

Pandemic Primer

Brian J. Maguire and Steven C. Wood

May 2008

Introduction

Communities and other groups across the country are stepping up efforts to prepare for the next – inevitable – pandemic influenza event. This Primer is a summary overview of information to assist with preparedness efforts. Community leaders and exercise participants may find this a useful foundation in preparing for exercises and other planning events.

Background

The Spanish Flu of 1918 was an avian influenza pandemic. Over an approximate 18 month period, that pandemic killed an estimated 50 million people worldwide, including 675,000 Americans¹. It was “the fastest spreading and most deadly influenza pandemic in recorded history”².

The avian flu virus as it exists today is not easily transmitted between people³, although cases of human to human transmission have been reported⁴. However, if it mutates (antigenic shift in the virus¹) to an easily transmissible virus (as happened in 1918):

- no human being on the planet will have immunity;
- a third of the community could be afflicted – millions of people in America could die;
- it may take many months to develop and deploy a vaccine⁵ (in 2005, the world capacity for human vaccine production was 300 million doses per year – for six billion people);
- a global pandemic may occur.

Communities will be largely on their own to respond to such an event. U.S. Health and Human Services Secretary Mike Leavitt has warned communities not to count on federal assistance in the event of a pandemic⁶. Mutual aid plans between communities may be cancelled as each community struggles to meet its own needs. Competition for vendors and resources could be intense.

The World Health Organization reports that from 2003 to March 2008, there have been 373 known human cases of H5N1 avian flu in the world – 236 victims died (63% fatality rate)⁷.

Vaccine and anti-virals

As indicated above, it is likely that there will be a period of many months (if not longer) between the time the pandemic begins and the time that a vaccine becomes widely available. Even when vaccines begin arriving at the community level, it is likely that the initial deliveries will be

ⁱ “Antigenic shift refers to an abrupt, major change to produce a novel influenza A virus subtype in humans that was not currently circulating among people”. CDC. *Influenza Viruses*. Available at: <http://www.cdc.gov/flu/avian/gen-info/flu-viruses.htm>. Accessed April 21, 2008.

sufficient for only a tiny fraction of the population. Therefore, public health and community leaders will need to decide how to allocate the scarce and valuable resource. A number of issues will need to be considered before making such a difficult decision.

Some communities may wish to focus on those residents most at risk. Typical flu fatality patterns resemble U-shaped curves with higher fatality rates for children and the elderly and with relatively low rates for adults. When flu vaccines were interrupted in recent years, some communities used this risk assessment and allocated the scarce vaccine to children and the elderly.

However, the 1918 flu was characterized by more of a W-shaped curve with high rates for young children, lower rates for 10 year olds, higher rates for 30 year olds, lower rates for 50 year olds and then rising rates to a peak for the elderly.⁸ Therefore, there could be three (or more) high risk groups in the next pandemic.

Some communities may want to give first priority to those workers doing the most hazardous (e.g. health care workers) or the most critical (e.g. law enforcement) jobs. While other communities may wish to take a more public health type approach and distribute vaccines based on patterns that will minimize the spread of the disease.

“Genetic sequencing of avian influenza A (H5N1) viruses from human cases in Vietnam, Thailand, and Indonesia shows resistance to the antiviral medications amantadine and rimantadine, two of the medications commonly used for treatment of influenza. This leaves two remaining antiviral medications (oseltamivir and zanamivir) that should still be effective against currently circulating strains of H5N1 viruses. A small number of oseltamivir resistant H5N1 virus infections of humans have been reported.”⁹

Without knowing the specific risks of, and resources available for, the next pandemic, communities and health officials may be unable to proactively make specific recommendations for distribution of vaccines or anti-virals. Pandemic exercises may help community leaders develop the tools and relationships to help make these decisions as quickly as possible in a real event.

Clinical presentation

The incubation period for the current H5N1 virus ranges from two to eight days but may be considerably longer. The patient typically presents with influenza like symptoms and a high fever. “Diarrhoea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported as early symptoms in some patients.” Lower respiratory tract involvement and respiratory distress are commonly seen within five days. Pneumonia, unresponsive to antibiotics, is seen in almost all patients. Clinical deterioration, including multi-organ dysfunction and acute respiratory distress may occur within four to 13 days.¹⁰

Health care system issues

Mary Duley described the “four major objectives that each health care facility's Emergency Operations Plan must address. They are: increasing bed availability, developing strategies to deal with the potential staffing shortages, developing strategies for dealing with potential critical equipment and pharmaceutical shortages, and, lastly, the implementation of education, training and communication strategies for their health care workers and the public they serve.”¹¹ EMS, like other health agencies, may be poorly prepared for this type of event.¹²

Personnel Issues

Maintaining, recruiting and protecting the workforce are among the most critical objectives facing preparedness and response officials. Researchers report that a third of healthcare workers say they will not come to work during this type of event¹³; in addition, another potentially large proportion may be afflicted and unable to perform their duties. Pre-event recruiting of ancillary personnel may help health care and emergency services agencies be better prepared for the inevitable shortage of staff. Those recruits, and regular staff, may require just-in-time training on a number of skills including personal protective equipment usage¹⁴.

Community Issues

As far back as the plague in ancient Athens, civilized societies have succumbed to “wild recklessness” and “lawless extravagance” in the face large-scale deaths from illness¹⁵. The worried well further contribute to community anxiety and resource reduction. Concerned parents, and others may react to news announcement of an outbreak by descending upon supermarkets in the hope of buying large amounts of groceries. Anxiety may soon grow among these shoppers when faced with depleted shelves and the news of delayed or cancelled truck deliveries. In fact, HHS estimates that perhaps 40% of the general workforce may be absent for weeks at a time¹⁶; that includes truck drivers, shop keepers, sanitation workers, plumbers, power plant workers, etc.

Some citizens may decide to take their families out of the city; those with country homes (or relatives with country homes) may feel they will have a refuge there. However, anecdotes from 1918 and from the SARS outbreak in China include stories of villages posting armed guards to keep potentially infected travelers from entering their communities.

Schools, theaters, stadiums and other places of congregation will likely be closed for much of the pandemic period. This will leave parents at home with children; it will mean school teachers and other smart and healthy workers will be idle.

Preparedness

Preparedness efforts for a pandemic should include key elements such as:

- Choosing a planning team;
- Developing community and key stakeholder involvement;
- Conducting exercises; and,
- Encouraging and assisting citizens with personal preparedness.

Conclusions

An influenza pandemic will be a resource and time intensive event. Surge strategies, especially for staffing and resource management are crucial to managing the event. Feelings of helplessness and futility likely lead to the acts of lawlessness seen during some such disasters; leaders can prepare for those feelings by planning ways to mobilize otherwise idle citizens to help the community. Exercises and other preparedness efforts will help local leaders manage such an event. Prepared leadership and proactive risk communication messaging will help meet the needs of the community.

For more information contact:

Brian J. Maguire, Dr.PH, MSA
Global Secure Systems
1033 N. Fairfax St. Suite 302
Alexandria, Va 22314
Voice) 202 / 714-8026
Fax) 703 / 299-9033
email: bmaguire@globalsecurecorp.com
<http://globalsecurecorp.com>

© 2008. May not be copied or distributed without the express permission of the authors.

References

- ¹ HHS. *The Great Pandemic*. Available at: http://1918.pandemicflu.gov/the_pandemic/index.htm
Accessed April 20, 2008.
- ² Olson DR, Simonsen L, Edelson PJ, Morse SS. Epidemiological evidence of an early wave of the 1918 influenza pandemic in New York City. *PNAS*. 2005; 102: 11059-11063.
- ³ Yang Y, Halloran ME, Sugimoto JD, Longini IM Jr. Detecting human-to-human transmission of avian influenza A (H5N1). *Emerg Infect Dis*. 2007; 13(9): 1348-53.
- ⁴ WHO. *Avian influenza – situation in Pakistan - update 2*. 3 April 2008. Available at: http://www.who.int/csr/don/2008_04_03/en/index.html. Accessed April 21, 2008.
- ⁵ U.S. Health and Human Services. *Tests, Vaccines, Medications, & Masks*. Available at: <http://www.pandemicflu.gov/vaccine/index.html>. Accessed March 25, 2008.

-
- ⁶ Rivera R. Prepare for Pandemic, Localities Are Warned. *Washington Post*. February 25, 2006 (B04). Available at: <http://www.washingtonpost.com/wp-dyn/content/article/2006/02/24/AR2006022401802.html>. Accessed April 12, 2008.
- ⁷ World Health Organization. *Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO*. March 18, 2008. Available at: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2008_03_18/en/index.html. Accessed March 25, 2008.
- ⁸ Morens DM, Fauci AS. The 1918 Influenza Pandemic: Insights for the 21st Century. *The Journal of Infectious Diseases*. 2007; 195: 1018–28. Available at: http://www3.niaid.nih.gov/about/directors/pdf/morens_fauci.pdf. Accessed April 1, 2008
- ⁹ CDC. *Avian Influenza: Current H5N1 Situation*. Available at: <http://www.cdc.gov/flu/avian/outbreaks/current.htm>. Accessed April 21, 2008
- ¹⁰ WHO. *Avian influenza ("bird flu") - Fact sheet*. February 2006. Available at: http://www.who.int/mediacentre/factsheets/avian_influenza/en. Accessed April 21, 2008.
- ¹¹ Duley MG. The next pandemic: anticipating an overwhelmed health care system. *Yale J Biol Med*. 2005; 78(5): 355-62.
- ¹² Maguire BJ, Dean S, Bissell RA, Walz BJ, Bumbak D. Epidemic and Bioterrorism preparation among EMS systems. *Prehospital and Disaster Medicine*. 2007; 22(3): 237-242.
- ¹³ Hanfling D, Wright C, Sakran J, Howell M. Will They Come To Work? Evaluating Healthcare Workforce Knowledge And Intent Regarding Hospital Disaster Response. Submitted for publication. March 2008.
- ¹⁴ Mitchell CS, Maguire BJ, Guidotti TL. Worker Health and Safety in Disaster Response. In Ciottone G. (Ed.) *Disaster Medicine*. Mosby Pub. 2006.
- ¹⁵ Kolata G. *Flu: The story of the great influenza pandemic of 1918 and the search for the virus that caused it*. Touchstone Pub. 1999. Page 37
- ¹⁶ HHS. *Key Elements of Departmental Pandemic Influenza Operational Plans*. Available at: <http://www.pandemicflu.gov/plan/federal/operationalplans.html>. Accessed April 24, 2008.