

Fact Sheet: Influenza in people predisposed to serious complications from influenza

1. Why certain people are vulnerable to severe complications from influenza

Medical conditions	
Chronic lung disease (incl. severe asthma)	<ul style="list-style-type: none"> ▪ The most common cause of chronic obstructive pulmonary disease (COPD) exacerbation is infection of the airways or lungs.^{1,2} ▪ Contracting influenza or developing pneumonia may worsen COPD markedly.^{1,2} ▪ Influenza can exacerbate symptoms and may induce asthma attacks in people with severe asthma.³ ▪ Studies have found that infections with viral diseases like influenza can worsen lung damage in people with cystic fibrosis.⁴
Diabetes (type 1 and type 2)	<ul style="list-style-type: none"> ▪ Influenza can interfere with blood glucose management, putting those with diabetes at increased risk of high or low blood sugar.⁵ ▪ People with type 1 diabetes are at particularly increased risk of developing ketoacidosis (where the chemical balance of the body becomes too acidic).⁵ ▪ Some people with diabetes may have impaired immune function, making them more vulnerable to severe influenza infections.⁶
Heart disease	<ul style="list-style-type: none"> ▪ People with chronic cardiovascular disease and cerebrovascular disease (CVD) are at increased risk of experiencing an acute exacerbation of disease during influenza epidemics.⁷
Weakened immune defenses (incl. HIV)	<ul style="list-style-type: none"> ▪ People with HIV infection have increased susceptibility to influenza infection, longer duration of symptoms and high influenza-related mortality.⁸
Chronic kidney failure	<ul style="list-style-type: none"> ▪ People with end stage renal disease (ESRD) are at high risk of influenza infection and complications given their altered immune status.⁹
Neurological/ neuromuscular disorders (e.g. cognitive dysfunction, spinal cord injuries)	<ul style="list-style-type: none"> ▪ Studies have shown that people with neuromuscular disorders are at increased risk of respiratory failure and severe illness from influenza.^{10,11}
Other groups	
Aboriginal & Torres Strait Islanders	<ul style="list-style-type: none"> ▪ Influenza hospitalisation rates for Aboriginal and Torres Strait Islander people are higher than in non-Indigenous people.¹²
Pregnant women	<ul style="list-style-type: none"> ▪ Infection with the influenza virus is associated with serious illness and hospitalisation among pregnant women and young infants (this includes neonates).¹³
People aged ≥ 65 years	<ul style="list-style-type: none"> ▪ For adults aged ≥ 65 years, influenza can trigger complications or worsen existing health conditions, such as asthma or congestive heart failure. This group may also develop complications such as bacterial infections including pneumonia, bronchitis, and sinus and ear infections following contacting influenza.¹⁴

2. Evidence of influenza-related hospitalisation or death

Medical conditions	
Chronic lung disease (incl. severe asthma)	<ul style="list-style-type: none"> ▪ Deaths from influenza are more common among people of any age with COPD than the general population.² ▪ A US study of influenza hospitalisation rates over a four-year period (1990-1995) found people with acute respiratory conditions (incl. COPD and asthma) were more frequently hospitalised than any other group.³ ▪ Respiratory exacerbations, generally thought to be caused by infections, are responsible for considerable morbidity and mortality in people with cystic fibrosis.⁴
Diabetes (type 1 and type2)	<ul style="list-style-type: none"> ▪ People with diabetes are six times more likely to be hospitalised with influenza complications than people without diabetes.¹⁵ ▪ Death rates of people with diabetes increase five to 15 percent during influenza epidemics.¹⁵
Heart disease	<ul style="list-style-type: none"> ▪ The risk of myocardial infarction (otherwise known as a 'heart attack') is five-times higher in the first three days following diagnosis with a respiratory tract infection such as influenza.¹⁶ There is also a three-fold increased risk of stroke during this period.¹⁶
Weakened immune defenses (incl. HIV)	<ul style="list-style-type: none"> ▪ People with impaired immune defences are at higher risk of influenza-associated complications and experience higher rates of influenza infection.¹⁷
Chronic kidney failure	<ul style="list-style-type: none"> ▪ Infectious diseases are the second leading cause of death among people with ESRD.⁹
Neurological/ neuromuscular disorders (e.g. cognitive dysfunction, and other neuromuscular disorders)	<ul style="list-style-type: none"> ▪ A USA study of children during the 2003-2004 influenza season found that a third of all children that died due to influenza complications had chronic neurologic or neuromuscular conditions.^{10,11}
Other groups	
Aboriginal & Torres Strait Islanders	<ul style="list-style-type: none"> ▪ Influenza hospitalisation rates for Aboriginal and Torres Strait Islander people are higher than in non-Indigenous people.¹⁸ ▪ Indigenous Australians also have a 17-28 percent higher risk of dying from influenza-related complications than people of non-Indigenous backgrounds.¹⁸
Pregnant women	<ul style="list-style-type: none"> ▪ Studies have found that during severe influenza seasons and pandemics pregnant women are at increased risk of influenza-related hospitalisation compared with non pregnant women.¹⁹
People aged ≥ 65 years	<ul style="list-style-type: none"> ▪ Elderly people account for 90 per cent of deaths reported as influenza complications.²⁰

3. Research into the relative benefits of influenza vaccination

Medical conditions	
Chronic lung disease (incl. severe asthma)	<ul style="list-style-type: none"> ▪ Clinical trials have found influenza vaccination: <ul style="list-style-type: none"> — Reduces exacerbations in people with COPD.^{22,23} — Is highly effective in the prevention of acute respiratory illness due to influenza in people with COPD.^{22,23} — Reduces the risk of influenza-related complications and exacerbations in people with asthma.^{3,24} — Vaccination is effective and reduces deaths in people with cystic fibrosis.⁴
Diabetes (type 1 and type2)	<ul style="list-style-type: none"> ▪ Influenza vaccination has been found to reduce hospital admission by 79 per cent during influenza epidemics.²⁵
Heart disease	<ul style="list-style-type: none"> ▪ Evidence shows that influenza vaccination decreases the incidence of cardiovascular events by 20-70 per cent during influenza epidemics.²⁶
Weakened immune defenses (incl. HIV)	<ul style="list-style-type: none"> ▪ Current evidence suggests that influenza vaccines are effective in reducing the incidence of influenza in people with HIV.⁸
Chronic kidney failure	<ul style="list-style-type: none"> ▪ Influenza vaccination in people with kidney disease has been shown to reduce infection rates and lower the risk of hospitalisation and death.^{9,27}
Neurological/ neuromuscular disorders (e.g. seizure disorders or other neuromuscular disorders)	<ul style="list-style-type: none"> ▪ Influenza vaccination is recommended for people with neurological and neuromuscular disorders who are at-risk of severe cases of influenza.^{10,11}
Other groups	
Aboriginal & Torres Strait Islanders	<ul style="list-style-type: none"> ▪ Data unavailable.
Pregnant women	<ul style="list-style-type: none"> ▪ Influenza vaccination can reduce the incidence of influenza infection and hospitalisation rates among pregnant women during the influenza season.^{28,29}
People aged ≥ 65 years	<ul style="list-style-type: none"> ▪ A 10 year study in the USA of adults aged ≤ 65 years found influenza vaccination was associated with significant (27 percent) reduction in the risk of hospitalisation for pneumonia or influenza and in the risk of death (48 percent) in community dwelling elderly persons.³⁰

References

1. Centers for Disease Control and Prevention. What adults with COPD should know about 2009 H1N1 flu. Last viewed March 2010. Available at: www.cdc.gov/h1n1flu/guidance/copd.htm
2. Plans-Rubio, P. et al. Prevention and control of influenza in persons with chronic obstructive pulmonary disease. *International Journal of COPD* 2007; vol. 2; 1:41-53
3. Glezen, W. P et al. Asthma, influenza, and vaccination. *Journal of Allergy and Clinical Immunology* 2006; vo118; 6:1199-1206
4. Dharmaraj P, Tan AA, Smyth RL. Vaccines for preventing influenza in people with cystic fibrosis. *Cochrane Database of Systematic Reviews* 2000, Issue 1. Art. No.: CD001753. DOI: 10.1002/14651858.CD001753.
5. American Diabetes Association. Diabetes Myths. Last viewed: July 2009. Available at: <http://www.diabetes.org/diabetes-myths.jsp>
6. Centers for Disease Control and Prevention. Diabetes Public Health Resource News and Information. Last viewed July 2009. Available at: http://www.cdc.gov/diabetes/news/docs/swine_flu.htm
7. Centres for Disease Control and Prevention. Guidance and considerations for health care providers and for state and local public health agencies. Last viewed March 2010. Available at: www.cdc.gov/h1n1flu/cardiovascular/index.htm
8. Atashili J, Kalliani L, Adimora A. A. Efficacy and clinical effectiveness of influenza vaccines in HIV-infected individuals: a meta-analysis. *BioMed Central (BMC) Infectious Diseases* 2006; 6 (138): 1-6
9. Gilbertson, D. T. et al. Influenza vaccine delivery and effectiveness in end-stage renal disease. *Kidney International* 2003; 63: 738-743
10. Centers for Disease Control and Prevention (CDC). Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). [erratum appears in MMWR Morb Mortal Wkly Rep. 2006 Jul 28;55(29):800]. *MMWR - Morbidity & Mortality Weekly Report* 2006;55 (RR-10):1-42
11. Bhat N, Wright JG, et al. Influenza-associated deaths among children in the United States, 2003–2004. *NEJM* 2005; 353 (24): 2559-2567
12. Australian Government National Health and Medical Research Council. Fight Flu Campaign. Last update July 2008. Available at: <http://www.fightflu.gov.au/indigenous>
13. Zaman, K, Roy,E, Arifeen S. E, Rahman M, et al. Effectiveness of Maternal Influenza Immunisation in Mothers and Infants, *The New England Journal of Medicine* 2008; vol. 359 (15): 1555-1564
14. Centers for Disease Control and Prevention. How well does the seasonal influenza vaccine work. Last viewed March 2010. Available at: www.cdc.gov/flu/about/qa/vaccineeffect.htm
15. Jones, R. Vaccines can be a life preserve for people with diabetes. *Kentucky Epidemiologic Notes & Reports* 2000; 35: 2-3
16. Keller, T, Weeda, V. B, van Dongen, C. J, et al. Influenza vaccines for preventing coronary heart disease (Review). *The Cochrane Library* 2008 issue 3: 1-18
17. Kunisaki, K. M, Janoff EN, et al. Influenza in immunosuppressed populations: a review of infection frequency, morbidity, mortality, and vaccine responses. *The Lancet Infectious Diseases* 2009: vol. 9: 493-504
18. Cooper C, Hutton B, Fergusson D, et al. A review of influenza vaccine immunogenicity and efficacy in HIV-infected adults. *Canadian Journal of Infectious Diseases and Medical Microbiology* 2008; vol. 19 (6): 419-423.
19. Australian Government National Health and Medical Research Council. Fight Flu Campaign. Last update July 2008. Available at: <http://www.fightflu.gov.au/indigenous>
20. Kelly H, Mercer G. N, Cheng A. C. Quantifying the Risk of Pandemic Influenza in Pregnancy and Indigenous People in Australia in 2009. *Euro Surveillance* 2009; vol. 14, no. 50: 1-3
21. Ciszewski, A., Bilinska, Z. T., Brydak, L. B et al. Influenza vaccination in secondary prevention from coronary ischaemic events in coronary artery disease: FLUCAD study, *European Heart Journal* 2009; vol. 29: 1350-1358.
22. Poole P, Chacko EE, Wood-Baker R, Cates CJ. Influenza vaccine for patients with chronic obstructive pulmonary disease. *Cochrane Database of Systematic Reviews* 2006, Issue 1. Art. No.: CD002733. DOI: 10.1002/14651858.CD002733.pub2.
23. Wesseling, G. et al. Occasional review: Influenza in COPD: pathogenesis, prevention and treatment. *International Journal of COPD* 2007; vol. 2 (1): 5-10
24. Watanabe1 S, Hoshiyama Y, Matsukura S et al. Prevention of Asthma Exacerbation with Vaccination against Influenza in Winter Season. *Allergology International* 2005;54:305-309
25. Colquhoun, A. J., et al Effectiveness of influenza vaccine in reducing hospital admissions in people with diabetes. *Epidemiology & Infection* 1997; 119: 335-41
26. Madjid, M. et al. Influenza and atherosclerosis: vaccination for cardiovascular disease prevention. *Expert Opin Biol Ther* 2005; 5: 91-96
27. Kausz, A. et al. The value of vaccination in chronic kidney disease. *Seminars in Dialysis* 2004, 17: 9-11
28. Goodnight, W.H et al. Pneumonia in pregnancy. *Crit Care Med* 2005; 33:S390-9
29. Englund, J.A. Maternal immunization with inactivated influenza vaccine: rationale and experience. *Vaccine* 2003; 21: 3460-4
30. Nichol KL, Nordin JD, Nelson DB, Mullooly JP, Hak E. Effectiveness of Influenza Vaccine in the Community-Dwelling Elderly. *New England Journal of Medicine* 2007 357: 1373-1381