A Review and Analysis of the "National Pandemic Influenza Plan"

by

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ABSTRACT
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Infectious disease authorities are warning of a virus with potential to cause a human pandemic. The H5N1 virus is possibly endemic in certain areas, with the ability of animal to human transmission among those that come in close contact. The H5N1 virus is spreading rapidly through wild and domestic flocks and shows no signs of slowing its progress (DHHS, 2006).

In response to the threat, the White House and the Department of Health and Human Services (DHHS) have created the Health and Human Services Pandemic Influenza Plan (DHHS, 2005a) and the National Strategy for Pandemic Influenza (HSC, 2005). The National Strategy is a general document that seeks to provide general guidance for local planning. The DHHS 2005a plan is a large document that both outlines the expected federal government’s roles and activities during all phases of a pandemic, and serves as a template for local governments to develop their own plans.
A Review and Analysis of the National Pandemic Influenza Plan

Well before the terrorist attacks in 2001, local governments have been preparing for natural and manmade disasters. However, the 2001 attacks opened the eyes of the public and the Federal Government that we are vulnerable to large scale foreign terrorist attacks on United States soil. Subsequently, funding available to local governments for terrorist preparedness and response has increased dramatically. However, an old and simple communicable disease threat has reemerged recently that has gotten the attention of policy makers from the White House to the local Boards of Health. The H5N1 avian influenza virus has become endemic in the poultry and wild bird population in Asia and has been found in animals from Asia to the Middle East to Africa and even Europe. (DHHS, 2006) This virus has caused death and illness in a limited amount of humans and has been especially deadly to those who contract it. (WHO, 2006a)

**Background on Influenza** - Influenza is caused by a virus containing eight segments of single strand RNA. The outer shell of the virus is covered by spikes of two different proteins, hemagglutinin and neuraminidase. Influenza viruses are classified as A, B or C, depending on their protein composition. The A type virus is thought to be responsible for all pandemics. B and C type viruses circulate but are not as virulent and cause mild respiratory infections (Diseases, 2005). Interpandemic strains of influenza, or seasonal influenza, infect, on average 5%-20% of Americans every year. More than 200,000 are hospitalized and more than 36,000 die from the interpandemic influenza in the United States (DHHS, 2005b).
Many people confuse the “flu” with various other viruses that cause just stomach problems that can clear your system within 24 hours. The Centers for Disease Control and Prevention (CDC) lists the following as standard symptoms of influenza: high fever, headache, extreme tiredness, dry cough, sore throat, runny or stuffy nose, muscle aches and stomach symptoms which usually only occur in children. Implications from the flu virus range from bacterial pneumonia to dehydration and a worsening of an existing chronic medical condition such as heart failure and diabetes (DHHS, 2005b). Influenza mainly attacks the upper respiratory tract and is easily passed from person to person by droplets excreted when infected individuals cough or sneeze. Individuals may take one to four days to develop symptoms while continuing to shed viruses. Influenza virus can survive outside the body longer in cold, dry weather which explains why seasonal influenza appears in the winter in temperate climates (WHO, 2003).

Influenza occurs naturally in wild aquatic birds and causes little harm to these carriers. Occasionally, such as with the current epizootic H5N1 avian virus in much of the world, the virus jumps to domesticated ducks and then to chickens. Normally, the virus will make a jump to pigs where it can combine with a human form of influenza. If a pig is infected with both an avian and human form, the RNA strands can mix, creating a brand new version (Diseases, 2005). Humans and birds alike would not possess antibodies to this new virus, causing an outbreak. Several factors then determine the severity of the outbreak, including how well the virus is passed from one person to another and how virulent it is.

**Drift and Shift**- Influenza viruses change through one of two methods. Small changes in A and B types occur when the virus copies itself, causing a slight change to
the protein structure. This is called antigenic drift. This phenomenon is behind seasonal outbreaks of influenza and is why vaccines are reformulated every season. The slight change in protein structure makes the virus different enough to your body’s immune system that it is unrecognizable.

Dramatic changes in Type A influenza are called antigenic shift. The shift occurs when a cell is infected by two types of influenza and the RNA of both are combined. This creates a completely new subtype of influenza that no one has been exposed to before. These shifts are associated with severe flu epidemics or pandemics (Diseases, 2005).

**Naming the virus**- The two proteins, hemagglutinin and neuraminidase which make up the protein spikes on the outer shell of the virus are used to name Type A viruses. There have been sixteen hemagglutinin and neuraminidase subtypes identified and nine neuraminidase subtypes identified. The beginning of the name will start with the type, which is always A. Next, is the location it was first identified, the lab ID that discovered it, the year discovered and the protein combination on the surface. The current avian flu threat was discovered first in 1997, in Hong Kong. It has subtype 5 hemagglutinin and subtype 1 neuraminidase. Its name is A/Hong Kong/156/97 (H5N1) (Diseases, 2005).

**Spanish Influenza 1918 Pandemic**- In 1918, a pandemic influenza swept the globe and by the end of 1919, an estimated 500 million people, or one third of the humans on the planet, showed signs of the illness (WH, 1920). Archived tissue samples have provided the gene sequence of the 1918 virus and it has been determined that most seasonal and pandemic strains since are descendants of that virus. Taubenberger and
Morens have dubbed this virus, the “mother of all pandemics” (Taubenberger, 2006). The pandemic had three distinct waves; the first was relatively small and did not raise any concern. The second, coming in the fall of 1918, was the strongest and it subsided around Christmas 1918. A third wave started up in February. Figure 1 is a graphic showing the pandemic waves based on data from the United Kingdom (Jordan, 1927)

![Figure 1. Three pandemic waves: weekly combined influenza and pneumonia mortality, United Kingdom, 1918–1919 (Jordan, 1927)](image)

The 1918 influenza, also called the Spanish flu, claimed anywhere from 21 to 40 million people (Crosby, 1989). Most influenza seriously affects the very young and the very old. The Spanish flu had a unique characteristic in that is did not discriminate between ages and there was a measurable increase in the amount of mortality in adults (Schoch-Spana, 2000). Figure 2 below shows two curves on a graph. The solid line is the death rate across all ages for the Spanish flu pandemic and the dotted line is for the six years of seasonal flu prior to the pandemic.
Figure 2. "U-" and "W-" shaped combined influenza and pneumonia mortality, by age at death, per 100,000 persons in each age group, United States, 1911–1918. Influenza- and pneumonia specific death rates are plotted for the interpandemic years 1911–1917 (dashed line) and for the pandemic year 1918 (solid line) (Taubenberger, 2006).

At this time in medicine, the influenza virus had not been identified. Doctors and public health officials did not even know what they were dealing with and therefore could not offer proper advice for citizens to protect themselves. Many types of bacteria were mentioned as culprits and did cause many fatal cases of bacterial pneumonia. Other theories included foul atmosphere from the rotting corpses from World War One, a covert German biological weapon, spiritual malaise and poverty (Schoch-Spana, 2000). When the second wave hit the United States, there was serious impact to the delivery of essential government and industrial services. Sanitation, law enforcement, fire fighting and even postal delivery were impacted due to a high rate of employee absenteeism.
Since the cause of the illnesses could not be identified and its ease of transmission, many people were afraid to venture outside (Schoch-Spana, 2000).

**1957: Asian Influenza (H2N2)** - In 1933, the first influenza virus in humans was isolated (W. Smith, 1933). It was speculated that the same type of virus could be responsible for the 1918 pandemic. This was not the popular opinion until the 1957 pandemic occurred and the H2N2 virus was identified. This virus spread rapidly but did not have the same results as the 1918 pandemic. Influenza based pneumonia was found but instead of in all age groups, just those with underlying lung or heart disease (Kilbourne, 2006). During this outbreak, the virus was identified and a vaccine was produced to protect the public. It arrived in the United States in the summer of 1957 and flourished in the school children population once school started in September. A second wave in the elderly emerged around January 1958, further proving the cyclical nature of pandemics (Muriera, 2006). This virus became endemic once the population created a sufficient antibody to the virus.

**1968: Hong Kong Influenza (H3N2)** - This virus popped up only eleven years after the Asian pandemic. This pandemic was not as widespread as its predecessors, and had a varying degree of mortality depending on the location. The United States saw a higher than normal mortality rate, while Europe saw a high infection rate but no change from seasonal influenza death rates. Many attribute the pocket breakouts to similarity to the Asian virus. The hemagglutnin protein changed but the neuraminidase stayed the same subtype (JL Schulman, 1969). This could have provided many people the partial immunity to the Hong Kong strain. Also, improvements to the medical field and antibiotics prevented most bacterial pneumonia cases.
1976 Fort Dix Swine Flu Epidemic – In 1976, soldiers at Fort Dix in New Jersey came down with the H3N2 virus, responsible for the Hong Kong pandemic and the H1N1 virus, thought to be responsible for the 1918 pandemic. The US government acted quickly, created a vaccine and started the National Immunization Program. 43,000,000 people were to be vaccinated against this threat, which had the potential to be very dangerous. The influenza never left Fort Dix, and the vaccine program was abandoned (JL Schulman, 1969). Some questions will never be answered in regards to this incident.

1. Was the outbreak contained through proper public health actions, such as quarantine and hand washing or was it a hoax?

2. Were the vaccine’s effective in containing the outbreak?

3. Did the outbreak die out only because the proper environmental conditions did not exist?

Public Health officials see this episode as a time when they may have acted too slowly or over reacted. Richard Krause, a member of National Institute of Allergy and Infectious Diseases (NIAID) Infectious Disease Committee in 1976 writes that, “You will be in a fog, and you will need to exercise the best judgment you can on the basis of available surveillance information and historical context.” (Krause, 2006) Krause defends his committee’s decision to not only make the vaccine but administer it and not just stockpile it incase the epidemic spreads. Currently, public health officials in the WHO and in Asia are making these decisions, to prevent the spread of H5N1.

Pandemics of the past versus the present- Often, a potential pandemic is described in two versions, a catastrophic version similar to the 1918 pandemic or a mild pandemic like either the 1957 or 1968 pandemics. Possibly due to improvements in
healthcare, surveillance, existence of vaccines, an improved public health system and the increased use of soap and water to for prevention, the 1957 and 68 pandemics did not have the same effect as the 1918 pandemic. The importance of vaccines have been thoroughly proven (Temte, 2006) in controlling influenza but the effects of a pandemic on the economy, infrastructure and the healthcare system are not clear. In 1918, the healthcare system was inundated and patient needs exceeded capacity. The lower death rate and improved response in the two more recent pandemics could also be a sign that the current threat is not much of a threat at all. Antibiotics were not available during the 1918 pandemic to combat secondary bacterial pneumonias, which are available now (Bonten MJM, 2006). In 1918, simple habits such as hand washing were not known to help prevent transmission. Most citizens lived very close to each other in urban areas or out by themselves in rural parts of the country. Now, most of our public is spread out in suburbia which could help slow or prevent rapid spread. In this age of high tech laboratory facilities, rapid data sharing, improved surveillance and top notch healthcare, we will not know how bad a pandemic will be until the virus shows itself.

Current pandemic threat- Webster’s defines pandemic as “occurring over a wide geographic area and affecting an exceptionally high proportion of the population” ("Merriam-Webster Online Dictionary", 2006). Since 1997, the H5N1 virus has been spreading throughout chickens, ducks and wild bird throughout Asia, Africa and Europe. Since it has spread over half the globe, it could be described as a bird pandemic, but its spread and ability to pass to humans has made it a prime candidate to cause a human pandemic in the near future (HSC, 2005). It is impossible to determine if the H5N1 virus will cause a pandemic in humans, but based on its ability to pass to many types of
animals and its high mortality rate in the few human infections so far, it bears consideration. Figure 3 below shows the cumulative number of confirmed human cases of avian influenza A/(H5N1) reported to WHO as of March 10, 2006 (WHO, 2006a).

**Figure 3- 10 March 2006**

<table>
<thead>
<tr>
<th>Country</th>
<th>2003 cases</th>
<th>2003 deaths</th>
<th>2004 cases</th>
<th>2004 deaths</th>
<th>2005 cases</th>
<th>2005 deaths</th>
<th>2006 cases</th>
<th>2006 deaths</th>
<th>Total cases</th>
<th>Total deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>7</td>
<td>5</td>
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<td>10</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>28</td>
<td>21</td>
<td></td>
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<td>0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
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<td>14</td>
</tr>
<tr>
<td>Turkey</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
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<td>3</td>
<td>29</td>
<td>20</td>
<td>61</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>93</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
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<td>3</td>
<td>46</td>
<td>32</td>
<td>95</td>
<td>41</td>
<td>32</td>
<td>21</td>
<td>176</td>
<td>97</td>
</tr>
</tbody>
</table>

According to this data, some countries have experienced 100% mortality, while globally, the morality rate has been 54.2%. It is important to note that the countries listed above do not have the type of health care systems that exists in the United States, most cases occurring in remote farming communities. However, the virulence of the H5N1 virus deserves our attention and the possibility of a pandemic has forced our government from the federal to local level to re-examine their plans and procedures to handle an emergency such as a pandemic. Very few people still alive remember the 1918 pandemic and the other pandemics were small enough to not have a significant impact on the memories of either our leaders or the general public.
World Health Organization Global Influenza Preparedness Plan- The World Health Organization (WHO) was created in 1947 by the United Nations (UN) to serve as the health arm of the UN. Its primary purpose, "is the attainment by all peoples of the highest possible level of health." (WHO, 2006b) The WHO can be seen as the coordinating health department for the international community. Any pandemic will involve just about every country on the planet and a coordinated response is paramount to being able to reduce mortality and morbidity. The WHO released in 2005, the WHO Global Influenza Preparedness Plan (WHO, 2005) which:

1. Describes the new six stages of a pandemic
2. Outlines the WHO’s responsibilities
3. Provides its member states a guide to prepare their own plans which mirror both each other and the WHO’s plan.

At each stage of the pandemic, the plan provides both suggested goals and activities for governments to use to develop their own preparedness plans. The six stages of a pandemic as defined by the WHO are (WHO, 2005):

1. Phase 1- No new influenza subtypes in humans, Possible infection of some animals
2. Phase 2- No new subtypes of virus but current animal virus poses a significant risk to humans.
3. Phase 3- Human infection with new subtype but no human to human transmission.
4. Phase 4- Small clusters of human to human transmission, but highly localized.
5. Phase 5- Larger clusters but human to human transmission remains localized
6. Phase 6- Sustained transmission globally.

Phases 1 and 2 are the interpandemic phases, 3-5 are the Pandemic Alert period and the last phase constitutes the pandemic period. All of the WHO’s recommendations are based on experience from both past pandemics and seasonal outbreaks of influenza. It also was developed by a large international group of researchers, doctors and public health officials.

*The Federal Response in the United States*—Using the WHO plan as a guide, the executive branch of the federal government created two documents at the end of 2005, to lay out the national plan for pandemic preparedness and response. The first was the *National Strategy for Pandemic Influenza* (HSC, 2005), published by the Homeland Security Council in the White House. Quoting directly from the document, “The National Strategy for Pandemic Influenza guides our preparedness and response to an influenza pandemic, with the intent of (1) stopping, slowing or otherwise limiting the spread of a pandemic to the United States; (2) limiting the domestic spread of a pandemic, and mitigating disease, suffering and death; and (3) sustaining infrastructure and mitigating impact to the economy and the functioning of society (HSC, 2005).” The Strategy has three “Pillars” which are used to group activities into functional areas. The “Pillars” are;

1. Preparedness and Communication
   - Planning
   - Communicating Expectations and Responsibilities
   - Production and Stockpiling of vaccines and antiviral medications
   - Distribution plans for vaccine and antiviral medications
2. Surveillance and Detection

- Ensuring Rapid Reporting of Outbreaks
- Surveillance to limit spread

3. Response and Containment

- Containing Outbreaks
- Leveraging national medical and public health surge capacity
- Sustaining infrastructure, essential services and the economy
- Ensuring risk communication

The Strategy closes by outlining the responsibilities to every group from international partners to individual citizens. The document does not address funding or a timeline because many of the activities would not take place until an outbreak actually occurs.

The following day, Secretary Leavitt released the *HHS Pandemic Influenza Plan* (DHHS, 2005a). This monstrous, 398 page plan provides the detail to support the National Strategy. It describes in detail the responsibilities of each agency within the Department of Health and Human Services, as well as the rest of the federal government. It adequately describes the importance of working with international as well as local partners to first attempt to contain an outbreak and if uncontainable, provide the best response to sustain and protect life. The second section expands on the guidance from the WHO plan for state and local governments to develop their own pandemic response plans. An important piece of this plan is the inclusion of the *National Response Plan* (DHS, 2004). In 2003, the President released Homeland Security Presidential Directive/HSPD-5 (House, 2003) which directed DHS to develop the National Response
Plan and forced all state and local governments to design all local emergency plans around this plan to be eligible for federal assistance. The HHS plan details how local governments can design their plan to match the NRP and use the National Incident Management System (NIMS) to make interagency interaction and assistance easier.

Key federal actions will be based around containment and development of a vaccine and antiviral stockpile program. In addition to national disease surveillance, the federal government hopes to prevent its introduction to US soil by containing it in other countries. This requires the presence of the CDC in the third world; to protect our assets and to work with international partners and the WHO to improve surveillance and healthcare in third world countries where pandemics typically start. Moszynski writes in the BMJ that in places like Africa where the healthcare system is almost non-existent and current health efforts are focused on AIDS, polio and dysentery, avian flu may not get the attention it deserves and may create an environment that allows it to flourish before it can be contained (Moszynski, 2006). It may be inappropriate to put much faith in a certain country's ability to adequately identify and contain an outbreak. On an international level, countries that can assist in the surveillance effort should coordinate with the WHO by bolstering third world efforts in an attempt to limit the spread and prevent a pandemic.

Public health has proven that prevention is more cost effective than treatment but the HHS plan seems to put more effort into other parts of its plan. The President’s proposed budget only earmarks $251 million to international disease surveillance out of a 7.1 billion dollar request (Halliman, 2005).

Within the United States, the issue of surveillance and containment will fall on the laps of local health departments. The HSPD-5 confirms that any event is first and
foremost the responsibility of the local government where it is occurring (House, 2003). In any type of emergency situation, a local government will attempt to handle the event with local resources and then request help from other jurisdictions (other counties, State or Federal). Local governments should have a system in place where the event is occurring, while State and Federal assets have to prepare and respond to the site of the emergency or outbreak after the fact.

The *HHS Plan* is clear that local governments have primary responsibility for surveillance and healthcare in their community and can request help from the federal government when necessary (DHHS, 2005a). The federal government’s job will be to coordinate with local governments in tracking and surveillance activities. Again the proposed budget does not match the importance of the activity. In the regular HHS budget, the Bush administration asked Congress for a decrease in local public health preparedness funding by $129 million, from $926 million to $797 million while asking for just $100 million in the pandemic preparedness budget (Brewin, 2005). $100 million for all of the public health departments in the country will not make much difference in improving surveillance or response, let alone help fund stockpiling of antiviral medications or increasing surge capacity.

Vaccine and antiviral medications make up the bulk of the federal government’s pandemic preparedness budget. In the *HHS plan*, vaccine and antiviral treatments seem to be one of many preparedness activities but by taking over half the proposed budget, it is clear the importance the federal government has placed on vaccines and antiviral medications. The Bush Administration’s proposed budget provides $2.8 billion to producing vaccines more efficiently and quickly, $1.5 billion to purchase 50 million
doses of a vaccine that does not exist and $1 billion to purchase and stockpile antiviral medications Tamiflu and Relenza (Brewin, 2005; Halliman, 2005). An organization of several professional associations called the Working Group on Pandemic Influenza has applauded the high level of funding into research and development of domestic vaccine production and the improvement of the vaccine production process. This expense is a true investment in the future and will provide benefit whether or not a pandemic occurs. The Working Group though points out that neither the HSS plan nor the budget provides details and a precise timeline for the development of a crash program for rapid vaccine development and production during a pandemic (Jeffery Levi, 2006). That investment in domestic vaccine production and new vaccine development techniques, while a good investment in the future, is being invested wholly in the private pharmaceutical industry. The government would still not be able to produce its own vaccines.

The WHO plan recommends a country stockpile enough antiviral medications to treat 25% of the population; this would be 75 million people in the United States (WHO, 2005). The current funding proposal will provide about 50 million doses to the national stockpile but the HHS plan to stockpile the remainder raises concerns. Rep. Nita Lowey (D-NY) has criticized the Bush administration’s shift of the stockpile burden on the States. She has said, “This is a national emergency, it should not depend upon where one lives as to what sort of protection you get.” (Halliman, 2005) By requiring States to purchase their own stockpile, it creates fifty more customers competing with each other for the limited production capability of the two pharmaceutical companies (UPMC, 2005). So in addition to the increased responsibility of planning and preparing for a pandemic with less funding than last year, States will have to find other funding sources
to purchase small stockpiles of both vaccines and antiviral medications. The Working
Group estimates the States will have to come up with $510 million in a short time to meet
this federal mandate (Jeffery Levi, 2006). Antiviral treatment has its drawbacks and is
not thought by all to have the ability to impede the spread of the virus. An infected
individual must start the dose pack within 48 hours of symptoms, which will be difficult
if a prescription is required and pharmacy stock is questionable. Oseltamivir (Tamiflu) is
only partially effective against the H5N1 virus and may be ineffective after mutation or
resistant strains form (Gostin, 2006).

Legal Maneuvering- Vaccine manufacturers are leveraging liability release with
the government to speed development and production. The 1976 National Influenza
Immunization Program debacle (Sencer, 2006) looms large over current vaccine
manufacturers and immunity from liability has been raised as a step to increase
production and development by the industry. The Vaccine Injury Compensation Program
(VICP) exists in the United States but it is inadequate in its current form during a
pandemic (Gostin, 2006; Jeffery Levi, 2006) The manner in which vaccines are
regulated during a public health emergency may streamline the vaccine manufacturing
process. To enable mass production with little lead time, the regulatory process to
approve vaccines should be timely and efficient (Gostin, 2006).

Antiviral manufacturers are fighting to keep their monopoly on their product,
pursuant to copyright laws. The Trade-Related Aspects of Intellectual Property Rights
Agreement (TRIPS, Art. 31) (WTO, 2006) provides countries to grant compulsory
licenses in a public health emergency. Hoffman-La Roche is resisting this practice even
though they admit the global orders and *WHO plan* recommendations exceed their production capacity (Gostin, 2006).

With the majority of the budget request from the White House being directed toward the pharmaceutical industry and work to remove any liability from the vaccine manufacturers, it appears that neither the public health infrastructure, healthcare infrastructure nor emergency preparedness are getting the funding in the pandemic flu budget.

**Vaccine Prioritization** - An important issue in a national vaccine program is prioritization of vaccine recipients. Prioritization is not a new concept with influenza vaccines. During the 2004 season, a problem with a vaccine manufacturer caused a major shortage in the US seasonal vaccine supply. A prioritization was established to ration the vaccine to those who are most susceptible to influenza. This included the elderly, children 6-24 months old, and people who are immuno-suppressed (CDC, 2004). While the seasonal vaccine is made before the influenza season, using several past strains, a pandemic vaccine cannot be created until the pandemic strain is identified due to antigenic shift. A vaccine for every American would not be available for several months (DHHS, 2005a). To prepare for this, in 2005, the National Vaccine Advisory Committee and the Advisory Committee on Immunization Practices unanimously approved a vaccine prioritization plan. Figure 4 below breaks down groups of the population into tiers, similar to the seasonal ration except for moving the healthcare workers to the top tier and other government officials working in pandemic response into the first tier (Temte, 2006). The healthcare workforce is the first line of defense against a
During a potential pandemic crisis, why do those over 65 years old, with existing health problems have a higher priority than children, whose life is ahead and public health and EMS workers who are on the front line of health response? During war and mass
casualty situations, those that have less probability of survival are not given priority over those with a higher chance of survival. This will be an issue for government to investigate and keep in mind if vaccine supplies are low and death rates are high.

In a survey conducted by the Honolulu Emergency Services Department, 80% of doctors would report to work during a natural disaster but only 58% would during a contagious epidemic. Figure 5 below shows the complete results of the survey.

Figure 5 (Huff, 2006)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Doctor (%)</th>
<th>Nurse (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Disaster</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>Explosion</td>
<td>71</td>
<td>69</td>
</tr>
<tr>
<td>Chemical</td>
<td>64</td>
<td>59</td>
</tr>
<tr>
<td>Biological</td>
<td>62</td>
<td>55</td>
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<tr>
<td>Contagious Epidemic</td>
<td>58</td>
<td>50</td>
</tr>
<tr>
<td>Radiological</td>
<td>59</td>
<td>49</td>
</tr>
</tbody>
</table>

Note: Percentages rounded off. The survey included 1,057 doctors and 2,432 nurses.
Source: Hawaii Medical Personnel Assessment, 2003
Besides first access to vaccines and antiviral medications, planning efforts should be made to increase both the ways to ensure staff’s safety and increasing the surge capacity of the staff pool.

*Investments in the future, missing from the plan*—Mentioned in the plan but lacking in funds to accomplish are investments in the infrastructure to the nation’s healthcare system that can not only benefit the country during a pandemic but also during any other emergency or healthcare crisis. The nation’s healthcare system is strapped every year during the seasonal influenza outbreaks while the *HHS plan* predicts anywhere from 865,000 to 9.9 million hospitalizations during a pandemic (Huff, 2006). Surge capacity must be improved to not only increase bed space but staff and medical equipment. The Strategic National Stockpile can only support so many incident locations with extra ventilators and medical supplies. The Stockpile, which operates under the CDC, is available to all States if local medical supplies are depleted (CDC, 2005).

Operating under DHHS and DHS are Disaster Medical Assistance Teams (DMATs). These teams can drop into an affected area and set up a mobile hospital where needed (CA-1). Their weakness is they pull medical staff from one area and send them to another. If a pandemic affects the entire country, healthcare administrators will not allow their staff to be deployed, in fear of being understaffed themselves. The *HHS plan* calls for the creation of more mobile teams (DHHS, 2005a) but this is more of a band-aid than a solution. A mobile hospital will only supplement bed space, not the entire healthcare system. In 1918, the healthcare system was completely overwhelmed, from the hospitals to the druggist and everywhere in between. Fear of infection and actual influenza infection reduced the available healthcare staff available, as did the ongoing war effort.
Efforts should be pushed toward strengthening the Medical Reserve Corps capacity to supplement healthcare staffing by using medical professionals in the community (MRC). The Medical Reserve Corps is part of the Citizen Corps system which reemerged after the 9/11 terrorist attacks. Improvements to this system as well as the hospital surge capacity infrastructure are not part of the Bush administration’s funding plan but would provide for a much better investment and provide longer lasting improved preparedness than any stockpile of antiviral medications ever could.

The other serious weakness in the HHS plan is the lack of planning for a possible disruption of essential services during a pandemic. Either out of fear of infection, orders to stay at home to stop the spread or actual infection, employee absenteeism is expected to be high. This was experienced also during the 1918 pandemic (Schoch-Spana, 2000). This is not just a breakdown in law enforcement or postal delivery. It is possible there could be a disruption in the shipping industry, affecting food and fuel deliveries. No food on the shelves at the store and no fuel for vehicles could cause panic and starvation in an already stressed community. It will take a coordinated effort between local, state, federal and private industry to keep essential commodities flowing, while preventing the spread of the flu virus across the country.

_Last Line of Defense_- Possibly the most important part of halting the spread of a pandemic is personal preparedness. There are certain actions people can take to prepare themselves and their family for the potential pandemic and during a pandemic both to protect themselves and others. People must be informed about the signs and symptoms as well as what actions they can take to prevent transmission and if infected to reduce the possibility of passing it to family and others. HHS has prepared information for the
public that can be found at www.pandemicflu.gov (DHHS). On this site, there are personal preparedness checklists that are clear in what citizens can do to prepare themselves and their family for a pandemic and the affect it could have on their life.

HHS needs to take this resource a step further and find ways to get this information out to those both without internet access and those who do not even know there is a threat. Education and improvements to personal preparedness is also an investment in the future and will have an impact in all aspects of emergency preparedness.

The H5N1 Avian influenza virus has the potential to cause a pandemic in humans but when and where that will happen is a mystery. Government officials from top to bottom have added a pandemic to their list of hot topics to prepare for. DHHS has released their plan to prepare the country for this threat and has made clear through its budget requests, what they feel is most important to protect the citizens. What is missing is an investment in the local communities and healthcare system to increase surge capacity and a clear plan to sustain essential services. While improvements to vaccine production both domestic and internationally are important and is an excellent investment, surge capacity building and local preparedness will provide a benefit to the public for all types of emergencies and disasters.
References


MRC. Medical Reserve Corps Homepage.


