

Pandemic influenza

What is influenza?

- Commonly called "the flu", it is an infection of the respiratory tract (nose, throat, airways, and lungs) caused by the influenza virusⁱ
- It is an infectious disease that can affect anybody in any age groupⁱⁱ
- The virus is spread through the air as water droplets formed during coughing or sneezingⁱⁱⁱ
- There are two main types of influenza virus that can cause infection: influenza A and influenza B^{iv}
 - Influenza A generally causes more severe illness than influenza B^v

Who is at risk?

- Everyone is at risk of developing influenza. Each year in Europe, Japan and the USA alone approximately 100 million people are affected by influenza. Up to one in 10 adults and one in three children can be affected by influenza annually.^{vi} Certain groups of patients are at particularly high risk of developing the virus and additional complications. These include:^{vii}
 - Infants or young children
 - Individuals over the age of 50
 - Individuals whose immune system is compromised e.g. by HIV treatment
 - Patients suffering from chronic illnesses e.g. chronic respiratory, cardiac or renal disease
 - Individuals who are residents of a nursing home or other long term care facility

What is the difference between seasonal and pandemic influenza?^{viii,ix}

- Seasonal influenza occurs regularly; every year during autumn and winter
 - People usually have some immunity
 - Healthy adults are not usually considered to be at risk of serious complications
 - Health systems can usually manage its impact
- Pandemic influenza occurs much less frequently (on average three times each century)
 - People have little or no immunity
 - Otherwise healthy people may be at risk of serious complications

- Public health systems may not be able to adequately control its effect

What is a Pandemic?

- According to the World Health Organisation (WHO), a pandemic occurs when a new strain of the virus (influenza A) appears against which the human population has no immunity, resulting in several, simultaneous epidemics worldwide with enormous numbers of deaths and illness.^x
- Some past pandemics have infected 20 to 40 percent of the worldwide population, causing over 20 million deaths.^{xi,iii}

Past Pandemics

- Three major influenza pandemics crippled the world in the twentieth century. By far the most destructive was the Spanish influenza pandemic (H1N1) in 1918, which claimed more than the 30 million lives - a greater loss of life than in the First World War.^{xii}
- The second pandemic strain (H2N2) appeared in Asia 40 years later, and although it was slightly less virulent than the Spanish Flu., it still killed more than one million people around the world.
- The most recent major pandemic was “swine flu” in 2009/2010 which was caused by an A/H1N1 strain of influenza. Starting in Mexico, the virus soon spread globally.^{xiii} The pandemic was declared by the WHO in June 2009 and later the status de-escalated in August 2010. During this time, at least 18,000 deaths were reported.^{xiv}

Effects of a Pandemic

- Influenza can place substantial demands on healthcare resources and escalate costs due to primary case consultations, referrals, hospitalisations, clinical complications, and drug treatment
- During a pandemic, the WHO predicts that the world could face up to 233 million outpatient visits, 5.2 million hospital admissions and 7.4 million deaths globally within a short period of a pandemic starting^x
- Influenza infections during a pandemic can be expected to generate widespread absenteeism amongst the workforce
 - Lack of manpower could have a significant impact on societal infrastructure,³ with breakdowns in essential community services, such as healthcare, public transport, and even policing.^v

The WHO identifies that in the event of a pandemic...

- The virus can spread rapidly, leaving little or no time to prepare
- Vaccines, antiviral treatments, and antibiotics could be in short supply and unevenly distributed

- several months may pass before a vaccine that matches the pandemic strain becomes available to protect the population
- Medical facilities can be overwhelmed
- Widespread illness may result in sudden personnel shortages to maintain essential community services
- Effects of pandemic outbreaks can last for a prolonged period of time

Pandemic Preparedness Planning

- Detailed planning is essential to ensure a coordinated response to a pandemic, internationally and within each country, to minimise serious illness, overall deaths and societal disruption.
- National governments are responsible for the pandemic planning and management in their country. In 1999, the WHO launched its Influenza Pandemic Plan, clarifying the specific roles and responsibilities of the WHO and those of national authorities in preparing for, managing a pandemic, and providing guidelines to assist governments in national and regional planning.^{xv}

This plan was updated in 2005 and then again in 2009 in light of pandemic (H1N1) 2009. Each update outlines the recommended actions for national authorities and the WHO to be taken at each phase of a pandemic.^{xvi, xvii} These phases are outlined below.

Inter-pandemic period

- Phase 1 - no new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals; the risk of human infection or disease is considered to be low.
- Phase 2 - no new influenza virus subtypes have been detected in humans. A circulating animal influenza virus subtype poses a substantial risk of human disease.

Pandemic alert period

- Phase 3 - Human infection(s) with a new subtype, but no human-to-human spread, or at most rare instances of spread to a close contact
- Phase 4 - Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans.
- Phase 5 - Larger cluster(s) but human-to-human spread is still localized, suggesting that the virus is becoming increasingly improving its adaptation to humans, but may not yet be fully transmissible (substantial pandemic risk).

Pandemic period

- Phase 6 - increased and sustained transmission in general population.

Preventing and Treating Pandemic Influenza

- A key element of preparing for a pandemic is the development and implementation of a prevention and treatment strategy
- The WHO estimates it may take at least five to six months to develop a new vaccine that is effective against the circulating strain.¹ During this time, millions could be infected with the virus worldwide. Until a vaccine is developed governments will need to rely on antivirals and non-medical interventions to help contain the spread of virus.
- One such antiviral is Tamiflu (oseltamivir), which is designed to be active against all clinically relevant influenza viruses⁹ and has been tested by the WHO against various strains of influenza and has been proven effective against the avian H7 and H9 strains of influenza.
 - Recent data has shown that the oral neuraminidase inhibitor (NAI), Tamiflu, is effective against the H5N1 avian influenza virus.^{xviii}
 - The advantage of antiviral therapies such as Tamiflu is that because they are effective against all strains of influenza, unlike vaccines, they can be stockpiled for use when a pandemic strikes.^{xix}

Pandemic Stockpiling

- Antiviral stockpiling by governments for pandemic preparedness is strongly recommended by the WHO.^{xvii}
- Roche provides Tamiflu to governments purchasing for pandemic stockpiling or pandemic use at substantially reduced prices. Further price reductions ('tiered' pricing) are available to developing economy countries according to pre-defined criteria.
- Roche has donated millions of treatment courses to the WHO to establish a rapid response stockpile for containment of a pandemic as well as regional stockpiles for use in pandemic situations.
- In total Roche has donated 10.9 million courses of treatment (equating to 109 million capsules) to the WHO
 - 2004: 250,000 packs
 - 2005: 3 million packs (held by Roche until WHO requested their distribution in May 2009)
 - 2006: 2 million packs (regional stockpiles provided to WHO)
 - 2009:
 - Additional 5 million packs to replace the 2005/2006 donations which were distributed early in the 2009 pandemic to countries in need

- An additional 650,000 courses of paediatric treatment (2009)

Roche and its network of manufacturing partners have dramatically scaled up Tamiflu product capacity to 400 million packs annually, enabling governments to stockpile for a potential pandemic

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