

# Prospects for controlling seasonal and pandemic influenza

**Keywords:** seasonal influenza, pandemic influenza, ischemic heart disease, chronic obstructive pulmonary disease

## Editorial

Seasonal influenza, an underappreciated cause of morbidity and mortality worldwide, is estimated to annually result in more than 200,000 hospital admissions and 36,000 deaths in the United States. A previous study revealed that the most common discharge diagnoses after hospital admission for influenza were respiratory and vascular complications other than pneumonia, including the International Classification of Diseases codes corresponding to ischemic heart disease and chronic obstructive pulmonary disease. These discharge diagnoses were approximately 7 times more common than diagnoses of pneumonia and influenza. Seasonal influenza causes annual epidemics by accumulation of antigenic drift (changes), which contribute to evasion of herd immunity by influenza viruses.

Pandemic influenza can occur via a major antigenic shift (changes) of the influenza A virus. These antigenic changes can originate from birds and swine. Pandemic influenza can replace the previously circulating seasonal influenza virus. Since the late 19<sup>th</sup> century in 1918, a novel H1N1 influenza virus, called "Spanish flu" emerged and expelled the H3N8 virus that had been circulating among human beings. In 1957, a novel H2N2 virus, called "Asian flu" expelled the H1N1 virus. In 1968, a novel H3N2 virus, called "Hong Kong flu" expelled the H2N2 virus. Nevertheless, in 1977, the re-emerged H1N1 influenza virus, called "Russian flu", did not expel the H3N2 virus. Since 1977, both H1N1 and H3N2 viruses have been co-circulating. In 2009, the swine-origin H1N1 virus, which was closely related to the "Spanish flu" virus in 1918 emerged and contributed to a pandemic influenza. Some elderly had some immunity to this 2009 pandemic influenza virus. The H3N2 virus (progeny of Hong Kong flu) still appears, whereas the former H1N1 virus disappeared after the emergence of the influenza A (H1N1) pdm09 virus. Since then, both H1N1 and H3N2 viruses have continued to co-circulate in humans, thus, the next influenza pandemics is a prominent threat to human health. Avian influenza viruses, such as H5N1 and H7N9 viruses, continue to cause sporadic human infections. Once these viruses acquire the ability to efficiently transmit between humans, they have the potential to cause an influenza pandemic.

Severe diseases or complications from seasonal influenza, which happens annually, can occur in some people at high-risk, such as infants, elderly, extremely obese persons, pregnant women, and some peoples with certain chronic medical conditions. Healthy persons may be at high risk for serious complications from pandemic influenza. Protective vaccine is available for seasonal influenza, which is usually one dose is needed for most people, whereas may not be available for

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pandemic influenza in the early stages of a pandemic. The World Health Organization (WHO) reported an update on production capacity for seasonal and pandemic influenza between 2006 and 2016 (Third WHO Consultation on Global Action Plan for Influenza Vaccines (GAP III), 15-16 November 2016-Geneva, Switzerland) and concluded that since 2006, there had been an increase of seasonal vaccine capacity, but since 2013, there was a small reduction identified. There was consolidation of vaccine production in the European region. There were numerous new small manufacturers within South-East Asian region and Western-Pacific region. Two large-scale facilities became operational within the region of the Americas since 2013. Between 2013-2016, the African region and Eastern-Mediterranean region had not developed any functional production capacity. Finally, there was regional variations, such as, off-setting of increased production by a decreased production in some regions and plateauing of seasonal demand in others.

In conclusion, the three cornerstones of pandemic influenza management includes undergoing nonpharmaceutical interventions, antiviral treatment, and vaccination. Public health policy for both seasonal and pandemic influenza prevention and management is likely to evolve almost as rapidly as the influenza viruses.

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## Conflicts of interest

The authors declare no conflicts of interest.