may work to lessen the impact of a new, highly transmissible, pathogenic strain of influenza virus. This will be especially true if effective and timely surveillance systems can be built at local levels. Recently, this capability has been shown to be lacking in state-level pandemic influenza response plans.<sup>11</sup> State and community planners must develop syndromic surveillance and testing networks that will allow them to recognize the onset of an outbreak in their jurisdiction. The educational focus should be on the importance of recognizing a problem so that the situation can be controlled. Failure to rapidly detect the onset of a pandemic might well result in a catastrophic event.

Beyond recognition, the principles of containment must also be considered. Traditional responders, public health workers, and medical communities should prepare for a pandemic in the same way they prepare for an act of terrorism or a natural disaster. The use of vulnerability assessments and the identification of

capabilities and shortfalls allow communities to better prepare for worst-case scenarios.

The main goal of any preparedness program is the improvement of public safety during a potential emergency. Enacting current processes and guidelines offered by the WHO and the NSPI is the responsibility of local communities. Community planners should establish minimum guidelines for businesses, healthcare providers, emergency response organizations, and other preparedness partners in the community.

“Surge capacity” refers to a healthcare system’s ability to rapidly expand beyond normal services to meet the increased demand for qualified personnel, medical care, and public health in the event of bioterrorist events, large-scale public health emergencies, or natural disasters. Surge capacity is not defined by the number of beds available in a healthcare system. Rather, it encompasses potentially available space that may be converted for use in triage, management, vaccination, and the holding of patients. Surge capacity also includes personnel of all types who contribute to the operation, as well as necessary medications, supplies, and equipment.<sup>12</sup> During the planning process, the legal community should address barriers to the provision of such services beyond normal capacity, licensure, certification, or authority during times of extreme need.

Communities should identify a “trigger point” based upon public health recommendations. Trigger points may include influenza managers working in the private sector. Influenza managers would ensure screening for signs and symptoms of pandemic influenza in all people entering their respective facilities. The screening might well escalate from passive (e.g., signs at the entrance) to active (e.g., direct questioning). In addition to visual alerts, potential screening measures may include priority triage of people with respiratory symptoms and telephone screening of patients with appointments.

In order to plan for and meet the surge need, communities should work with healthcare facilities to anticipate emergency staffing needs, increased demand for isolation wards, alternate care sites, maintenance of day-to-day healthcare systems, intensive care units

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(ICUs), assisted ventilation services, and consumable and durable medical supplies.

HHS has set a benchmark of 500 additional beds per million people, which will be necessary to care for influenza patients. This physical capacity translates to 1,624 additional personnel (physicians, nurses, respiratory therapists, lab technicians, administrative assistants, food workers, engineers/maintenance, and security). Without community involvement, this will be impossible to achieve. Finding the additional personnel requires innovative and collaborative solutions. Increased cross-training of personnel provides support for essential patient care areas at times of severe staffing shortages (e.g., in emergency departments, ICUs, and medical surgical units). A discussion with state health department officials on plans for rapidly credentialing healthcare professionals during a pandemic is crucial. Together, state health departments and members of the healthcare community can agree on a definition of an emergency staffing crisis and when it can be declared, as well as identify emergency laws that allow employment of healthcare personnel with out-of-state licenses.

HHS is developing a deployable mass casualty capability that could be used to supplement hospitals. However, HHS recommends that hospitals develop their own response plans that include components on hospital surveillance, hospital communication, staff education and training, triage and admission procedures, staffing and bed capacity, consumable and durable supplies, and planning for provision of care in nonhospital settings. During the peak of a pandemic, hospital emergency departments and outpatient offices might be overwhelmed with patients seeking care.

“Prophylaxis” is defined as the medical care or measures provided to individuals to prevent or protect them from disease. The medical care or protective measure may be administered to entire populations or large sectors considered to be at risk. This widespread medical prevention, or “mass prophylaxis,” is a cornerstone of any public health campaign against outbreaks of preventable disease. According to *Community-Based Mass Prophylaxis: A Planning Guide for Public Health Preparedness*,<sup>13</sup> there are five distinct components of the response: surveillance,

supply and stockpiling, distribution, dispensing, and follow-up. All components are addressed in detail in the PIPP curriculum. Additionally, the fact that an effective vaccine for the next pandemic strain may not be available at the onset of a pandemic is stressed. Antiviral drugs may be in short supply and are only effective when given at the onset of illness; this is also stressed in PIPP. Genetic trends emerging from studies with highly pathogenic H5N1 suggest that mutations may be limiting the effect of antiviral drugs altogether.<sup>14</sup> These troubling facts may limit the use of mass prophylaxis in the early response to a pandemic.

The nature of a pandemic means the response will span geographically scattered areas and could last weeks or months instead of days. The entire supply chain of a country will be taxed. In a pandemic situation, any existing inventory of consumable supplies will potentially be used rapidly. Since the majority of hospitals and medical facilities have moved toward just-in-time inventories, most do not have more than a few days’ worth of supplies of these types of items. Further complicating the issue, in many metropolitan areas only one or two vendors supply the entire hospital and healthcare community with essential items needed in a pandemic. These supplies would be used quickly as patient volumes increased. Therefore, it is imperative that individual hospitals, medical facilities, local governments, and states have surplus medical supplies readily available for pandemics.

#### *Exercising the planning team*

The PIPP course culminates with an all-day tabletop exercise (TTX) in which students take on specific community roles in a fictitious city referred to as “Our Town.” The students are introduced to a scenario and given a preparedness budget, an administrative code for Our Town, and information concerning the currently available vaccine.

In this scenario, an outbreak of an unusually severe respiratory illness is identified in a small village in a foreign country. With increased surveillance and specimen testing, the WHO reference laboratory in Geneva determines that the isolates are from a subtype never before isolated from humans. Isolates of the new strain are sent to the Food and Drug

Administration so it can begin work on producing a reference strain for vaccine production, and influenza vaccine manufacturers are placed on alert. Isolates are also sent to the CDC so that detection capabilities can be enhanced through the Laboratory Response Network. The novel influenza virus begins to receive significant media attention, and key US government officials are briefed daily as surveillance is intensified throughout the infected region and within the United States.

Through a number of injects given periodically during the exercise day, the outbreaks spread to surrounding countries, and ultimately strains of the virus are detected in airline passengers arriving in several US cities. States and local areas are asked to intensify influenza surveillance activities, and vaccine manufacturers are requested to go into full production. Subsequently, occurrence of cases of the pandemic influenza strain becomes widespread.

Initially, the students, in small groups, are led into planning and preparedness activities by an experienced facilitator. Each group is given approximately three hours to determine what planning and preparedness activities would best serve the public. Students also have a \$1.2 million budget to acquire supplies and overtime authorizations that might minimize the impact of the novel flu strain entering Our Town and the surrounding area. Students must work with the administrative code that is given to determine the best strategies for using surveillance, social distancing, quarantine, and isolation to contain the outbreak. Following this phase of the TTX, students receive hourly injects that advance the timeline of the exercise and move the problem closer to Our Town. Each inject brings its own unique set of challenges and issues. The TTX culminates with an after-action review, conducted in the classroom. During the review, each group highlights the preparedness activities and response issues that it found important in dealing with the circumstances of the scenario.

### CONCLUSION

Pandemic influenza may be the greatest challenge that emergency planners will face in the coming century. The PIPP course provides responders at the planning and management levels with outbreak containment and

response skills, enabling them to better plan and prepare for an outbreak of pandemic influenza. The course also provides responders with information regarding the imminent threat of pandemic influenza, its challenges and clinical aspects, the goals and objectives of the NSPI, and the many facets of an effective response in relation to avian influenza.

At the conclusion of this course, responders are able to demonstrate their ability to plan and prepare a community for pandemic influenza by considering various factors, including the current threat, clinical manifestations, mass prophylaxis programs, medical surge enhancement, medical supply management and distribution, emergency response actions, and problems relating to containing the contagion and dealing with the massive numbers of victims.

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