



Influenza

The disease and vaccine

The disease

What is flu?

Influenza (flu) is a highly infectious disease caused by influenza viruses. There are three types of influenza virus: A, B and C. Influenza A and B viruses cause virtually all of the clinical illness. The symptoms of influenza C infection are usually mild. Flu occurs every year mainly during the winter months.

The influenza virus attacks the respiratory tract (the ear, nose and throat). The virus is mainly spread by respiratory droplets in the air produced by coughing or sneezing. It can also be spread by, for example, hand to eye contact after touching the respiratory droplets on another person or object. The incubation period before onset of symptoms is between one and three days.

Flu generally lasts up to a week, during which time a person usually feels sufficiently unwell to stay in bed. A cough and malaise may persist for several days up to a few weeks later.

Influenza infection is different from having a cold: the symptoms of flu come on suddenly and

include fever, headache, extreme tiredness and an aching body. A dry cough, sore throat and stuffy nose are other common symptoms of the infection.

Although most people recover from flu within a week, for some people the infection is more serious and leads to complications (see Table 1). These illnesses may require treatment in hospital and can be life-threatening especially in the elderly, people with heart or chest disease and those in poor health.

Who is most at risk from flu?

Anyone can get flu but it is more serious for people aged 65 years and over and people of any age with a chronic medical condition, particularly chronic respiratory and cardiac disease. Young children have a greater risk of being infected because they will not have had the opportunity to develop immunity to the virus.

When does the flu season start and end?

Flu occurs most often in the winter months and usually peaks between December and March, although it can start earlier.

Table 1. Serious complications of influenza infection

Complications	Symptoms
Viral pneumonia	Cough, breathing difficulties, chest pains, fever, headache, confusion.
Secondary bacterial infections such as <i>Haemophilus influenzae</i> or <i>Staphylococcus aureus</i>	
• Pneumonia	Cough, breathing difficulties, chest pains, fever, headache, confusion
• Bronchitis	Coughing, mucus secretion
• Otitis media	Fever, ear pain
• Sinusitis	Facial pain, post nasal drip
Worsening of chronic medical conditions, such as congestive heart failure, asthma, or diabetes.	

Why do the different types of flu change every year?

The structure of the influenza virus is unstable and new variations are constantly emerging. Typically each year one or two types of influenza A may be in circulation as well as an influenza B strain. Each year the composition of the flu vaccine is designed to protect against the influenza viruses that are most likely to be circulating in the coming winter (see Table 2).

Table 2. Influenza vaccine composition for 2004/05 season

<p>The strains of influenza virus recommended by WHO to be included in the components for the 2005/06 vaccine are:</p>
<ul style="list-style-type: none">• an A/New Caledonia/20/99(H1N1)-like virus• an A/California/7/2004 (H3N2)-like virus• an B/Shanghai/361/2002-like virus

How common is flu?

The number of people who get flu varies from year to year depending on the type and severity of the circulating flu strains, but some cases occur every winter. Flu can lead to large increases in the number of people who consult their general practitioner (GP). During an epidemic, GP consultation rates for influenza-like illness may reach 450 per 100,000 population or over a week. This rate means that over 225,000 people will consult their GP that week in England.¹

Hospital admissions for respiratory disorders increase during a period of flu activity. On average, in England, an additional 3000 people aged 65 to 74 years, and 6000 people aged 75 years and over are admitted to hospital each year during the flu season. It is estimated that, on average, an additional 12,500 people die each year during the flu season in England and Wales, depending on the amount and severity of circulating flu. The majority of the excess deaths and hospital admissions are in the elderly.*

Figure 1 shows the number of people per 100,000 population who consulted their GP and were diagnosed with influenza-like illness each week in the last five years. Figure 2 shows the number of deaths registered each week from respiratory disease (pneumonia, bronchitis and influenza) in the last two years and in 1999/2000, the last year when flu reached epidemic levels.

* It is difficult to establish how many people are seriously affected by flu each year as hospital admissions and deaths may be due to complications or the infection making other illnesses worse. The numbers can be estimated by comparing the number of people admitted to hospital and the number of deaths during a flu epidemic with the numbers that occur in the winter weeks when flu is not in circulation.

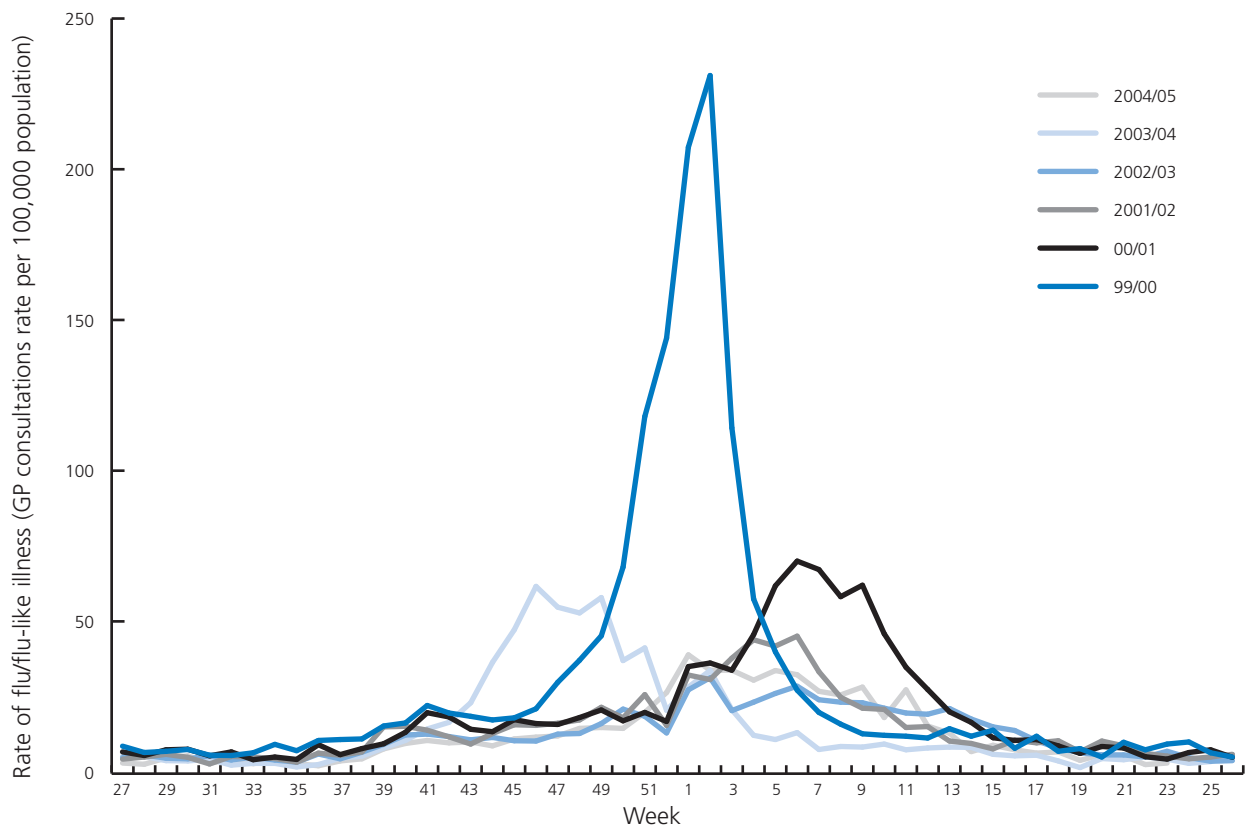


Figure 1. Weekly number of GP consultations per 100,000 population for influenza/flu-like illness.

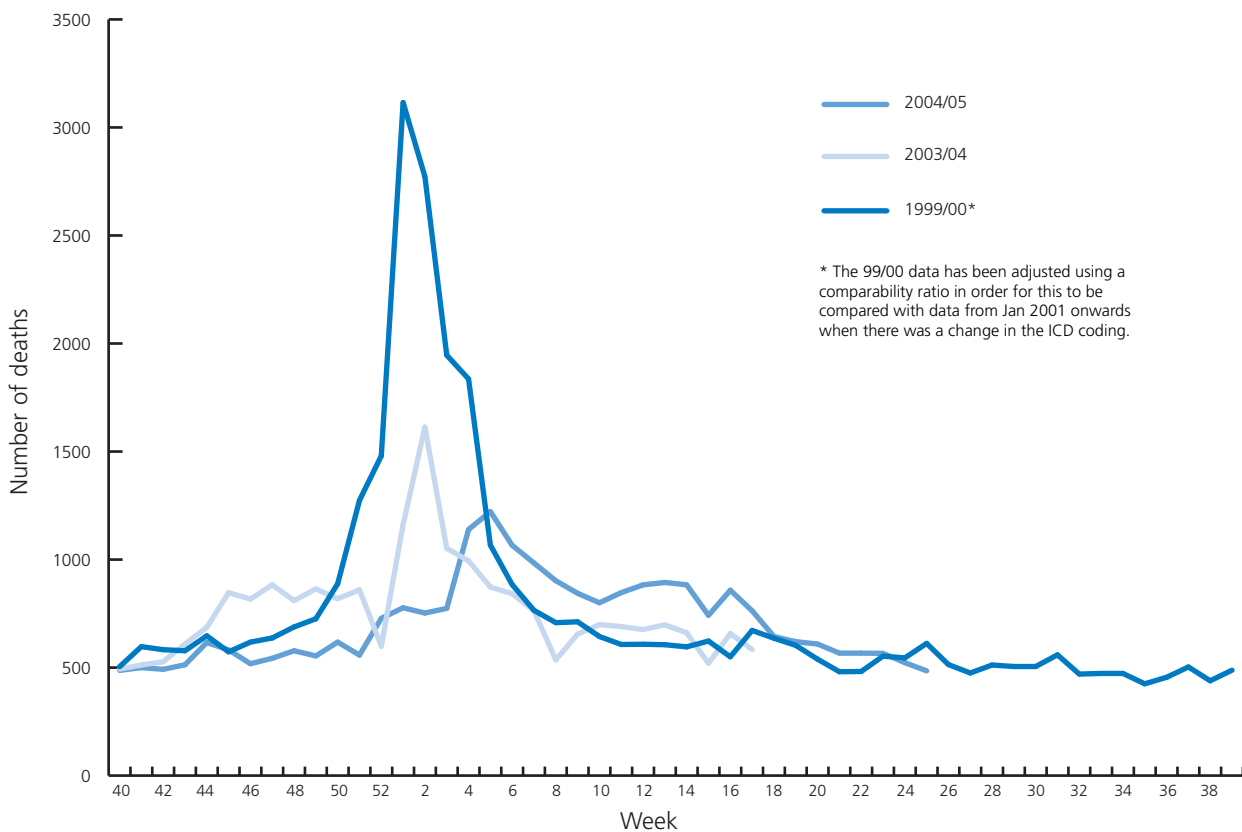


Figure 2. Estimated number of deaths registered each week from respiratory diseases (pneumonia, bronchitis and influenza).

Source: Health Protection Agency based on ONS figures.

The vaccine

What is flu vaccine?

Flu vaccine contains components of two types of influenza A and one type of influenza B viruses. Because the flu virus is continually changing, and different types circulate each winter, a new influenza vaccine has to be produced each year.

Can the flu vaccine cause flu?

As the viruses are inactivated and do not contain live viruses, they cannot cause flu. Some people may experience mild flu-like symptoms for up to 48 hours after immunisation as their immune system responds to the vaccine, but this is not flu.

How is the vaccine made?

The viruses for the vaccine are grown in hens' eggs, then inactivated (killed) and purified before being made into the vaccine. There are currently three types of flu vaccine that are as effective as each other but differ in the way the vaccines are made. The first type is prepared by treating whole viruses with organic solvents or detergents to inactivate them ('disrupted virus' vaccines). The second type is prepared by extracting and purifying components of the influenza viruses ('surface antigen' vaccines). The third type is prepared from disrupted virus particles reconstituted into virosomes.

Other flu vaccines are being developed such as an intranasal vaccine and an attenuated live flu vaccine but these are not currently available in the UK.

How is the vaccine composition decided each year?

The World Health Organization decides each February which three flu viruses are likely to be the greatest threat in the forthcoming winter season. The decision is made by analysing several thousand influenza viruses in the WHO influenza laboratories in London, Atlanta, Melbourne and Tokyo. These laboratories assess which strain has been dominant over the previous winter and look for evidence of new strains that have the potential to spread, and how well the current vaccines protect against them.

When is the vaccine made?

Production of the vaccine starts in March each year after the WHO announcement and continues throughout the spring and summer for the northern hemisphere. The flu vaccine is then available in the UK from September onwards.

How effective is the vaccine?

The currently available influenza vaccines give 70-80% protection against infection with influenza virus strains closely matching those in the vaccine.² In the elderly, protection against infection may be less, but immunisation has been shown to reduce the incidence of bronchopneumonia, hospital admissions and mortality.

Do people who have had flu vaccine or had flu before need to be immunised?

Yes. The viruses which cause flu change every year, which means the flu this winter will be different from last winter's, and the vaccine will be different as well.

How long does the protection from influenza vaccine last?

Protection lasts for about one year. To provide continuing protection, annual immunisation is necessary with vaccine containing the most recent strains.

When should flu vaccine be given?

The best time is between September and early November, before the main flu season.

How soon is it before the influenza vaccine starts to work?

After immunisation, antibody levels may take up to 10-14 days to reach protective levels.

Can it be given at the same time as other vaccines?

Yes. Flu vaccine can be given at the same time as other vaccines such as pneumococcal vaccine or the routine childhood vaccines. They should be given at a separate site, preferably in a different limb. If given in the same limb, they should be at least 2.5cm apart.³

Does flu vaccine contain mercury (thiomersal)?

Some flu vaccines contain thiomersal as a preservative.

Does it matter which flu vaccine is given?

The flu vaccines that are thiomersal-free are as effective as those containing thiomersal. If a thiomersal-free influenza vaccine is not available, then a thiomersal-containing vaccine should be given. The benefits of vaccination far outweigh the risks, if any, of exposure to thiomersal-containing vaccines.^{4*}

Who should have flu vaccine?

Flu vaccine is offered to the following groups of people who are most at risk from the serious complications of influenza infection:

Older people

All those 65 years and over.

People with serious medical conditions

All those aged six months or over who have the following medical conditions:

- **Chronic respiratory disease**

This includes diseases such as chronic bronchitis, emphysema and cystic fibrosis. It also includes severe asthma where the person requires continuous or repeated use of inhaled or systemic steroids or has been admitted to hospital because of their asthma. It is recommended that all children who have previously been admitted to hospital for lower respiratory tract disease should be immunised.

- **Chronic heart disease**

This includes diseases such as chronic ischaemic heart disease, congenital heart disease and hypertensive heart disease that require regular medication/and or follow-up and chronic heart failure.

- **Chronic renal disease**

This includes diseases such as nephrotic syndrome, chronic renal failure and renal transplantation.

- **Diabetes mellitus** requiring insulin or oral hypoglycaemic drugs.

- **Immunosuppression due to disease or treatment**

This includes people who have a damaged or no spleen and people who are on immunosuppressant treatment or high doses of systemic steroids.

GPs may also advise patients with chronic liver disease to have the flu vaccine

People living in residential care homes

Flu vaccine should be given to people living in long-stay residential care homes where flu is likely to spread very quickly and cause serious illness for many people living in the care home.

People who are the main carer for an elderly or disabled person

Flu vaccines may be given to people who are the main carer for an elderly or disabled person so that they can continue to look after that person. This should be given at the discretion of their GP.

Health and social care professionals

Health and social care staff directly involved in patient care should be immunised to reduce the spread of influenza to patients, including vulnerable patients who may not be able to respond well to their own immunisation, and also to other staff within health or social care premises.

Responsibility for occupational flu immunisation rests with the employer and should be provided through an occupational health service.

Why doesn't everyone have the flu vaccine?

For most people, influenza infection is unpleasant but not usually serious and they recover within a week or two. The vaccine is only offered to those at high risk from the serious complications of flu.

Is there anyone who shouldn't have the vaccine?

There are very few people who cannot receive influenza vaccine. The vaccines should not be given to those who have had a confirmed anaphylactic reaction to a previous dose of the vaccine or any component of the vaccine (including neomycin, kanamycin and gentamicin – antibiotics which may be present in tiny amounts).

The vaccines are prepared in hens' eggs and should not be given to individuals with known anaphylactic hypersensitivity to egg products.

If a person is ill with a fever, the immunisation should be delayed until they have recovered.

* For more information on thiomersal, see thiomersal factsheet at www.immunisation.nhs.uk

Can the influenza vaccine be given to women who are pregnant?

Yes. Pregnant women who have medical conditions that increase their risk of complications from influenza should be vaccinated before the influenza season, regardless of the stage of pregnancy.

There is no evidence of risk from vaccinating pregnant women or those who are breast-feeding with inactivated virus vaccines.⁵

Pregnant women should preferably receive a thiomersal-free influenza vaccine. If a thiomersal-free vaccine is not available then a thiomersal-containing vaccine should be given. The benefits of vaccination far outweigh the risks, if any, of exposure to thiomersal-containing vaccines.

What adverse reactions might be seen after influenza vaccine?

Some side effects should be expected. Some people get a slight temperature and aching muscles for a couple of days and their arm may feel a bit sore where they were injected. Any other reactions are very rare.

Guillain-Barré syndrome has been reported very rarely after immunisation with influenza vaccine (one case per million people vaccinated in one US study⁶), although a causal relationship has not been established.

What are the main reasons people give for not wanting a flu vaccine?

- Some people think that flu vaccine can actually give them flu. This is not true – the vaccine doesn't contain any live virus, so it can't cause flu.
- They think they don't need to get vaccinated again if they have had the vaccine or flu before. This is wrong. Flu viruses change every year so you need a new flu vaccine each year to protect against the viruses most likely to be circulating in the coming winter.
- They think the vaccines don't work. The currently available influenza vaccines give 70-80% protection against infection with influenza virus strains closely matching those in the vaccine. But they do not protect against other respiratory infections such as the common cold.
- They don't like needles. On the other hand most people don't like being laid low by flu.

Even so, last year, 71% of people aged 65 years and over had their flu vaccine (see Table 3).

Table 3. Vaccine uptake in England since the start of the flu immunisation programme for people 65 years and over

Year	Approx. number of people immunised	% vaccine uptake
2000/01	5.0 million	65.4
2001/02	5.1 million	67.5
2002/03	5.5 million	68.6
2003/04	5.8 million	71.0
2004/05	5.9 million	71.5

What should someone do if they catch flu?

The best way to treat flu is to stay at home and rest. It is important to drink plenty of liquids to replace the fluids lost by sweating and eat what you can. Painkillers such as paracetamol or aspirin can be taken to relieve headache and muscle pains and to reduce a fever.

Aspirin should not be given to children under 16 years old.

Influenza is a virus, so antibiotics won't work unless the flu has led to a bacterial illness that requires treatment.

Most people recover from flu in about a week although they may feel weak for several weeks afterwards. Medical advice should be sought if symptoms become severe or last more than about a week. Those with chronic or long-standing illness may need medical attention earlier.

Can antiviral drugs be used to prevent or treat flu?

The best way to prevent flu is by vaccination before the start of the flu season. For some people who are at risk from flu but are unable to have the vaccine or if they come into contact with flu before the vaccine has had a chance to work (within the 2 weeks following vaccination), antiviral drugs can be given to prevent flu infection for a short period of time.

Antiviral drugs can also be used to treat an 'at-risk' person who has flu.

Guidance on the use of antiviral drugs is given by the National Institute for Clinical Excellence (NICE) and can be found on their website <http://www.nice.org.uk>

The drugs are only given when flu is known to be circulating in the community and must be started within 48 hours of exposure or onset of symptoms.

NICE have stated that these drugs are not a substitute for influenza immunisation.

Glossary

anaphylaxis

a severe allergic reaction.

antibodies

proteins produced by the body to neutralise or destroy toxins and disease-carrying organisms.

antiviral drugs

drugs used to treat infections caused by viruses.

bronchitis

inflammation of the main tubes to the lungs.

bronchopneumonia

the most common form of pneumonia.

Inflammation of the lung caused by bacteria, e.g. *Haemophilus influenzae*.

cardiac disease

any disease of the cardiac system – the heart and its associated blood vessels.

chronic renal failure

long term failure of the kidneys.

congestive heart failure

a type of heart failure which results in accumulation of fluid in the liver and tissues.

cystic fibrosis

an inherited disease that results in the production of thick mucus causing lung infections and digestive problems.

diabetes

a condition caused by insufficient production of insulin by the pancreas leading to high levels of glucose in the body.

emphysema

a condition in which the air sacs in the lungs are damaged and enlarged.

epidemic

an outbreak of a disease that spreads within a population. A pandemic is a world-wide epidemic, usually affecting several countries.

Guillain-Barré Syndrome

a disease of the peripheral nerves (the nerves outside the brain and spinal cord) causing progressive numbness and weakness in the limbs and sometimes breathing difficulties.

***Haemophilus influenzae* type b**

the bacterium that causes Hib disease.

immunity

the ability to resist an infection, usually as a result of immunisation or previous exposure to the infection.

immune system

the body's system for fighting infectious disease.

immunisation

the priming of the body's immune system with a specially prepared medicine.

inactivated vaccine

a vaccine manufactured either from the killed germ, or from the toxin, or using parts of the germ either as component vaccines or as conjugate vaccines.

incubation period

the time between a germ infecting the body and it causing symptoms.

intranasal vaccine

a vaccine given through the nose.

live attenuated vaccine

a vaccine made from the live pathogen which has been altered to make it less harmful. The live vaccines in the childhood immunisation schedule are oral polio, MMR and BCG. Other live vaccines include yellow fever and one form of typhoid vaccine.

lower respiratory tract infections

infections of the lower parts of the lungs – the smaller bronchioles and air sacs.

nephrotic syndrome

a condition leading to the loss of large amounts of protein in the urine.

oral vaccine

a vaccine taken by mouth.

organic solvents

chemicals used to dilute or dissolve.

otitis media

inflammation of the middle ear, usually due to viral or bacterial infection.

pneumococcal vaccine

a vaccine that protects against pneumococcal disease – a range of infections such as pneumonia, septicaemia and meningitis caused by pneumococcal bacteria.

renal transplant

replacement of a kidney with a donor kidney.

respiratory disease

any condition of the respiratory system – the windpipe and lungs.

sinusitis

inflammation of the sinuses.

Staphylococcus aureus

A type of bacterium that can lead to a range of infections.

thiomersal

a mercury-based preservative used in some vaccines to prevent microbial contamination, or in the process of producing inactivated vaccines. The levels of mercury in vaccines in the UK are below the permitted levels.

vaccine

a medicine used to induce immunity to a particular infection. Vaccines are manufactured in different ways, usually using part of the germ or virus which causes the disease. They cannot cause the disease for which they give protection, except very rarely following oral polio vaccine.

viral pneumonia

pneumonia (lung inflammation) caused by a virus.

virosome

a type of vaccine delivery system. Parts of the flu virus are inserted into a special carrier making it easier for the immune system to recognise and respond to the virus proteins in the flu vaccine.

virus

an organism that needs to live inside a cell to grow and reproduce. Viruses cause many types of disease, including the common cold.

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