Introduction

According to the World Health Organization, “an influenza pandemic occurs when a new influenza virus appears against which the human population has no immunity, resulting in several, simultaneous epidemics worldwide with enormous numbers of deaths and illness.”

Influenza is a highly contagious respiratory virus that is responsible for annual epidemics in the United States and other countries. Each year, approximately 200,000 people are hospitalized and 36,000 die in the U.S. from influenza infection or a secondary complication. During an influenza pandemic, the level of morbidity and mortality from influenza-related complications can increase dramatically worldwide.

During the last century, three influenza pandemics caused excess mortality, morbidity and societal burden throughout the world. The "Spanish" influenza pandemic of 1918 killed over 500,000 people in the United States and had a worldwide mortality of 20 to 40 million. The 1918 pandemic was notorious for its predilection for healthy young adults. After 1918, two global outbreaks of influenza A occurred. In 1957, Asian influenza caused approximately 68,000 deaths in the United States. During the Hong Kong pandemic in 1968-69, mortality in the United States was estimated at 34,000 deaths, with 51 million Americans affected by influenza and a total economic burden of $3.9 billion.

Influenza viruses cause annual epidemics as well as the rare pandemic because they have the ability to change genetically. Both influenza A and B viruses can undergo the minor genetic variations known as **antigenic drift**. Antigenic drift is a gradual change caused by minor point mutations in the viral genes, and results in small changes to the surface proteins of the influenza virus. Antigenic drift occurs continuously, and is the reason that the make-up of the influenza vaccine is changed almost every year.

Influenza A virus is unique in that it can infect a variety of animals; wild birds are the natural reservoir for influenza A. It is also unique in that it can undergo the major genetic reassortment known as **antigenic shift**. This sudden change happens infrequently and often occurs as a result of a recombination of human influenza A with an animal influenza A virus. This recombination results in a new subtype of influenza A to which the human population has little or no immunity. An antigenic shift is almost always followed by an influenza pandemic.

Based on observations from previous pandemics, the Centers for Disease Control and Prevention (CDC) has estimated that the economic losses in the United States associated with the next pandemic will range from approximately $71 billion to $166 billion. The level of economic loss will depend on the attack rate of the virus and the resulting morbidity and mortality.

The impact of an influenza pandemic on the healthcare system could be devastating. It has been estimated that in the United States, a moderate pandemic could result in 20 to 47 million people becoming ill; 18 to 42 million outpatient visits; 314,000 to 734,000 hospitalizations; and 89,000 to 207,000 deaths. This potential for high levels of morbidity and mortality, coupled with the significant disruption to society, make planning for the next influenza pandemic imperative.

The purpose of planning for pandemic influenza is to:

- reduce mortality
- reduce morbidity
- minimize social disruption

The threat of pandemic influenza is not as much a question of *if*, but rather a question of *when*.

Impact on North Carolina

The following table illustrates the impact of pandemic influenza on North Carolina. Given these projections, North Carolina's pandemic influenza plan is vitally important to protecting our citizen's health. This plan is designed so that members of the public health community, medical providers, and others can be ready to respond when an influenza pandemic strikes.

Characteristic	**Moderate (1957-like)**	**Severe (1918-like)**
Illness	2,989,442	2,989,442
Outpatient medical care	1,594,655	1,594,655
Hospitalization	35,252	289,762
Deaths	7,949	65,334

Calculated using NC total population of 8,541,263
Both scenarios are based on a clinical attack rate of 35%

These estimates were obtained using FluAid 2.0 software available online at the National Vaccine Program website:

http://www2.cdc.gov/od/fluaid/default.htm

The FluAid software has population data available for each state; however, it is based on 1999 US Bureau of the Census data when North Carolina's population was just below 7.5 million people. The estimates shown in the table below are based on a North Carolina population of just over 8.5 million people. The more recent North Carolina census data were entered into the FluAid 2.0 software to determine the number of deaths, hospitalizations, and outpatient visits.

The source for the updated NC population was the 2004 Census Data obtained from the NC State Demographics website:

http://demog.state.nc.us/frame_start.html