

Pandemic Influenza

This media kit explores the reasoning behind the belief that an influenza pandemic is imminent.

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What is the issue?

Among experts in the medical field, there is an accepted belief that an influenza pandemic is guaranteed in the near future due to its cyclical nature. Such a global outbreak would drastically affect millions of people worldwide, both physically and economically. In response to fears of pandemic influenza, many efforts have been pushed toward minimizing the damage. Vaccination campaigns, influenza surveillance, and pandemic preparedness programs have been developed by national and international governing bodies. This media kit explores the reasoning behind the belief that an influenza pandemic is imminent.

Unlike most other pathogens which remain relatively stable for years, the influenza virus changes substantially enough to allow for new circulating strains each year. Due to this ability, each season people are newly susceptible to the flu. Pandemic strains differ from seasonal strains due to drastic changes in the genetic makeup of the pandemic virus. The newly formed virus is so different that many people are incapable of mounting a substantial immune response to the virus.

The first well documented influenza pandemic occurred in 1580. In the last two centuries, there have been six major episodes, together causing millions of deaths worldwide prompting a conference on influenza preparedness in March 2004. At the conference, the World Health Organization (WHO) Director General Dr. Lee Jong-wook announced that another influenza pandemic was inevitable. The following year in the midst of the H5N1 Avian Flu scare, the Centers for Disease Control and Prevention (CDC) labeled avian influenza as the most important threat the nation was facing. In response to growing pandemic fears, the Bush Administration released the National Strategy for Pandemic Influenza Report which outlined the regional, state, and federal responsibilities for containment and treatment during a pandemic.

Predicting Pandemics

Based on the idea that influenza returns in cycles, several theories have been established in an attempt to predict when the next major pandemic will occur. One such theory was developed by J. Mulder, who argued that only a few potential serotypes exist that can cause pandemic influenza and reappear when the population's immunity to those strains has declined considerably after decades of initial exposure. This type of prediction relies on determining the antibody reaction of different populations to various strains of influenza. It is difficult to support because such techniques have only been used for a few decades, thus there is little data collected in the historical record to establish a substantial evidence for this theory.

Edwin Kilbourne, creator of the first genetically engineered influenza vaccines, proposed an Eleven Year Cycle Theory, which argued that pandemics occur every eleven years. This was widely accepted,

especially given his credibility in the field. More recently, Valcal Smil explored fatal discontinuities, key variables whose impact was likely to be powerful enough to change the course of human history in the next 50 years. In his study, he mentioned that the recurrence interval for pandemics is about 28 years, calculating the time span between 1996 and 2021 as probabilistically high risk zones for pandemic occurrence.

David Patterson, on the other hand, argues against the predictable nature of influenza. After conducting research on influenza pandemics between 1700 to 1900 he believes that there is no chronological pattern that would allow us to predict when a new outbreak is about to occur. Antigenic shifts in influenza A strains occur at irregular intervals which gives little credence of notions of periodic reemergence. He also concluded that many of the pandemics throughout the last three centuries were very similar, exhibiting high morbidity and low mortality with most deaths occurring among the elderly. The 1918 Influenza Pandemic, in comparison, was more of an anomaly in its high levels of mortality and the population which it effected most.

Although some attempts can be made to predict when a pandemic will occur, no existing data can predict other major factors contributing to the damaging effects of influenza, such as attack rates or its virulence. Attempts have been made to understand what types of molecular markers make certain strains deadlier than others. Studies in the reconstructed 1918 H1N1 strain have allowed scientists to discover that due to its ability to set off an overly sensitive immune response, it was ultimately more dangerous to individuals with strong immune systems, young to middle aged adults. Other studies in H5N1, the avian flu, have determined which mutations would be necessary to allow for the virus to be able to be transmitted between humans. Even with this wealth of knowledge, we are limited by the lack of understanding of the influenza virus and the diversity of variables that may affect viral recombination. Past pandemics can be utilized to create models to predict pandemic behavior in the future, but there is insufficient data to predict how soon it may occur.

Consequences of an Influenza Pandemic

Even with the lack of certainty for when an influenza pandemic may occur, the consequences of such a devastating event encourages a push for national measures and increased research in hopes to better prepare for the difficulties of managing the disease. In a report analyzing the economic impact of pandemic influenza in the U.S. published by the CDC in 1999, researchers Meltzer, Cox and Fukuda concluded that vaccination of 60% of the population would generate the highest economic returns, helping to mitigate the healthcare expenses associated with a possible influenza pandemic. Yet, in an event of an emergence of a new strain, current vaccine production methods required to produce effective vaccines would take too long to develop to be useful in response to a pandemic. Other ramifications include the possibility of unequal distribution of vaccines, preferentially providing vaccines to richer nations. These are just a few issues that must be resolved to better manage future outbreaks.