

Pandemics of Influenza

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Influenza is a common illness of the Respiratory tract, caused by the Influenza Virus. It has recently gained popularity because of the development of a Pandemic of Influenza A H1N1 infection from "Swine flu".

Influenza has been widespread and prevalent in all the countries and is a truly international disease. Annually, it affects millions of people throughout the world. There are three types of Influenza viruses (Type A, Type B & Type C). The behavior of the influenza viruses is unpredictable.

Influenza occurs in several forms: It may be in a subclinical form and recognized only by serological surveys. It may occur in Pandemics every 10-15 years. In between pandemics, epidemics tend to occur. Influenza A occurs every 2-3 years, Influenza B occurs every 4-7 years. This regularity is not maintained as in other illnesses as several strains are usually in circulation and epidemics with different strains can occur following one another leading to epidemics every year or every six months.

In the case of the usual common epidemics of influenza, once an epidemic starts, the picture is characteristic; following a few early cases there is a sudden outburst of respiratory tract infections initially among children and later among adults. Schools and work places report absence of students and workers, due to respiratory illnesses. This increase in numbers continues and a peak is reached in 3-4 weeks, and the epidemic subsides. The attack rates may be 10 – 50% of the population.

The unique features of influenza epidemics are:

- Suddenness with which they start
- short incubation period (18 – 72 hours)
- speed and ease with which it spreads
- large number of subclinical cases (with mild or no symptoms) who can transmit the disease

- short duration of immunity (8-12 months)
- absence of cross immunity to the different strains

The fate of the virus during the inter-epidemic period is not clear. It is possible that there may be extra human reservoirs such as pigs, horse & birds which sustain the infection.

Presently there are four major types of influenza viruses circulating in the world. They are:

1. Influenza virus A (H₁N₁) causing Swine flu (Figure 1)
2. Influenza virus A (H₃N₂)
3. Influenza virus A (H₅N₁) causing Bird flu
4. Influenza B viruses causing the usual epidemics of influenza

Agent factors

Influenza viruses are classified within the family Orthomyxoviridae. There are three viral subtypes namely Type A, Type B and Type C, which are antigenically distinct with no cross immunity.

Type A viruses are responsible for pandemics throughout the world. This type A viruses are unique among viruses as they are subject to frequent antigenic variations. The viruses can undergo shift or drift. Shift is where the antigenic change is sudden and complete whereas Drift is when the antigenic change is gradual. The type A viruses are of public Health importance, mutate rapidly, and have large number of subtypes maintained in

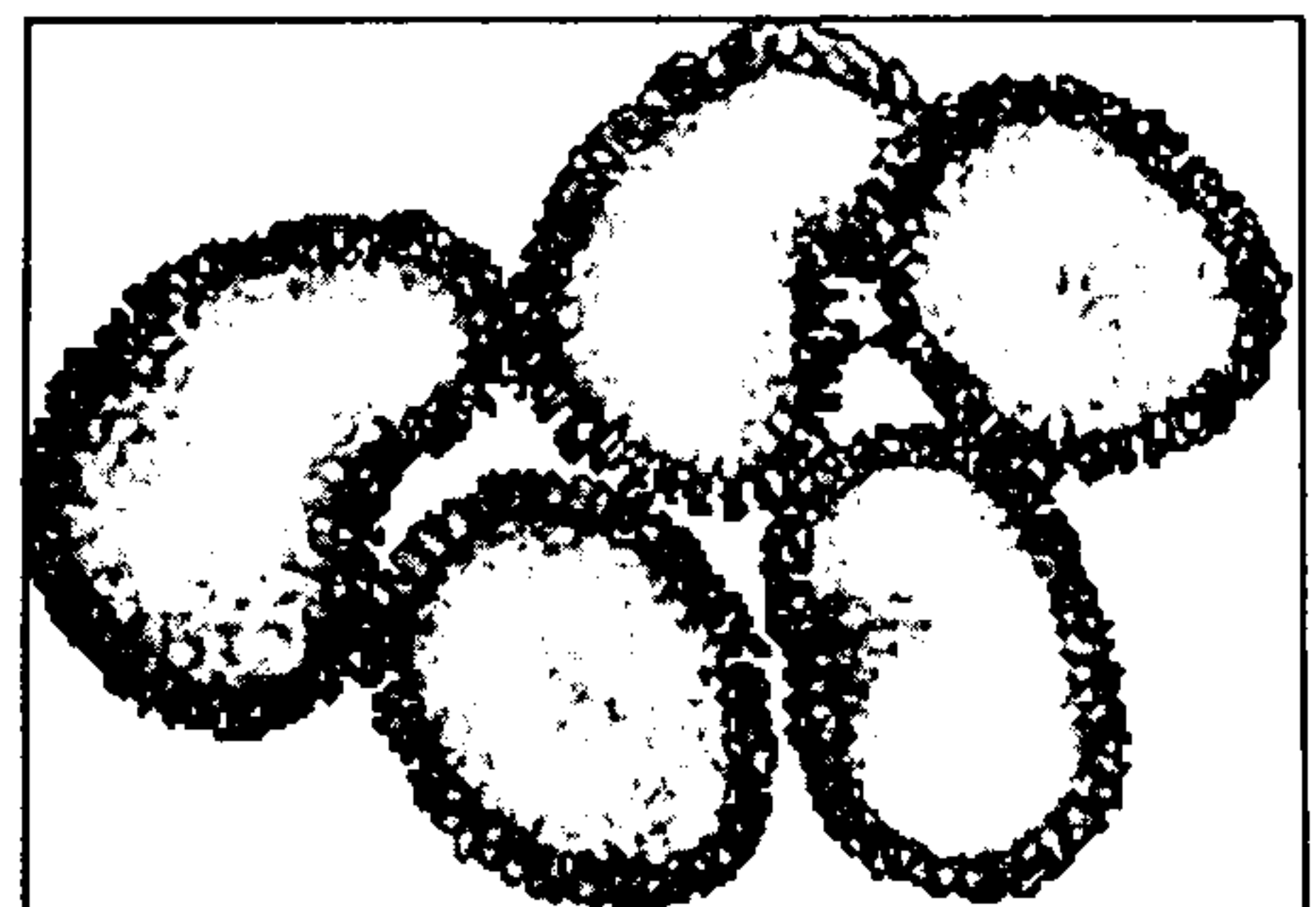


Figure 1: Influenza virus A (H₁N₁)

aquatic birds. They have a large pool of genetic diversity.

Type B viruses are also responsible for some epidemics and outbreaks of slightly severe respiratory disease. Type C is antigenically stable and causes very mild respiratory symptoms.

Reservoir of Infection

Influenza viruses have been identified in animals such as pigs, horses, dogs, cats, wild birds and domestic poultry. These animal reservoirs are suspected to provide the new strains of influenza virus by recombination between the influenza viruses of man, animals and birds.

Epidemiological features

Influenza is spread from person to person by droplet infection or droplet nuclei created by sneezing, coughing or talking. Therefore spread is rapid in overcrowded places like schools, institutions, offices etc. Epidemics occur during the winter in the Northern hemisphere and during winter or rainy season in the southern hemisphere.

Influenza affects all ages and both sexes. However, high mortality occurs among the elderly (over 65 years) and among children under 18 months. Mortality is also high among persons with diabetes, chronic heart, Kidney and respiratory diseases.

The virus enters the respiratory tract and causes inflammation and necrosis of the superficial epithelium of the tracheal and bronchial mucosa. This may be followed by secondary bacterial infection. The usual symptoms are:

- Fever, chills and body aches & pains
- Coughing
- Generalized weakness

The fever lasts 1-5 days (average 3 days). The dreaded complication is pneumonia, which has to be suspected if the fever lasts over 4 to 5 days.

Antibodies appear in the blood by 7 days following infection and reach a maximum level

by 2 weeks. It falls back to pre-infection levels by 8-12 months.

Pandemics of Influenza

Pandemic is a condition where epidemics occur in several countries at the same time. There have been several pandemics of Plague Cholera and influenza.

During the past century three major Pandemics of influenza have occurred in the world causing the death of several millions of people.

The first recorded influenza pandemic of the 20th century occurred in 1918/19. This was termed the "Spanish flu". It struck at the end of World War I and was estimated to have killed between 20 and 40 million people worldwide – more than the number who died in the World War I! This pandemic was caused by a strain of influenza known as H1N1, which had an attack rate of 25 per cent. While most of the time influenza is especially harmful to the elderly, this outbreak was characterized by a high death rate among younger people. In 1957/58 the "Asian flu" spread throughout the countries and took away the lives of 2 million people. In 1968/69 the "Hong Kong" engulfed the world. One million people died in this pandemic. Figure 2 shows these details graphically.

The new Influenza A H1N1 virus is also called "Novel Influenza Virus". WHO is coordinating the global response to human cases of influenza A (H1N1) and monitoring the corresponding threat of an influenza pandemic.

Based on assessment of all available information and following several expert consultations, the WHO has raised the current level of influenza pandemic alert from phase 4 to 5 (See Figure 3). The WHO stated that all countries should immediately activate their pandemic preparedness plans. At this stage, effective and essential measures include heightened surveillance, early detection and treatment of cases, and infection control in all health facilities.

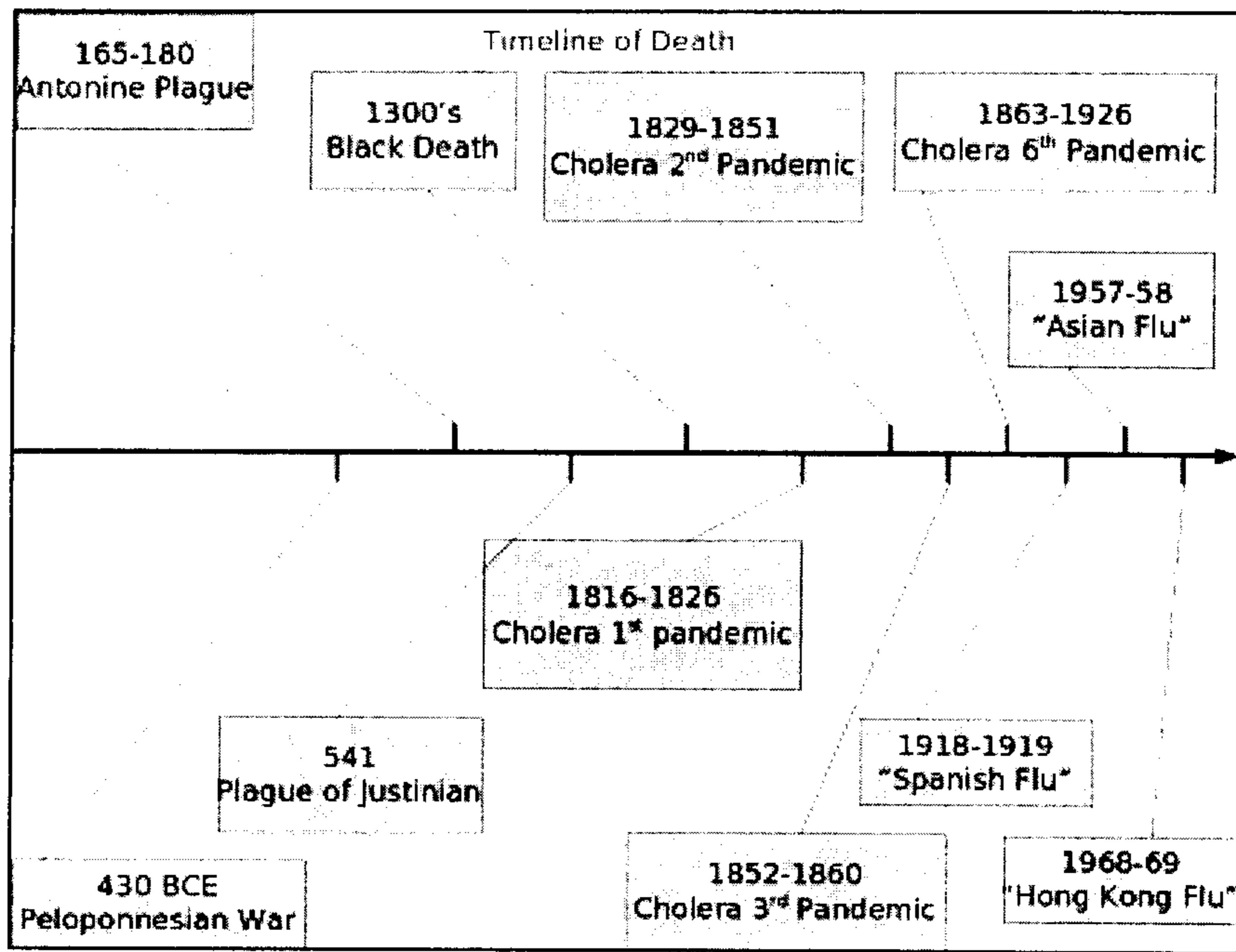


Figure 2: Time line of Influenza deaths

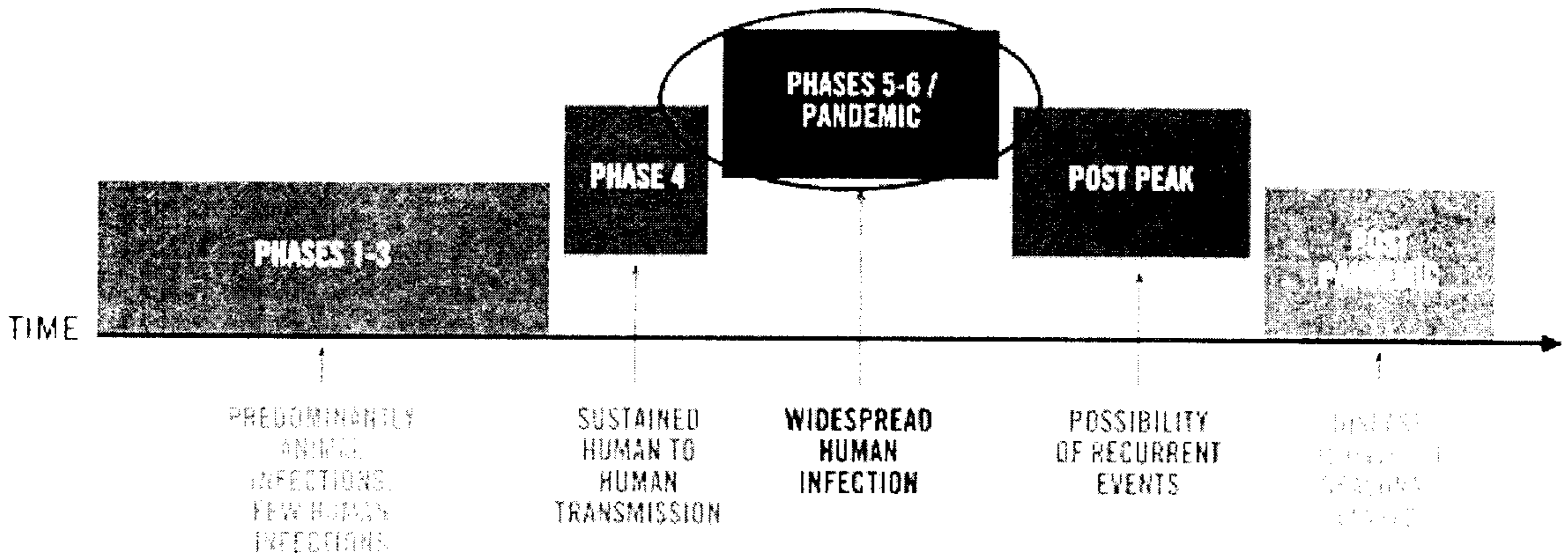


Figure 3: Pandemic Influenza Phases.

Current Epidemic of Influenza

The current epidemic of influenza is caused by a new influenza virus. This was originally referred to erroneously as "Swine flu". But it has been now shown that the present virus causing influenza pandemic is a new mutant with genes from flu virus that normally circulates in pigs in Europe and Asia together with avian & human genes. The current virus could spread from human to human.

Swine flu is a common respiratory disease of pigs caused by a type A influenza virus which spreads among pigs. Humans are rarely infected. Human to human spread is limited. The present epidemic has been caused by a mutant of this virus which has the capability for human to human spread.

New subtype of the "Swine influenza" virus was suspected to be circulating in USA & Mexico since March & April 2009. Between March 17 & April 25th, 2009 clusters of

outbreaks occurred. The outbreak was consistent with human to human spread. The new Influenza A (H1N1) Virus is killed by cooking at 70 degrees C. The Symptoms are like the usual Flu. In addition Diarrhea and vomiting has been reported

The current pandemic (by June 5, 2009) has spread to 69 countries, infected 21,940 persons. There were a total of 125 deaths. However the case Fatality Rate was only 0.56%. The most affected countries were USA (11,054 cases), Mexico (5,563 cases), Canada (1795 cases) and Australia (876 cases)

“Bird Flu”

This is caused by another influenza virus – the Virus H5N1. Presently the epidemic of Bird Flu is limited to domestic, wild and migratory birds. Countries like Indonesia, Cambodia, China, Thailand and India have had the disease spread among their poultry and a few humans have been affected. But the transmission from man to man is limited. The global cases of Avian Influenza is given in Table 1 and shown in Figure 4.

Infected birds shed a large amount of virus in their droppings, saliva, and nasal secretions. These contaminate the soil and water. They become airborne and spread to the others. The contaminated clothing, shoes, cages vehicles etc can carry the viruses from farm to farm and infect other birds. Rodents also can act as mechanical vectors and carry the virus from farm to farm.

Domestic birds could roam freely and contaminate water sources and soil with their droppings. Markets where poultry is sold could be contaminated.

At present there is no concrete evidence of human to human spread. All reported cases of Bird flu in humans have been linked to direct exposure to dead or infected birds or contaminated surfaces. Few exceptional cases have been related to food preparation. No cases have been reported following consumption of properly cooked eggs or meat. No cases have been reported among health workers who have had unprotected contact

with severely ill patients. However theoretically, transmission of Avian influenza could occur through either droplet spread or direct contact with infected material.

How do we prevent the spread of Influenza?

Although the risk level for infection of Avian Flu to spread in Sri Lanka is reported to be low, with cases in India it is possible that cases could be imported into Sri Lanka. Northern Sri Lanka could be an entry point. The large number of poultry breeders, presence of migratory birds & increased travel between Sri Lanka and countries with Avian Influenza adds up to the risk.

The Health Institutions identified as sentinel sites for influenza surveillance under Avian Influenza program will carry out routine influenza surveillance and education of staff.

The virus could survive for about 2 hours or longer on surfaces like cafeteria tables, doorknobs, and desks. Frequent hand washing will help reduce the chance of getting contamination from these surfaces.

Some simple personal preventive measures are:

1. Washing of hands frequently with soap and water. Hand washing is not merely “wetting your hand” but must be done for at least 15-20 seconds.
2. If someone has a running nose you should stay at least an “arms length” from him – “Social distancing”.
3. Avoid crowded places.

Year	Cases	Deaths	CFR
2003	4	4	100%
2004	46	32	69.50%
2005	98	43	43.90%
2006	115	79	68.60%
2007	88	59	67.00%
2008	44	33	75.00%
2009	38	12	31.50%
Total	433	262	60.50%

Table 1: Global Cases of Avian Influenza (as at June 2, 2009)

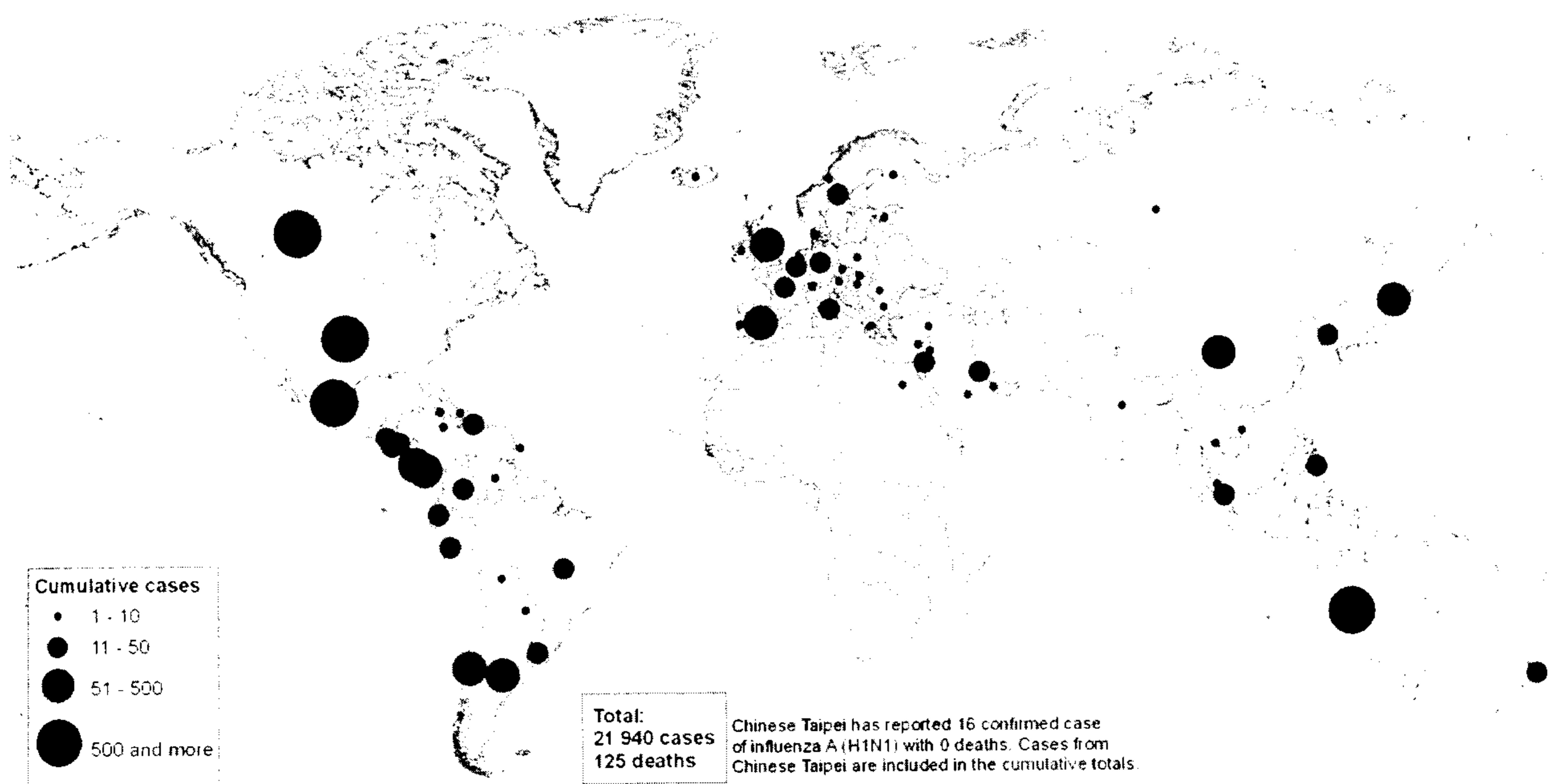


Figure 4: New Influenza A(H1N1), Number of laboratory confirmed cases as reported to WHO. (Status as of June 05, 2009, 6.00 GMT, Source: WHO)

4. Eat nutritious food and drink plenty of water.
5. Get plenty of sleep and rest.
6. Do not shake hands or hug.
7. Do not spit in public.
8. Do not take medicines without consulting a physician.
9. If you are sick cover your nose or cough, stay at home, rest and take plenty of fluids and see a doctor

Measures undertaken in the control of Avian influenza includes:

- Strict bio-security
- Depopulation & disposal of infected birds. The most important measure is culling of infected birds or exposed poultry and proper disposal of carcasses
- Control of avian traffic: within the country and between countries
- Surveillance and tracing
- Increasing of public awareness
- Avian restocking
- Stamping out
- Monitoring evaluation & reporting

What is the future?

The keystone of influenza prevention is immunization. We cannot count on prophylaxis with antiviral agents to protect a large, vulnerable population for more than a few days at a time, and that is not long enough. How long can we afford to give prophylaxis? To whom are we to give? What are the risks in mass administration? All of this is unknown. A vaccine has to be developed. But it will take time. Can we wait?

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