

# Influenza prevention and treatment

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## ABSTRACT

This year's influenza guideline was published in the South African Medical Journal.<sup>1</sup> It adds important new data with regard to influenza prevention and treatment. This article highlights the role of the nurse in influenza prevention and management strategies in South Africa.

## Influenza – the virus

The influenza virus is a middle size virus consisting of a genome, covered by protein shell (capsid) and, being an enveloped virus, by a surrounding bilipid layer derived from the cellular cytoplasmic membrane as the virus buds out of the host cell at the end of its replication cycle. Embedded in this envelope are the 2 viral spikes, also referred to as peplomers: haemagglutinin (H or HA) and neuraminidase (N or NA). These two 'bits' of the virus give the numbers to the viruses that cause disease each year.

The influenza virus belongs to the family orthomyxoviridae and is classified into 3 types, A, B and C. Type A is the most important and is widespread in nature and found in birds and mammals. It is further divided into subtypes on the basis of the antigenicity of the HA and NA proteins. In nature some 16 HAs and 9 NAs have been described, all of which are found in birds, while relatively few have been detected in mammals. In man only H1, H2 and H3 and N1 and N2 in the combinations H1N1, H2N2 and H3N2 have so far been associated with regular outbreaks of human influenza. Only on rare occasions have the nonhuman viruses crossed the species barrier from birds to infect humans, but these have only caused sporadic cases of influenza and have not established themselves in the human host to the extent of being transmissible between humans. Each of the human subtypes H1N1, H2N2 and H3N2 are further subdivided into strains on the basis of more subtle antigenic properties of the HA protein.

Types B and C influenza virus are found exclusively in humans. They are not classified into subtypes, but each type is subdivided into strains. (Type C is a cause of minor upper respiratory tract infection and is therefore not included in the vaccine.)

The nomenclature for influenza strains details, in sequence, the type, subtype (in the case of type A) and the strain identifiers – the place where it was first characterised, the year of isolation and a laboratory identifying number. The following strains have been recommended by the World Health Organization for the 2008 Southern Hemisphere influenza season and incorporated into this year's vaccine<sup>2</sup>:

- A/Solomon Islands/3/2006 (H1N1)-like virus
- A/Brisbane/10/2007 (H3N2)-like virus
- B/Florida/4/2006-like virus

## Influenza vaccine strategy

Influenza vaccine forms the most important basis for prevention of influenza disease.

## Indications for vaccination

### Adults

- Persons who are at high risk for influenza and its complications because of underlying medical conditions and who are receiving regular medical care for conditions such as chronic pulmonary

and cardiac disease, chronic renal diseases, diabetes mellitus and similar metabolic disorders, and individuals who are immunosuppressed (including HIV infected persons with CD4 counts above 200/ml).

- Residents of old-age homes, chronic care and rehabilitation institutions.
- Medical and nursing staff responsible for the care of high-risk cases.
- Adults and children who are family contacts of high-risk cases.
- All persons > 65 years.
- Women who will be in the second or third trimester of pregnancy during the influenza season. Pregnant women with medical conditions placing them at risk for influenza complications should be immunised at any stage of pregnancy.
- Any person wishing to protect themselves from the risk of contracting influenza.
- In occupational settings where large-scale absenteeism could cause significant economic losses.

### Children

- All children at high risk of complications from influenza including those with chronic pulmonary, cardiac, renal, hepatic, endocrine, neurologic, metabolic or immunological disease that increases the risk of severe influenza;
- Children on chronic aspirin therapy;
- Adults and children who are family contacts of young children or contacts of high risk people;
- Some countries recommend routine immunisation of all young healthy children 6 through 59 months of age;
- Other children, adolescents, and adults can be immunized to decrease the impact of influenza as required.

## Dosage

1 Dose = 0.5 ml

- *Adults*: whole or split-product or subunit vaccine: 1 dose I.M.
- *Children (< 12 years)*: split-product or subunit vaccine: 1 dose I.M.
- *Children < 9 years* who have never been vaccinated should receive 2 doses 1 month apart.
- *Children < 3 years* should receive half the adult dose on two occasions separated 1 month apart.

## Contraindications

- Persons with a history of severe hypersensitivity to eggs.
- Persons with acute febrile illnesses should preferably be immunised after symptoms have disappeared.
- The vaccine should be avoided in the first trimester of pregnancy unless there are specific medical indications.

## Timing

Vaccines should be given sufficiently early to provide protection for the winter from March to October. A protective antibody response takes about two weeks to develop.

**Allergic reactions to influenza vaccine**

Allergic reactions are extremely **rare**. In a UK study of 269 000 people receiving influenza vaccine only 2 cases of anaphylaxis have been reported.<sup>3</sup> However since this reaction is possible all individuals administering influenza vaccine should be conversant with resuscitation procedures and carry at least an adrenalin pre-filled syringe. Access to emergency care with oxygen should be possible.

**Influenza treatment**

Influenza occurs in winter in South Africa with cases reported from April to October. A clinical prediction score is effective in diagnosing influenza. Sudden onset of fever, cough, pharyngitis and headache *during the influenza season* has been reported to have a sensitivity and specificity of approximately 80%.

**Additional risk of complications**

- The main underlying disorders associated with increased risk of complications from influenza are chronic respiratory and cardiac conditions.
- Cardiorespiratory disorders accounts for up to 80% of the cases with high-risk conditions during influenza epidemics, and the highest rate and greatest risk for complications are in persons > 65 years old and young children.
- Respiratory disorders include chronic obstructive pulmonary disease (COPD), asthma, and cystic fibrosis. Although asthmatics do not appear to have increased susceptibility to influenza infections, they are likely to develop a more severe response to such infections. Influenza infections occurring in patients with chronic lung disease may be associated with acute exacerbations of asthma or COPD, greater need for hospitalisation, complicating pneumonia, and even death.
- Cardiac conditions associated with congestive cardiac failure are important risk factors for complicated influenza infections and have a particularly high risk of death.
- Chronic conditions associated with an increased risk of complicated infection include:
  - Chronic metabolic conditions such as diabetes mellitus
  - Chronic renal dysfunction
  - Immune deficiency
- Residents of chronic care facilities, rehabilitation institutions and nursing homes, particularly those with underlying chronic medical disorders are at increased risk of complicated infections. In these situations the infection spreads very rapidly once the virus is introduced into the population.
- Pregnant females. It has been documented that influenza mortality has been higher in pregnant females during some previous influenza epidemics.
- HIV-seropositive individuals. Influenza is more prolonged and more severe.

**Antiviral agents effective against influenza**

Recent evidence has indicated that a high proportion of the circulating influenza A strains in the United States have developed resistance to amantadine (as well as to rimantadine, which is not available in South Africa). Therefore neither amantadine nor rimantadine can or should be used for the treatment or chemoprophylaxis of Influenza A in South Africa. Currently only oseltamivir and zanamivir are recommended for antiviral treatment or chemoprophylaxis of influenza in South Africa.

**Neuraminidase inhibitors** are an important adjunct to influenza vaccination, in both the prevention and treatment of influenza. They act by specifically inhibiting the neuraminidase enzymes that are present on all influenza subtypes and which are responsible for releasing viral particles from host cells and the propagation of infection. Two neuraminidase inhibitors are currently available for clinical use:

**Oseltamivir (Tamiflu®)**

This is given orally as a prodrug and is distributed systemically to all potential infection sites. It should be reserved for ill influenza

patients or prophylaxis in high-risk patients. It must not replace vaccination for prophylaxis (except in the very rare cases where vaccine is contraindicated in high-risk patients) but could supplement vaccination in very high-risk individuals. Oseltamivir is well tolerated and the most common side effect has been mostly mild nausea or vomiting. Other side effects are rare and include headache, fatigue, insomnia and dizziness.

The approved indications for oseltamivir are:

- The treatment of uncomplicated acute illness due to influenza infection in patients ≥ 1 year of age, who have been symptomatic for ≤ 48 hours;
- The prophylaxis of influenza in patients ≥ 13 years of age.

The dosage for the treatment of influenza using this antiviral agent is given in Table 1.

**Table 1:** Dosage of oral oseltamivir for treatment of influenza

Body weight	Dose
< 15 kg	30 mg bd
15–23 kg	45 mg bd
23–40 kg	60 mg bd
> 40 kg (adults)	75 mg bd

**Zanamivir (Relenza®)**

This antiviral agent is administered via inhalation and is deposited primarily in the respiratory tract. It is approved for the treatment of uncomplicated illness due to influenza infection in patients > 7 years of age.

When given within 48 hours of onset of symptoms of influenza, both agents significantly reduce duration of illness and symptom severity, and decrease the rate of influenza-associated complications, such as pneumonia, bronchitis and otitis media. Both agents are effective in protecting close contacts of index cases from symptomatic influenza when used as post-exposure prophylaxis.

Prophylaxis is recommended for high-risk individuals and may be classified as:

- Post-exposure (prophylaxis for > 7 days after exposure to infected individuals).
- Seasonal (for the entire influenza season, e.g. in individuals in whom vaccination is contraindicated).
- Post-vaccination (prophylaxis for 2-4 weeks after receiving vaccination) and outbreak control (e.g. institutional outbreak).

**Influenza and HIV**

The incidence of severe pneumonia in which influenza virus was identified was 8.03 fold greater in HIV infected compared to HIV uninfected children aged < 2 years. In general influenza vaccine should be given to all HIV-infected people but the best immune response may be expected in individuals with a CD4 count > 200/ml (15% in children). PNT

**References:**

1. Green RJ, Feldman C, Schoub B, et al. Influenza guideline for South Africa – Update 2008. S Afr Med J. 2008;98:126-132.
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3. Peng MM, Jick H. A population-based study of the incidence, cause, and severity of anaphylaxis in the United Kingdom. Arch Intern Med. 2004;164:317-319.