VACCINATION FOR OUR MOB

Summary report of Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia

2006 – 2010

ncirs
NATIONAL CENTRE FOR IMMUNISATION RESEARCH & SURVEILLANCE

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ISBN: 978-0-9876099-0-8

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Acknowledgements

This document was funded by the Australian Government Department of Health.

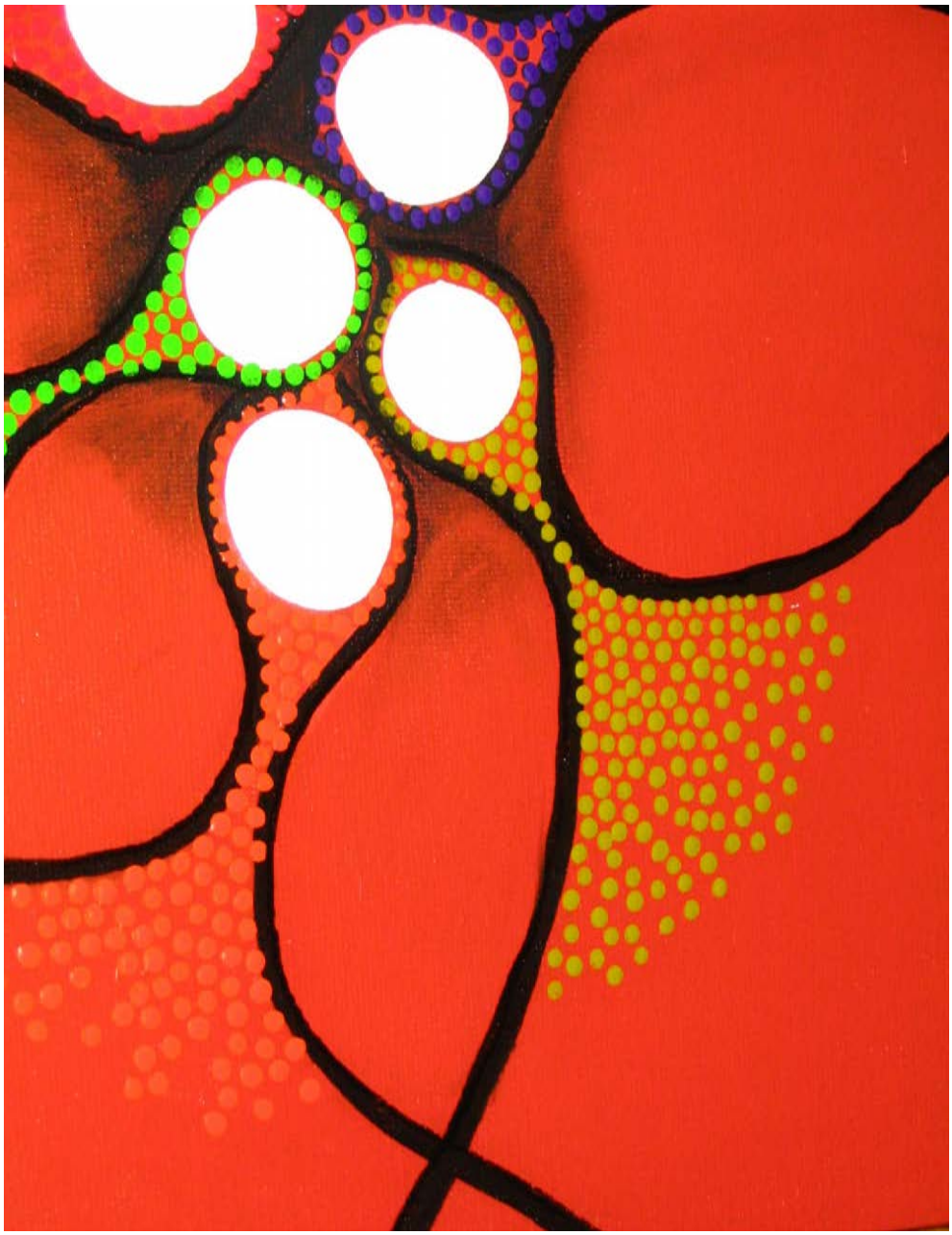
This report was prepared by Ms Telphia Joseph and Dr Rob Menzies from the National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS). It is a summary of the publication *Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia, 2006 to 2010*. We would like to acknowledge and thank Ms Mary Sinclair who wrote the adaptation for this current publication.

NCIRS is supported by the Australian Government Department of Health, the New South Wales Ministry of Health and The Children's Hospital at Westmead. Data are provided by the Communicable Diseases Network Australia, the Australian Institute of Health and Welfare and the Australian Bureau of Statistics.

Many thanks also to Ms Danielle Grant for the design and layout of this publication and to Ms Donna Armstrong for editing and proofreading.

Artwork

The artwork in this report was painted by Mr Maurice Shipp. Maurice is a Wiradjuri man from Dubbo, with most of his growing up occurring between Canberra and Sydney. Maurice has worked in both the government and community controlled sectors of Aboriginal health addressing issues such as sexual health, maternal and child health and health service management over the last 19 years. The artwork was commissioned by NCIRS for use in all *Vaccination for Our Mob* reports. The background is representative of the land (ochre), which symbolises connectedness for Aboriginal people. The black lines represent the people. The white circles represent healthy cells. The coloured dots represent the vaccines that work towards protecting cells from diseases and illness.



Foreword

Disease prevention underpins public health. If a patient presents for surgery, we may have failed prevention. The corollary is that vaccination prevents many surgical presentations. Healthy development, growth and learning are the main goals of any intervention. The greatest example to date being smallpox eradication, vaccines not only prevent disease in the people who receive them, but they also protect those who are unvaccinated (herd immunity).

I often deal with discharging ears, in a process called chronic suppurative otitis media. This is the end stage of ear disease; resultant from many hours of infection, pain, behavioural disturbance, time off work and missed learning that have preceded. To prevent such would seem far more productive. Any vaccine that limits, or better still eradicates, infections can provide optimism, particularly with otitis media in our mob.

We cannot ignore the social agenda that we are attempting to address. Aboriginal and Torres Strait Islander people endure deplorable health statistics. The dichotomy of Australia's wonderful health statistics for non-Aboriginal and Torres Strait Islanders, against our deplorable Aboriginal and Torres Strait Islander health figures, defies belief.

Vaccine-preventable diseases have a costly impact on our health system, economy and individuals alike, resulting in doctor's visits, hospitalisations, poor school attendances, poor educational outcomes and premature deaths. This excludes the plethora of social issues and poor access to healthcare for Aboriginal and Torres Strait Islander people. To this note I feel vaccination plays an enormous role in addressing disease rates. The conditions in which our mob endure are a testament to how strong our immunity can be.

Vaccination is the beginning of the disruption of the pathogenesis of disease. The importance of vaccination cannot be over-stressed. Aboriginal and Torres Strait Islander people endure the social manifestations of diseases more than any group. Publications such as these help many healthcare providers give appropriate advice and evidence to better strive for equality in health. I highly recommend the read and congratulate all for the hard work in providing this publication.

Associate Professor Kelvin Kong, BSc MBBS(UNSW) FRACS

Contents

Summary

While Aboriginal and Torres Strait Islander people are commonly affected by infectious diseases more than other Australians, there have been some impressive improvements in vaccine-preventable diseases in recent years, as well as some areas for improvement.

Hepatitis A cases have declined dramatically since the implementation in 2005 of a vaccination program for Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia. Hepatitis A is now less common in Aboriginal and Torres Strait Islander children than in non-Indigenous children.

The meningococcal C vaccine has also had a substantial impact since its introduction for all children in 2003. Serogroup C cases in Aboriginal and Torres Strait Islander and non-Indigenous people have decreased. However, serogroup B now accounts for more than 80% of meningococcal disease in children under 5 years of age, and invasive disease is more than 4 times more common in Aboriginal and Torres Strait Islander people than in other Australians. A vaccine for serogroup B is sorely needed.

Since *Haemophilus influenzae* type b (Hib) vaccine was included in the routine vaccination schedule in 1993, there has been a 90% reduction in Hib disease in all Australians. However, the few cases that are occurring are up to 13 times more common in Aboriginal and Torres Strait Islander people. This serves as a reminder for planners of health programs to keep immunisation a priority.

Measles is a very good example of the effectiveness of 'universal programs'. A significant number of deaths occurred in Aboriginal and Torres Strait Islander communities during epidemics in the 1970s and 1980s but, with the roll-out of a universal program, notifications and hospitalisations are now extremely low. Other diseases that have been successfully reduced by universal programs are diphtheria, mumps, poliomyelitis (polio), rubella (German measles) and tetanus.

Pertussis (whooping cough) epidemics occurred in 2001, 2005 and 2008 affecting Aboriginal and Torres Strait Islander people up to 3 times more than other Australians. While there is a universal program that covers pertussis, it has been the least successful and pertussis has the highest notification and hospitalisation rates among vaccine-preventable diseases. Waning of protection occurs, prompting the need for boosters in young teens and carers of infants to assist in the protection of babies who are too young to be vaccinated.

Since the introduction of the HPV vaccination program in 2007 there have been encouraging results, with noticeable decreases in high-grade lesions and genital warts in young Australian women. However, there is no information yet on the impact in Aboriginal and Torres Strait Islander females. It is important to continue a dedicated Pap testing program because other HPV types can also contribute to cervical cancer. The expansion of the school-based HPV vaccination program in 2013 to include boys should increase benefits for both males and females, through protection of vaccinated people as well as their sexual partners.

Rotavirus was introduced to the National Immunisation Program Schedule in 2007. Before this, rotavirus infection affected most children at least once, normally before 2 years of age, resulting in 1 in 30 children needing to be hospitalised. Hospitalisations for Aboriginal and Torres Strait Islander children were around 6 times higher than for other Australian children. Since the vaccination program began, hospitalisations for rotavirus in Aboriginal and Torres Strait Islander infants under 1 year of age have decreased by 40%. Rotavirus is a disease where timely immunisation is important to ensure efficacy and protection.

Other vaccine-preventable diseases that need constant monitoring are influenza and pneumonia which are still causing a high number of hospitalisations and deaths. There is hope that seasonal influenza vaccination coverage improves now that it is available free for all Aboriginal and Torres Strait Islander people aged 15 years or over, anyone aged 6 months or over with a chronic health problem, and all pregnant women. With continued promotion each year to ensure effective take-up, hopefully this will decrease hospitalisations and disease burden due to influenza and assist to reduce the incidence of pneumonia in all age groups.

Vaccination coverage for Aboriginal and Torres Strait Islander children is high, and similar to that for other children, at the 2 year and 5 year age milestones. However, vaccination of Aboriginal and Torres Strait Islander children is more often delayed, which is reflected in around 6% lower coverage at 12 months of age compared to other children. It is very important that vaccines due in the first year of life are given on time, to get the most protection when babies are most vulnerable.

Unfortunately coverage for Aboriginal and Torres Strait Islander adults has not been measured since 2004/2005, and for adolescents no information is available.

Haemophilus influenzae type b disease

The disease

Haemophilus influenzae is a bacterium that commonly lives in the respiratory tract without causing disease. One type of this bacterium, type b (Hib), can cause a number of serious infections in children under 5 years of age.

Before the development of a Hib vaccine, the most common Hib infection that occurred in Aboriginal and Torres Strait Islander children was meningitis, which affects parts of the brain and spinal cord. Hib meningitis resulted in permanent problems, such as brain damage, deafness or death, in around 40% of children who got the infection.

Other less common types of diseases that are caused by Hib involve the lungs (pneumonia), blood (septicaemia), joints (septic arthritis) and under the skin (cellulitis). Epiglottitis (a severe swelling of the plate of cartilage at the back of the throat that shuts off the entrance to the larynx during swallowing) most often occurred in children between 2 and 6 years of age, as a result of Hib, but today is uncommon.

Transmission

Haemophilus influenzae is commonly found in the nose and throat of healthy people, and most people have the disease-causing type b in their throats at some stage. Normally the bacteria are spread from person to person by droplets of saliva or mucus from people with the infection, during contact such as coughing, sneezing or kissing. Transmission happens more often in crowded living conditions. Sometimes bacteria in the throat cross over into the blood or brain and cause disease, and it is not clear why this happens in some cases but not others.

A person does not have to have symptoms to spread the bacteria.

Signs and symptoms

Symptoms depend on which part of the body is affected by the bacteria:

- meningitis – high fever, headache, stiff neck, nausea, vomiting, drowsiness, poor feeding
- pneumonia – shortness of breath, fever, lack of energy, loss of appetite, headache, chest pain, cough
- epiglottitis – difficulty breathing and swallowing, drooling, pale colour, fever
- osteomyelitis – swelling, inflammation and pain over the affected bone

Vaccination

Hib vaccine was included in the routine vaccination schedule in 1993. Since October 2009, all children have had the same vaccine and schedule. A total of four doses of Hib vaccine should be received to ensure full protection. The combination vaccine containing Hib is given at 2, 4 and 6 months of age and a booster dose at 12 months of age.

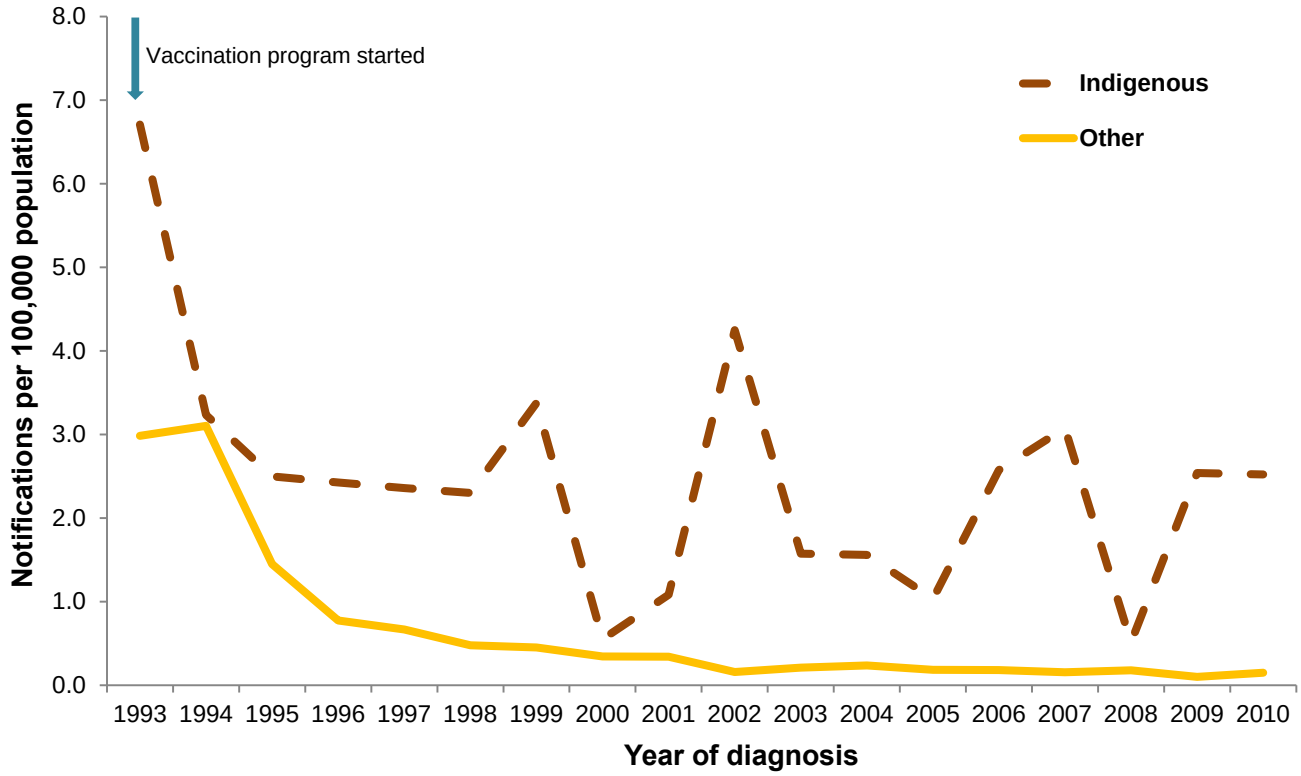
Who is most affected?

Hib disease is most common in children under 6 years of age, with Aboriginal and Torres Strait Islander children most commonly at risk of bacterial meningitis and affected at a younger age than other Australian children. Most cases of Hib disease in Aboriginal and Torres Strait Islander children occur before the age of 4 years.

How common is it?

Since Hib vaccination was introduced in 1993, the number of cases of Hib disease has decreased by over 90%, in both Aboriginal and Torres Strait Islander children and other Australian children (see Figure 1). Before Hib vaccine was introduced, there were between 200 and 600 cases in every 100,000 Aboriginal and Torres Strait Islander children under 5 years of age in some communities. Between 2007 and 2010, there were 6 per 100,000 nationally. However, Hib disease is notified in Aboriginal and Torres Strait Islander children under 5 years of age at nearly 16 times the rate in other Australian children of the same age (see Table 1).

Figure 1: Hib notification rates, all Australian states, 1993 to 2010,* <15 years of age, by Indigenous status



* Notifications where the date of diagnosis was between 1 January 1993 and 31 December 2010.

Table 1: Hib notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

Age group (years)	Indigenous status	Notifications* (2007–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people)	
0–4	Indigenous	15	5.6	15.7	
	Other	19	0.4		
5–14	Indigenous	2	0.4	8.1	
	Other	5	0.0		
15–24	Indigenous	2	0.5	13.4	
	Other	4	0.0		
25–49	Indigenous	4	0.6	14.7	
	Other	12	0.0		
≥50	Indigenous	2	0.7	9.9	
	Other	20	0.1		
All ages‡	Indigenous	25	0.9	12.9	
	Other	60	0.1		

* Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Deaths/hospitalisations

Between 2006 and 2010, there were no deaths recorded (in selected states/territories*) with *Haemophilus* meningitis as either the main or underlying cause of death. Information on hospitalisations and deaths from other types of Hib disease was not available as there are no specific codes to separate those caused by Hib from those caused by other *Haemophilus* types.

Comment

Although vaccination has been very successful, making Hib meningitis and other diseases now rare, the fact that cases are still occurring at a higher rate in Aboriginal and Torres Strait Islander children compared with other Australian children is of concern. This difference is greatest in children 0 to 4 years of age. The persistently higher rates in this young age group are probably due to infection occurring before the vaccine can be fully effective. This highlights the importance of vaccinating Aboriginal and Torres Strait Islander babies on time.

* New South Wales, Northern Territory, Queensland, South Australia and Western Australia

Hepatitis A

The disease

Hepatitis A is a highly contagious liver infection caused by the hepatitis A virus (HAV). Hepatitis A causes inflammation that affects the liver's ability to function. It does not lead to chronic (long-term) infection.

Transmission

During the infectious period, HAV is found in large numbers in the faeces of people with the infection. Infection happens by accidentally ingesting just a small number of virus particles. Hepatitis A is transmitted when virus from a person with the infection is swallowed by another person (called faecal–oral transmission) through eating contaminated food or drinking contaminated water. It is also transmitted easily by children, but also by adults, through person-to-person contact like playing together or shaking hands. It can also be spread during sexual contact. Adults often catch hepatitis A from their children and childcare centres are a common place where the virus can be passed around.

People with the infection can pass on the virus to others from 2 weeks before symptoms develop until 1 week after jaundice appears (about 3 weeks in total). The virus can survive in the environment for several weeks in the right conditions (e.g. in sewage).

Signs and symptoms

In adults, infection with HAV causes fever, weight loss, tiredness and nausea, followed by dark urine, pale stools and jaundice (yellowing of the eyeballs and skin). Hepatitis A does not cause long-term liver disease and deaths are rare. Illness usually lasts at least a month, generally followed by complete recovery. Young children usually have no symptoms or have a very mild illness; they rarely get a severe illness like adults.

After having the infection, people are immune to HAV for the rest of their lives.

Vaccination

Since late 2005, Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia have had two doses of hepatitis A vaccine added to the routine vaccination schedule, given 6 months apart between 12 and 24 months of age. Check with your state or territory health department for individual details.

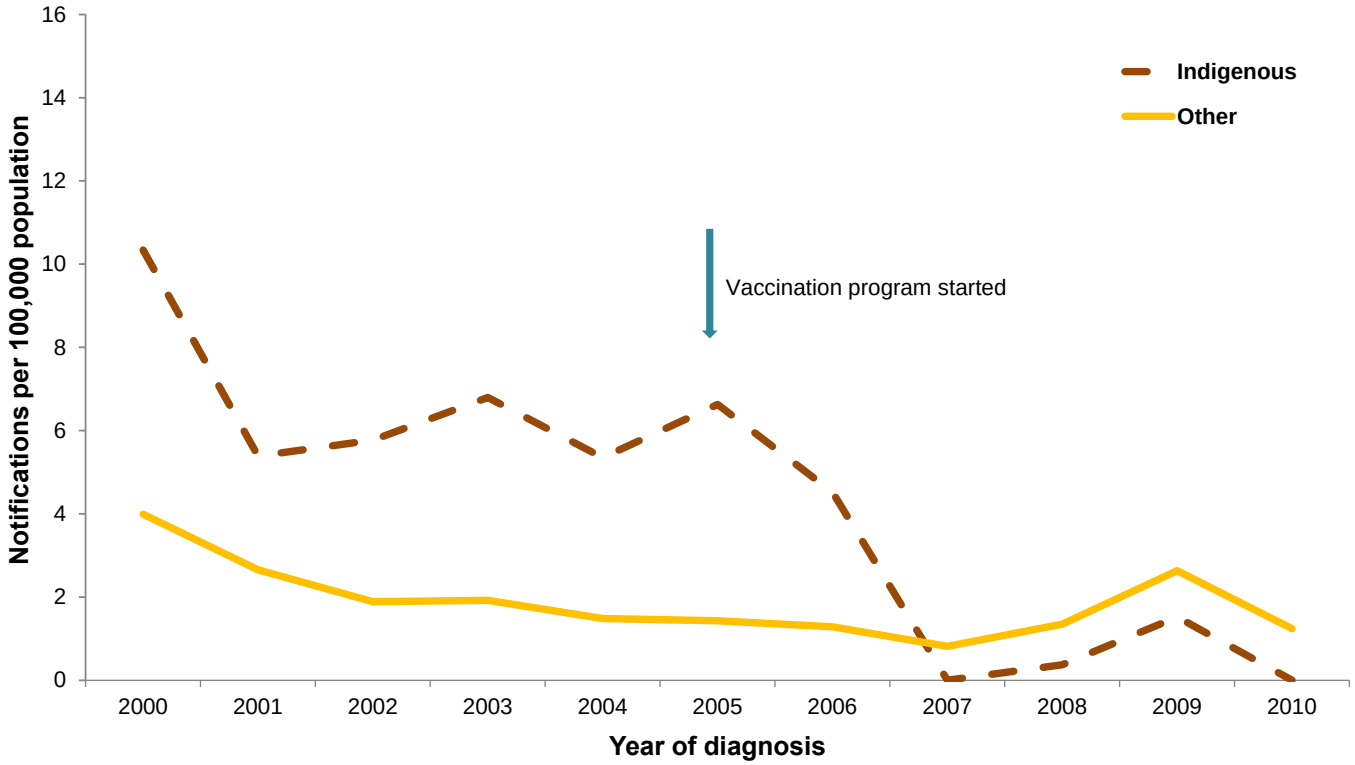
Who is most affected?

Living conditions play a big role in the spread of HAV infection. People in communities where homes are overcrowded, or who don't have enough water for washing, tend to get HAV infection at an earlier age. Communities with better living conditions have less chance of HAV infection, with most never having the infection or getting it late in life. Since Aboriginal and Torres Strait Islander people often have poorer living conditions than other people, HAV has been more common in Aboriginal and Torres Strait Islander children under 5 years of age. People who have not become immune to the infection at an early age more commonly get the infection as adults through activities such as sexual contact or travel overseas.

How common is it?

Before vaccination started, Aboriginal and Torres Strait Islander people of all ages were affected at 5 times the rate of other Australians. The majority of hepatitis A cases occurring in Aboriginal and Torres Strait Islander people affected young children and notification numbers decrease as age increases. The opposite occurs in other Australians (i.e. notifications increase as age does). Since 2005, when the vaccine was introduced, notifications have dropped dramatically (see Figure 2) and hepatitis A has become a rare disease in Aboriginal and Torres Strait Islander people. Between 2007 and 2010, there were 1,272 cases of hepatitis A notified, with only 11 (0.9%) of them being in Aboriginal or Torres Strait Islander people (see Table 2). This is a significant difference from the previous reporting period, 2003 to 2006, when there were 1,169 notifications, with 162 (14%) of them in Aboriginal or Torres Strait Islander people.

Figure 2: Hepatitis A notification rates, selected Australian states,* 2000 to 2010,† by Indigenous status



* Jurisdictions with satisfactory data quality over the whole time period (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia).

† Notifications where the date of diagnosis was between 1 January 2000 and 31 December 2010. Rates are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Table 2: Hepatitis A notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

Age group (years)	Indigenous status	Notifications* (2007–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people)	
0–4	Indigenous	1	0.4	0.3	
	Other	70	1.3		
5–14	Indigenous	5	1.0	0.5	
	Other	194	1.8		
15–24	Indigenous	3	0.7	0.3	
	Other	258	2.2		
25–49	Indigenous	2	0.3	0.2	
	Other	500	1.7		
≥50	Indigenous	0	0.0	0.0	
	Other	239	0.9		
All ages	Indigenous	11	0.5	0.3	
	Other	1,261	1.5		

* Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.

† Average annual age-specific rate per 100,000 population.

Hospitalisations

Sickness from hepatitis A is uncommon in Aboriginal and Torres Strait Islander adults, mainly because people are already immune after a childhood infection. Before vaccination was introduced, Aboriginal and Torres Strait Islander people (of all ages) were hospitalised at nearly 4 times the rate of other Australians, and children 4 years of age or younger were admitted at 157 times the rate of other Australian children of the same age.

Between July 2006 and June 2010, there were 869 hospitalisations for hepatitis A (in selected states/territories*), with 19 (2%) of them being in Aboriginal or Torres Strait Islander people (see Table 3). There has been a dramatic decrease in hospitalisations since vaccine introduction in 2005.

Table 3: Hepatitis A hospitalisations, selected Australian states, 2006/2007 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations* (2006–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people)	
0–4	Indigenous	0	0.0	0.0	
	Other	13	0.3		
5–14	Indigenous	2	0.4	0.8	 
	Other	48	0.5		
15–24	Indigenous	3	0.7	0.6	 
	Other	129	1.2		
25–49	Indigenous	14	2.2	1.8	 
	Other	342	1.2		
≥50	Indigenous	0	0.0	0.0	
	Other	323	1.3		
All ages‡	Indigenous	19	0.9	0.9	 
	Other	850	1.1		

* Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2006 and 30 June 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

Deaths

Between 2006 and 2010, there were no deaths due to hepatitis A recorded in Aboriginal or Torres Strait Islander people (in selected states/territories*); 6 deaths were reported in other Australians.

Comment

The targeted vaccination program for Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia has resulted in a big decrease in disease. Hepatitis A is now less common in Aboriginal and Torres Strait Islander people than in other Australians.

* New South Wales, the Northern Territory, Queensland, South Australia and Western Australia

Hepatitis B (acute)

The disease

Hepatitis B is a serious liver infection caused by the hepatitis B virus (HBV). For some people, the infection becomes chronic, leading to cirrhosis (a condition that causes permanent scarring of the liver) or even liver failure or liver cancer.

Once they have the infection (acute hepatitis B), people will either get rid of the virus from their blood (clear the infection) and have no further problems, or have chronic hepatitis B which sticks around for a long time. Chronic hepatitis B is usually infectious for life, and can cause many serious health complications in later life. The younger a person is when they get the infection, the higher their chance of having chronic hepatitis B.

There is no cure for hepatitis B but the vaccine can prevent the disease.

Transmission

Infection occurs from contact with blood or body fluids (e.g. blood, semen and vaginal secretions) of the person with the infection. This happens when there is blood-to-blood contact through broken skin (e.g. from sharing razors, toothbrushes and earrings), sex without using a condom, or re-using drug equipment. Hepatitis B can be passed on to a baby at birth from a mother with the infection.

Hepatitis B can also be spread in healthcare settings through needle-stick injury or contaminated instruments.

Signs and symptoms

Around half of adults and 90% of babies don't get sick and have no symptoms of infection. Those who do get symptoms can have fever, nausea and vomiting, tiredness, joint pain, abdominal pain, loss of appetite, jaundice (yellowing of eyeballs and skin), pale stools and dark urine.

More serious than these symptoms is that, even if they don't get sick at first, up to 90% of babies, 20 to 50% of young children aged 1 to 5 years, and 1 to 10% of older children and adults develop an infection that hangs around (becomes chronic). In a chronic infection, the body cannot get rid of the virus, and the infection continues for years. People with chronic hepatitis B infection may not feel sick, but many get cirrhosis and some get liver failure or liver cancer later in life.

Vaccination

All infants should receive a hepatitis B vaccine, paediatric formula, within 24 hours of birth (it must be given within 7 days of birth), plus three more doses of combination vaccines that include hepatitis B vaccine, given at 2, 4 and 6 months of age. Unvaccinated older children (aged 10 to 13 years) should receive two or three doses, depending on which vaccine is used. Adolescent vaccination will be phased out in future when all children reaching adolescence have been eligible for vaccination as infants, so check with your state or territory health department.

Who is most affected?

Before infant vaccination was introduced, hepatitis B infection in Aboriginal and Torres Strait Islander people was most common in early childhood. Hepatitis B immunisation programs were introduced for Aboriginal and Torres Strait Islander children born in all parts of Australia between the late 1980s and the early 1990s. The universal program for all Australian babies started in 2000. The age group most affected by hepatitis B now is adolescents and young adults, who were born before these immunisation programs started.

People of all ages in prison are at high risk.

How common is it?

Between 2007 and 2010, there were 1,023 cases of acute hepatitis B notified, with 72 (7%) of them being in Aboriginal or Torres Strait Islander people (see Table 4). Notification rates for all Australians increased with age, with those most affected being people between 15 and 49 years of age. About 91% of Aboriginal and Torres Strait Islander people affected were 15 to 49 years of age. This age group was born before the start of the universal vaccination program. As a result of higher rates in adults, hepatitis B in Aboriginal and Torres Strait Islander people occurred at 3 times the rate in other Australians.

Table 4: Hepatitis B* notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

Age group (years)	Indigenous status	Notifications† (2007–2010)			
		n	Rate‡	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	0	0.0	0.0	
	Other	9	0.2		
5–14	Indigenous	2	0.4	4.5	
	Other	9	0.1		
15–24	Indigenous	24	5.4	4.6	
	Other	138	1.2		
25–49	Indigenous	42	6.1	3.0	
	Other	625	2.1		
≥50	Indigenous	4	1.5	2.3	
	Other	170	0.6		
All ages§	Indigenous	72	3.5	3.1	
	Other	951	1.1		

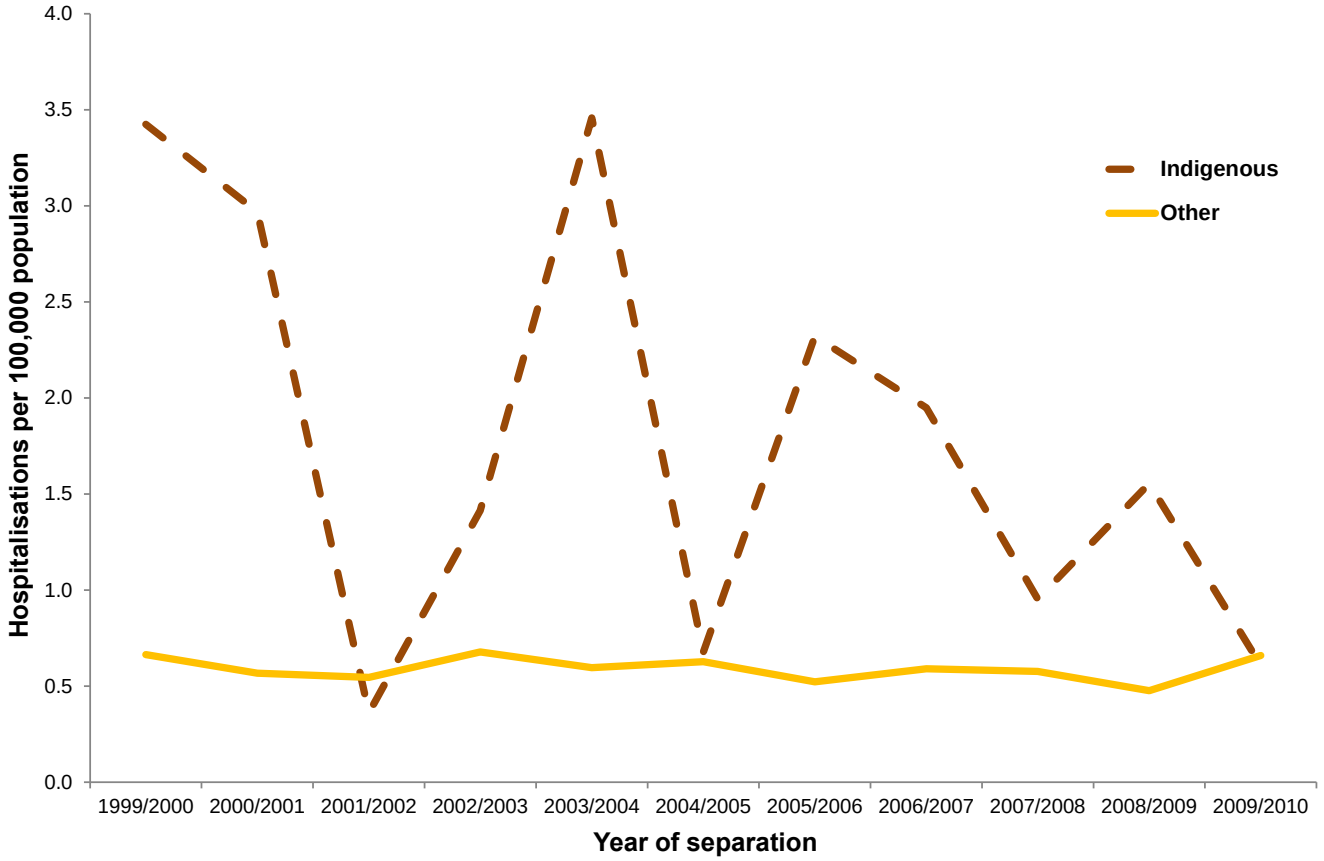
* Recorded as acute only.
† Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.
‡ Average annual age-specific rate per 100,000 population.
§ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Hospitalisations

Between July 2005 and June 2010, there were 711 hospitalisations for acute hepatitis B (in selected states/territories*), with 31 (5%) of them being in Aboriginal or Torres Strait Islander people (see Table 5). While the numbers are low, Aboriginal and Torres Strait Islander people are still being admitted to hospital at twice the rate of other Australians (see Figure 3).

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

Figure 3: Hepatitis B* hospitalisation rates, selected Australian states,† 1999/2000 to 2009/2010,‡ by Indigenous status



* Hepatitis B as principal cause of hospitalisation only.
† Jurisdictions with a satisfactory data quality over the whole time period (Northern Territory, Queensland, South Australia, Western Australia).
‡ Hospitalisations where the date of separation was between 1 July 1999 and 30 June 2010.

Table 5: Hepatitis B* hospitalisations, selected Australian states, 2005/2006 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations† (2005–2010)			
		n	Rate‡	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	0	0.0	0.0	
	Other	1	0.0		
5–14	Indigenous	1	0.2	6.8	 
	Other	3	0.0		
15–24	Indigenous	6	1.2	2.2	 
	Other	77	0.6		
25–49	Indigenous	19	2.4	1.9	 
	Other	447	1.3		
≥50	Indigenous	5	1.7	3.4	 
	Other	152	0.5		
All ages§	Indigenous	31	1.6	2.2	 
	Other	680	0.7		

* Principal cause of admission only.
† Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.
‡ Average annual age-specific rate per 100,000 population.
§ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

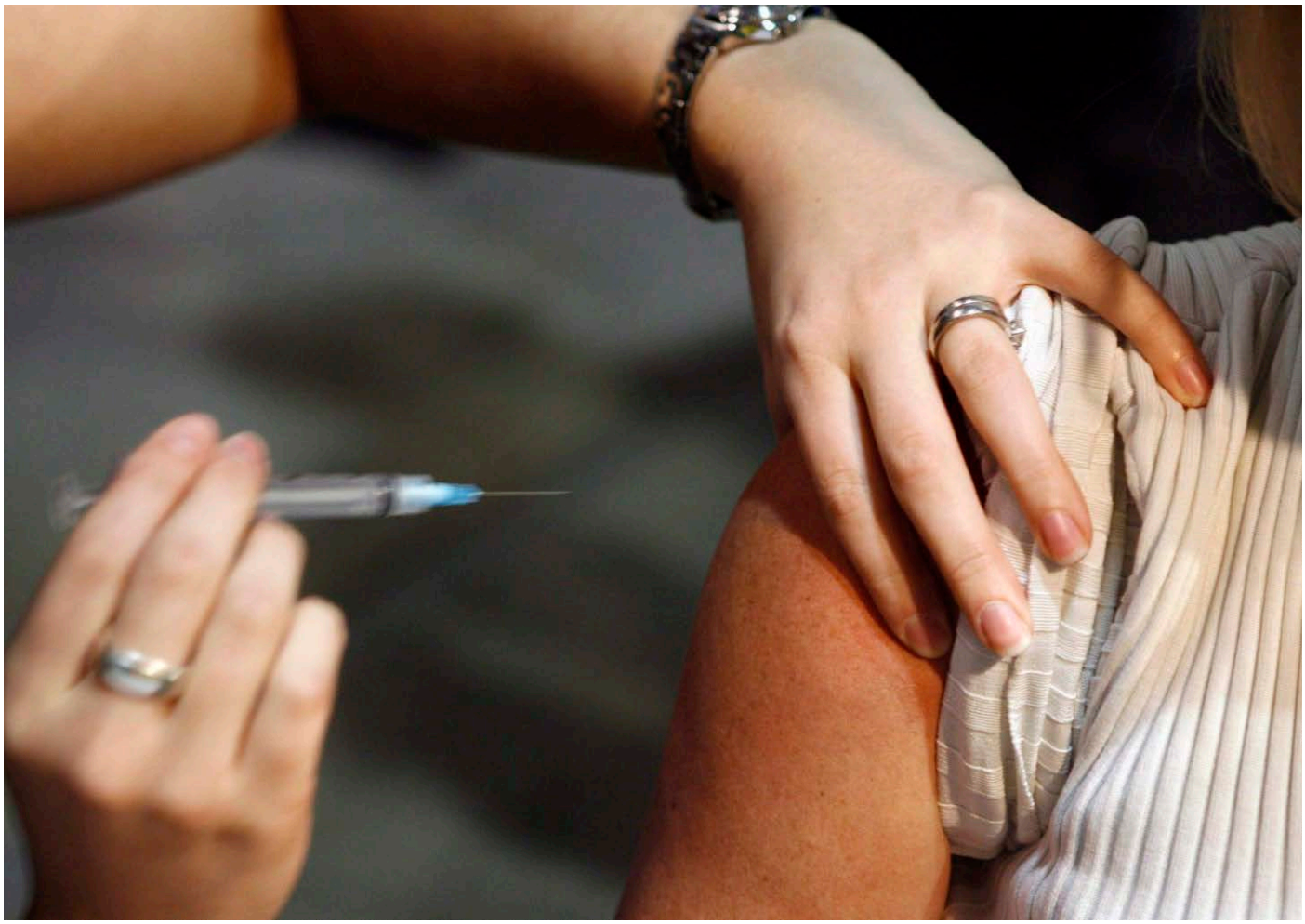
Deaths

Between 2006 and 2010, there were 32 deaths recorded (in selected states/territories*) with hepatitis B as the main cause, with between 6 and 9 of them reported in Aboriginal or Torres Strait Islander people. Hepatitis B was recorded as an underlying or contributing cause in 179 deaths during the same period, with 25 of these being in Aboriginal or Torres Strait Islander people.

Comment

As a result of universal hepatitis B vaccination, rates of acute hepatitis B are considerably lower in most Aboriginal and Torres Strait Islander people and other Australian children. However, new cases still occur in unvaccinated, young Aboriginal and Torres Strait Islander adults and other Australian adults. While there have been few reported infections in children and adolescents, there is still a higher rate of cases in Aboriginal and Torres Strait Islander people of all ages than in other Australians.

These data may underestimate acute hepatitis B disease as they may not include cases where people have acute infection but have no symptoms. The data do not reflect the large burden from chronic hepatitis B infection, with its later complications such as cirrhosis and liver cancer.



* New South Wales, the Northern Territory, Queensland, South Australia and Western Australia

Human papillomavirus

The disease

Human papillomavirus (also called HPV) is a very common sexually transmitted infection. HPV is the name for a group of more than 100 related viruses. Different HPV types can affect different parts of the body. Some types infect the genital area; others cause common warts on the hands, plantar warts on the feet, and warts and other sores in the mouth and upper respiratory system. Some types don't cause any symptoms at all.

In most cases, the infection clears up naturally without treatment in about 12 to 24 months. While most infections don't lead to cancer, there are some types of HPV that can cause cancer of the cervix or of the penis. When cervical cancer does develop, HPV is often found to be the cause. A woman can be unaware that she has HPV infection of the cervix until she has a Pap test.

There is no cure for HPV infection, but the development of cancer can be prevented if it is detected early by a Pap test. All sexually active women should have a Pap test every 2 years, from 18 years of age or 2 years after first having sex (whichever is later) up until 70 years of age.

Transmission

Infection occurs when the virus enters the body through a cut, scratch or tiny break in the skin. The virus is spread mainly by skin-to-skin contact. It is not spread in blood or other body fluids.

Genital HPV is normally spread through sexual contact with a person who has the virus. This includes vaginal or anal sex. HPV infections that cause oral or upper respiratory lesions are spread through oral sex. Condoms can protect against many sexually transmitted infections but they give incomplete protection against HPV as they do not cover all of the genital skin. Anyone who has ever had sexual contact could have HPV. The greater the number of sexual partners a person has, the more likely they are to get a genital HPV infection. Having sex with someone who has had many sex partners also increases the risk.

It is rare for a mother with an HPV infection to give the virus to her baby during birth.

Signs and symptoms

HPV infections are often undetected because they don't cause symptoms, and genital warts often take months to years to develop. In women, warts may be on the cervix and therefore not visible. The signs and symptoms that do appear depend on the type of HPV infection; symptoms can be common warts, plantar warts, female and male genital warts, or cervical cancer. Even if someone doesn't have symptoms, they can still spread the virus to someone else.

A person usually becomes aware of HPV from an abnormal Pap test result or if genital warts appear. If genital infection with certain HPV types lasts more than 2 years, there is a risk of developing cervical cancer. Cervical cancer often has no symptoms in the early stages. A common symptom of cancer following genital HPV infection is vaginal bleeding, such as heavy menstrual bleeding, bleeding between periods or bleeding after vaginal sex.

Vaccination

In Australia, the HPV vaccination program started in April 2007. There are two vaccines available, Gardasil and Cervarix. Both vaccines protect women against the types of HPV that cause 7 out of 10 cases of cervical cancer (types 16 and 18), while Gardasil also provides protection against the types that cause 9 out of 10 cases of genital warts (types 6 and 11).

The National Immunisation Program provides free vaccine for 12 to 13-year-old girls and, starting in 2013, boys of the same age, through school-based programs. Three doses are required, with doses at 1 to 2 months and 6 months after the first dose. Contact your state or territory health department for details.

A catch-up program for 13 to 18-year-old girls attending school and 16 to 26-year-old women outside school finished in 2008, and catch-up for boys aged 14 to 15 years goes till the end of 2014.

Who is most affected?

HPV infection rates are highest in young women, usually peaking soon after they become sexually active. However, all sexually active adolescents and young adults are at risk.

Disease patterns

There is no clear difference in rates of HPV infection, or early stages of cervical pre-cancer, in Aboriginal and Torres Strait Islander women compared with other women. However, use of cervical screening is not as high for Aboriginal and Torres Strait Islander women, leading to cervical cancer being 2 to 5 times more common, and deaths from cervical cancer around 10 times more common, in Aboriginal and Torres Strait Islander women than in other women. These differences are even greater in remote areas.

Since HPV vaccines were introduced, there have been significant decreases in high-grade cervical lesions (which can develop into cervical cancers) in girls under 18 years of age. There have been no significant decreases in women aged 18 to 20 years.[1] From 2007 to 2011, there was also a significant decrease (93%) in genital warts in Australian females under 21 years of age and in females 21 to 30 years of age (73%). There was also a noticeable decrease in genital warts in heterosexual males under 30 years of age, which suggests some herd immunity as males did not begin receiving vaccine until 2013.[2]

Unfortunately though, there is no information available yet on the impact of HPV vaccine in Aboriginal and Torres Strait Islander people.

Comment

The HPV vaccine is expected to reduce cervical cancer in Aboriginal and Torres Strait Islander and other Australian women, but it does not protect against all strains of HPV that cause cervical cancer. It is still important for women to keep up to date with regular Pap tests, so that early changes caused by HPV can be monitored and treated to prevent cervical cancer.

References

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2. Ali H, Donovan B, Wand H, Read TR, Regan DG, Grulich AE, et al. Genital warts in young Australians five years into national human papillomavirus vaccination programme: national surveillance data. *BMJ* 2013;346:f2032.

Seasonal influenza, pneumonia and pandemic influenza

The disease

Influenza ('the flu') is a respiratory illness caused by infection with influenza type A or B viruses. Epidemics normally occur each winter. The virus often changes, so people can have the infection several times during their lives, and immunity from the vaccine wears off. A new vaccine must be made each year because the virus type keeps changing and vaccination every year is necessary to protect against influenza. Big changes to the virus can result in new strains that cause 'pandemics' (epidemics across many countries). The pandemic strains can spread very quickly because immunity to previous strains might not protect against the new pandemic strains.

Transmission

The influenza virus is very contagious from droplets sent into the air from coughing, sneezing or talking by a person with influenza infection. The virus can also land on surfaces such as table tops or door handles, making it easy for people to pick up the virus and transfer it to their mouth or nose. Children often pass the virus to adults.

Signs and symptoms

People often call any illness with a runny nose or cough the flu, but most of these colds are actually caused by bacteria or other viruses. Real influenza is a serious illness. The symptoms can come on very fast with one or more of the following: fever, cough, sore muscles and joints, tiredness and headache. The most common complication of influenza is pneumonia.

Vaccination

Since January 2010, free influenza vaccine provided each year under the National Immunisation Program has been extended to all Aboriginal and Torres Strait Islander people aged 15 years or over, anyone aged 6 months or over with a chronic health problem, and all pregnant women. For other Australians, free vaccine is provided for everyone aged 65 years or over.

In 2009 a pandemic influenza vaccine was developed and made available to all Australians aged 6 months or over. For the next several years it was then included in the seasonal influenza vaccine.

Who is most affected?

Anyone can get influenza but young children are most likely to get sick from it. Elders and people of any age with other illnesses, especially with lung disease, heart disease or diabetes, are the most likely to become severely ill or die.

How common is it?

Influenza cases are not included in this report because there is not enough information on whether or not the people who tested positive were Aboriginal or Torres Strait Islander. Better data are available when Aboriginal and Torres Strait Islander people are hospitalised for influenza, and that is provided below. It is known, though, that each year between 5% and 20% of people are sick with seasonal influenza. School children are often the most commonly sick, but young children and the elderly get more serious disease.

Hospitalisations

Between July 2005 and June 2010, there were 22,998 hospitalisations for influenza (in selected states/territories*), with 2,245 (10%) of them being in Aboriginal or Torres Strait Islander people (see Table 6). This is likely to be an underestimate as many cases of pneumonia start off as influenza, especially in winter, but are not tested or recorded as influenza. Aboriginal and Torres Strait Islander people are hospitalised at a higher rate for all ages but those over 50 years of age are hospitalised at over 6 times the rate of other Australians.

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

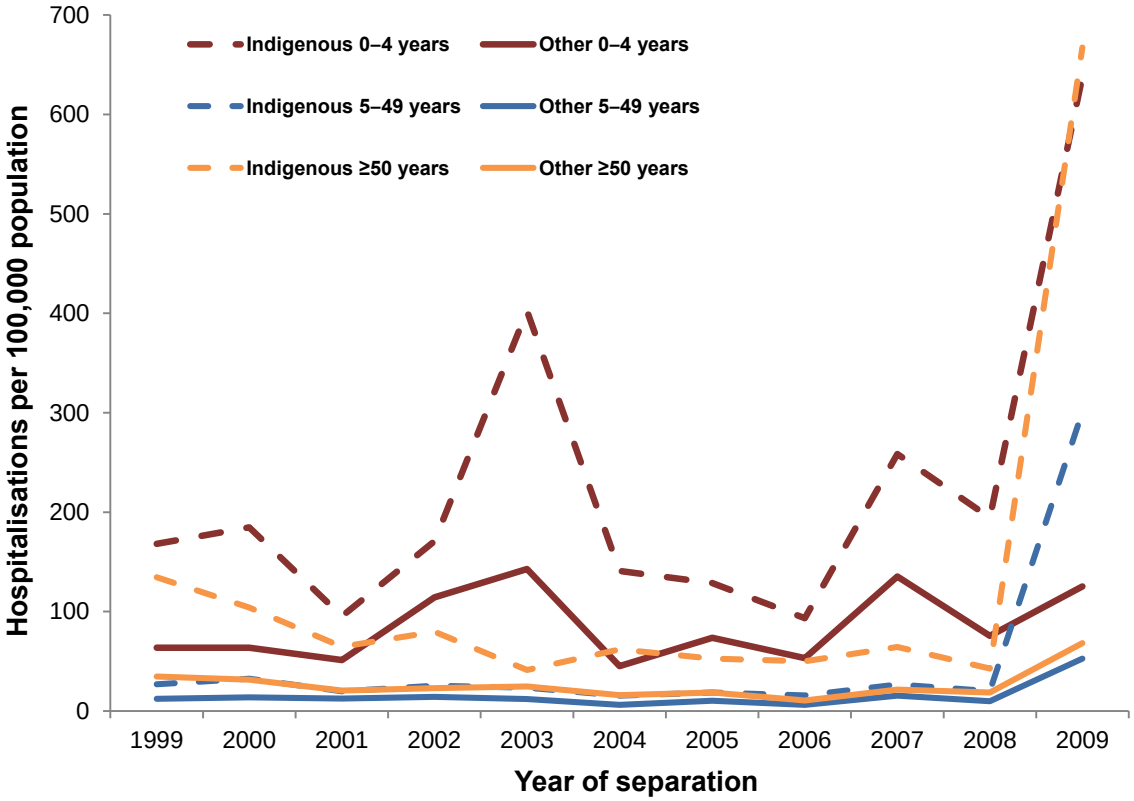
Table 6: Influenza hospitalisations, selected Australian states, 2005/2006 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations* (2005–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	657	209.7	2.9	
	Other	4,435	72.0		
5–14	Indigenous	238	38.4	2.6	
	Other	1,876	14.9		
15–24	Indigenous	264	53.3	3.4	
	Other	2,178	15.9		
25–49	Indigenous	678	85.2	5.4	
	Other	5,603	15.7		
≥50	Indigenous	408	136.1	6.3	
	Other	6,661	21.6		
All ages‡	Indigenous	2,245	97.2	4.6	
	Other	20,753	21.0		

* Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Figure 4 shows hospitalisations from 1999 to 2009, and in every age group Aboriginal and Torres Strait Islander people were admitted to hospital much more often than other Australians, especially in more severe years like 2003 and 2007. The most severe year was 2009, which was the pandemic year (discussed later).

Figure 4: Influenza* hospitalisation rates, selected Australian states,† 1999 to 2009,‡ by age group and Indigenous status



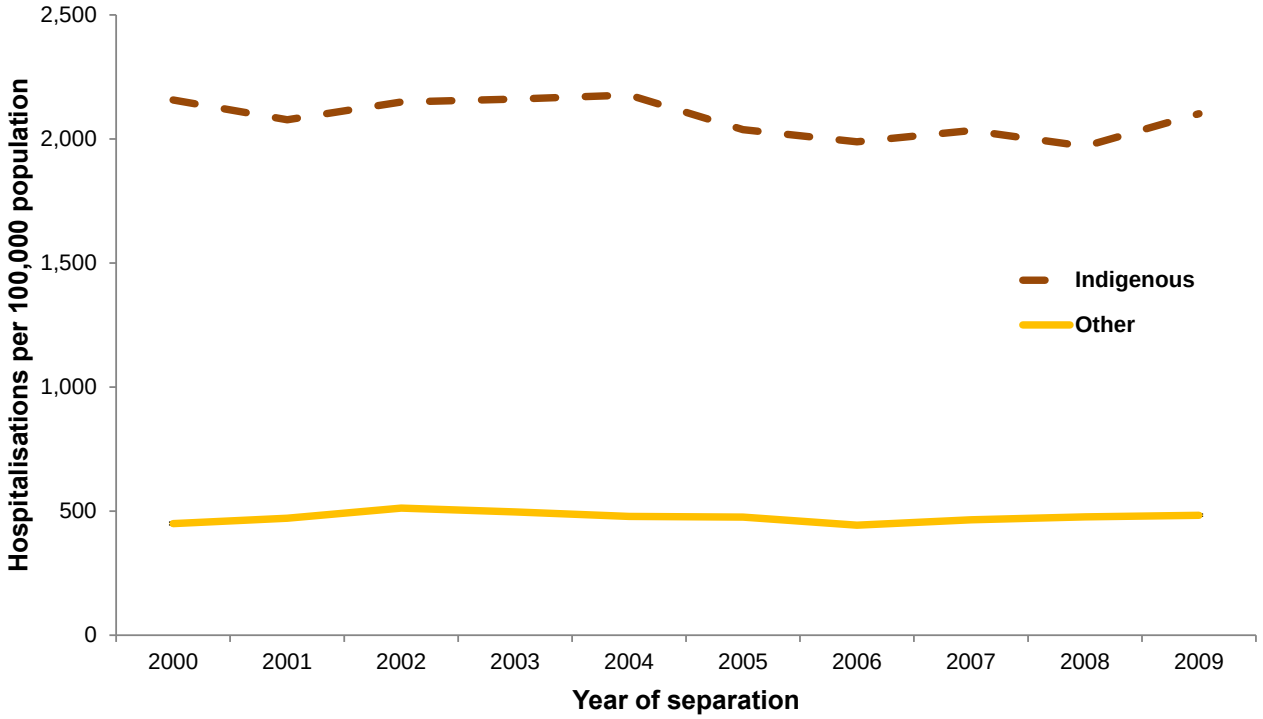
* The ICD-10-AM codes used to identify influenza hospitalisations were: J09 (influenza due to certain identified influenza viruses), J10 (influenza due to identified influenza virus) and J11 (influenza, virus not identified).

† Jurisdictions with satisfactory data quality over the whole time period (Northern Territory, Queensland, South Australia, Western Australia).

‡ Hospitalisations where the date of separation was between 1 January 1999 and 31 December 2009.

Figure 5 shows that, from 2000 to 2009, when influenza and pneumonia hospitalisations were combined Aboriginal and Torres Strait Islander people were admitted to hospital at nearly 5 times the rate of other Australians.

Figure 5: Influenza and pneumonia* hospitalisation rates, selected Australian states,† 2000 to 2009,‡ by Indigenous status



* The ICD-10-AM codes used to identify hospitalisations were J09–J18 (Influenza and/or pneumonia).
† Jurisdictions with satisfactory data quality over the whole time period (Northern Territory, Queensland, South Australia, Western Australia).
‡ Hospitalisations where the date of separation was between 1 January 2000 and 31 December 2009. Rates are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Deaths

Between 2006 and 2010, there were 235 deaths recorded (in selected states/territories*) with influenza as the underlying cause, with 14 of them reported in Aboriginal or Torres Strait Islander people.

There were 7,879 deaths recorded with influenza or pneumonia as the underlying cause, with 183 in Aboriginal or Torres Strait Islander people.

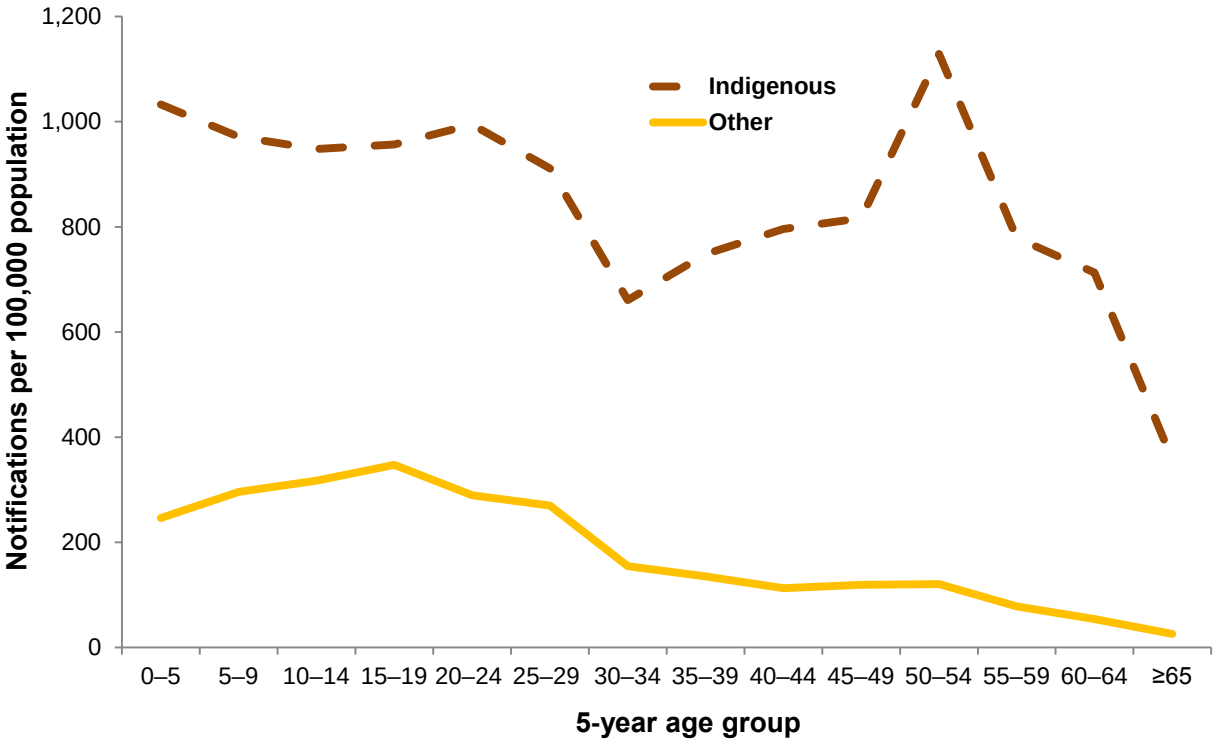
There were 341 deaths recorded with influenza as the underlying or a contributing cause, with between 20 and 23 of them in Aboriginal and Torres Strait Islander people, and 58,268 deaths with pneumonia as the underlying or a contributing cause, with 1,120 in Aboriginal or Torres Strait Islander people.

Pandemic influenza

During 2009, a new strain of influenza virus appeared – pandemic H1N1. It spread to Australia within a few months of its discovery, where the first person to die was a young Aboriginal man from Western Australia. Australia had a combined total of 37,683 lab tested notifications of pandemic influenza A (H1N1). Testing for H1N1 was reduced early during the epidemic so the true numbers of people infected are much higher. Of the 37,683 cases notified, 4,063 (11%) were reported in Aboriginal and Torres Strait Islander people, 18,832 (50%) were in other Australian people, and for 14,788 (39%) the person's Indigenous status was unknown. While the burden of disease was over 5 times higher in Aboriginal and Torres Strait Islander people, the age groups most affected were children and adults between 50 and 54 years of age (see Figure 6).

* New South Wales, Northern Territory, Queensland, South Australia and Western Australia

Figure 6: Pandemic influenza A (H1N1) 2009 infection reporting rates to NetEpi, Australia, 2009, by age group



Source: Wallace P. Chapter 4: H1N1 2009 infections in Australia's Indigenous population 2009 [thesis chapter]. Canberra: Australian National University; 2011.

The total number of hospitalisations during the pandemic was 4,993, with 830 (17%) of them in Aboriginal and Torres Strait Islander people (see Table 7). Aboriginal and Torres Strait Islander people were hospitalised at 8.5 times the rate of other Australians and 50 to 54 year olds were hospitalised the most.

During the pandemic, pregnant women were greatly affected. Of the total notifications, 568 (1.5%) of them were in pregnant women, with 55 (10%) of those being Aboriginal and Torres Strait Islander women. Hospitalisation for pregnant women was high with 300 (53%) notified cases being admitted to hospital; 44 (15%) of those hospitalised were Aboriginal and Torres Strait Islander women. Also, 33% of all intensive care unit (ICU) admissions were pregnant women. Aboriginal and Torres Strait Islander people were admitted to ICU at nearly 8 times the rate of other Australians.

It is well known that seasonal influenza is more severe in people who have existing illnesses such as lung disease, heart disease or diabetes, and this was also the case for all Australians during the 2009 pandemic. More than that though, Aboriginal and Torres Strait Islander people who had renal failure or diabetes were diagnosed with H1N1 flu and hospitalised at twice the rate of other Australians with the same health problems. Of Aboriginal and Torres Strait Islander people who were hospitalised, nearly 50% had an existing illness.

There was a total of 191 deaths from H1N1, with 23 (12%) of them in Aboriginal or Torres Strait Islander people, which was nearly 6 times the rate in other Australians (see Table 7).

Table 7: Pandemic influenza A (H1N1) 2009 infections, Australia, 2009, by Indigenous status

	Indigenous			Other			Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
	n	Rate*	Median age (95% CI)	n	Rate*	Median age (95% CI)		
Notifications	4,063	892.7	18 (18–19)	33,620	173.3	21 (21–22)	5.2	
Hospitalisations	830	182.4	31 (28–34)	4,163	21.5	31 (29–32)	8.5	
ICU admissions	77	16.9	42 (36–44)	412	2.1	43 (40–47)	7.9	
Deaths	23	5.1	50 (42–56)	168	0.9	50 (47–55)	5.8	

* Age-standardised rate per 100,000 population, standardised to 2006 non-Indigenous population.

Source: Wallace P. Chapter 4: H1N1 2009 infections in Australia's Indigenous population 2009 [thesis chapter]. Canberra: Australian National University; 2011.

Comment

The higher levels of serious disease from influenza and other related conditions in Aboriginal and Torres Strait Islander people than in other Australians led to setting up a special program, the National Indigenous Pneumococcal and Influenza Immunisation program. Vaccination continues to be important for Aboriginal and Torres Strait Islander adults between 15 and 49 years of age who have an underlying disease because they have a much greater risk of severe influenza disease. Young children are still experiencing a higher disease burden, with hospitalisation rates in children under 5 years of age still double those of other Australian children the same age. Children are able to pass influenza on to their parents and grandparents, especially when there is overcrowding in homes.

It is important to flag influenza vaccination as an important way to reduce pneumonia and other serious complications, which are common causes of serious illness and death in both younger and older Aboriginal and Torres Strait Islander adults.

Measles

The disease

Before vaccination was introduced, measles infection was very common in childhood. Measles is a respiratory infection caused by a highly contagious virus. It can have serious complications. Even though the vaccine was introduced in Australia in 1969, serious epidemics of measles occurred in the 1970s and 1980s among Aboriginal and Torres Strait Islander children in Central Australia, with a significant number of deaths.

Transmission

The measles virus is found in the throat and nose of people with the infection. When someone with measles coughs, sneezes or talks, infected droplets spray into the air, where other people can breathe them in. The infected droplets can live in the air or on surfaces where they remain active and contagious for up to 2 hours. Measles is one of the most easily spread of all human infections. Just being in the same room as someone with measles can result in infection.

People with measles are usually infectious from 4 days before the rash appears until 4 days after. The rash usually appears around 14 days after exposure to the measles virus.

Signs and symptoms

The typical symptoms are fever, cough, sore throat, runny nose and conjunctivitis (inflamed red eyes), followed by a red, blotchy skin rash all over the body. It can take 10 to 12 days for a person to show any signs of infection or feel unwell after they get the infection. While most children completely recover, some will be affected by complications such as otitis media (middle ear infection) or serious problems like pneumonia and encephalitis (brain infection) which can lead to death or brain damage.

Vaccination

Two doses of the vaccine containing measles, mumps and rubella (MMR) are given routinely to children at 12 and 18 months of age. Since July 2013, the 18-month dose includes varicella (MMRV). Children who turned 18 months old before the introduction of the 18-month MMRV dose should receive their MMR vaccine at 4 years of age, as was previously recommended. To ensure older people are protected against measles, it is important that everyone born after 1966 has had two doses of MMR vaccine.

Who is most affected?

People of all ages who have not been immunised are at risk of measles, but most cases these days are in young adults who were not vaccinated as children, and babies too young to be vaccinated.

How common is it?

Notification rates are very low these days because of universal measles vaccination. Between 2007 and 2010, there were 251 cases of measles notified, with only 3 (1%) of them in Aboriginal or Torres Strait Islander people (see Table 8). The notification rates for measles in Aboriginal and Torres Strait Islander people and other Australians are not significantly different.

Table 8: Measles notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

Age group (years)	Indigenous status	Notifications* (2007–2010)				
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people		
0–4	Indigenous	1	0.4	0.6		
	Other	31	0.6			
5–14	Indigenous	1	0.2	0.3		
	Other	64	0.6			
15–24	Indigenous	0	0.0	0.0		
	Other	65	0.6			
25–49	Indigenous	1	0.1	0.5		
	Other	85	0.3			
≥50	Indigenous	0	0.0	0.0		
	Other	3	0.0			
All ages	Indigenous	3	0.1	0.5		
	Other	248	0.3			

* Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.
† Average annual age-specific rate per 100,000 population.

Hospitalisations

Before vaccination was introduced, hospitalisation often occurred due to measles complications such as pneumonia, encephalitis and otitis media.

Between July 2005 and June 2010, there were 139 hospitalisations for measles (in selected states/territories*), with only 6 (4%) of them being in Aboriginal or Torres Strait Islander people (see Table 9).

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

Table 9: Measles hospitalisations, selected Australian states, 2005/2006 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations* (2005–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	4	1.3	2.2	
	Other	35	0.6		
5–14	Indigenous	2	0.3	4.1	
	Other	10	0.1		
15–24	Indigenous	0	0.0	0.0	
	Other	26	0.2		
25–49	Indigenous	0	0.0	0.0	
	Other	56	0.2		
≥50	Indigenous	0	0.0	0.0	
	Other	6	0.0		
All ages	Indigenous	6	0.2	1.8	
	Other	133	0.1		

* Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.
† Average annual age-specific rate per 100,000 population.

Deaths

Between 2006 and 2010, there were no deaths due to measles reported for any Australians.

Comment

Measles notifications and hospitalisations are now at very low levels in Australia. Measles has been well controlled in both Aboriginal and Torres Strait Islander people and other Australians. The small number of cases that are reported each year have largely been limited to small outbreaks linked to people who have been infected overseas. The low rates of sickness and no deaths from measles since 2000 show how effective the universal immunisation program has been. High vaccine coverage has been responsible for this success. To keep measles under control in Australia it is important to maintain high coverage rates.

Meningococcal disease

The disease

Meningococcal disease is caused by an infection with meningococcus bacteria (*Neisseria meningitidis*).

There are several types (serogroups) of meningococcus bacteria. The three most common strains are serogroups A, B and C. The most common strains in Australia are serogroups B and C. Serogroup A is associated with poor living conditions while B and C are also commonly found in developing countries.

Meningococcal disease is a serious illness that usually causes meningitis (infection of the membranes covering the brain and spinal cord) or septicaemia (infection in the bloodstream), or a combination of the two. People with meningococcal disease can become extremely sick very quickly and, without immediate treatment, can die.

Transmission

Meningococcal bacteria are not easily spread from person to person. They are only found in humans and cannot live for more than a few seconds outside the body. They are only passed from person to person by regular, close household and intimate contact with secretions from the back of the nose and throat. The bacteria are spread by coughing, sneezing and kissing when people are in close contact such as family members, young children playing together, or boyfriends and girlfriends.

The bacteria cannot be picked up from drinking water, swimming pools, buildings or factories, or by sharing drinks, food or cigarettes.

Signs and symptoms

Early symptoms of meningococcal disease such as fever and sore throat can be similar to many other diseases, making it hard to diagnose at first. Symptoms can include some or all of the following: a sudden fever, headache, neck stiffness, joint pain, a rash of red-purple spots or bruises, dislike of bright lights, nausea and vomiting. Young children can have fever, irritability, drowsiness or difficulty waking up, high-pitched crying and not eating normally.

Meningitis

Meningitis often results in serious problems such as brain damage (creating memory loss, learning difficulties and speech problems) and hearing loss. The most common symptoms are fever, headache and stiff neck.

Septicaemia

Septicaemia is the most dangerous form of meningococcal disease. The most common symptoms are fever, limpness, vomiting, cold hands and feet, the shakes and a rash. The rash can go from small dots to big blotches covering most of the body very rapidly. Septicaemia can cause loss of arms or legs, or death.

Vaccination

One dose of meningococcal C (MenC) vaccine or Hib-MenC combination vaccine should be given at 12 months of age. There are also combination vaccines against serogroups A, C, W and Y that give either short-term (3 years) or long-term protection. These are usually given to people travelling to countries that have a lot of serogroup A disease, such as sub-Saharan Africa, Saudi Arabia and India. This vaccine cannot be given to children under the age of 2 years.

Who is most affected?

Meningococcal disease is spread in environments where there is a lot of close contact between people, such as crowded homes, childcare centres (for children under 5 years of age), and shared accommodation or night clubs (adolescents and young adults).

In Australia, serogroup A used to cause epidemics in Aboriginal and Torres Strait Islander communities but there have not been any cases for more than 10 years. The most common serogroups causing infection recently have been B and C.

A particular strain of serogroup B caused an epidemic mainly in Maori and Pacific Islander children under 5 years of age in New Zealand. This has been controlled through a New Zealand vaccination program which ran from 2004 to 2008.

In Australia, children under 5 years of age and young adults between 15 and 24 years of age are most at risk.

Disease caused by serogroup C has become rare in Australia since the introduction of the meningococcal C vaccine to the National Immunisation Program Schedule. Serogroup B disease, though, is still common, more so in Aboriginal and Torres Strait Islander children under 5 years of age.

How common is it?

Between 2007 and 2010, there were 1,079 cases of meningococcal disease notified, with 104 (11%) of them being in Aboriginal or Torres Strait Islander people (see Table 10). Meningococcal disease in Aboriginal and Torres Strait Islander people was notified at nearly 3 times the rate in other Australians. Aboriginal and Torres Strait Islander children under 5 years of age have the highest recorded rates of meningococcal disease, 4 times the rates in other Australian children the same age. The rate was also higher in Aboriginal and Torres Strait Islander adolescents up to 14 years of age and adults over 25 years of age, up to 4 times higher than in other Australians in the same age groups.

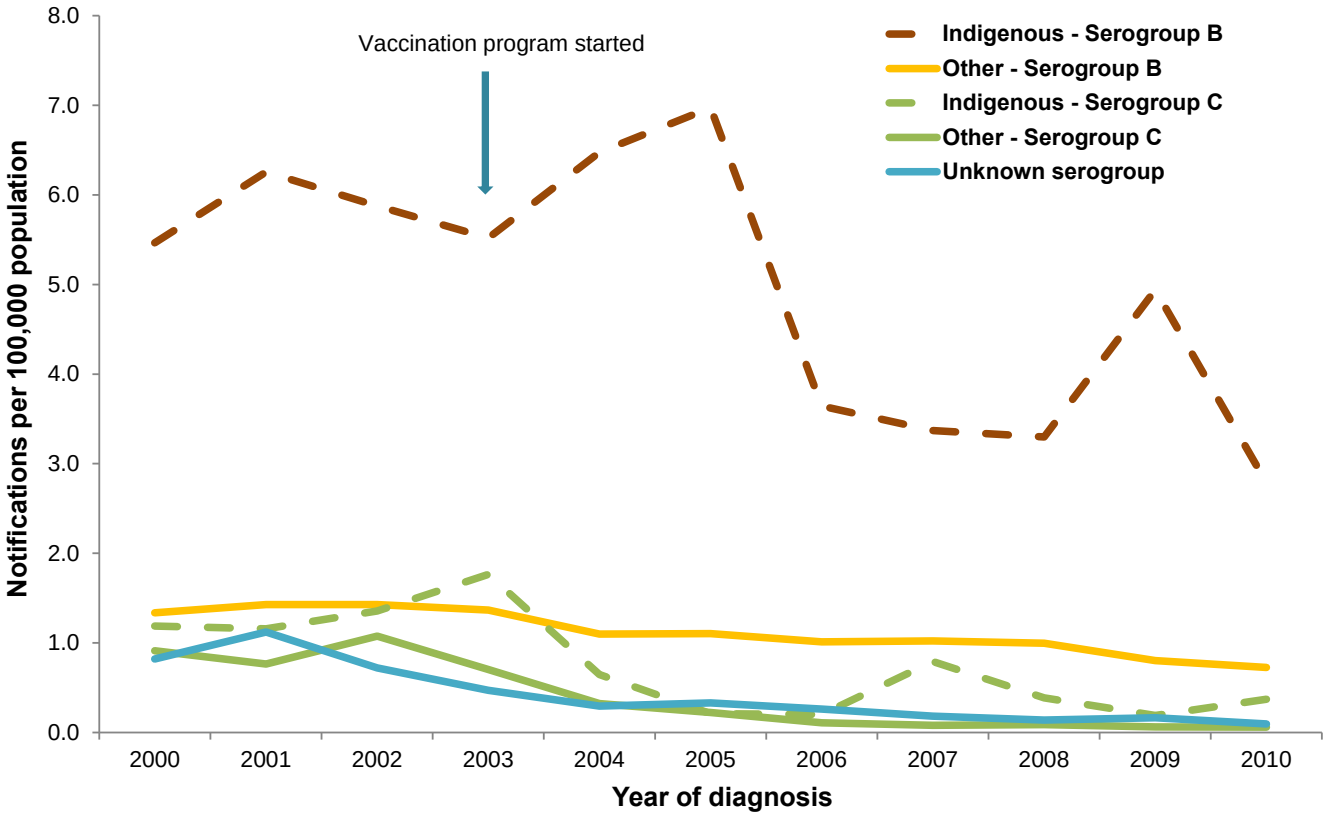
Most meningococcal disease is now due to serogroup B – 82% in Aboriginal and Torres Strait Islander people and 86% in other Australians (see Figure 7).

Table 10: Meningococcal disease notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

Age group (years)	Indigenous status	Notifications* (2007–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	62	23.2	3.8	
	Other	322	6.1		
5–14	Indigenous	21	4.1	4.1	
	Other	105	1.0		
15–24	Indigenous	8	1.8	0.8	
	Other	283	2.4		
25–49	Indigenous	9	1.3	2.7	
	Other	147	0.5		
≥50	Indigenous	4	1.5	3.4	
	Other	118	0.4		
All ages‡	Indigenous	104	3.3	2.7	
	Other	975	1.2		

* Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Figure 7: Meningococcal disease notification rates, selected Australian states,* 2000 to 2010,† by Indigenous status and serogroup



* Jurisdictions with satisfactory data quality over the whole time period (New South Wales, Northern Terrirtory, Queensland, South Australia, Victoria, Western Australia).

† Notifications where the date of diagnosis was between 1 January 2000 and 31 December 2010.

Hospitalisations

Between July 2005 and June 2010, there were 2,230 hospitalisations for meningococcal disease (in selected states/territories*), with 189 (9%) of them being in Aboriginal or Torres Strait Islander people. Aboriginal and Torres Strait Islander people were hospitalised at twice the rate of other Australians overall, and in children under 5 years of age at more than 3 times the rate of other Australian children that age.

Deaths

Between 2006 and 2010, there were 42 deaths due to meningococcal disease (in selected states/territories†), with between 1 and 4 deaths reported in Aboriginal and Torres Strait Islander children under 5 years of age and between 1 and 4 deaths in those 5 to 49 years of age.

Comment

Routine vaccination that started in 2003 against meningococcal serogroup C has dramatically reduced disease caused by that serogroup in Australia. Meningococcal serogroup B disease now accounts for more than 80% of the Aboriginal and Torres Strait Islander cases; a vaccine for this serogroup will be important for decreasing the disease in all Australians. However, as meningococcal disease due to types not covered by the meningococcal C vaccine is still common, if meningococcal disease is suspected, it is important to get medical treatment quickly.

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia
† New South Wales, Northern Territory, Queensland, South Australia and Western Australia

Pertussis (Whooping cough)

The disease

Also known as whooping cough, pertussis is a very infectious coughing illness caused by *Bordetella pertussis* bacteria. Although it starts like an ordinary cold, it can turn more serious, particularly in very young babies.

Transmission

Bordetella pertussis bacteria are spread from person to person through droplets that are coughed or sneezed into the air by someone who already has the pertussis infection. Without treatment, a person with the infection can spread the bacteria for up to 3 weeks but pertussis is most contagious as soon as the cough starts.

Signs and symptoms

The pertussis bacteria irritate the airways, which causes uncontrollable coughing. The bacteria also produce inflammation that narrows the breathing tubes in the lungs which makes you gasp for air after a fit of coughing.

Pertussis normally starts like an average cold with a runny nose, tiredness and usually no fever or only a mild one. These symptoms are followed by an irritating cough which may have the characteristic whoop. In babies and small children, the coughing fits can be severe and end with a strange whooping noise when the child tries to get its breath. Babies and small children can turn blue from lack of oxygen during these coughing fits and sometimes die. In older children, teenagers and adults, pertussis generally does not cause hospitalisation or death but can go on for weeks or months and interfere with work and sleep. The cough can last for months, even after antibiotic treatment is completed and the person is no longer infectious. Vomiting after coughing is common.

Vaccination

Three doses of combination diphtheria–tetanus–acellular pertussis (DTPa) vaccine are given, at 2, 4 and 6 months of age, with the first booster dose at 4 years of age and another booster between 10 and 15 years of age. The first dose of this vaccine (and other vaccines due at the same time) can be given as early as 6 weeks of age, and this is recommended in most states and territories to provide earlier protection from pertussis.

The vaccine given to adolescents between 10 and 15 years of age should be the adolescent/adult formulation, which has lower amounts of the diphtheria and acellular pertussis components (dTpa).

DTPa vaccine does not give lifelong protection against pertussis. Therefore, children must have all of the doses, including the boosters at 4 years of age and again at 10 to 15 years of age, in order to be protected as much as possible. Vaccination is also recommended for healthcare workers, people planning a pregnancy or people caring for young babies, to help protect babies who are too young to receive vaccine; this is called ‘cocooning’. Vaccine has been provided free of charge for this in some states and territories. Check with your state or territory health department to see who is eligible. Boosters are also recommended for adults at 50 and 65 years of age if they have not received a pertussis-containing vaccine in the last 10 years.

Who is most affected?

These days pertussis is common in all age groups. The disease is most severe in unimmunised babies under 6 months of age. They are affected more seriously by the disease than older children or adults and are more likely to develop complications. One in every 200 babies who contract whooping cough will die. Immunisation is the best way to prevent whooping cough.

How common is it?

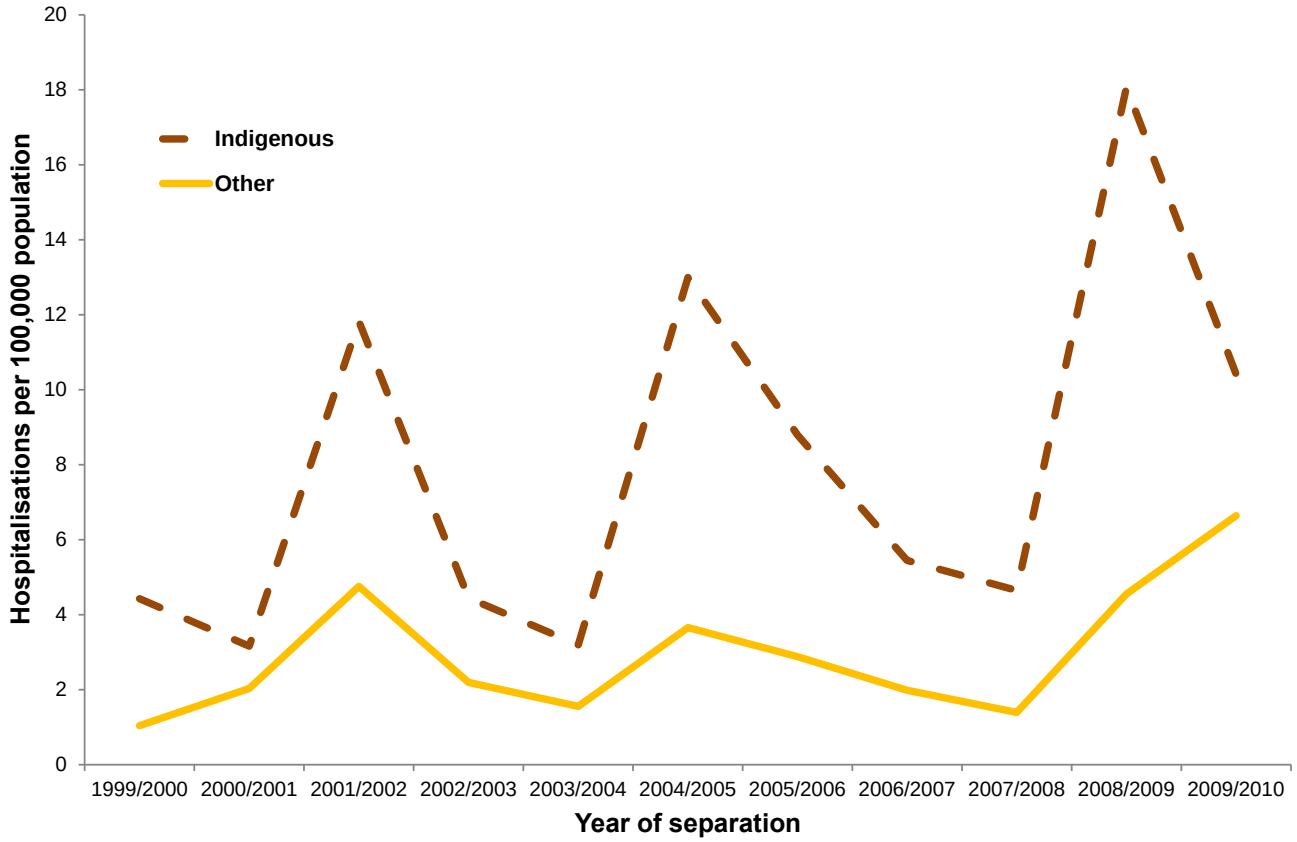
Between 2003 and 2006, there were just over 29,000 cases of pertussis notified, with 439 (2%) of them being in Aboriginal or Torres Strait Islander people. Overall, the rate of pertussis is similar in Aboriginal and Torres Strait Islander people and other Australians. Aboriginal and Torres Strait Islander children 0 to 4 years of age had the highest notification rate, followed by all Australian adults over 50 years of age. More recent information on notifications has not been included because reporting of Indigenous status was not good enough.

From 2008, Australia has experienced an increase in pertussis which has resulted in higher rates of hospitalisation for all Australians (see Figure 8).

Hospitalisations

Between July 2005 and June 2010, there were nearly 3,800 hospitalisations for pertussis (in selected states/territories*), with 362 (10%) of them being in Aboriginal or Torres Strait Islander people (see Table 11). Of these, about 80% were babies or young children 0 to 4 years of age. Aboriginal and Torres Strait Islander babies and young children, and adolescents and young adults 15 to 24 years of age, were hospitalised at over 3 times the rate of other Australians in the same age groups.

Figure 8: Pertussis hospitalisation rates, selected Australian states,* 1999/2000 to 2009/2010,† by Indigenous status



* Jurisdictions with satisfactory data quality over the whole time period (New South Wales, Queensland, South Australia, Western Australia).

† Hospitalisations where the date of separation was between 1 July 1999 and 30 June 2010. Rates are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

***** New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

Table 11: Pertussis hospitalisations, selected Australian states, 2005/2006 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations* (2005–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	292	93.2	3.3	
	Other	1,748	28.4		
5–14	Indigenous	13	2.1	1.8	
	Other	149	1.2		
15–24	Indigenous	10	2.0	3.3	
	Other	83	0.6		
25–49	Indigenous	25	3.1	2.7	
	Other	420	1.2		
≥50	Indigenous	22	7.3	2.2	
	Other	1,010	3.3		
All ages‡	Indigenous	362	10.0	2.9	
	Other	3,410	3.5		

* Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Deaths

Between 2006 and 2010, there were a total of 27 deaths due to pertussis (in selected states/territories*); 10 deaths were reported with pertussis as the underlying cause and 17 with pertussis as either the underlying or a contributing cause. There were between 1 and 4 deaths in Aboriginal or Torres Strait Islander people with pertussis reported as either the underlying or a contributing cause.

Comment

Universal childhood pertussis vaccination has been available since the 1950s in Australia and an adolescent booster since 2004. Pertussis is the least well controlled of all vaccine-preventable diseases. It has the highest notification rate for all ages, for both Aboriginal and Torres Strait Islander people and other Australians, and higher hospitalisation rates than most other vaccine-preventable diseases. This is because the immunity provided by the vaccine eventually wears off, leaving teenagers and adults who have not had a booster at risk of infection during an outbreak.

Transmission from older children and adults to babies is common. Babies aged 6 months and younger are at greatest risk of getting the infection because young babies are not fully immune to pertussis until they get at least three doses of vaccine. Babies can be best protected by making sure that vaccination is done on time (at 2, 4 and 6 months of age). Adults in contact with babies, including healthcare and childcare workers, as well as parents and grandparents, should also be vaccinated. Babies should be kept away from family members and friends who have a cough.

* New South Wales, Northern Territory, Queensland, South Australia and Western Australia

Pneumococcal disease

The disease

Pneumococcal disease is caused by infection with the bacteria *Streptococcus pneumoniae*. It refers to a range of diseases that affect various parts of the body such as meningitis (infection of the membranes covering the brain and spinal cord), bacteraemia (blood infection), pneumonia (infection of the lungs) and otitis media (middle ear infection).

Transmission

The disease is spread from person to person by droplets of saliva or mucus in the air. The bacteria can live in the nose and throat of healthy people and they can spread to other people by coughing, sneezing, talking or kissing. Sometimes pneumococci can get into the bloodstream from the throat and cause infection in the bloodstream, lung, brain or middle ear. Children have been linked to passing the bacterium on to adults.

Signs and symptoms

Symptoms depend on where the infection is and the age of the person.

- Meningitis causes fever, headache, stiff neck, nausea, vomiting and drowsiness. This can lead to permanent brain damage or deafness.
- Pneumonia can begin very quickly with shakes and chills. Other symptoms include fever, shortness of breath and rapid breathing, chest pain, cough, sneezing and headache.
- Otitis media can cause crying, tugging at the ear, fever, irritability, poor hearing and sometimes diarrhoea and vomiting.

Vaccination

There are more than 90 known strains of pneumococcus bacteria and it is not yet possible to make a vaccine to protect against them all. The vaccines that have been developed have the most common pneumococcus strains in them.

There is currently one pneumococcal vaccine available that protects against 13 strains, the 13-valent conjugate vaccine (13VPCV; Prevenar 13), which is given to babies under 12 months of age. The other available vaccine, which protects against 23 strains, the 23-valent polysaccharide vaccine (23VPPV; Pneumovax 23), is commonly used for adults.

There is a standard National Immunisation Program Schedule recommended for all children and adults in certain age groups and doses at other ages for people at higher risk of disease. Check with your state or territory health department for details.

Prevenar 13

- Vaccination is recommended for all children at 2, 4 and 6 months of age.
- All children with underlying medical conditions should receive a booster dose at 12 months of age (check with your local health authorities).
- Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia should receive a booster between 12 and 18 months of age.

Pneumovax 23

- Children with underlying medical conditions should also receive a Pneumovax 23 booster at 4 years of age. Aboriginal and Torres Strait Islander people aged between 15 and 49 years with chronic disease or with weaker immune systems should receive one dose, then revaccination 5 years later and once more 10 years later or at 50 years of age.
- In the Northern Territory, all Aboriginal and Torres Strait Islander people from 15 years of age should receive one dose and two booster doses, as explained above.
- All Aboriginal and Torres Strait Islander adults 50 years of age or over should receive one dose and one booster 5 years later.

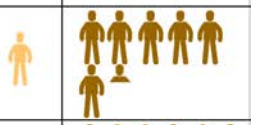
Who is most affected?

Disease most commonly occurs in young children and older adults, and those with chronic infections or weakened immune systems. Bacteraemia and meningitis are most common in young children, and pneumonia is most common in adults.

How common is it?

Between 2007 and 2010, there were 6,304 notified cases of 'invasive' pneumococcal disease (the more serious type of infection found in blood or spinal fluid). Of these, 698 (11%) were in Aboriginal and Torres Strait Islander people (see Table 12). Invasive pneumococcal disease in Aboriginal and Torres Strait Islander people was notified at nearly 4 times the rate in other Australians, and in those aged 25 to 49 years the rate was nearly 12 times the rate in other Australians.

Table 12: Invasive pneumococcal disease notifications, all Australian states, 2007 to 2010, by age group and Indigenous status

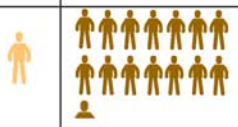
Age group (years)	Indigenous status	Notifications* (2007–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	137	51.2	2.9	
	Other	925	17.4		
5–14	Indigenous	64	12.4	5.5	
	Other	237	2.3		
15–24	Indigenous	47	10.7	6.3	
	Other	200	1.7		
25–49	Indigenous	306	44.7	11.8	
	Other	1,143	3.8		
≥50	Indigenous	144	53.3	4.6	
	Other	3,100	11.6		
All ages‡	Indigenous	698	42.0	3.6	
	Other	5,606	11.5		

* Notifications where the date of diagnosis was between 1 January 2007 and 31 December 2010.
† Average annual age-specific rate per 100,000 population.
‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

Hospitalisations

Between July 2005 and June 2010, there were 3,615 hospitalisations for invasive pneumococcal disease (in selected states/territories*), with 397 (11%) of them being in Aboriginal or Torres Strait Islander people (see Table 13). Aboriginal and Torres Strait Islander people were hospitalised at 6 times the rate of other Australians, and those in the 25 to 49 year age group were over 14 times more likely to be hospitalised than other Australians of the same age.

Table 13: Invasive pneumococcal disease hospitalisations, selected Australian states, 2005/2006 to 2009/2010, by age group and Indigenous status

Age group (years)	Indigenous status	Hospitalisations* (2005–2010)			
		n	Rate†	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
0–4	Indigenous	83	26.5	3.7	
	Other	436	7.1		
5–14	Indigenous	32	5.2	5.2	
	Other	124	1.0		
15–24	Indigenous	15	3.0	4.3	
	Other	97	0.7		
25–49	Indigenous	195	24.5	14.2	
	Other	613	1.7		
≥50	Indigenous	72	24.0	3.8	
	Other	1,948	6.3		
All ages‡	Indigenous	397	18.9	6.0	
	Other	3,218	3.2		

* Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.

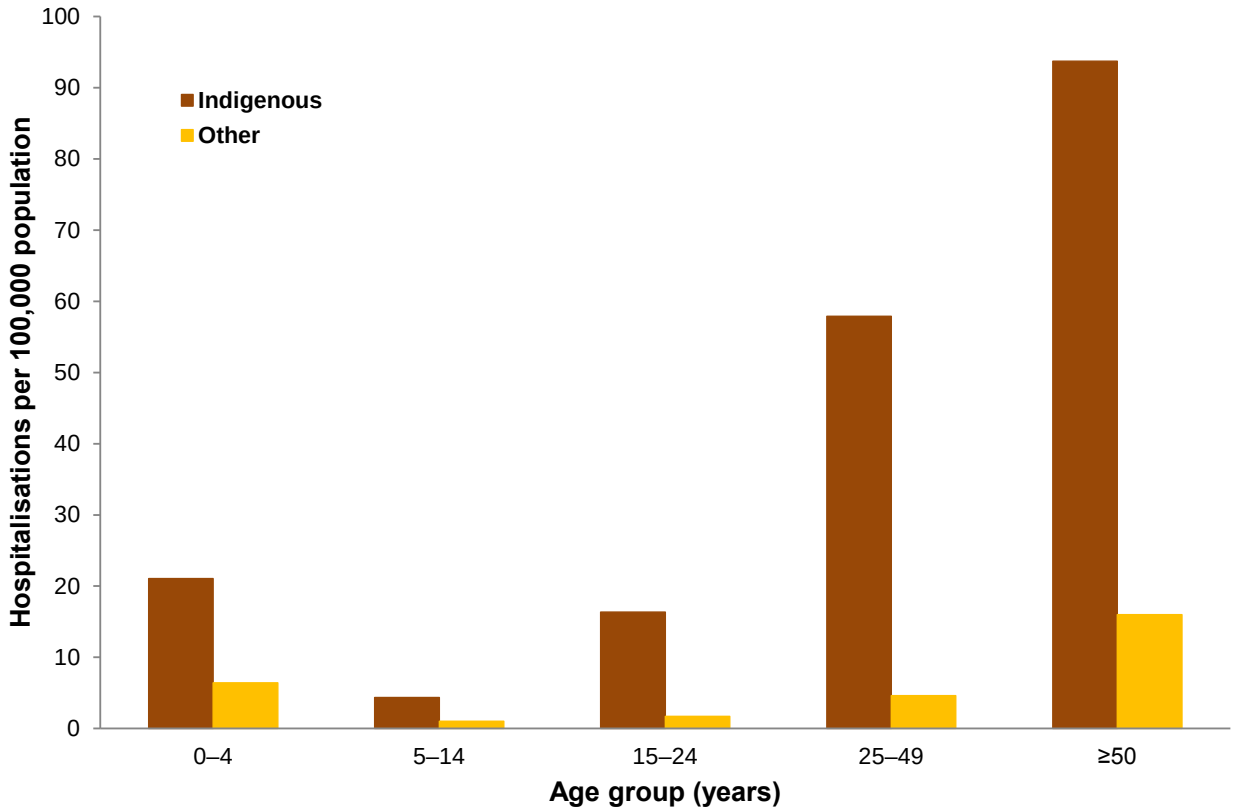
† Average annual age-specific rate per 100,000 population.

‡ Rates for all ages combined are age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

* New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia

Pneumococcal pneumonia is much more common than invasive disease. The difference in pneumococcal pneumonia disease burden between Aboriginal and Torres Strait Islander people and other Australians is clearly shown in (Figure 9) especially within the 24 to 49 years and 50 years and over age groups.

Figure 9: Pneumococcal pneumonia* hospitalisation rates, selected Australian states,† 2005/2006 to 2009/2010,‡ by age group and Indigenous status



* Not coded as meningitis or septicaemia.
† New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia.
‡ Hospitalisations where the date of separation was between 1 July 2005 and 30 June 2010.

Deaths

Between 2006 and 2010, there were 575 deaths due to invasive pneumococcal disease in Australia, with 34 (6%) of them reported in Aboriginal or Torres Strait Islander people.

Comment

There have been many benefits from pneumococcal vaccination of Aboriginal and Torres Strait Islander people. Despite this, Aboriginal and Torres Strait Islander people of all ages, but particularly younger adults aged 25 to 49 years, continue to have higher rates of pneumococcal disease than other Australians. This highlights the need for all Aboriginal and Torres Strait Islander people to be vaccinated as recommended in a timely way.

Rotavirus

The disease

Rotavirus infections are the most common cause of severe diarrhoea (gastroenteritis) in babies and children worldwide. Almost all children have at least one bout of the infection by the time they are 5 years of age. In developing countries, rotavirus causes almost half a million deaths each year. In developed countries such as Australia, death from rotavirus is rare but hospitalisations are common, especially in children under 2 years of age. Because there are many types of rotavirus, children can get infected more than once, although the later infections are less severe than the first one. Rotavirus infection has a seasonal pattern in southern Australia, peaking in winter each year, while in northern Australia, there is no clear seasonal pattern.

Transmission

Rotavirus is transmitted when virus from a person with the infection is swallowed by another person (called faecal–oral transmission), through eating contaminated food or drinking contaminated water or after touching contaminated hands. The virus can also be spread by coughing and sneezing. People can spread infection for 1 to 2 weeks after becoming infected themselves. Frequent hand washing can help to stop the spread of the infection.

Signs and symptoms

The infection usually starts with a fever, followed by 3 to 8 days of watery diarrhoea and vomiting, and can also cause tummy pain. Rotavirus infection is usually more severe than other causes of gastroenteritis. The most serious complication for young children is dehydration which, if not treated, can cause death (though rarely in Australia). Babies under 3 months of age with rotavirus may not show any symptoms, and in adults a rotavirus infection may cause only mild symptoms or none at all.

Vaccination

The oral rotavirus vaccine has been available in the National Immunisation Program for all infants since 2007. There are two vaccines available in Australia, Rotarix and RotaTeq; the brand used depends on your state or territory. There are strict age cut-offs for these vaccines, so babies need to be vaccinated at the right age.

Rotarix: given as two oral doses, at 2 and 4 months of age. The first dose must be given by 14 weeks and the second by 24 weeks of age, with at least 4 weeks between doses.

RotaTeq: given as three oral doses, at 2, 4 and 6 months of age. The first dose must be given by 12 weeks and the third dose by 32 weeks of age, with at least 4 weeks between doses.

Who is most affected?

Rotavirus infections are most common in children between 4 and 24 months of age, particularly those who are in childcare facilities. Aboriginal and Torres Strait Islander children in some remote communities are at higher risk of rotavirus infections. Adults who are in contact with children with the infection are also at increased risk.

Infections and hospitalisations

In Australia, it is estimated that by the age of 5 years, about 1 in 30 children are hospitalised, 1 in 15 visit an emergency department and about 2 in every 5 visit a GP because of rotavirus infection. In Aboriginal and Torres Strait Islander children, the hospitalisation rates are 3 to 5 times the rates in other Australian children. Aboriginal and Torres Strait Islander children are also hospitalised at a younger age and stay in hospital for longer than other Australian children. Epidemics of rotavirus occur frequently in Central Australia.

Table 14 shows the rates of hospitalisation in children under 5 years of age, before and after vaccine introduction. There has been a noticeable reduction in hospitalisations for children under 1 year of age – 38% in Aboriginal and Torres Strait Islander children and 71% in other Australian children. There was a slight increase in hospitalisation rates for Aboriginal and Torres Strait Islander people aged 5 years and over but this did not occur in other Australians of the same age.

Table 14: Rotavirus hospitalisation rates, comparing pre-vaccine period 2002/2003 to 2005/2006 and post-vaccine period 2008/2009 to 2009/2010, selected Australian states,* by age group and Indigenous status

Age group (years)	Pre-vaccine rates† 2002/2003–2005/2006			Post-vaccine rates† 2008/2009–2009/2010			
	Indigenous	Other	Rate ratio	Indigenous	Other	Rate ratio (Risk of disease in Indigenous vs non-Indigenous people	
<1	2,273.4	344.8	6.6	1,404.1	99.4	14.1	
1–4	351.7	246.0	1.4	327.3	70.0	4.7	
≥5	1.5	2.3	0.7	2.6	1.9	1.4	

* Northern Territory, Queensland, South Australia, Western Australia.
† Average annual age-specific rate per 100,000 population.

Deaths

Between 2006 and 2010, there were between 1 and 4 deaths recorded (in selected states/territories*) with rotavirus as the main cause of death, none of which were in Aboriginal or Torres Strait Islander people. There were between 5 and 8 deaths where rotavirus was recorded as the underlying cause or a contribution to death, with between 1 and 4 of these reported in Aboriginal or Torres Strait Islander people.

Comment

In the past, rotavirus has been a significant cause of severe gastroenteritis in Aboriginal and Torres Strait Islander children but vaccination has reduced the amount of disease caused by rotavirus. These rates may not reflect the full impact of vaccination as many hospitalisations are just coded as 'gastroenteritis' and not rotavirus. Because of strict upper age cut-offs for rotavirus vaccine, it is very important to give vaccination on time.

* New South Wales, Northern Territory, Queensland, South Australia and Western Australia

Other vaccine-preventable diseases

The other vaccine-preventable diseases which are part of the National Immunisation Program are:

- Diphtheria
- Mumps
- Polio
- Rubella (German measles)
- Tetanus
- Varicella (chickenpox)

Vaccines for these diseases are combined. Please check with your state or territory health department to confirm which vaccine is used and the number of doses required.

- DTPa-HepB-IPV-Hib – diphtheria, tetanus, pertussis, hepatitis B, inactivated poliovirus and *Haemophilus influenzae* type b
- DTPa-IPV – diphtheria, tetanus, pertussis and inactivated poliovirus
- dTpa – diphtheria, tetanus and acellular pertussis (adolescent/adult formulation)
- MMR – measles, mumps and rubella
- MMRV – measles, mumps, rubella and varicella

Numbers of reported cases, hospitalisations and deaths in Aboriginal and Torres Strait Islander people and other Australians for each of these diseases are given in the tables in Appendix 1 and 2. All these diseases have vaccines recommended for all children in Australia, and the data show similar rates of infection in Aboriginal and Torres Strait Islander children and other children.

Diphtheria is a bacterial infection, usually a serious throat infection, that can cause difficulty breathing, and death in 5 to 10% of cases. Less serious infections can occur in other areas such as the skin. It is transmitted by person-to-person contact with people who have the infection. Diphtheria used to be very common in Australia, but it is now very effectively controlled by vaccination. Hospitalisation for diphtheria occurred in 47 Aboriginal and Torres Strait Islander people between 2005 and 2010, with a significant proportion of these due to skin infections.

In children, diphtheria is included in the combination DTPa-HepB-IPV-Hib vaccine given at 2, 4 and 6 months of age and the booster DTPa-IPV given at 4 years of age. When given to older children and adults, dTpa vaccine, with reduced amounts of diphtheria and pertussis, is used and is given routinely at around 15 years of age. Boosters of either dTpa or dT (reduced dose diphtheria and tetanus, ADT Booster) are recommended at 50 years of age for people who have not had a tetanus-containing vaccine in the previous 10 years. Check the schedule and vaccines used with your state or territory health department.

Mumps is a viral infection usually causing painful swelling of the salivary glands, with possible painful swelling of the testes of males who have reached puberty. Mumps can also result in swelling of the tissue surrounding the brain and spinal cord resulting in permanent damage or deafness. The mumps virus is highly infectious and is transmitted through the air or in droplets by coughing or by other contact with saliva. Before vaccination was introduced, almost all children suffered from mumps at some stage. The disease is much less common since vaccination was introduced. Cases and hospitalisations are still reported, but these are mainly in unvaccinated young adults. Mumps vaccine is found in combination in the MMR and MMRV vaccines. MMR vaccine should be given at 12 months and MMRV at 18 months of age. MMR vaccine should be given at 4 years of age only if no MMRV was received at 18 months.

Poliomyelitis is a viral illness which can cause paralysis in various parts of the body. Infection occurs through faecal–oral transmission, mainly through person-to-person contact. It causes a gastrointestinal infection and, in some cases, then spreads to the nerves to cause paralysis. Epidemics of paralytic polio occurred in Australia as late as the 1950s and 1960s. The most recent Australian case was acquired overseas by an Australian resident in 2007. As a result of childhood vaccination there have been no other cases in Australia for at least 30 years. The oral vaccine has been

replaced in Australia by an injectable vaccine (IPV), usually in combination with other vaccines (e.g. DTPa-HepB-IPV-Hib, DTPa-IPV), which should be given at 2, 4, 6 months and 4 years of age.

If an older person needs polio vaccination, this can be given either in combination with dTpa, using either Boostrix-IPV or Adacel Polio (dTpa-IPV), or as polio alone using IPOL (IPV).

Rubella (also known as German measles) is a viral disease usually causing mild fever and rash. It is highly infectious through coughing or sneezing or direct contact with saliva of people with the infection. The main reason that rubella is important is that infection in a pregnant woman can result in the baby having severe problems, including blindness, deafness and brain damage. This infant condition is called congenital rubella syndrome. Before a vaccine was introduced, almost every child had rubella. Pregnant women who were not fully immune could easily get the infection from children. Rubella vaccine is now included in the combined MMR and MMRV vaccines (see Mumps above). The small number of rubella cases reported are now mainly in unvaccinated young adults. There were two cases of congenital rubella syndrome in Australia in 2003. This underlines the importance of vaccinating young adults (especially women of child-bearing age) who have not been vaccinated in the past, to stop the virus circulating and possibly being responsible for the infection in pregnant women.

Tetanus is a bacterial infection causing severe muscle spasms and breathing problems that can result in death even with intensive treatment. The bacteria live in soil, dust or other outside environments and cause infection after a wound to the skin which may not always be noticeable. Few cases occur in Australia since vaccination was introduced, and these are mainly in older people who have not been recently vaccinated. Tetanus vaccine is included in DTPa childhood vaccines given at 2, 4, 6 months and 4 years of age, and the dTpa vaccine given between 10 and 15 years of age. Boosters of either dTpa or dT (ADT Booster) are recommended at 50 years of age for people who have not had a tetanus-containing vaccine in the previous 10 years or after some injuries. Check with your state or territory health department for details.

Varicella, or chickenpox, is a viral illness usually with mild fever and a rash. The rash starts with a number of bumps topped with fluid-filled bubbles which later crust over. Although usually a mild disease in children, some cases can be severe with serious complications such as pneumonia, encephalitis (brain infection) or even death. The large number of hospitalisations for varicella for both Aboriginal and Torres Strait Islander people and other Australians can be seen in the table in Appendix 2. Before a vaccine was available, almost everyone got the infection in childhood. After infection, the virus then lives in nerve cells of the body and can reactivate as herpes zoster (shingles), most commonly in elderly people. Shingles usually appears as fluid-filled bubbles, like chickenpox, in a series of lines on the face and/or body. These can be very painful and stay around for days, weeks or longer. All children should be vaccinated with MMRV at 18 months of age, and any 10 to 13 year olds who have not already had chickenpox should be vaccinated with varicella vaccine.

Vaccinations for Aboriginal and Torres Strait Islander people

The vaccines funded by the National Immunisation Program (NIP) (valid from 1 July 2013) are shown in Table 15. The vaccine names and schedules differ between states and territories, so please check with your state or territory health department.

There are several differences between the vaccines recommended for Aboriginal and Torres Strait Islander people and other Australians, mainly due to differences in disease incidence. The differences for adults are in influenza and pneumococcal vaccines for the whole country. For children, there are differences in some states and territories which are areas of high risk for hepatitis A, pneumococcal disease, tuberculosis and Japanese encephalitis.

Adults

Influenza vaccine is recommended yearly and is funded under the NIP for all Aboriginal and Torres Strait Islander people aged 15 years or over, and those aged 6 months or over with a chronic health problem.

23-valent pneumococcal polysaccharide vaccine (23vPPV) is recommended for all Aboriginal and Torres Strait Islander people at 50 years of age with a booster dose 5 years later. Aboriginal and Torres Strait Islander people aged between 15 and 49 years with chronic disease or with weaker immune systems should receive one dose, then revaccination 5 years later and once more 10 years later or at 50 years of age. In the Northern Territory, all Aboriginal and Torres Strait Islander people aged 15 years or over should receive one dose with two booster shots (similar to those with chronic health problems).

Children

Two doses of **hepatitis A vaccine**, 6 months apart, are funded for Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia. The recommended ages differ between states and territories; please check with your state or territory health department for the correct vaccination schedule.

An extra dose of **13-valent pneumococcal conjugate vaccine** (13vPCV) should be given to Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia at 12 to 18 months of age.

23-valent pneumococcal polysaccharide vaccine (23vPPV) should also be given at 4 years of age for Aboriginal and Torres Strait Islander children with an underlying medical condition.

Vaccination against **tuberculosis** (BCG vaccine) is recommended for Aboriginal and Torres Strait Islander newborns in areas of high risk (i.e. the Northern Territory, Queensland and northern South Australia). Check with your state or territory health department for more details.

Vaccination for **Japanese encephalitis** is recommended for people who live in the Torres Strait outer islands or plan to visit for 30 days or more during the wet season. While this vaccine in not part of the National Immunisation Program Schedule it is now part of the childhood vaccination schedule for children living in these areas.

Table 15: The Australian National Immunisation Program Schedule for Aboriginal and Torres Strait Islander people, effective 1 July 2013

Age	Vaccine												
Birth	HepB												BCG*
2 months	HepB	DTPa	Hib	IPV				13vPCV			Rotavirus		
4 months	HepB	DTPa	Hib	IPV				13vPCV			Rotavirus		
6 months	HepB	DTPa	Hib	IPV				13vPCV			Rotavirus†		
12 months			Hib		MMR		MenCCV	13vPCV‡,§		Influenza#,¶			
12–18 months									HepA‡				
18 months					MMRV								
18–24 months									HepA‡				
4 years		DTPa		IPV				23vPPV§					
10–13 years	HepB**					VV**							
12–13 years		dTpa										HPV	
15–17 years													
15–49 years								23vPPV††,‡‡		Influenza#			
≥50 years								23vPPV‡‡,§§		Influenza#,§§			

For Aboriginal and Torres Strait Islander people only.

* For Aboriginal and Torres Strait Islander infants living in areas of high risk.

† Third dose is dependent on vaccine brand used.

‡ For Aboriginal and Torres Strait Islander children living in areas of higher risk (Northern Territory, Queensland, South Australia and Western Australia).

§ For children with medical risk conditions.

Annual vaccination for those in whom vaccine is recommended.

¶ For people medically at risk aged >6 months.

** Should be given only if there is no prior history of disease or vaccination.

†† For Aboriginal and Torres Strait Islander people medically at risk.

‡‡ See recommendations regarding revaccination with 23vPPV in *The Australian Immunisation Handbook*, 10th edition.

§§ For non-Indigenous people aged ≥65 years.

Vaccine abbreviations

BCG = Bacille Calmette-Guérin (for tuberculosis)

DTPa = Diphtheria-tetanus-acellular pertussis

dTpa = Diphtheria-tetanus-acellular pertussis (adolescent/adult)

HepA = Hepatitis A

Hib = *Haemophilus influenzae* type b

HepB = Hepatitis B

HPV = Human papillomavirus

IPV = Inactivated poliomyelitis vaccine

MenCCV = Meningococcal serogroup C conjugate vaccine

MMR = Measles-mumps-rubella

MMRV = Measles-mumps-rubella-varicella

13vPCV = 13-valent pneumococcal conjugate vaccine

23vPPV = 23-valent pneumococcal polysaccharide vaccine

VV = Varicella vaccine

Vaccination coverage of Aboriginal and Torres Strait Islander people

Vaccination coverage for the standard vaccines recommended for all children nationally (universal vaccines) is 6 to 8% lower in Aboriginal and Torres Strait Islander infants than in other infants at 12 months of age, largely due to the higher prevalence of delayed vaccination in Aboriginal and Torres Strait Islander children. By 24 months of age, that difference has disappeared and coverage is over 90%. At 5 years of age, fewer children had received all the recommended vaccines, but there was no difference between Aboriginal and Torres Strait Islander children and other children nationally (see Table 16).

There used to be higher coverage for Aboriginal and Torres Strait Islander children in remote areas and lower coverage in urban areas, but this is no longer the case for childhood vaccines.

Table 16: Percentage of Australian children immunised, by vaccine type and Indigenous status

Age	Vaccine	Indigenous (%)	Other (%)
Coverage at 12 months of age (born January – December 2009)	DTP 3 doses	85.7	92.6
	Polio 3 doses	85.7	92.6
	Hib (2 or 3 doses)	85.7	92.4
	Hep B (2 or 3 doses)	85.6	92.1
	7vPCV 3 doses	85.3	91.7
	Rotavirus (3-dose states)	66.4	83.4
	Rotavirus (2-dose states)	77.4	86.5
	'Fully vaccinated'*	85.5	91.9
	'Fully vaccinated'† (including 7vPCV)	85.0	90.0
	'Fully vaccinated' (including 7vPCV) + rotavirus	69.9	83.7
Coverage at 24 months of age (born January – December 2008)	DTP 3 doses	94.1	94.7
	Polio 3 doses	94.0	94.6
	Hib (2 or 3 doses)	94.0	94.4
	Hep B (2 or 3 doses)	94.0	93.9
	MMR first dose	94.4	93.8
	MenC 1 dose	93.9	93.3
	Varicella 1 dose	82.3	82.9
	'Fully vaccinated'*	91.3	92.0
	'Fully vaccinated'† (including varicella and MenC)	79.4	81.1
Coverage at 60 months (born January – December 2005)	MMR 2 doses	86.1	89.6
	DTP-polio	85.0	88.8
	'Fully vaccinated'*	85.3	89.2

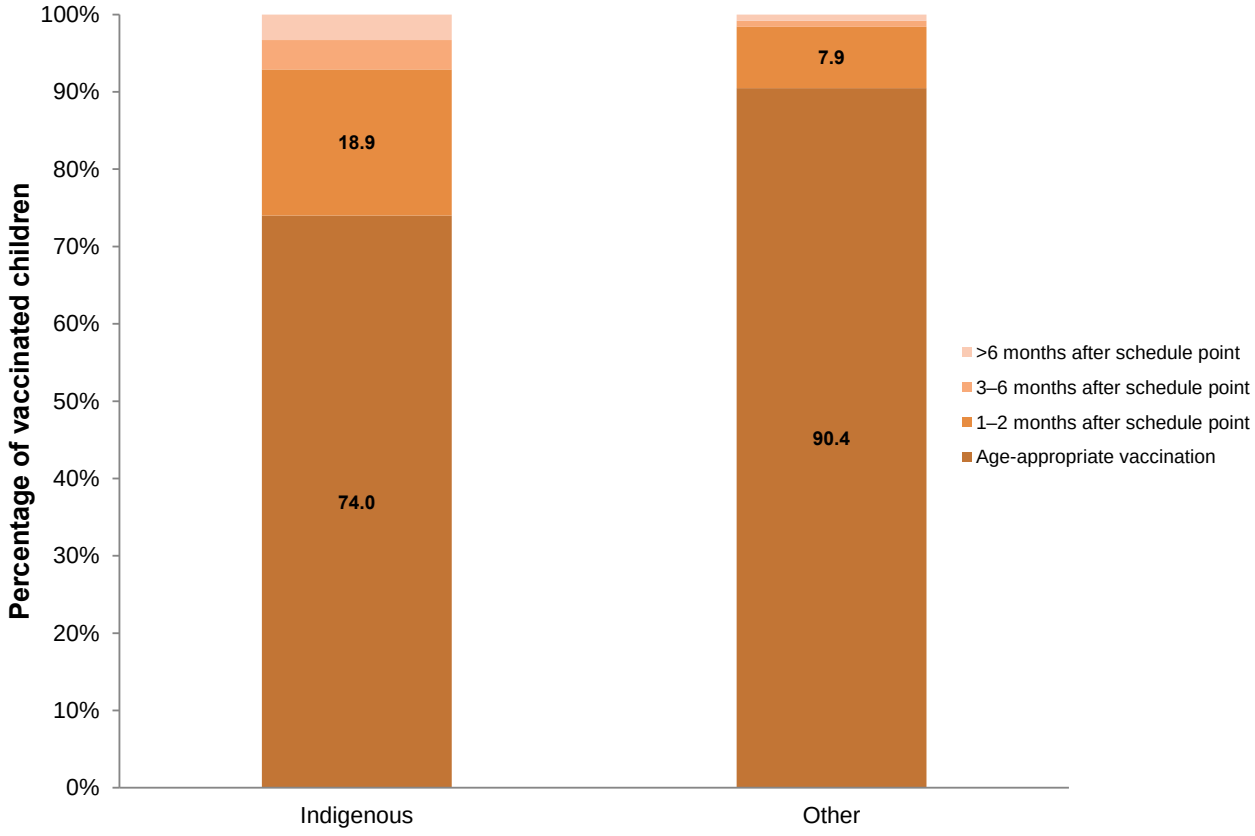
* 'Fully vaccinated' definition from 1996 to June 2013: at 12 months of age – defined as receipt of 3 doses of diphtheria, tetanus, pertussis, Hib, hepatitis B and polio, but did not include rotavirus and pneumococcal vaccines, which are also due at the same schedule points; at 24 months of age – included 3 or 4 doses of Hib and hepatitis B, and 1 dose of measles, mumps, rubella, but did not include meningococcal C or varicella vaccines; at 5 years (60 months) – included a 4th dose of diphtheria, tetanus, pertussis, polio and a 2nd dose of measles, mumps and rubella.

† 'Fully vaccinated' definition from July 2013: pneumococcal vaccine added at 12 months, varicella and meningococcal vaccines added at 24 months, unchanged at 60 months.

Source: ACIR, data as at June 2011.

Timeliness of the second dose of DTPa, due at 4 months of age, is shown in Figure 10. Of doses given to Aboriginal and Torres Strait Islander babies, 74% are given in the month they are due; the rest (26%) are delayed. For non-Indigenous babies, more than 90% of doses are given on time.

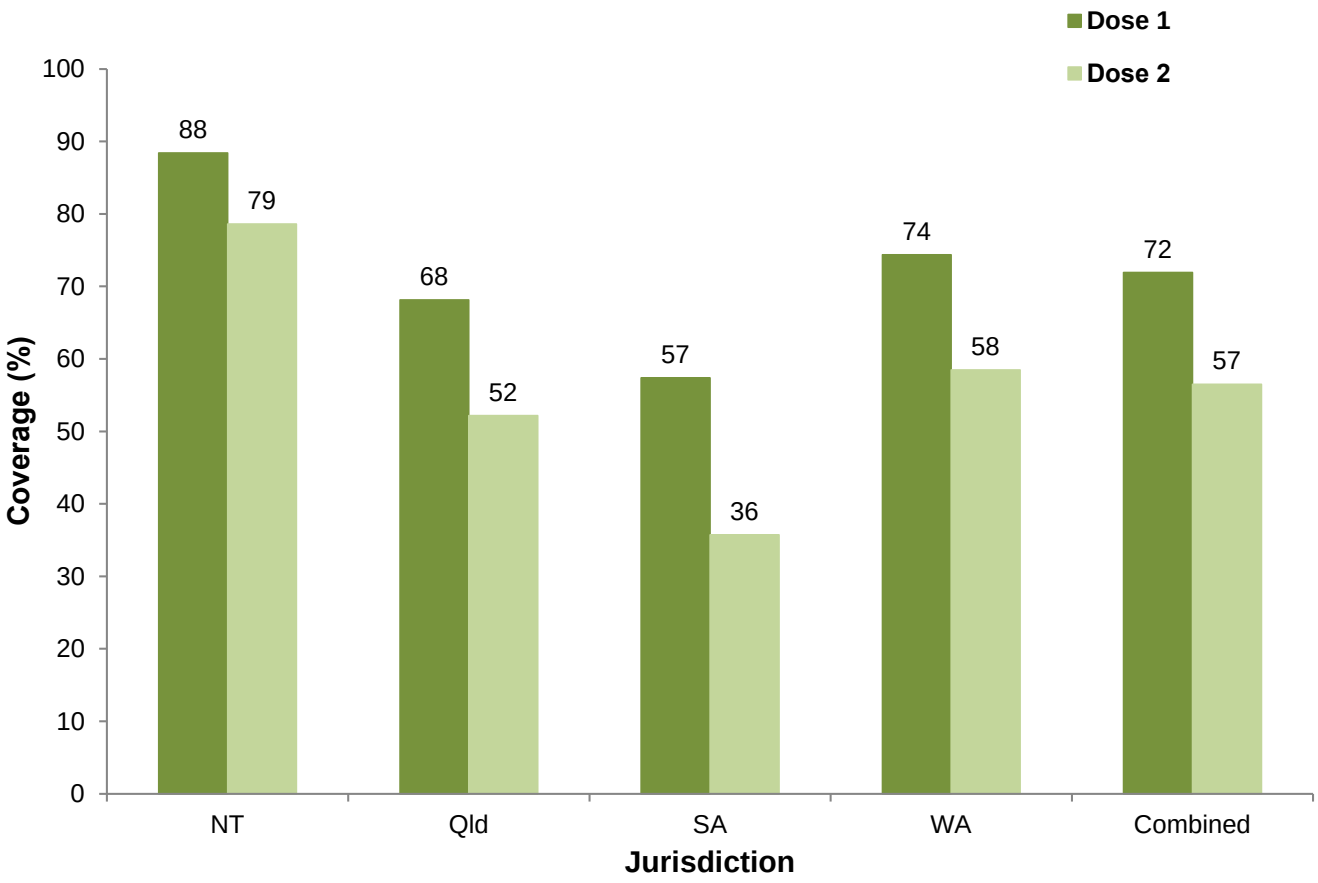
Figure 10: Timeliness of the second dose of DTPa vaccine, children born in 2009, by Indigenous status



Source: ACIR, data as at June 2011.

For vaccines or age groups where vaccination is targeted only at Aboriginal and Torres Strait Islander people, coverage is much lower than for the universal vaccines. Two examples are hepatitis A (see Figure 11) and the 13vPCV booster in the Northern Territory, Queensland, South Australia and Western Australia. Poor coverage rates may be due to logistical barriers such as distance and because the doctor has not asked or does not know if the children are Aboriginal or Torres Strait Islander.

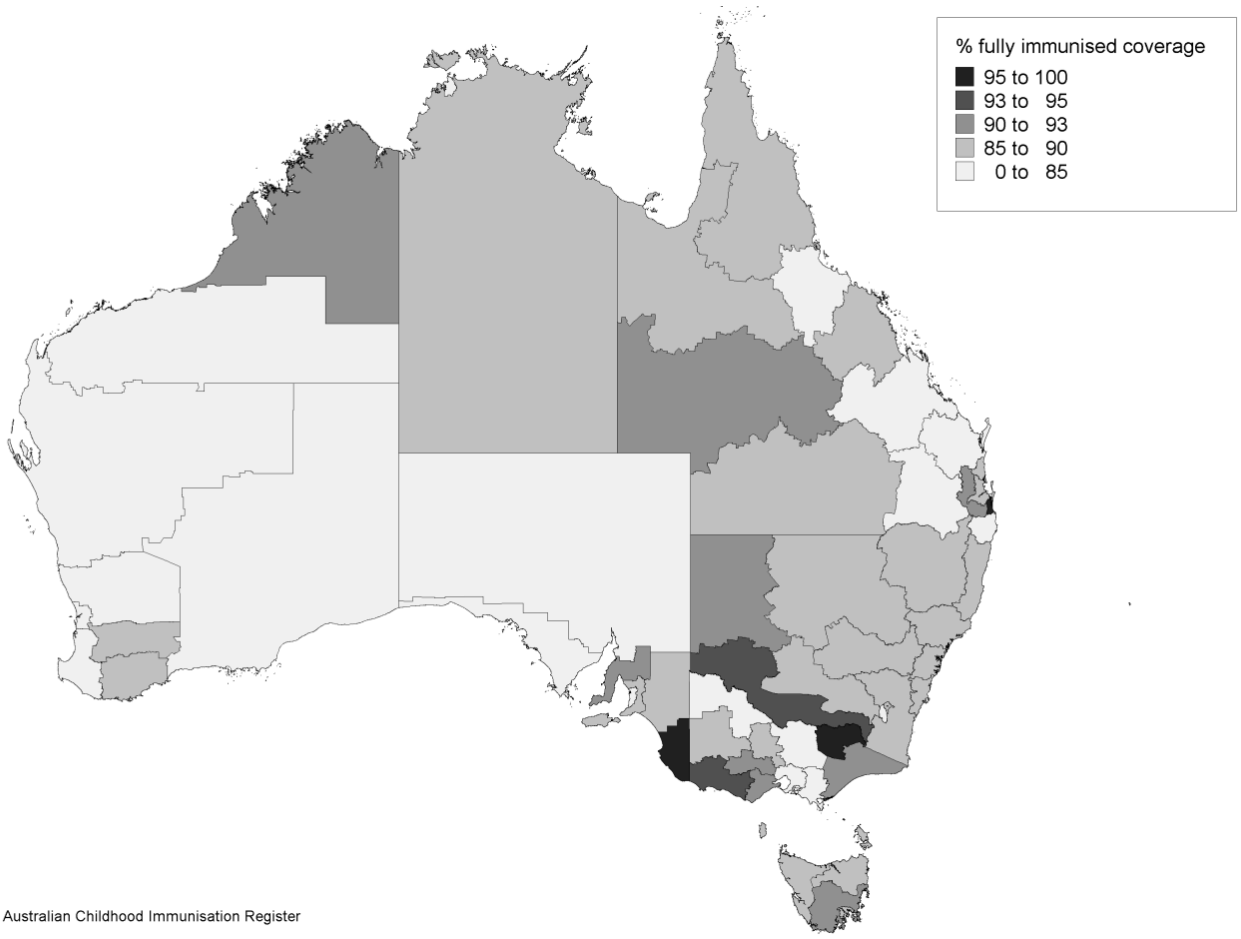
Figure 11: Percentage of Aboriginal and Torres Strait Islander children born in 2008 who had received 1 or 2 doses of hepatitis A vaccine within 6 months of the relevant schedule point



NT: Northern Territory; Qld: Queensland; SA: South Australia; WA: Western Australia
Source: ACIR, data as at June 2011.

Vaccination coverage for all childhood vaccines provided at 12 months of age varies around the country, with generally higher coverage in northern and eastern regions (see Figure 12).

Figure 12: 'Fully vaccinated' coverage at 12 months of age in Aboriginal and Torres Strait Islander children born in 2009, Australia, by Statistical Division



SOURCE: Australian Childhood Immunisation Register

Vaccination coverage was also lower in Aboriginal and Torres Strait Islander adults, particularly so in younger Aboriginal and Torres Strait Islander adults, but coverage has not been updated since 2004/2005. As for Aboriginal and Torres Strait Islander adolescents, their vaccination coverage is not known.

Appendix 1: Summary of notifications in Australia, for vaccine-preventable diseases, 2007 to 2010, by Indigenous status

Disease*	Indigenous status	Notifications† (2007–2010)		
		n	Rate‡	Rate ratio
Diphtheria	Indigenous	0	0.0	–
	Other	0	0.0	
Hib disease (invasive)	Indigenous	25	0.9	12.9
	Other	60	0.1	
Hepatitis A§	Indigenous	11	0.5	0.3
	Other	1,261	1.5	
Hepatitis B	Indigenous	72	3.5	3.1
	Other	951	1.1	
Measles§	Indigenous	3	0.1	0.5
	Other	248	0.3	
Meningococcal disease	Indigenous	104	3.2	2.7
	Other	975	1.2	
Invasive pneumococcal disease	Indigenous	698	42.0	3.6
	Other	5,606	11.5	
Poliomyelitis§	Indigenous	0	0.0	0.0
	Other	1	<0.01	
Rubella§	Indigenous	0	0.0	0.0
	Other	143	0.2	
Tetanus§	Indigenous	0	0.0	0.0
	Other	12	0.01	

* Varicella, mumps, pertussis, influenza excluded due to low Indigenous status completeness.
† Notifications (all jurisdictions) where the date of diagnosis was between 1 January 2007 and 31 December 2010.
‡ Rates are per 100,000 population for all ages combined, age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.
§ Rates not standardised due to low number of Indigenous cases.

Appendix 2: Summary of hospitalisations and deaths in Australia, for vaccine-preventable diseases, 2005/2006 to 2009/2010, by Indigenous status

Disease*	Indigenous status	Hospitalisations† (July 2005–June 2010)			Deaths§ (2006–2010)
		n	Rate‡	Rate ratio	n
Diphtheria#	Indigenous	47	1.9	33.5	0
	Other	55	0.1		1–4
Hepatitis A	Indigenous	48	1.6	1.6	0
	Other	1,031	1.0		6
Hepatitis B	Indigenous	31	1.6	2.2	6–9
	Other	680	0.7		23–26
Influenza	Indigenous	2,245	97.2	4.6	14
	Other	20,753	21.0		221
Influenza and pneumonia	Indigenous	29,734	1,604.2	3.0	183
	Other	532,439	527.2		7,696
Measles#	Indigenous	6	0.2	1.8	0
	Other	133	0.1		1–4
Meningococcal disease	Indigenous	189	4.5	2.2	2–8
	Other	2,041	2.1		34–40
Mumps#	Indigenous	43	1.7	5.1	0
	Other	329	0.3		1–4
Pertussis	Indigenous	362	10.0	2.9	1–4
	Other	3,410	3.5		6–9
Invasive pneumococcal disease	Indigenous	397	18.9	6.0	3–12
	Other	3,218	3.2		37–46
Poliomyelitis#	Indigenous	1	0.04	0.7	0
	Other	22	0.06		0
Rotavirus	Indigenous	1,487	32.1	2.6	0
	Other	11,772	12.5		1–4
Rubella#	Indigenous	6	0.2	1.8	0
	Other	134	0.1		0
Tetanus#	Indigenous	2	0.08	0.9	0
	Other	85	0.09		1–4
Varicella	Indigenous	279	8.5	1.7	0
	Other	4,883	5.0		20
Zoster	Indigenous	376	26.0	1.1	1–4
	Other	25,231	23.8		71–74

* Hib disease is excluded because there is no type-specific code for hospitalisation. The code for *Haemophilus* meningitis was used as proxy to identify deaths recorded during the period between 2006 and 2010. There were no deaths due to *Haemophilus* meningitis.

† Hospitalisations (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia only) where the date of separation was between 1 July 2005 and 30 June 2010.

‡ Rates are per 100,000 population for all ages combined, age-standardised to the Australian Bureau of Statistics Australian population estimates for 2006.

§ Underlying cause of death, recorded in New South Wales, Northern Territory, Queensland, South Australia, Western Australia only, from 2006 to 2010.

Rates not standardised due to low number of Indigenous cases.

Appendix 3: Contact details for more information on immunisation

Australian Childhood Immunisation Register (ACIR)

Medicare Australia
Free call: 1800 653 809
Website: www.humanservices.gov.au

Australian Government Department of Health

Immunise Australia Information Line: 1800 671 811
Website: www.immunise.health.gov.au

Australian Capital Territory

ACT Health
Population Health
Phone: (02) 6205 0881
Email: HealthACT@act.gov.au
Website: www.health.act.gov.au

New South Wales

NSW Health
Website: www.health.nsw.gov.au/immunisation/pages/default.aspx

Public Health Units

Greater Southern
Goulburn (02) 4824 1840
Albury (02) 6080 8900

Greater Western
Dubbo (02) 6841 5569
Bathurst (02) 6339 5601
Broken Hill (08) 8080 1499

Hunter New England
Newcastle (02) 4924 6477
Tamworth (02) 6764 8000

North Coast
Port Macquarie (02) 6588 2750
Lismore (02) 6620 7500

Northern Sydney and Central Coast
Hornsby (02) 9477 9400
Gosford/Ourimbah (02) 4349 4845

South Eastern Sydney and Illawarra
Randwick (02) 9382 8333
Wollongong (02) 4221 6700

Sydney South West
Liverpool (02) 9515 9420
Camperdown (02) 9515 9420

Sydney West
Parramatta (02) 9840 3603
Penrith (02) 4734 2022

Northern Territory

Department of Health, Centre for Disease Control Offices
Website: www.health.nt.gov.au/Centre_for_Disease_Control/Immunisation/index.aspx
Darwin (08) 8922 8044
Alice Springs (08) 8951 7540
Nhulunbuy (08) 8987 0357
Katherine (08) 8973 9049
Tennant Creek (08) 8962 4259

Queensland

13 HEALTH (13 43 25 84)
Website: www.health.qld.gov.au/immunisation
www.health.qld.gov.au/health_professionals/diseases/default.asp

Public Health Units

Brisbane Southside (07) 3000 9148
Brisbane Northside (07) 3624 1111
Cairns (07) 4226 5555
Darling Downs (07) 4631 9888
Gold Coast (07) 5668 3700
Logan (07) 3412 2989
Mackay (07) 4911 0400
Moreton Bay (07) 3142 1800
Mount Isa (07) 4744 7186
Rockhampton (07) 4920 6989
Sunshine Coast (07) 5409 6600
Townsville (07) 4753 9000
West Moreton (07) 3413 1200
Wide Bay (07) 4303 7500

South Australia

South Australian Immunisation Coordination Unit: 1300 232 272
Website: www.health.sa.gov.au/pehs/immunisation-index.htm

Tasmania

Tasmanian Public Health Hotline: 1800 671 738
Website: www.dhhs.tas.gov.au/peh/immunisation

Victoria

Department of Health Immunisation Program: 1300 882 008
Website: www.health.vic.gov.au/immunisation
Local councils providing immunisation services: www.health.vic.gov.au/immunisation/resources/local-councils.htm

Western Australia

Central Immunisation Clinic
Phone: (08) 9321 1312
Website: www.health.wa.gov.au/health_index/i/immunisation.cfm

Regional Public Health Units

Perth–North (08) 9380 7745
Perth–South (08) 9431 0200
Albany (08) 9842 7525
Broome (08) 9194 1630
Bunbury (08) 9781 2350
Carnarvon (08) 9941 0515
Geraldton (08) 9956 1950
Kalgoorlie–Boulder (08) 9080 8200
Northam (08) 9622 4320
South Hedland (08) 9174 1321