

EXPLAINING PANDEMIC FLU

A guide from the Chief Medical Officer

'Most experts believe that it is not a question of whether there will be another severe influenza pandemic but when.'

Getting ahead of the curve – a strategy for combating infectious diseases

A report by the Chief Medical Officer, Department of Health 2002





EXPLAINING
PANDEMIC
FLU

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Foreword from the Chief Medical Officer

The World Health Organization (WHO) and other international organisations have recently warned that an influenza (flu) pandemic is both 'inevitable' and 'imminent'. Such warnings have been fuelled largely by the persistence of a highly virulent strain of 'bird' (avian) flu in Asia that experts fear could trigger another influenza pandemic. While these warnings aim to ensure countries are prepared for such an event, they have also caused public concern over the nature of the threat and our ability to respond to it. The consequences of an influenza pandemic would be serious with the numbers of people falling ill and dying being far higher than with 'ordinary' winter flu outbreaks.

There is a great deal of effort under way, both globally and in this country, to anticipate and respond effectively to an influenza pandemic, should one occur. Protecting the public from infectious diseases, including pandemic influenza, is part of the ongoing work of the Department of Health and is an integral part of its mandate. This guide aims to provide a proper understanding of the nature of the threat, its likely impact on the United Kingdom and reassure people that our country is ready to respond.

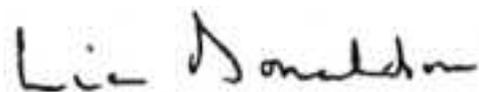
Influenza pandemics are not new. Three flu pandemics caused public health emergencies during the last century and experts are predicting that another is due. The current epidemic of highly pathogenic avian (bird) flu (A/H5N1), now widespread among poultry in Asia, is generally believed to have increased the likelihood of such an event occurring in the near future. The consequences of an influenza pandemic would be serious with the numbers of people falling ill and dying being far higher than with 'ordinary' winter flu outbreaks.

In my 2002 report, *Getting ahead of the curve – a strategy for combating infectious diseases*, I highlighted the importance of developing strong contingency plans to reduce the impact of a flu pandemic which, nevertheless, would be serious. Being prepared is not only prudent but necessary in today's globalised environment. The global expansion in tourism and the vast increase in air travel can accelerate the spread of infectious diseases, allowing little time to prepare. The rapid international spread of Severe Acute Respiratory Syndrome (SARS) in 2003, for example, provided some valuable lessons in emergency public health protection. This, together with an outbreak of avian flu (A/H5N1) in Hong Kong in 1997, highlighted the need for countries to develop or improve existing contingency plans.

Following on from the commitment to protecting the UK from infectious diseases, made in *Getting ahead of the curve*, and in response to revised recommendations made by the World Health Organization, the UK health departments have developed a new and flexible contingency plan for responding to an influenza pandemic. The UK health departments' *Influenza Pandemic Contingency Plan 2005* (thereafter referred to as the 'UK Plan') is an updated version of the *Multiphase Contingency Plan for Pandemic Influenza* published by the UK health departments in 1997. The UK plan, one of a number of national pandemic influenza contingency plans currently under preparation, has been developed in collaboration with the World Health Organization and incorporates international expertise and recommendations. Launched in March 2005 as a consultation document, the plan can be viewed in full at: www.dh.gov.uk/pandemicflu.

The UK plan is a technical document, aimed at planners in government departments, health service organisations and other agencies involved in responding to an influenza pandemic. While it has been shared with all health workers and NHS staff, so that they will know what to do if pandemic flu reaches the UK, it has not been distributed to the public at large. It is hoped that this explanatory guide will provide a useful reference document for members of the public and health professionals wishing to better understand the threat, its likely impact on the UK and their country's plans to respond.

A quick summary of the key facts relating to pandemic flu follows on page 7. A leaflet and a question and answer sheet are available separately.



Sir Liam Donaldson, Chief Medical Officer

Pandemic influenza (flu)

Key facts

(Figures in brackets refer to the paragraph in the main text describing that topic in more detail).

1. The disease

- Pandemic flu is a type of influenza that spreads rapidly to affect most countries and regions around the world (1.1).
- Unlike the 'ordinary' flu that occurs every winter in the UK, pandemic flu can occur at any time of year (1.3).
- Pandemics of influenza have occurred sporadically throughout history – three times in the last hundred years – resulting in many deaths (1.4).
- Experts predict another pandemic will occur but cannot say exactly when it will happen. When it does, it may come in two or more waves several months apart. Each wave may last two to three months (3.2).
- Pandemic flu is more serious than 'ordinary' flu. As much as a quarter of the population may be affected – maybe more (4.2.2).
- Pandemic flu is likely to cause the same symptoms as 'ordinary' flu. The symptoms may be more severe because nobody will have any immunity or protection against that particular virus (4.2.2).
- A serious pandemic is likely to cause many deaths, disrupt the daily life of many people and cause intense pressure on health and other services (4.3).
- Each pandemic is different, and until the virus starts circulating, it is impossible to predict its full effects (4.3).

2. What is it caused by?

- Pandemics of flu are due to the emergence of a new flu virus which is markedly different from recently circulating strains. Few – if any – people will have any immunity to this new virus. This allows it to spread widely, easily and to cause more serious illness (1.2).

3. Who's at risk?

- Once a pandemic of influenza starts, everybody will be at risk of catching it. Certain groups may be at greater risk than others: until the virus starts circulating we will not know for sure who the risk groups will be (Table 1.2).

4. Is there a vaccine to protect against pandemic flu?

- Medicines called antivirals can be used to **treat** influenza. They have been shown to be very helpful in the treatment of 'ordinary' flu, and it is likely that they will also be effective in the treatment of pandemic flu, but their effectiveness won't be known until the pandemic virus is circulating. Antivirals do not stop the flu from developing but they do subdue the symptoms and reduce the time people are sick (3.5).
- There is no vaccine ready to **protect** against pandemic flu. A vaccine to protect against pandemic flu cannot be made until the new virus has been identified. Before a pandemic starts it is difficult to predict what strain will cause it and even then, predictions may prove wrong. Also, the new virus may have changed enough for a pre-prepared vaccine to be ineffective.

'Ordinary' flu vaccines will not protect against pandemic flu. But 'ordinary' flu can be serious so it is very important that everyone who is due an 'ordinary' flu jab has one (3.4).

5. What is the government doing to prepare for a flu pandemic?

- The government has prepared a UK-wide Influenza Pandemic Contingency Plan which will be put into action in the event of a pandemic. The Plan includes initiatives to improve our preparedness now, before another pandemic occurs (5.3).
- NHS staff will be trained in how to manage services during a pandemic and cope with the demands that are likely to be placed on them (5.3.2).
- The government is building up its stocks of antiviral drugs. They will be used in the most effective way to treat those most at risk of serious illness based on how the disease develops (3.5).

- If pandemic flu reaches the UK, there will be announcements in the newspapers, and on radio and TV, and advice will be given on the best course of action to take. This will include simple hygiene measures and treatment advice (5.3.2).
- The government is taking steps to be in the best possible position for a vaccine to be manufactured as rapidly as possible when a pandemic virus is identified. Manufacture is still likely to take several months and vaccine will not be available at the start of a new pandemic (3.4.3).

6. What can I do?

- You can reduce, but not eliminate, the risk of catching or spreading influenza during a pandemic by:
 - covering your nose and mouth when coughing or sneezing, using a tissue when possible
 - disposing of dirty tissues promptly and carefully – bag and bin them
 - avoiding non-essential travel and large crowds whenever possible (3.6)
 - maintaining good basic hygiene, for example washing your hands frequently with soap and water to reduce the spread of the virus from your hands to your face, or to other people
 - cleaning hard surfaces (e.g. kitchen worktops, door handles) frequently using a normal cleaning product
 - making sure your children follow this advice.
- If you do catch flu:
 - stay at home and rest
 - take medicines such as aspirin, ibuprofen or paracetamol to relieve the symptoms (following the instructions with the medicines)
Children under 16 must not be given aspirin or ready made flu remedies containing aspirin
 - drink plenty of fluids.

These measures are for your own health and to avoid spreading the illness to others.

More information will be given at the time of a pandemic through leaflets, websites and the media. Such information will tell you how you can protect yourself and your family and what to do if you think you are infected. Some people will be recommended treatment – further information will be given at the time.

Key facts

For more information:

- visit www.nhsdirect.nhs.uk
- go to NHS Direct Interactive on digital satellite TV by pressing the interactive button on the remote control
- call NHS Direct on 0845 4647 (calls charged at local rates)
- visit www.dh.gov.uk/pandemicflu and www.immunisation.nhs.uk
- pick up the leaflet *Pandemic flu* from your doctor's surgery or clinic.

Introduction

Being prepared

**NEW STRAIN
OF FLU
COULD KILL
MILLIONS
AROUND
THE WORLD**

The Independent
28 August 2004

**FLU-VACCINE
SHORTAGE
SIGNALS US
VULNERABILITY
TO PANDEMIC**

The Wall Street
Journal
8 October 2004

**'WORLD IS
NOT READY'
FOR A FLU
PANDEMIC**

Financial Times
(FT.Com)
1 March 2005

**PANDEMIC
FIGHT FACES
LIMITATIONS OF
SCIENCE AND
MANUFACTURING**

Financial Times
23 August 2005

Headlines like these can be alarming. While they draw attention to a very real threat, they also leave many questions unanswered: What is pandemic flu? Why are we at risk now? What is the difference between pandemic flu and 'ordinary' flu? How can 'bird flu' lead to pandemic flu? How likely *is* a flu pandemic? What treatments are available? How would it affect the UK? How would it affect *me*? And, most importantly, how do we control it? Understanding the nature of pandemic flu is an important part of being prepared.

Flu pandemics are global epidemics of a newly emerged strain of flu to which most people have little or no immunity. Much of our understanding of pandemic flu comes from the experience of three major flu pandemics last century, the first and worst of which killed an estimated 20-40 million people worldwide – more lives lost than during the First World War. As history has shown, pandemic flu differs from 'ordinary' flu in important ways. For example, 'ordinary' flu occurs seasonally, allowing us time to identify the virus and administer a vaccine in advance, whereas pandemic flu can occur at any time allowing no time for a vaccine to be prepared because the virus is completely new. 'Ordinary' flu most seriously affects the elderly and vulnerable groups while pandemic flu can affect people of any age. These differences strongly influence the way in which we respond to pandemic flu.

Introduction Being prepared

Immunisation – having the flu ‘jab’ – is the principal countermeasure in protecting people from influenza. However, a vaccine for pandemic flu is unlikely to be available in the early stages of the pandemic since its development can only begin once the virus has been identified. Antiviral drugs, the second major tool in pandemic flu control, are likely to be effective in reducing the seriousness of the illness. However, it is impossible to measure their efficacy until the virus is circulating and there is some concern that the virus could develop resistance. Antivirals are also costly and have a limited shelf life of five years.

Why should we worry about avian (bird) flu? Evidence suggests that recent pandemic flu viruses originated in birds. During the last few years, the world has faced several threats with pandemic potential – principally from outbreaks of avian flu. Many experts believe that the outbreak of highly pathogenic avian flu (A/H5N1) in Hong Kong in 1997 in which 18 people were infected, six of whom died, could have led to a pandemic, if it wasn't for the prompt destruction of Hong Kong's entire poultry population – almost 1.5 million chickens. The current outbreak of highly pathogenic avian flu (A/H5N1) which has affected poultry in numerous countries in Asia, and has to date (August 2005) infected 112 people, of whom 57 have died, has brought the threat of pandemic flu close again.

While it is unlikely that a pandemic flu virus will originate in the UK, no country is exempt from risk. Once a pandemic virus emerges, we will probably not be able to prevent its global spread; but by being prepared we can significantly reduce its impact. How severe the next pandemic will be, who will be most at risk and how many people will be affected cannot be predicted with any certainty. The scale and severity of illness associated with previous pandemics have varied; we can assume, however, that they will be of greater magnitude than even the most severe epidemic of ‘ordinary’ flu. Experts predict anything between 2 million and 50 million deaths globally. From a variety of possible outcomes, the UK plan assumes that around a quarter of the population will be affected with over 50,000 deaths. The uncertainty over precisely how a flu pandemic will affect the UK, and indeed any other country, poses a significant challenge to our preparatory efforts. The UK plan is, therefore, a flexible document and will be continually updated as more information emerges.

What we do know is that pandemic viruses spread rapidly. During the pandemics of 1957 and 1968, the viruses took only three to four months to spread from south-east Asia – where they were first identified – to Europe and North America. The intercontinental spread of Severe Acute Respiratory Syndrome (SARS) in 2003 was even faster. Within four months of the global alert, more than 8000 people had been affected in 30 countries across six continents and 900 people had died. The expansion of international air travel is likely to make the spread of pandemic flu just as rapid. All these experiences indicate that once a pandemic flu strain has been identified as causing illness in one country, it will be too late to begin planning.

The old adage, 'forewarned is forearmed', has particular resonance as we face this potential risk to global public health. The timing and the precise impact of another flu pandemic may not be clear but by preparing for every eventuality now, before it occurs, we stand the best chance of reducing its impact. Even with good planning and preparation though, the consequences of pandemic flu would still be very serious.

1 Understanding influenza

1.1 What is influenza or flu?

Flu is an illness resulting from infection by an influenza virus. It is highly infectious and can spread easily from person to person. Because the flu virus constantly changes there are many different strains of flu. Some are more infectious and cause more severe illness than others.

1.1.1 Symptoms

People are affected by flu with varying degrees of severity ranging from minor symptoms through to pneumonia and death.

Symptoms are generally of sudden onset and include:

- fever
- cough
- headache
- severe weakness and fatigue
- aching muscles and joints
- sore throat
- runny nose.

The symptoms of pandemic flu are similar to 'ordinary', seasonal flu. However, in the case of pandemic flu, these symptoms are likely to be worse, resulting in more severe illness and possibly death.

1.1.2 How flu spreads

Influenza viruses are easily passed from person to person when an infected person talks, coughs or sneezes and expels the virus into the air. You can also catch it through touching an infected person or surface contaminated with the virus, and then touching your, or another person's, face.

Flu viruses have an incubation period – the time a person is infected with flu before showing symptoms – of one to three days.

Adults are likely to be infectious from just before symptoms develop until four to five days after the onset of symptoms. Children, however, tend to be infectious for longer (typically up to seven days).

1.1.3 Different types of flu virus

Flu viruses are divided into three main groups: **influenza A, B and C**. Type A viruses are the source of most 'ordinary' flu epidemics and have caused all previous pandemics. Whereas influenza B and C viruses infect humans only, influenza A viruses also infect birds and other animals such as pigs

Understanding influenza

and horses. This unique ability to jump the species barrier enables influenza A viruses to cause pandemics.

Table 1.1 Influenza virus types

Influenza types	Hosts
Type A	Humans, birds, pigs and horses
Type B	Humans only
Type C	Humans only

1.2 What causes pandemic flu?

1.2.1 How flu viruses change

'Some of the commonest infections have a particular ability to change, influenza viruses being the chameleons of the microbial world.'

Getting ahead of the curve – a strategy for combating infectious diseases
A report by the Chief Medical Officer, January 2002

Flu viruses have a particular characteristic that enables them to cause annual epidemics and even pandemics: change. Type A viruses undergo frequent changes in their surface antigens or proteins. These changes can be minor – known as antigenic drift – or major, known as antigenic shift.

Antigenic drift: 'ordinary' flu

Antigenic drift occurs constantly among influenza A viruses resulting in the emergence of new strains every year. These new strains cause the annual flu epidemics we experience each winter. Some annual flu epidemics are worse than others. This happens when the new strains are significantly different from previous strains. The more a strain differs from previous ones, the less immunity a population will have to it.

Antigenic shift: pandemic flu

Occasionally major changes occur in the surface antigens (proteins) of influenza A viruses. These changes are much more significant than those associated with antigenic drift. Such changes can lead to the emergence of a pandemic strain by creating a virus that is different from recently circulating strains. The population would have very little or no immunity to it – since they will not have been infected with it or vaccinated against it before. This lack of immunity allows the virus to spread more rapidly and more widely than an 'ordinary' flu virus.

How does antigenic shift occur?

Antigenic shift usually occurs in two ways: either as a sudden 'adaptive' change during replication of a normal virus, or from an exchange of genes between a human strain of an influenza A virus and an animal strain. This genetic exchange or 're-assortment' produces a new virus capable of causing a pandemic in humans. Genetic exchange occurs when an animal becomes infected with a human and an animal flu virus at the same time – so-called 'co-infection.' The animal in which this genetic exchange takes place is often described as a 'mixing vessel.' The domestic pig is a likely 'mixing vessel' because it is susceptible to both human and avian (bird) flu. However, more recently experts fear that people may also serve as 'mixing vessels' (see Fig 1.1).

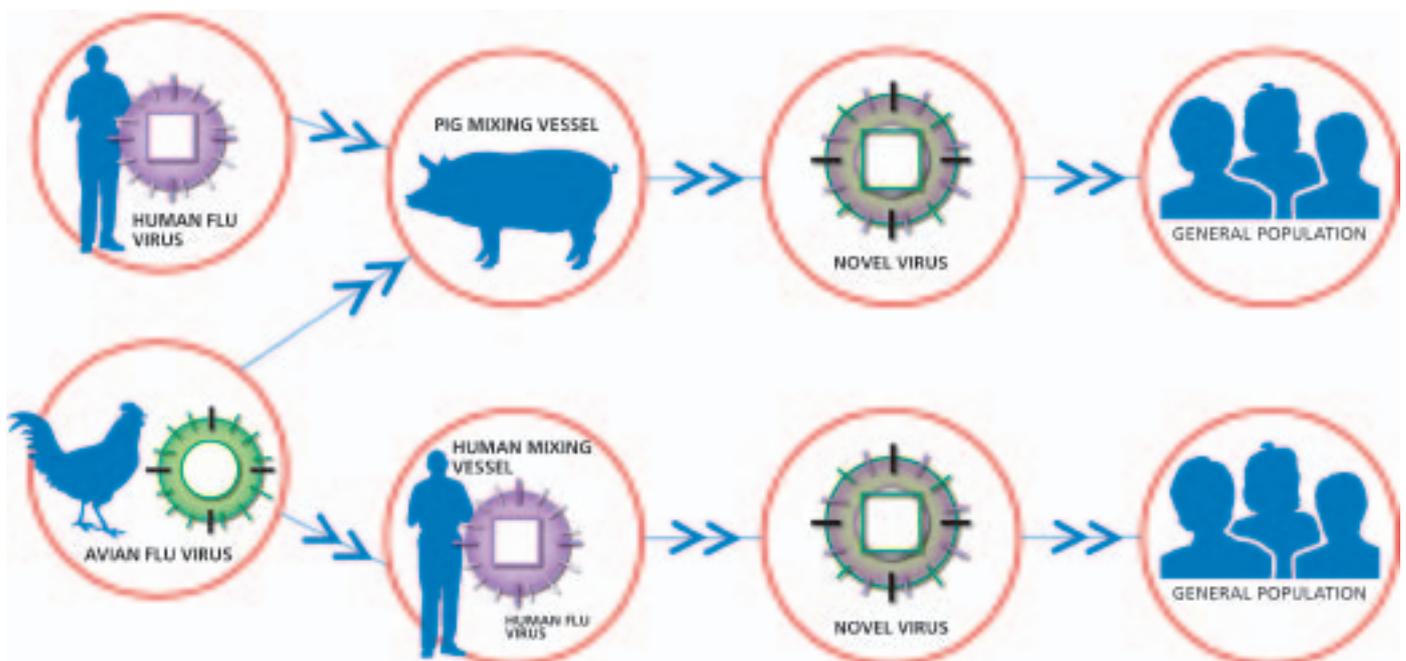


Figure 1.1 Co-infection with human virus and non-human virus and the birth of a pandemic strain

This possibility that people could act as 'mixing vessels' has caused particular concern in the context of the highly pathogenic avian flu (A/H5N1) currently circulating in Asia. This strain of avian flu has demonstrated the ability to infect people. Experts fear that people infected with avian flu could also become infected with a human flu strain at the same time, allowing the exchange of genes that could lead to the emergence of a pandemic strain. Alternatively, the avian flu strain could evolve into a pandemic strain simply by re-adapting to the human body, thereby acquiring the ability to pass easily from person to person. The role of avian flu in the emergence of pandemic flu is described in more detail in Chapter 2.

1.3 The differences between 'ordinary' flu and pandemic flu

There are important differences between 'ordinary' flu and pandemic flu (see p.16). These differences explain why we regard pandemic flu as such a serious threat. Epidemics of 'ordinary' flu occur every year around the world. An **epidemic** is a widespread outbreak of disease in a single community, population or region. A **pandemic**, on the other hand, spreads around the world affecting many hundreds of thousands of people across many countries. The word *pandemic* comes from the Greek words *pan*, meaning 'all,' and *demos*, meaning 'people.' Other diseases of pandemic proportions include HIV/AIDS and tuberculosis.

1.3.1 Key characteristics of pandemic flu

There are a number of key characteristics which experts look for when deciding whether or not a particular flu virus is a potentially pandemic strain.

For an influenza virus to be capable of causing a pandemic, it must be able to:

- infect people (not just other mammals and birds)
- cause illness in a high proportion of those infected
- spread easily from person to person
- spread widely because the virus is significantly different from previously circulating strains and most people will have little or no immunity to it.

All previous flu pandemics exhibited these characteristics.

Table 1.2 The differences between 'ordinary' and pandemic flu

'Ordinary' flu	Pandemic flu
<ul style="list-style-type: none"> • 'Ordinary' flu occurs every year during the winter months in the UK. • It affects 10-15% of the UK population, causing around 12,000 deaths every year. • Globally, epidemics of 'ordinary' flu are thought to kill between 500,000 to 1 million people every year. • Most people recover from 'ordinary' flu within one or two weeks without requiring medical treatment. • Deaths are generally confined to 'at risk' groups including: <ul style="list-style-type: none"> • elderly people over 65 years of age • people with existing medical conditions such as lung diseases, diabetes, cancer, kidney or heart problems • people whose immune systems are compromised due to HIV/AIDS or because they have a transplant, for example • the very young. • The vaccine against 'ordinary' flu is effective because the virus strain in circulation each winter can be fairly reliably predicted. • Annual vaccination, when the correct virus strain is fairly reliably predicted, and antiviral drugs are available for those at risk of becoming seriously ill. 	<ul style="list-style-type: none"> • Pandemics of have occurred sporadically throughout history and can take place in any season. • It affects many more people than 'ordinary' flu – a quarter or more of the population – and is associated with much higher rates of illness and death. For example, the worst flu pandemic last century – the 1918 'Spanish Flu', caused around 250,000 deaths in the UK alone and up to 40 million deaths worldwide. • Pandemic flu, usually associated with a higher severity of illness and consequently a higher risk of death, represents a much more serious infection than 'ordinary' flu. • People of all age groups may be at risk of infection with pandemic flu, not just 'at risk' groups. • A vaccine against pandemic flu will not be available at the start of a pandemic. This is because the virus strain will be completely new. It will be different from the viruses that circulated the previous winter, and not predictable in the same way. • Antiviral drugs may be in limited supply, their use depending on evidence of their efficacy which will only emerge once the pandemic is under way. (Treatment available for pandemic flu is described in more detail in Chapter 3).

1.4 Previous flu pandemics

Three times in the last century, influenza A viruses have undergone antigenic shift resulting in pandemics with large tolls in terms of both disease and deaths.

Table 1.3 Pandemics during the last century

Pandemic	'Spanish Flu'	'Asian Flu'	'Hong Kong Flu'
Strain	A(H1N1)	A(H2N2)	A(H3N2)
Year	1918-1919	1957-1958	1968-1969
Likely origin	Not known (first cases identified in Europe and USA)	China	China
Estimated deaths			
Global	20-40 million	1 million	1-4 million
UK	250,000	33,000	30,000 (England and Wales)

1.4.1 Using past pandemics to estimate the impact of future pandemics

Most estimates of the impact of a future pandemic are based on extrapolations from previous pandemics. However, it is important to remember that significant details of these events are still disputed, in particular the true number of deaths. Secondly, predictions based on previous pandemics need to take into account the fact that the modern world is very different from 1918, for example: since then there have been considerable improvements in nutrition, health care and opportunities for interventions. It is, therefore, important to understand that all impact predictions are estimates and that the actual impact of the next pandemic may turn out to be very different. The likely impact of the next flu pandemic is discussed in further detail in Chapter 4.

1.4.2 Where will the next flu pandemic originate?

While a new pandemic strain of the flu virus could first emerge anywhere, including the UK, it is most likely to emerge in China and the Far East, as most previous pandemics appear to have done. In this part of the world, dense human populations, domestic pigs and wild and domestic birds live in close proximity, facilitating the mingling of human and animal viruses through co-infecting and the consequent genetic exchange that could give rise to a pandemic strain.

Understanding influenza: Summary

- Influenza or 'flu' is a highly infectious viral illness, spreading easily from person to person either through the air or through hand/face contact.
- Annual outbreaks of 'ordinary' flu arise as a result of minor genetic changes in the flu viruses known as antigenic drift which produce different strains each year.
- The more a flu strain differs from previously circulating strains, the less immunity a population will have to it.
- 'Ordinary' flu epidemics kill between 500,000 and 1 million people worldwide every year; in the UK, they affect up to 10-15% of the population each year and cause around 12,000 deaths.
- A pandemic flu virus is a novel flu virus to which the population has very little or no immunity.
- Pandemic flu emerges as a result of major genetic changes in the flu virus known as antigenic shift and has occurred sporadically throughout history.
- Pandemic flu is generally associated with much higher rates of illness than 'ordinary' flu, affecting a quarter of the population or greater, and more deaths.
- The worst flu pandemic last century killed around 40 million people worldwide and around 250,000 people in the UK alone.
- For more information about flu and pandemic flu visit:
 - **Department of Health:** www.dh.gov.uk/pandemicflu
 - **UK Health Protection Agency:** www.hpa.org.uk
 - **World Health Organization:** www.who.int

2 The nature of avian flu

'WHO and influenza experts worldwide are concerned that the recent appearance and widespread distribution of an avian influenza virus, influenza A/H5N1, has the potential to ignite the next pandemic.'

World Health Organization, 8 December 2004

2.1 What is avian or 'bird' flu?

Avian influenza or 'bird' flu is a contagious disease of birds caused by influenza A viruses. All bird species are thought to be susceptible to infection but domestic poultry flocks are especially vulnerable. In the latter, these viruses can cause epidemics associated with severe illness and high death rates.

There are different types of avian flu some of which are more serious than others. The 'highly pathogenic' form is extremely contagious and rapidly fatal with a death rate approaching 100%. Birds may die on the same day that symptoms first appear.

2.1.1 Where does avian flu occur?

Avian flu occurs worldwide. The current outbreak of highly pathogenic avian flu (A/H5N1), which began in mid-December 2003 in Korea, has to date affected poultry in nine countries (including Hong Kong) all of which are in Asia. In four of these countries, this A/H5N1 strain has also infected people. By the middle of March 2004, the virus had resulted in the loss of more than 100 million poultry. An up-to-date list of countries with A/H5N1 infections in poultry can be found at the website of the World Organisation for Animal Health: www.oie.int. More information on avian flu can also be obtained from the Department of the Environment, Food and Rural Affairs at www.defra.gov.uk.

‘Never before have we seen so many countries so widely affected by this disease, and with such devastating economic consequences, for rural farms and households as well as for the poultry industry.’

Dr Anarfi Asamoah-Baah, Assistant Director-General,
Department of Communicable Diseases,
World Health Organization

2.1.2 Avian flu in people

Avian flu viruses do not normally infect species other than birds or pigs. Historically, human infections with avian influenza viruses have been rare and usually mild. However, when the first documented infection of people with an H5N1 avian flu virus occurred in Hong Kong in 1997, causing severe respiratory disease in 18 people, six of them died. Investigation into this outbreak showed that close contact with live infected poultry was the source of human infection. A/H5N1 emerged again in February 2003 in

Hong Kong infecting two people and killing one. The current outbreak of A/H5N1 began in mid-December 2003 and has so far (August 2005) infected 112 people, killing 57 of them (see Fig. 2.1).

Two other avian flu viruses have recently caused illness in people but not on the same scale as that caused by A/H5N1: A/H7N7 emerged in the Netherlands in February 2003 causing mild illness in 83 people, and one death. A/H9N2 also caused mild cases of flu in two children in Hong Kong in 1999 and one child in mid-December 2003.



■ Poultry and human ■ Poultry

Figure 2.1 Map showing countries affected by the current outbreak of A/H5N1

The nature of avian flu

Table 2.1: Reported cases of avian influenza in humans up to November 2005.

Year	Strain	Country	Number of confirmed human cases	Number of confirmed human deaths
1997	A/H5N1	Hong Kong	18	6
1999	A/H9N2	Hong Kong	2	0
2003	A/H5N1	Hong Kong	2	1
2003	A/H7N7	Netherlands	84	1
2003	A/H9N2	Hong Kong	1	0
2003 to date	A/H5N1	Viet Nam, Cambodia, Thailand and Indonesia	122	62

Have there been human cases of avian flu in the UK?

In England in 1996, a woman farmer acquired a typically avian flu virus (H7) and suffered conjunctivitis (eye infection) after cleaning out a poultry house.

There have been no human cases in this country associated with the current outbreak of A/H5N1. Controls are in place, but it remains a very remote possibility that A/H5N1 in its current form could be introduced to poultry or humans in the UK, either by the migration or illegal importation of wild birds carrying the virus or the importation of contaminated dead chickens for consumption. It is also possible the UK could import avian flu through someone entering the country having acquired the infection in an infected area.

2.1.3 How does avian flu spread?

Avian flu viruses spread through poultry flocks either via respiratory secretions or contact with contaminated faeces (droppings). A single gram of contaminated faeces can contain enough virus to infect one million birds. Droppings can also contaminate dust, soil, water, feed, equipment and clothing.

People are usually infected through close contact with infected birds or their faeces. Person-to-person spread, if it has occurred, has done so only with difficulty and has not so far resulted in onward transmission of the infection. However, following a meeting hosted by the WHO in

Manila in May 2005, experts have expressed concern that human H5N1 viruses are continuing to evolve in a manner consistent with the possible development of human-to-human transmission. At the time of writing, there remains no conclusive evidence that human-to-human transmission has occurred.

2.1.4 Symptoms

The symptoms of avian flu in people range from conjunctivitis to typical flu-like symptoms which can lead to pneumonia, acute respiratory distress, viral pneumonia, and other severe and life-threatening complications.

2.2 How avian flu could lead to a pandemic

'WHO believes the appearance of H5N1, which is now widely entrenched in Asia, signals that the world has moved closer to the next pandemic.'

[World Health Organization, 8 December 2004.](#)

2.2.1 A/H5N1: The current situation

The current outbreak of highly pathogenic avian flu in Asia known as A/H5N1 – unprecedented in its scale and rate of spread – is thought to have significantly heightened the risk of another flu pandemic. Since its emergence in poultry in Korea in mid-December 2003, this strain has infected poultry in nine countries in Asia (including Hong Kong) (see map on page 23). There have also been, to date (August 2005), 112 reported cases of human infection with the virus of which 57 have been fatal. Three countries have reported human cases of A/H5N1 infection: Cambodia, Thailand and Viet Nam – countries with widespread outbreaks in poultry.

Although A/H5N1 has appeared before, infecting 18 people and killing six of them in Hong Kong in 1997, the current epidemic of this strain represents a more serious threat to public health. This time it has caused outbreaks at the same time in several countries and is proving difficult to eliminate.

Transmission to people remains relatively rare and in most cases, investigation has identified contact with infected poultry as the principal cause of infection. Although human infections have been documented in only four countries, it seems likely that additional cases have occurred in

The nature of avian flu

other countries but have remained unrecognised because of a lack of clinical awareness or diagnostic facilities.

A chronology of the current outbreak of A/H5N1 from January 2004 is available on the World Health Organization website at: www.who.int/csr/disease/avian_influenza/chronology/en/

Table 2.2 Cumulative number of confirmed human cases of avian influenza H5N1 between 28 January 2004 and 10 February 2005.

Country	Total cases	Deaths
Cambodia	4	4
Thailand	17	12
Viet Nam	90	40
Indonesia	1	1
Total	112	57

To keep up to date with the number of human cases of A/H5N1, visit the website of the World Health Organization's Communicable Disease, Surveillance and Response unit at: www.who.int/csr/en

2.2.2 How could A/H5N1 cause a pandemic in people?

Experts fear that A/H5N1 could trigger the next pandemic for several reasons. Firstly, it has already demonstrated an ability to infect people and cause severe disease – one of the key characteristics of a pandemic strain. Secondly, this particular virus has a documented ability to mutate and to acquire genes from viruses infecting other species. Experts fear that the virus could, either adapt, giving it greater affinity for humans, or exchange genes with a human flu virus, thereby producing a completely novel virus capable of spreading easily between people, and causing a pandemic.

The continued spread of A/H5N1 in birds increases the opportunities for direct infection of people. If more people become infected over time, the likelihood also increases that, if they are concurrently infected with human and avian influenza strains, they could serve as the 'mixing vessel' for the emergence of a novel subtype virus with sufficient human genes to be easily transmitted from person to person. Such an event could mark the start of an influenza pandemic. However, the likelihood of this mutation occurring is not easy to predict.

Person-to-person transmission

Human infection with A/H5N1 has been rare up to now. The virus has not acquired the ability to pass easily from person to person. Should it acquire this characteristic, it would meet all the criteria of a pandemic flu strain.

While there have been instances of possible person-to-person transmission, so far these have been one-off, isolated occurrences. Person-to-person transmission must be efficient and sustainable if the virus is to become capable of causing a pandemic. In other words, there must be a sustained chain of transmission causing community-wide outbreaks.

To date (August 2005), investigators have not been able to prove the occurrence of person-to-person transmission. However, the pattern of disease appears to have changed in a way that makes the development of person-to-person transmission possible. At the WHO inter-country consultation in Manila in May 2005, experts concluded that the viruses are 'continuing to evolve and pose a continuing and potentially growing pandemic threat'.

Why is A/H5N1 difficult to eradicate in poultry?

The eradication of A/H5N1 in domestic birds is of major importance in pandemic influenza prevention. However, despite international efforts, A/H5N1 has so far escaped elimination. There are several reasons for this:

- **High proportion of poultry in backyard farms**

The internationally recommended measures for controlling infection in poultry (culling, quarantining and disinfection, for example) are difficult to apply to small rural and backyard farms. Yet in several of the countries experiencing outbreaks, 80% of poultry are contained in such situations. In China alone, 60% of its estimated 13.2 billion chickens are raised on small farms in close proximity to people and domestic animals, including pigs.

- **Economic significance of poultry production**

Because so many people in the region are so dependent on poultry, important measures such as culling are difficult to implement.

- **Lack of experience**

Since the disease is new to most countries in the region, very little experience exists at national and international levels to guide the best control measures at the country level.

- **Lack of resources**

Several countries with very widespread outbreaks lack adequate infrastructure and resources, including funds to compensate farmers in order to encourage compliance with government recommendations.

- **Scale of spread**

With so many adjacent countries affected, one country's gains in control may be compromised by inadequate control in another.

For these reasons, elimination of highly pathogenic avian flu in Asia is expected to take several years (and may not even be achievable), during which time the possibility that the virus could mutate into a pandemic strain remains.

2.3 Protecting people from A/H5N1

2.3.1 Is there a vaccine against avian flu?

There are several potential vaccines for protecting humans from infection with avian flu. They are currently at various stages of testing and production. Vaccine manufacturers and institutions working to develop and produce avian flu vaccines are using candidate virus strains made available by the WHO for the development of vaccine against A/H5N1. The UK's National Institute for Biological Standards and Control (NIBSC) is one of several organisations worldwide participating in the development of an H5N1 vaccine. Whether these will be suitable for use against a pandemic flu strain derived from A/H5N1 depends on how much the pandemic strain has 'drifted' from the A/H5N1 virus currently in circulation in poultry. Nonetheless, as a precautionary measure, the UK has ordered 2 million doses in anticipation that such vaccine would provide some cross protection against a 'drifted' H5N1 pandemic strain.

The use and availability of vaccines during a pandemic is described in more detail in Chapter 3.

2.3.2 What drugs are available against A/H5N1?

There is evidence that recent A/H5N1 viruses respond to an antiviral drug called oseltamivir ('Tamiflu'). This has led experts to conclude that it may also be effective against a pandemic flu strain. However, the efficacy of antiviral drugs in a pandemic situation cannot be known with any certainty until the pandemic is under way. The use and availability of antivirals during a pandemic is discussed in more detail in Chapter 3.

The nature of avian flu: Summary

- Avian influenza or 'bird flu' is a contagious disease of birds caused by influenza A viruses. Domestic poultry are particularly susceptible.
- Avian flu was believed to infect people only rarely, and then to cause only mild disease until 1997 when the highly pathogenic avian flu virus, A/H5N1, infected 18 people in Hong Kong, killing six of them.
- A/H5N1 re-appeared in Korea in mid-December 2003 and has since affected poultry flocks in nine countries in Asia. In four of these countries – Cambodia, Thailand, Viet Nam and Indonesia – it has infected 112 people, killing 57 of them (up to August 2005).
- Of the 15 different HA subtypes of influenza A, H5 is the most virulent and poses the greatest threat to human health.
- Experts fear that A/H5N1 could trigger the next flu pandemic by mutating to become capable of passing easily from person to person.
- Despite isolated reports of human-to-human spread, so far there is no strong evidence of sustained person-to-person transmission.
- Work is under way to produce a vaccine against A/H5N1. However, if the virus mutates significantly, the vaccine may not prove effective.
- There is evidence that one antiviral drug, oseltamivir is effective against A/H5N1, but until a pandemic flu virus derived from H5N1 emerges and spreads it is not possible to predict how effective it will be against it.
- So far, there have been no human cases associated with the current outbreak of A/H5N1 in the UK.
- For more information on avian flu, visit:
 - **Department of Health:** www.dh.gov.uk/pandemicflu
 - **UK Health Protection Agency:** www.hpa.org.uk
 - **World Health Organization's Department of Communicable Disease Surveillance and Response:** www.who.int/csr

3.1 What can we do to prevent or contain a flu pandemic?

It is unlikely that the global spread of a pandemic flu virus could be prevented once it emerges. The emphasis in pandemic flu control is, therefore, on reducing its impact. Several tools help achieve this aim:

- year-round global surveillance
- effective and accurate methods of diagnosis
- vaccines (once they become available)
- antiviral drugs
- social interventions.

3.2 Surveillance

Surveillance is a year-round global activity. Its objective is to monitor the evolution of flu viruses and associated illness to inform recommendations for the annual vaccine, but also in order to detect the emergence of 'unusual' viruses (that may have pandemic potential) as soon as they emerge. The sooner a potential pandemic virus is detected, the sooner control measures can be put in place and the sooner the development of a vaccine can begin. Effective surveillance is vital, not only in detecting the first virus, but also for example, in detecting the first signs of person-to-person transmission. The UK is an integral part of an international network of flu surveillance to which it contributes, and from which it receives, data.

3.2.1 The World Health Organization Global Influenza Surveillance Network

This is an international network of laboratories which provides a mechanism for monitoring flu viruses and detecting the emergence of new viruses with pandemic potential. The World Health Organization network consists of four WHO Collaborating Centres (in Australia, Japan, the USA and the UK), which perform genetic analyses of around 2000 flu viruses each year, and 112 contributing national influenza laboratories in 83 countries, including the UK, which collect more than 175,000 samples from patients with flu-like-illness.

3.2.2 The European Influenza Surveillance Scheme

This is a collaborative surveillance network within the European Network for the Epidemiological Surveillance and Control of Communicable Diseases and is funded by the European Union. It combines clinical surveillance and reference laboratory reports from 23 European countries, including the UK, allowing flu activity to be monitored across Europe.

3.2.3 UK Health Protection Agency

Flu surveillance across the UK is co-ordinated by the Health Protection Agency (an independent body funded by the Department of Health) throughout the year but with a particular focus over the winter months. The agency uses a range of information sources including data on new general practitioner consultations for flu-like illness, laboratory reports and data from the NHS telephone information service – NHS Direct, and their equivalents in the other UK countries, to monitor circulating flu virus strains and the illness they are causing. It aims to detect new subtypes of epidemic or pandemic potential.

3.3 Diagnosis

GPs usually diagnose flu from a person's symptoms without sending samples for laboratory tests. However, laboratory testing is vital for detecting the emergence of new flu strains, assessing their risk to public health and to monitoring and containing the spread of disease. It can be difficult to distinguish flu from illnesses caused by other respiratory viruses or even bacteria by symptoms alone. There are two methods for confirming the presence of flu infection:

- **Laboratory tests**, the most common method for diagnosing flu. Samples from swabs taken from the nose and throat are sent to a laboratory for analysis.
- **Rapid 'near patient' tests** which have recently become available and can detect the presence of flu within 30 minutes. However, they cannot provide the information required to determine which specific virus is causing the infection – for example, whether it is a novel virus or whether human cases are caused by the same virus, indicating possible person-to-person transmission.

3.4 Vaccines

Vaccination is the mainstay of seasonal influenza control. However, vaccines may not be available during the early stages of a pandemic (see below).

3.4.1 How do vaccines work?

Vaccines are biological agents that stimulate the body to produce antibodies or other immunity. These antibodies are designed to protect the body from the strains of the virus contained in the vaccine. On exposure to the flu virus, the antibodies help prevent infection or reduce the severity of illness.

Generally, vaccines reduce infection by around 70-80%, hospitalisations in high-risk individuals by around 60% and deaths by around 40%.

3.4.2 Vaccination against 'ordinary' flu

Every year, a new vaccine must be developed to protect against the three most prevalent influenza virus strains likely to be circulating that winter. In the UK, vaccination is recommended for those most at risk of serious illness from flu (see Chapter 1, for a list of 'at-risk' groups). Vaccination is also offered to health and social care workers involved in direct patient care. Around 12 million doses of flu vaccine are now administered each year in the UK, covering over 70% of people aged 65 years and over and a substantial proportion of other at-risk groups.

The effectiveness of the vaccine depends on how well the vaccine strains match the circulating strains. The World Health Organization Global Influenza Surveillance Network decides which virus strains are likely to be circulating during the forthcoming flu season and should be covered by the vaccine. The strains in the vaccine are chosen to match as closely as possible the most virulent strains in circulation.

3.4.3 Vaccination during a pandemic

Vaccines also offer the best line of defence in reducing illness and deaths during a flu pandemic. However, currently available flu vaccines are likely to provide little or no immunity in a pandemic situation (although people who are due to their 'ordinary' annual flu jab should still have one). A new vaccine must be developed to match the pandemic strain of virus. This work can only begin once that strain has been identified, although preparatory work can shorten the lead time in production.

This means that:

- once a pandemic virus had been identified, even with the preparatory work under way, it will probably take around four to six months to produce a vaccine, possibly longer
- vaccines are unlikely to be available during the early stages of a pandemic and even then will not offer 100% protection
- when a vaccine is available, the aim will be to immunise the whole population as quickly as possible as vaccine supplies increase
- manufacturers will not be able to produce enough vaccines to immunise everyone straight away. This means that vaccines will be given to some high-priority groups of people before others.

Current vaccine research

The UK, in collaboration with the World Health Organization, is one of the countries leading research aimed at the development of a vaccine against pandemic flu once the pandemic virus is known. This includes the improvement of routine flu vaccine strains and the development of prototype pandemic vaccine strains based on the forecasting of possible genetic changes relevant to a pandemic.

NIBSC in the UK has produced a suitable virus, using the avian flu virus A/H5N1, for the development of an H5N1 vaccine against pandemic flu. If a pandemic strain derived from this virus does not diverge significantly from A/H5N1, this vaccine may prove effective. If a future pandemic virus turns out to be significantly different from this A/H5N1 strain, the vaccine may not offer protection but could speed up the production of an effective pandemic vaccine. This is why the UK is purchasing a limited amount of H5N1 vaccine as part of its prudent contingency planning for a flu pandemic.

An 'experimental' pandemic vaccine may be available in limited supplies before a definitive licensed vaccine becomes available. This may be used for protection of people at highest risk of infection, for example, laboratory workers.

Why will there not be enough vaccines to go round immediately?

Another constraint to ensuring sufficient vaccine supply during a pandemic is the current manufacturing capacity which is based on the year-on-year use of influenza vaccines for 'targeted' population groups. A vaccine cannot be produced until the virus strain is known. It is likely to take four to six months before quantities of vaccine will become available and then over a period of time. Discussions continue at the international and national level on how to boost vaccine production in the event of a pandemic.

Secondly, it is likely that in a pandemic situation two doses of the vaccine will be required rather than one.

Who would be vaccinated first?

The Joint Committee on Vaccination and Immunisation (JCVI) – an independent advisory committee – has made provisional recommendations for prioritising groups for vaccination. These recommendations, used in the UK plan, are not final and will continue to be informed by advice from WHO and JCVI, based on the emerging epidemiology of the pandemic and other information.

Groups prioritised for vaccination:

- **health care workers most at risk:** health care workers are essential to the health service response and are likely to be at increased risk of infection through their contact with patients
- **essential services workers:** to prevent disruption to key services through absence due to illness
- **'at-risk groups':** to prevent serious illness, reduce hospitalisations and deaths
- **enclosed communities:** to reduce the spread of flu in communities where it might spread particularly rapidly such as residential care homes, schools and prisons
- **general population:** to prevent illness in the population as a whole.

Who will purchase the vaccine?

The Department of Health (England) is responsible for purchasing and supplying a pandemic vaccine on behalf of the whole UK. The Department will liaise with the health departments of Northern Ireland, Wales and Scotland for the supply of vaccines to the devolved administrations.

Who will carry out immunisation?

The precise vaccine formulation, dose and dose schedule will not be known until nearer the time so detailed arrangements for immunisation are not yet established. However, it is likely that people at risk of becoming infected with pandemic flu through their occupations will be immunised at work whilst general practitioners and nurses will play a major role.

Strategic health authorities are responsible for ensuring local pandemic flu contingency plans are in place including the rapid provision of vaccines, once supplies become available.

3.5 Antiviral drugs

Medicines known as antivirals active against flu are the only other major medical countermeasure available. They may be used in the absence of, or as an adjunct to, vaccination.

How do antiviral drugs work?

Antiviral drugs work by preventing the flu virus from reproducing. For treatment, they must be taken within 48 hours of the onset of symptoms in order to be effective. Treatment at this stage can shorten illness by around a day and reduce hospitalisations by an estimated 50%. They must then be taken either before, or within 48 hours of, exposure.

Antiviral drugs are normally recommended to treat people more at risk of serious illness but during a pandemic different criteria will almost certainly apply.

Antiviral drugs for pandemic flu

Antiviral drugs are likely to have an important role in the prevention and treatment of pandemic flu, especially when sufficient vaccine supplies are not available. However, it is important to note the following:

- the effectiveness of antiviral drugs in a pandemic, and in particular in reducing mortality in cases of severe disease is not known
- it is recommended that antiviral drugs should be given to treat those at risk of serious illness. However, until the pandemic is under way, we cannot say for certain who will benefit most
- the pandemic flu virus may develop resistance to antiviral drugs.

Are there enough antiviral drugs available for everyone during a pandemic?

Antiviral drugs are expensive, take time to manufacture, have a limited shelf life, and will be in high international demand at the time of a pandemic. The UK is building up a stockpile of antiviral drugs against the contingency of a flu pandemic. As with other medicines it will be necessary to use them in the most effective way.

Who will receive antiviral drugs?

The UK plan has identified strategies and prioritised groups for receipt of antiviral drugs. However, since it is impossible to identify with absolute certainty those who would benefit most from antiviral treatment, these recommendations are not final and will be reviewed according to advice from expert bodies on the emerging epidemiology of the pandemic and other information. The priority groups are likely to be:

- **health care workers:** if and when they develop fever or other flu symptoms. To minimise impact on the health service response.
- **un-immunised people in high-risk groups:** to ameliorate illness and reduce complications, hospital admissions and deaths.
- **other un-immunised groups**
- **immunised people:** if emerging information suggests the vaccine is not effective at reducing serious illness, complications or deaths.

Who will supply antiviral drugs?

Health service organisations are responsible for local plans to ensure those recommended antiviral treatment receive it within 48 hours of the onset of symptoms. Pharmacists are likely to have a role in the supply of antiviral drugs.

3.6 Social interventions

Non-medical, 'social' or 'social distancing' interventions may be important in delaying or slowing the spread of pandemic flu to allow time for a vaccine to be produced.

These interventions are still under consideration and may be amended pending guidance from the World Health Organization, national advisory bodies and evidence acquired during the pandemic.

Personal interventions

Some basic measures can be taken at the individual level to reduce the risk of infection:

- **respiratory hygiene:** covering the mouth and nose with a tissue when coughing or sneezing
- **disposing of dirty tissues** promptly and carefully – bagging and binning them
- **avoiding non-essential travel and large crowds**, where possible
- **handwashing frequently with soap and water:** reduces acquiring the virus from contact with infected surfaces and from passing it on
- **cleaning hard surfaces** (e.g. kitchen worktops, door handles) frequently, using a normal cleaning product
- making sure your children follow this advice.

Population-wide interventions

Other interventions at the national level may also be introduced at various stages during the pandemic:

- **restrictions of mass gatherings:** this will probably only be effective early on and could include the prohibition of large international gatherings such as pop concerts and sporting events. It may also include local gatherings.
- **travel restrictions:** travel to or from infected areas may be restricted. However, this measure cannot be enforced. Recommendations on restricting national travel may also apply.
- **school closure:** schools may be closed to prevent the spread of infection.
- **voluntary home isolation of cases**
- **voluntary quarantine of contacts of known cases.**

Screening of people entering UK ports

This is unlikely to be effective because of the highly infectious nature of the flu virus. Screening can only detect people who are showing symptoms. Pandemic flu victims may be infectious even before they exhibit symptoms yet would not be detected by port screening systems.

Wearing of masks

The widespread wearing of masks by the general public during a pandemic is unlikely to be effective in preventing people from becoming infected with the virus. However, they may have some limited use for those already infected with the virus in order to prevent them spreading it.

Controlling pandemic flu: Summary

- Surveillance, diagnosis, vaccination, antiviral drugs and 'social' interventions are the principal tools in controlling pandemic flu.
- A vaccine for use against pandemic flu can only be produced once the pandemic strain has been identified. This means that vaccines will not be available immediately.
- Antiviral drugs are the only other medical countermeasure available but there are important limitations to their use including uncertainty over their efficacy.
- The UK plan has identified strategies and has prioritised groups for receipt of both vaccines and antivirals according to their availability.
- Various 'social' interventions at both the personal and national level may be necessary. These include personal hygiene and possible restrictions on travel and mass gatherings.
- For more information on pandemic flu control, visit:
 - **Department of Health:** www.dh.gov.uk/pandemicflu
 - **World Health Organization:** www.who.int

4 How will pandemic flu affect the UK?

4.1 Predicting the impact

'Although the next influenza pandemic in the UK may cause considerable illness and death, great uncertainty is associated with any estimate of the pandemic's potential impact.'

UK Pandemic Influenza Contingency Plan 2005

If a pandemic flu strain is causing outbreaks overseas, it will almost certainly reach the UK. Once it reaches our shores, it is expected to spread throughout the country in a matter of weeks causing much more illness and higher death rates than those associated with 'ordinary' flu. This will result in intense pressure on health and other essential services and disruption to many aspects of daily life.

It is currently impossible to predict when the flu pandemic will begin. It is also difficult to predict its impact with any accuracy. A great deal of uncertainty is associated with estimating the scale of illness, death rates and the identification of those likely to be most affected.

4.2. Scale and severity of illness

4.2.1 Illness and deaths at the global level

Experts predict that the global death toll could range from anything between 2 million to over 50 million deaths worldwide. Studies by the US Centers for Disease Control and Prevention reduce that range to between 2 million to 7.4 million deaths worldwide. However, narrowing down the range cannot be done with any confidence until the pandemic is under way. The level of preparedness in each country will also influence the final death toll.

While the precise figures are not known, the burden on health systems is likely to be considerable. In high-income countries alone (including the UK), which represent 15% of the world's population, experts anticipate around 280,000-650,000 deaths, 134-233 million hospital visits and 1.5-5.2 million hospital admissions.

The impact is likely to be more severe in developing countries whose health systems are already overburdened.

How will pandemic flu affect the UK?

4.2.2 Illness and deaths in the UK

For planning purposes The World Health Organization advises that national plans are based on a cumulative clinical attack rate of 25%, compared to the attack rate of 5-10% associated with 'ordinary' flu. A clinical attack rate is the percentage of the total population who become infected and exhibit symptoms of the virus.

- Experts predict that the next pandemic is likely to affect around a quarter of the UK population with over 50,000 additional deaths occurring over one or more waves lasting around three months each.
- Of the total UK population (circa 59 million), an estimated 14.5 million people will become ill.
- This is expected to lead to an increase in general practitioners consultations from around one million during the 'ordinary' flu season to around 15 million during a pandemic.
- Hospital admissions for acute respiratory and related conditions are likely to increase by at least 50%, with at least 20,000 new patients a week requiring hospital admission at the peak.

Hospitalisations and deaths will be higher if the elderly are most affected and lower if adults aged 15-64 are affected.

Table 4.1 Estimated deaths and hospitalisations during an influenza pandemic

	Expected deaths	Expected hospitalisations
Global	2-50 million	6.4-28.1 million
High-income countries	280,000-650,000	1.5-5.2 million
UK	A minimum of 50,000	A minimum of 80,000
USA	89,000-207,000	314,000-734,000

4.3 Impact on health services

As the above figures indicate, a flu pandemic will place great pressure on health and social services due to the increased burden of patients with flu requiring treatment and the depletion of the workforce due to illness and other disruption. This could mean delays in dealing with other medical conditions, as sometimes occurs during a particularly bad epidemic of 'ordinary' flu. Non-urgent work will have to be prioritised during the peak weeks and some work cancelled because of pressure on beds, staff and resources.

NHS-specific contingency plans will include planning for large and sudden increases in the numbers of patients and the minimising of staff absenteeism due to illness. NHS staff are currently being trained in how to cope with an outbreak of pandemic flu and how to manage the increased demands that will be placed on them.

4.4 Impact on business

A flu pandemic is likely to affect all age groups, with more than 10% of the population likely to lose working days.

- The UK plan assumes that 25% of the UK workforce will take 5-8 working days off over a three-month period.
- During the peak of the pandemic, estimates suggest that absenteeism will double in the private sector and increase by two-thirds in the public sector.

This has important implications for business continuity. Advice for employers on how to maintain business continuity is available at www.ukresilience.info.

4.5. Impact on schools and services

4.5.1 Schools

Pandemic flu is likely to spread rapidly in schools and other closed communities leading to potential closures. Schools could also be affected by staff absenteeism and disruption to transport services.

How will pandemic flu affect the UK?

4.5.2 Services

Pandemic flu will impact all services including police, fire, the military, fuel supply, food production, distribution and transport, prisons, education and businesses. All are likely to be affected by staff sickness, travel restrictions and other potentially disruptive countermeasures.

The civil emergency response is covered by other contingency plans which will come into effect should they be required. These will ensure the maintenance of essential services, transport, food distribution, pharmaceutical supplies, utilities and communications, the maintenance of public order and the role of the police and armed services.

How will pandemic flu affect the UK?: Summary

- We do not know with any certainty who will be most affected, how many people will become ill or how many people will die.
- What we do know is that the next pandemic is likely to be associated with a much higher degree of illness and many more deaths than 'ordinary' flu and cause considerable social and economic disruption.
- Worldwide experts predict anything between 2 million and 50 million deaths.
- There may be in excess of 50,000 additional deaths in the UK.
- For more information on the impact of pandemic flu, visit:
 - **Department of Health:**
www.dh.gov.uk/pandemicflu
 - **World Health Organization:**
www.who.int

5 How will the UK respond to pandemic flu?

'Good planning is essential to establish contingency arrangements and improve our preparedness in order to be in the best possible position to cope with an emergency on such a scale and ameliorate its impact. Disruption is likely to be less if people know what to expect and what to do.'

UK Influenza Pandemic Contingency Plan 2005

5.1 The UK Pandemic Influenza Contingency Plan

The UK was one of the first European countries to have a pandemic flu contingency plan in place. It set out specific measures and actions required from health and other government departments and organisations at national and local levels to support an effective response to a flu pandemic.

The *UK Pandemic Influenza Contingency Plan* was published in March 2005. Replacing the *Multiphase Contingency Plan for Pandemic Influenza* published in 1997, the current plan has been updated to take account of new scientific developments, changes in the health service, lessons learned from the 1997 outbreak of avian flu in Hong Kong and from the 2003 SARS outbreak and experience in emergency planning since the events of 11 September 2001. It has subsequently been revised, taking into account comments received in response and further developments in planning. A summary of these comments is available at www.dh.gov.uk/PolicyandGuidance/EmergencyPlanning/PandemicFlu/fs/en

The UK plan has been developed in accordance with international recommendations issued by WHO and adapted to meet national needs. Its overall objective is to minimise the impact of a flu pandemic on the UK population. Key elements are:

- the organisational arrangements for an effective response
- identifying pandemic flu and monitoring its spread and impact, to inform actions
- containing the spread of infection to the extent that this is possible
- reducing illness and saving lives

How will UK respond to pandemic flu?

- ensuring the continuation of essential services, thereby minimising social and economic disruption
- ensuring that the public, health professionals and media have up-to-date, comprehensive information at all stages.

An integrated international, national and local response

The UK plan provides the overall framework for a UK-wide response and covers the national health response. Contingency plans also need to be developed at the local level. Primary care trusts and strategic health authorities, for example, (and their equivalents in Northern Ireland, Scotland and Wales) are responsible for developing their own contingency plans, ensuring local needs are met while remaining integrated in the national and international response.

A collaborative multi-agency response

Responding to a pandemic involves co-ordinating the contributions of many different organisations, not just those relating to health. All organisations involved in preparing for and responding to a flu pandemic in the UK are expected to produce their own specific contingency plans, using the UK plan as their key guidance tool. It is hoped that this will ensure a coherent national response across all sectors.

A flexible response

There is much uncertainty associated with the next pandemic: the scale and severity of illness, which groups will be worst affected and the efficacy and availability of antivirals and vaccines. The UK plan is therefore flexible, enabling us to adapt our response as this new information emerges.

5.2 How does the plan work?

5.2.1 A phased response

The World Health Organization has defined a series of phases in the progression of a flu pandemic which have been incorporated into the UK plan. The phases which describe the increasing public health risk associated with the emergence of a new influenza virus subtype that may pose a pandemic threat, have recently been redefined. The amended phases are included in the updated *WHO Global Influenza*

Preparedness Plan which also recommends actions for national authorities and outlines measures to be taken by WHO during each phase. The UK plan has been updated taking into account these recent amendments. Each phase will be announced by the World Health Organization and will dictate specific actions at the national level.

The phases are grouped into three periods:

- 1. Interpandemic period:** actions required before a pandemic is announced.
- 2. Pandemic alert period:** pandemic is announced and the UK plan is activated.
- 3. Pandemic period:** UK plan fully operational.

UK alert levels

The UK plan also incorporates a four-step UK alert mechanism which allows actions within the UK to be related to specific UK rather than international activity:

Alert level	
0	No cases anywhere in the world
1	Cases only outside the UK
2	New virus isolated in the UK
3	Outbreak(s) in the UK
4	Widespread activity across the UK

5.2.2 Signalling the start of a pandemic and the activation of contingency plans

The UK plan, along with other national contingency plans, will be activated in the later phases of the Pandemic alert period when the World Health Organization confirms evidence of sustained person-to-person transmission and the onset of the pandemic.

5.2.3 What happens next?

1. The **Department of Health for England**, which has overall responsibility for developing and maintaining the UK's contingency plans and for co-ordinating the health response across the UK, will inform the other UK health departments – in Northern Ireland, Scotland and Wales – and the **Civil Contingencies Secretariat**.
2. The **UK National Influenza Pandemic Committee** will be convened as the pandemic potential of a virus has been confirmed. This will advise all UK health departments on the health response in the UK.
3. The Civil Contingencies Secretariat will provide the focal point for UK wider strategy and co-ordinate the response across all government departments.
4. The **Chief Medical Officer** will rapidly alert the NHS via **strategic health authorities** and **Regional Directors of Public Health** who would implement the pandemic flu contingency plan and mobilise **primary care trusts** and **front-line NHS services**.

5.3 The public health response

The Department of Health for England leads on the development, purchase, supply and distribution of a vaccine for the UK in discussion with manufacturers and in liaison with the other UK departments of health.

The public health response will depend on whether:

- no vaccine is available
- vaccine is available but in limited supply
- vaccine is available widely.

5.3.1 The Health Protection Agency (HPA)

The HPA is the lead agency responsible for advising and supporting the UK national public health response to major infectious disease incidents and outbreaks. It will co-ordinate its activities with the equivalent agencies in Northern Ireland, Scotland and Wales. It will play a key role in national surveillance, providing reference laboratory support, developing expert advice and guidance, research and gathering international data which will inform decisions such as choice of vaccine or antiviral strategy across the UK, as well as through its local and regional services supporting local public health responses.

5.3.2 The National Health Service

In England, the National Health Service (strategic health authorities, NHS foundation trusts, NHS trusts, NHS Direct) will use its own co-ordinated contingency plans to provide public health arrangements and information at the local level:

- look after patients in the community
- provide specialist care for those who need it
- ensure the existence of appropriate infection control facilities
- make arrangements for mass vaccination
- arrange the distribution of antivirals
- minimise the disruption to other NHS work
- provide arrangements to ensure sufficient staff are available in the event of absenteeism due to illness.

5.4 Keeping the public informed during the pandemic

5.4.1 How will people know what to do in a pandemic?

Information and advice on how best to protect individual citizens and their families will be made widely available through information leaflets, websites and the media. Such advice will include when, where and how to seek medical assistance.

What do I do if I think I'm infected?

If you think that you or a member of your family might be infected:

1. Stay at home and rest
2. Take medicines such as aspirin, ibuprofen or paracetamol to relieve symptoms (following the instructions with the medicines)
Children under 16 must not be given aspirin or ready made flu remedies containing aspirin
3. Drink plenty of fluids
4. Contact your surgery for further advice
5. For advice and information visit www.nhsdirect.nhs.uk, go to NHS Direct Interactive on digital satellite TV by pressing the interactive button on the remote control, or telephone
NHS Direct on 0845 4647

How will the UK respond to a flu pandemic?: Summary

- The UK has a national pandemic influenza contingency plan outlining actions to be taken in the event of a pandemic.
- The plan provides guidance for the development of contingency plans for other departments, agencies and organisations involved in responding to a pandemic.
- The plan is based on phases, as recommended by The World Health Organization, describing the progression of a pandemic from the identification of a novel pandemic flu virus to its worldwide spread. These phases dictate specific actions at the national level.
- The public health response is based around the rapid production of a vaccine and the stockpiling of antiviral drugs.
- The public health response will be informed by advice from the Health Protection Agency and will be carried out by the National Health Service and associated organisations and its equivalent in Northern Ireland Scotland and Wales.
- Arrangements will differ at the local level in order to meet local needs.
- The public will be kept informed through information leaflets, websites and the media.
- Further information will be available:
 - at www.nhsdirect.nhs.uk
 - on NHS Direct Interactive digital satellite TV by pressing the interactive button on the remote control.
 - from **NHS Direct** on **0845 4647** (calls charged at local rates)
- For more information on pandemic flu preparedness, visit:
 - World Health Organization: www.who.int
 - Department of Health: www.dh.gov.uk/pandemicflu
 - Health Protection Agency: www.hpa.org.uk





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