



Government
Office for
Science

Pandemic Flu (Swine Flu):

A glossary of terms for writers and editors.

GLOSSARY

Acquired Immunity

Immune defence that develops following exposure to a pathogen (e.g. bacterium or virus) or vaccine. It involves the production of specific defensive blood cells (lymphocytes) and proteins (antibodies), and provides lasting immunity based on the experience or 'memory' of previous exposure - contrast with 'innate immunity'.

Acute

Occurring over a short time frame (not to be confused with 'severe' or 'lethal') - contrast with 'chronic', which means being ill over a long period of time.

Adjuvant

Vaccine additive that boosts the body's immune response, leading to a stronger and longer lasting immune response for the same dose of vaccine. Examples include squalene (see below) and AS03.

Airborne transmission

Movement of viral particles through the air either attached to solid particles (such as dust) or suspension in droplets of liquid.

Alcohol hand gels

Gels that are effective against flu viruses, even though they are often labelled as 'antibacterial' with no reference to action against viruses. They should (but often don't) contain at least 62% ethanol. Also referred to as hand sanitisers or hand rubs.

Adamantane

A class of drugs that can inhibit some influenza infections (e.g. amantadine, sold as Symmetrel; or rimantadine, sold as Flumadine). Adamantanes work by inhibiting the M2 protein, and are ineffectual against H1N1 swine flu (see also 'M2 protein inhibitors').

Antibacterial

An agent that destroys bacteria or limits their growth or ability to reproduce. An antibacterial product will not necessarily be effective against viruses.

Antibiotic

A type of chemical that can prevent the growth of bacteria.

Antibody

Proteins made by a class of white blood cells (B lymphocytes) and which are a major component of the body's immune response.

Antigen

A molecule that stimulates an immune response. Sometimes used to describe a protein recognised by an immune response (e.g. antibody or T cell receptor), usually a component of an infectious agent (e.g. viral surface protein such as influenza haemagglutinin) that is recognised by the immune system.

Antigenic shift

A significant genetic change in a virus that causes it to produce a very different antigen, which may allow it to escape recognition by the host's immune system. This is often associated with the onset of a pandemic, since people in the general population do not have the necessary protective antibodies to the new type of viral antigen. Antigenic shift for influenza viruses occurred in 1918, 1957, 1968 and the new H1N1 represents a similar change.

Antiviral

Used to describe a chemical or drug that inhibits virus replication.

Antiviral resistance

The lack of responsiveness of a virus to an antiviral drug, caused by natural variation or as a result of adaptation by the virus.

ARI

Acute respiratory infection.

Asian Flu (H2N2)

The strain of flu that appeared in the pandemic of 1957-58, and remained in circulation until 1968.

Asymptomatic infection

An infection that does not generate observable symptoms, but which can produce full immunity.

'At risk' groups

Groups of people who, through their immune disposition or long-term illness (e.g. diabetes, chronic heart or respiratory disease) are deemed to be especially threatened by infection.

Attack rate

In epidemiology, a term referring to the proportion of a population affected by a disease over a defined length of time during an epidemic.

Attenuated vaccine

A vaccine consisting of a live, fully infectious (but weakened) virus that stimulates an immune response but does not cause disease or symptoms.

B cell

A type of white blood cell (lymphocyte) that produces defensive proteins (antibodies; also known as immunoglobulin) and signalling proteins (called cytokines) that alert other cells of the immune system.

Bacterium / Bacteria (pl.)

A life form that can, in many (but not all cases), grow unaided on simple carbon sources. Can be killed with antibiotics. Distinct from viruses which replicate within host cells and depend on the host cell for many aspects of its replication and production of progeny.

Baxter

One of two companies with Department of Health contracts to produce swine flu vaccine for the UK (see also GlaxoSmithKline).

Case fatality ratio (CFR)

The proportion of people who become ill (clinical cases) who end up dying during an outbreak.

CCS

Civil Contingencies Secretariat. Part of the Cabinet Office which provides the secretariat to the official and ministerial committees of COBR. (see COBR)

CD4

A protein on the surface of a type of immune cell (helper T lymphocyte) that helps the T cell receptor bind to specific proteins (class II MHC) on other cells that contain short fragments of foreign proteins that may indicate infection .

CD8

A protein on the surface of a type of immune cell (killer T lymphocyte) that helps the T cell receptor bind to specific proteins (class I MHC) on other cells that contain short fragments of foreign proteins that may indicate infection.

CDC

Centers for Disease Control and Prevention - A US government organisation based in Atlanta Georgia, that is responsible for, amongst other things, assisting state monitoring of disease outbreaks, implementing preventative measures and organising the response to disease outbreaks throughout the U.S.

Cell-based vaccine

Influenza vaccine grown in an approved and licensed tissue culture cell line, as opposed to vaccine produced in hen's eggs (contrast with 'egg -based vaccines').

Chemokine

A family of cytokines (see below).

CHM

See Commission on Human Medicines.

Chronic

Occurring over a long period of time; a persistent or recurring illness - contrast with 'acute'.

Chief Medical Officer (CMO)

The UK Government's principal medical adviser and the professional head of all medical staff in England (currently Professor Sir Liam Donaldson).

Chief Scientific Adviser to HM Government

The scientist responsible for advising the Prime Minister on scientific matters (currently Professor John Beddington). There are other scientific advisers for individual government departments.

Clinical trials

A test of a drug/medical treatment in humans. These are organised into three phases - the first tests for adverse effects (toxicity), the second for the optimal dose in different populations, and the third is to show that the benefits outweigh the risks in a larger population of patients.

COBR

A committee that meets in the Cabinet Office Briefing Rooms (A), and acts as a coordination facility of the UK government activated in cases of national or regional emergency or crisis, or during events abroad with major implications for the UK.

Commission on Human Medicines (CHM)

A statutory independent scientific body under the Medicines Act that advises Ministers and the MHRA on the quality, safety and efficacy of all medicines used in the UK, based on an evaluation of the benefits and risks. The CHM also informs the UK position within Europe, advises on prescribing, and with the MHRA, oversees the Yellow Card Scheme for the reporting of suspected adverse reactions to medicines. Currently chaired by Professor Sir Gordon Duff.

Community

The general population, outside of a hospital or clinical environment.

Confirmed cases

Cases of illness that have been confirmed by laboratory analysis.

Contact transmission

Infection that requires proximity to or physical contact with an infected person or animal.

Contagious

Used to describe an illness that can be passed to another person or animal by contact.

Critical Care

Care of a patient in a life-threatening situation of an illness by staff specially trained in recognising and responding to emergencies. In the NHS, there is a spectrum of critical care services covering three levels:

- Level 1: acute ward care, with additional advice and support from the critical care team e.g. patients who are at risk of deterioration, or who are recovering after requiring higher levels of care.
- Level 2: more detailed observation or intervention e.g. patients with a single failing organ system, or patients stepping down from higher levels of care.
- Level 3: advanced respiratory support alone (ventilator), or basic respiratory support together with support of at least two organ systems.

Cytokines

Small proteins (mainly produced by defensive blood cells called macrophages and lymphocytes) that act as signals to other cells of the immune system.

Cytokine storm

A condition in which an infected person (or animal) becomes overwhelmed by their own aggressive immune response with high levels of cytokines (signalling proteins) being found in the blood, lung and other body fluids. This may produce a state of clinical shock, with high fever, drop in blood pressure and organ failure, as occurred in the six people in the Northwick Park drug trial. During the 1914-18 pandemic, following infection, many younger people died quickly from a cytokine storm.

Delaying strategy

Strategies which aim to slow the development of a pandemic (e.g. through quarantining infected individuals).

Dendritic cells

Cells that are part of the immune system and which capture, process and present antigens to lymphocytes. They are known as antigen presenting cells (APCs).

Diagnosis

Specific identification of the illness that is causing a disease or set of symptoms.

Disinfectant

An agent applied to surfaces or objects that kills microorganisms or prevents their growth/ability to reproduce. They may have a narrow or broad range.

Droplet transmission

See airborne transmission.

ECDC

The European Centre for Disease Prevention and Control (based in Stockholm, Sweden). An organisation that collects and collates data on infection from member states of the European Union, to inform the EU on the prevalence of various infections throughout the region.

Egg-based vaccines

Vaccines grown in hens' eggs. Generally, one egg is required for each dose of vaccine.

EMA

The European Medicines Agency. A decentralised body of the European Union responsible for the scientific evaluation of applications for marketing authorisation of medicinal products within the European Union.

Emergence

An observed increase in disease that was previously rare or unknown.

Epidemic

A rapid and extensive spread of an infection that affects many individuals in a single or restricted area or population at the same time (see also pandemic).

Epidemiology

The study of the incidence and prevalence of disease in large populations (epidemics).

Fever

A rise in body temperature, usually in response to infection. A sign of influenza.

'Flu

Abbreviation for influenza. May refer to the virus or the disease.

Flu-CIN

Department of Health funded Flu Clinical Information Network.

GlaxoSmithKline (GSK)

One of two companies with Department of Health contracts to produce swine flu vaccine for the UK (see also Baxter).

Glycoproteins

Proteins which have sugars attached to them. For example, the surface proteins of influenza virus particles which facilitate attachment to cells, and which are the principal components of some influenza vaccines.

H1N1

See Influenza A.

HPA

The Health Protection Agency, which in the UK covers many functions including those of the CDC in the USA (see CDC). Also houses the UK's National Influenza Centre, part of the Global Influenza Surveillance Network.

Haemagglutinin

A glycoprotein capable of binding to red blood cells. In the case of influenza, haemagglutinin occurs on the surface of the influenza virus particle and is responsible for binding the virus to the cell that is being infected. It is a key component of the influenza vaccine. The 'H' in a flu variant's name refers to haemagglutinin (e.g. H1N1).

Herd immunity

If enough members of a population are immune to infection a virus cannot find enough susceptible or previously unexposed individuals to sustain a spread through the population.

Hong Kong Flu (H3N2)

The strain of flu that appeared in the pandemic of 1968 and has remained in circulation since then.

Human leukocyte antigen (HLA)

The name of the major histocompatibility complex (MHC) in humans.

ILI

Influenza Like Illness.

Immune system

The system of specialised cells and tissues that provide defence against infection.

Immunity

Resistance to infection.

Immunology

The scientific study of the immune system.

Incubation period

The time from the point at which infection occurs until the appearance of signs or symptoms of disease.

Infection

The acquisition and active growth of a foreign microbial agent in a host, such as a human or animal, usually with a detrimental outcome.

Infectious

A disease caused by a microorganism that can be transmitted from one person to another (see also contagious).

Influenza A

Influenza type A viruses are divided into subtypes based on two proteins on the surface of the virus, called haemagglutinin (HA) and neuraminidase (NA). There are 16 different HA subtypes and 9 different NA subtypes. Many different combinations of HA and NA proteins are possible. Only two influenza A subtypes (H1N1 and H3N2) are currently in general circulation among humans. Influenza type A viruses circulate in birds, pigs, and horses, in addition to humans and seals; whales, cats and dogs are occasionally infected. Wild birds show the widest range of subtypes and are considered the natural evolutionary hosts for these viruses. All 16 HA subtypes and all 9 NA subtypes can be found in avian species (see also haemagglutinin, neuraminidase, H1N1, H3N2).

Influenza A(H1N1)

Any influenza virus bearing a H1 type haemagglutinin and an N1 type neuraminidase. H1N1 viruses were responsible for the 1918 pandemic of influenza and remained in the human population until 1957 when the Asian Influenza pandemic emerged. H1N1 viruses reappeared in 1977 as Russian flu and have circulated in the human population with H3N2 viruses since then.

Influenza B

A distinct form of influenza that is restricted to humans and seals, and generally causing mild seasonal disease and not associated with pandemics. Influenza B antigens are included as part of the seasonal influenza vaccines.

Influenza C

A distinct form of influenza restricted to man and pigs and generally causing only mild disease. There is no influenza C component of the seasonal influenza vaccine.

Influenza virus

The common name of a virus of the family Orthomyxoviridae (the influenza viruses) which cause influenza.

Innate immunity

Protection against infection that is present from birth, and does not depend on memory or experience of previous exposure (also known as 'natural immunity'). Does not confer permanent or long-lasting immunity (contrast with 'acquired immunity').

Joint Committee on Vaccination and Immunisation (JCVI)

An independent expert advisory committee set up in 1963 to advise the government on matters relating to communicable diseases and their prevention or treatment through immunisation. Currently chaired by Professor Andrew Hall.

Live vaccines

See 'attenuated vaccine'.

Lymphocytes

White blood cells found in lymph nodes, the spleen, mucosa, sites of inflammation and sites of infection.

M2 protein inhibitors

The M2 protein is produced by influenza viruses and is necessary for the virus to initiate infection. Drugs that inhibit this protein consequently inhibit influenza growth (see also 'adamantanes').

Macrophages

A type of white blood cell involved in phagocytosis. Macrophages are defined as antigen presenting cells (APCs), meaning they take up antigens and present them to T cells, to initiate the required immune response. They are major producers of cytokines such as Interleukin-1 (IL-1) and Tumour Necrosis Factor. (see cytokines and phagocytosis)

Major histocompatibility complex (MHC)

A system of proteins exhibited on the surface of cells that control the immune response by recognising other cells as being either familiar or foreign in origin (MHC also refers to the system of genes that code for MHC proteins).

Modelling

The use of mathematical representations of the epidemic to understand how it is developing, and how it may develop in the future.

Monocyte

A type of white blood cell involved in phagocytosis and antigen presentation to stimulate the required immune response.

MHRA

Medicines and Healthcare products Regulatory Agency (MHRA) is an executive agency of the Department of Health. As such, the MHRA is responsible for ensuring that medicines and medical devices work, and are acceptably safe. The MHRA issues licences for new medicines and monitors products after licensing. This is called post market surveillance and is an obligation under European Commission law.

Mitigation strategy

Actions aimed at reducing the impact of infection (e.g. closing schools).

Mortality rates

The number of deaths in a given time period (see also case fatality ratio).

Mutation

A genetic change.

Natural immunity

See 'innate immunity'.

Natural killer (NK) cells

Natural killer cells are a type of lymphocyte. As part of the innate immune system, they detect and destroy virally infected cells and tumours.

Neuraminidase antigen

A glycoprotein made by influenza viruses that forms spikes on the virus surface (see 'antigen'). Required to release newly produced virus from the surface of infected cells in which they were produced. The 'N' in a flu variant's name refers to neuraminidase (e.g. H1N1). See also 'haemagglutinin.'

Neuraminidase inhibitors

Chemicals which inhibit the enzymatic function of the neuraminidase protein and so have antiviral properties. The currently approved neuraminidase inhibitors are oseltamivir (Tamiflu) and zanamivir (Relenza).

NIBSC

National Institute for Biological Standards and Control (now part of the Health Protection Agency). A facility that develops standards and provides independent testing of biological medicines for the UK market, including vaccines. Also part of the WHO laboratory network that develops safe vaccine producer strains from new influenza strains as they emerge.

NICU

Neonatal Intensive Care Unit. A unit providing intensive and high dependency care for neonates.

NIMR

A UK research institute in Mill Hill, London; supported by the Medical Research Council UK. One of the UK's largest medical research organisations, and a primary UK base for flu research. The site where the human influenza virus was first isolated in 1933. Houses one of the five global WHO Collaborating Centres for Influenza.

Nosocomial infection

Infections acquired in hospital or other healthcare environments.

Novel H1N1 influenza strain

A H1N1 strain that is genetically significantly different from H1N1 strains that had been circulating in humans.

Oseltamivir

An orally active neuraminidase inhibitor used to treat flu infection, marketed by Roche as Tamiflu.

Pandemic

The worldwide community spread of an infection. Occurs rarely - three times in the 20th century, and again in 2009, with a larger impact than regular seasonal flu.

Pandemic (H1N1) 2009

The worldwide community spread of a new H1N1 influenza virus, originating in pigs and entering the human population in 2009.

Pathogenesis

The process by which disease is caused.

Phagocytosis

Ingestion of harmful or dead or dying material by specialised white blood cells (phagocytes).

PICU

Paediatric Intensive Care Unit. A unit providing specialised and high dependency care for children.

Polymorphonuclear leukocytes (PMN)

Phagocytic white cells that circulate in blood and typically increase during bacterial infections.

Primary Infection

First infection with a particular agent.

Quarantine

The period for which a person (or animal) is kept in isolation in order to prevent the spread of a contagious disease.

QSurveillance

A primary healthcare-based study of information on the health needs, risks, care and outcomes for a population of approximately 20 million people in the UK.

R₀ (the basic reproduction number)

In infectious disease epidemiology, the basic reproduction number is defined as the average number of secondary cases generated by a primary infection within a population with no immunity, and is a measure of how a disease may spread throughout the population. The number is important in estimating how many people have to be vaccinated in order to achieve herd immunity. For example, the R₀ for measles is relatively high, whereas by comparison the R₀ is lower for swine flu (see also epidemiology, herd immunity).

Reassortment (genetic reassortment)

The mixing of genes that can occur following infection of a cell by more than one strain of virus (e.g. influenza A).

Receptor

Protein molecules on the cell surface that bring the virus and cell together to allow infection to occur. Sialic acid on the surface of a cell acts as the receptor for influenza viruses.

Regulatory T cells

Lymphocytes that inhibit the action of the immune system, preventing excessive immune reactions.

Relenza

See 'Zanamivir'.

Respiratory

Relating to the respiratory system (e.g. the nose, throat, trachea and lungs).

SAGE (WHO)

Strategic Advisory Group of Experts on Immunisation - the principal advisory group to WHO for vaccines and immunization and covers all vaccine-preventable diseases. Established in 1999 and currently chaired by Prof David Salisbury (see <http://www.who.int/immunization/sage/en/>).

SAGE (UK)

The Scientific Advisory Group for Emergencies, set up to advise the UK government on pandemic influenza, co-chaired by Professor John Beddington and Professor Sir Gordon Duff.

Scientific Pandemic Influenza Advisory Committee (SPI)

Scientific Pandemic Influenza Advisory Group. Established by the department of Health in 2008 to advise on the scientific evidence base for health-related pandemic influenza policies and currently chaired by Sir Professor Gordon Duff <http://www.dh.gov.uk/ab/SPI/index.htm>. This Committee has three sub-groups which advise on modelling, clinical counter measures and behaviour and communications.

Seasonal epidemic

An epidemic that occurs at a defined time each year, typically in the autumn and winter months in the UK due to climatic or social factors (e.g. the end of school holidays).

Seasonal flu

Flu that occurs at a defined time each year, typically in the autumn and winter months in the UK. Has a smaller and more manageable impact than pandemic flu.

Secondary infection

Infection by a second agent following a primary, unrelated, infection. For example, a bacterial infection such as pneumococcal pneumonia, could follow a virus infection, such as influenza.

Shedding

The loss of a virus from a cell following replication; the movement of a virus from one part of the body into another part of the body or from a host body into the environment, where it may infect other bodies.

Squalene

A natural organic compound produced by all higher organisms, including humans. May be used as an adjuvant.

Strain

Influenza Type B, or subtypes of Influenza Type A, for example H1N1, may be characterised into different strains that can be clearly differentiated from other groups by a set of genetic characteristics. New strains of influenza viruses appear and replace older strains.

Surveillance

Purposeful observation for the occurrence of an infection.

Suspected cases

Cases of illness identified through symptoms but not confirmed by laboratory analysis.

Swine flu

H1N1 influenza arising in 2009 from pigs and the cause of the 2009 pandemic in man.

Swine influenza

See 'swine flu'.

Symptoms

What patients complain of when suffering an infection or disease (eg. sore throat, cough, muscle pains). Signs are what observers (usually doctors) can detect objectively, e.g. a high temperature (fever) by using a thermometer, or lung congestion using a stethoscope.

T cells

A type of lymphocyte. The T stands for thymus, which is the main site of T cell maturation.

T cell receptor (TcR)

A receptor molecule found on the surface of T cells and responsible for recognising antigens bound to proteins of the major histocompatibility complex (MHC).

Tamiflu

See 'Oseltamivir'.

Thymus

An organ located in the upper chest cavity. Its main function is as a site for the maturation of T cells.

Tissue culture

The culture of living tissues, removed from the body, in a suitable medium supplied with nutrients and oxygen.

Transmission rate

A measure of the effectiveness of the virus's spread.

Underlying health problems

A medical condition that exists prior to infection and which may predispose the individual to infection and/or exacerbate the infection.

Vaccine

A substance that is administered in order to generate an immune response, thereby inducing acquired immunological memory that protects against a specific disease.

Viral persistence

The continuous replication of a live virus.

Viral latency

The hidden presence of non-replicating viral DNA or RNA.

Virus

A microorganism containing genetic material (DNA or RNA) which is smaller than a bacterium and cannot grow or reproduce outside of a living cell. A virus reproduces by invading living cells and using them to replicate itself.

Virology

The science of studying viruses.

Virulence

The severity of a viral infection, usually at the cellular level.

WHO

World Health Organization - the central authority for health within the United Nations system.

WHO National Influenza Centre

One of a network of laboratories that make up the Global Influenza Surveillance Network of the WHO Global Influenza Programme. There are over 125 National Influenza Centres in over 96 countries around the world. In UK there are National Influenza Centres in London (HPA, Colindale), Glasgow (Gartnavel Hospital), Aberdeen (Royal Infirmary) and Belfast (Royal Victoria Hospital).

WHO Collaborating Centres for Influenza

Five laboratories located in London UK, Atlanta USA, Memphis USA, Melbourne Australia and Tokyo, Japan that serve as reference laboratories within the WHO Global Influenza Surveillance Network and collaborate with the WHO National Influenza Centres to continually carry out surveillance of the emergence of new influenza viruses in humans and to assess the risk that emerging animal influenza viruses may affect human public health.

Zanamivir

An inhaled neuraminidase inhibitor developed by GSK and marketed as Relenza.

Zoonosis / Zoonoses (pl.)

The transfer of an infection from a non-human animal species to humans (the reverse is sometimes referred to as a reverse zoonosis). An avian influenza virus infecting a human would be described a zoonotic event.

SOURCES OF FURTHER INFORMATION

- Department of Health: <http://www.dh.gov.uk/en/index.htm>
- European Centre for Disease Prevention and Control: [http://ecdc.europa.eu/en/healthtopics/Pages/Influenza_A\(H1N1\)_Outbreak.aspx](http://ecdc.europa.eu/en/healthtopics/Pages/Influenza_A(H1N1)_Outbreak.aspx)
- Health Protection Agency: <http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1240732817665?p=1240732817665>
- Medical Research Council
- <http://www.mrc.ac.uk/Newspublications/News/MRC006015>
- National Health Service: <http://www.nhs.uk/AlertsEmergencies/Pages/Pandemicflualert.aspx>
- UK Government's services website (Direct Gov): http://www.direct.gov.uk/en/Swineflu/DG_177831
- US Centers for Disease Control and Prevention: <http://www.cdc.gov/h1n1flu/>
- World Health Organization: <http://www.who.int/csr/disease/swineflu/en/index.html>

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