

# The role of vaccines in prevention of influenza pandemics essay sample

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## **The university name**

Influenza, also known as “ the flu” is the most common vaccine-preventable infectious disease in the United States, with 200, 000 hospitalizations each year as reviewed by (Tosh, Jacobson and Poland 2010). It is caused by A, B and C subtypes of single-stranded RNA virus of Orthomyxoviridae family. Influenza viruses infect a wide variety of mammals and birds including humans, pigs and chicken. Complications of influenza infection lead to morbidity and mortality in humans. A particularly known variant of the virus is the H1N1 - an A subtype that is endemic in pigs and humans and is commonly called the " swine flu". This subtype caused the 1918 " Spanish flu" (50-100 millions of fatalities) and the recent 2009 (~12, 220 fatalities) pandemics as summarized by Pada and Tambyah, 2011. To prevent such outbreaks, the World Health Organization coordinates the manufacturing of the influenza vaccine (Tosh et al., 2010).

## **How is the influenza vaccine produced, and why are new vaccines produced every year?**

Vaccination provides the immune system of the host the ability to efficiently recognize and neutralize the virus. Strikingly, however, rapid mutations constantly alter the structure of influenza surface proteins hemagglutinin (HA) and neuraminidase (NA), leading to elimination of previously acquired immunity (Barik, 2012). This necessitates annual production of a new vaccine. While the HA and NA proteins are used as the traditional vaccine targets, a recently developed approach suggests the M2 transmembrane protein as the target. The highly conserved structure of this protein suggests

it can be used for the creation of a “ universal” vaccine that would target distinct influenza strains. The vaccine consists of either whole attenuated virions or isolated components of 3-4 viral strains that are recommended by the WHO Global Influenza Surveillance Network. The CDC (Centers for Disease Control) transfers the virus seeds to vaccine manufacturers. The viruses are grown in fertilized chicken eggs or in cultured insect, animal or plant cells. Collected viruses are then processed to eliminate the possibility to contract the disease from the vaccine. The ready vaccine is delivered either as injections or nasal spray.

### **What role do you think vaccines play in preventing the spread of disease?**

According to the recent studies, influenza vaccines contribute to the prevention of epidemics by reducing the number of infected individuals that develop the illness and thus limiting the viral transmission. In addition, vaccination of pregnant women prevents passage of the infection to the fetuses and pregnancy complications. The WHO data suggests that vaccination done in timely manner can prevent 70-90% of influenza-specific illness in healthy adults.

### **What are the possible effects to individuals and the community of not vaccinating for influenza and other diseases?**

Individuals that fail to comply with vaccination perturb the communal resistance to infection by being more susceptible to infection and spreading the disease among the others. The children, the elderly and the health care

workers are the subpopulations that greatly impact the resistance to influenza infection. Succumbing to the disease, non-vaccinated children and the elderly cause their relatives to take “ sick leaves” and spread the infection. The health care workers interact constantly with infected individuals. In addition to missing work days, the non-vaccinated health care workers majorly contribute to the infection spread and emergence of the nosocomial infections (Music, 2011). The outlined principles are not an influenza-specific feature but rather applicable to other infectious diseases. In general, recent studies show that the influenza vaccination can greatly reduce the impact of annual epidemics on the population, with the special emphasis on the children, the elderly and the health care workers. Thus, it is very important to promote the health care initiatives that are aimed at the increase of vaccinated individuals.

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