

# **Part IV: Vaccine-preventable and other communicable diseases**

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**Chapter 10: Vaccine-preventable diseases**

**Chapter 11: Other communicable diseases**



Infectious diseases are illnesses caused by bacteria, viruses, parasites and other agents that can be passed from person to person, or from insects, birds and animals to humans. Bacteria cause diseases such as pertussis (whooping cough) and tuberculosis; viruses cause diseases such as mumps, rubella, measles and poliomyelitis; while parasites cause diseases such as malaria and hydatid disease.

Infectious diseases were responsible for considerable illness and death among children in Australia in the late 1800s and early 1900s. However, the impact of these diseases was dramatically reduced by improvements in hygiene and the introduction of antibiotics and mass immunisation programs. Immunisation is achieved by the administration of vaccines. Vaccines are usually made from extracts of killed viruses or bacteria, or from live but weakened strains of viruses or bacteria. The vaccine stimulates an immune response in the child that either prevents the infection or reduces the severity of disease. Although a very small number of children suffer adverse effects from vaccinations, the great majority are protected from dangerous complications – or death – that were once a common outcome of childhood infectious diseases (DHAC 2001a).

Mass vaccination occurred from the 1930s for diphtheria, from the 1940s for pertussis, from the 1950s for combined diphtheria-tetanus-pertussis and poliomyelitis, and from the 1970s for measles (Gidding et al. 2001). Widespread immunisation continued into the 1980s and 1990s, as more vaccines became available. Despite a reduction in the incidence of vaccine-preventable diseases since the introduction of immunisation, these diseases remain a problem in Australia. As long as cases of these diseases continue to occur, Australian children remain at risk. The 1995 ABS Children's Immunisation Australia survey (ABS 1996a) suggested that the majority of parents whose children are not immunised are either misinformed about the nature of immunisation or 'had not got around to it'. There remains a very small proportion of parents who object to immunisation on religious or other grounds. Inappropriate caution among health professionals about vaccinating children with previous adverse reactions to certain vaccines – particularly whooping cough – may have contributed to the re-emergence of these diseases in the past (Frost & Johns 1996; Burgess et al. 1998).

Many communicable diseases are notifiable in Australia so that the number of cases can be monitored and appropriate public health measures implemented. All vaccine-preventable diseases – diseases for which the NHMRC schedule recommends routine vaccination/immunisation for children – are notifiable. This means that when a vaccine-preventable disease occurs in an Australian child, medical practitioners and hospitals are legally obliged to report that event.

This section reports on notifications, hospitalisations and deaths from vaccine-preventable diseases and from selected other communicable diseases that cause significant mortality and morbidity in Australian children.



## 10. Vaccine-preventable diseases

Although vaccines are available for a wide range of potential diseases, the vaccine-preventable diseases considered here are those appearing on the NHMRC schedule recommended for routine vaccination/immunisation of children in Australia. They are pertussis (whooping cough), tetanus, diphtheria, poliomyelitis, invasive *Haemophilus influenzae* type b infection (Hib), measles, mumps, rubella and hepatitis B (see 'Vaccination coverage estimates' in Part VIII: Risk and protective factors).

A number of changes in the vaccination/immunisation schedule have occurred since 1998. These are outlined in the most recent edition of the *Australian Immunisation Handbook* (NHMRC 2000). The most important change has been the introduction of a universal vaccination program for infants against hepatitis B, for children born from May 2000 onwards.

This section provides information on the level of vaccine-preventable diseases in children, using official notification data for each disease, as well as information on hospitalisations and deaths. Information on one rare long-term effect of measles, brain damage caused by encephalitis (inflammation of the brain), is also included.

Information on the occurrence and impact of communicable diseases comes mainly from the following sources: disease notifications through the National Notifiable Diseases Surveillance System (NNDSS); hospitalisations from the AIHW National Hospital Morbidity Database; and deaths data from the AIHW Mortality Database. The Australian Paediatrics Surveillance Unit (APSU) annual reports and other special reports were also used as additional sources of information.

### Notifications, hospitalisations and deaths from vaccine-preventable diseases

Notifications of vaccine-preventable diseases continue to occur in both adults and children. A summary of notifications, hospitalisations and deaths of children aged 0–14 years from vaccine-preventable diseases is shown in Table 10.1.

**Table 10.1: Notifications, hospitalisations and deaths of children aged 0–14 years from vaccine-preventable diseases, 1993–00**

Disease	Notifications	Hospitalisations	Deaths
Pertussis (whooping cough)	22,555	4,123	8
<i>Haemophilus influenzae</i> type b disease	697	831	16
Measles	8,635	1,365	6 <sup>(a)</sup>
Rubella	4,775	196	1 <sup>(b)</sup>
Mumps	584	114	0
Hepatitis B	69	91	0
Tetanus	1	3	0
<b>Total</b>	<b>37,316</b>	<b>6,723</b>	<b>31</b>

(a) Three of these deaths were due to subacute sclerosing panencephalitis.

(b) Death from rubella was due to congenital rubella.

Note: Data for notifications and deaths are per calendar year (1 January 1993 to 31 December 2000), while data for hospitalisations are per financial year (1 July 1993 to 30 June 2000).

Source: Communicable Diseases Network Australia–National Notifiable Diseases Surveillance System, AIHW National Hospital Morbidity Database and AIHW Mortality Database.

- Between 1993 and 2000, more than 37,000 children suffered a vaccine-preventable disease and more than 6,000 hospitalisations occurred as a result of contracting one of these diseases. Whooping cough, measles and rubella were the most commonly occurring vaccine-preventable diseases in Australian children.

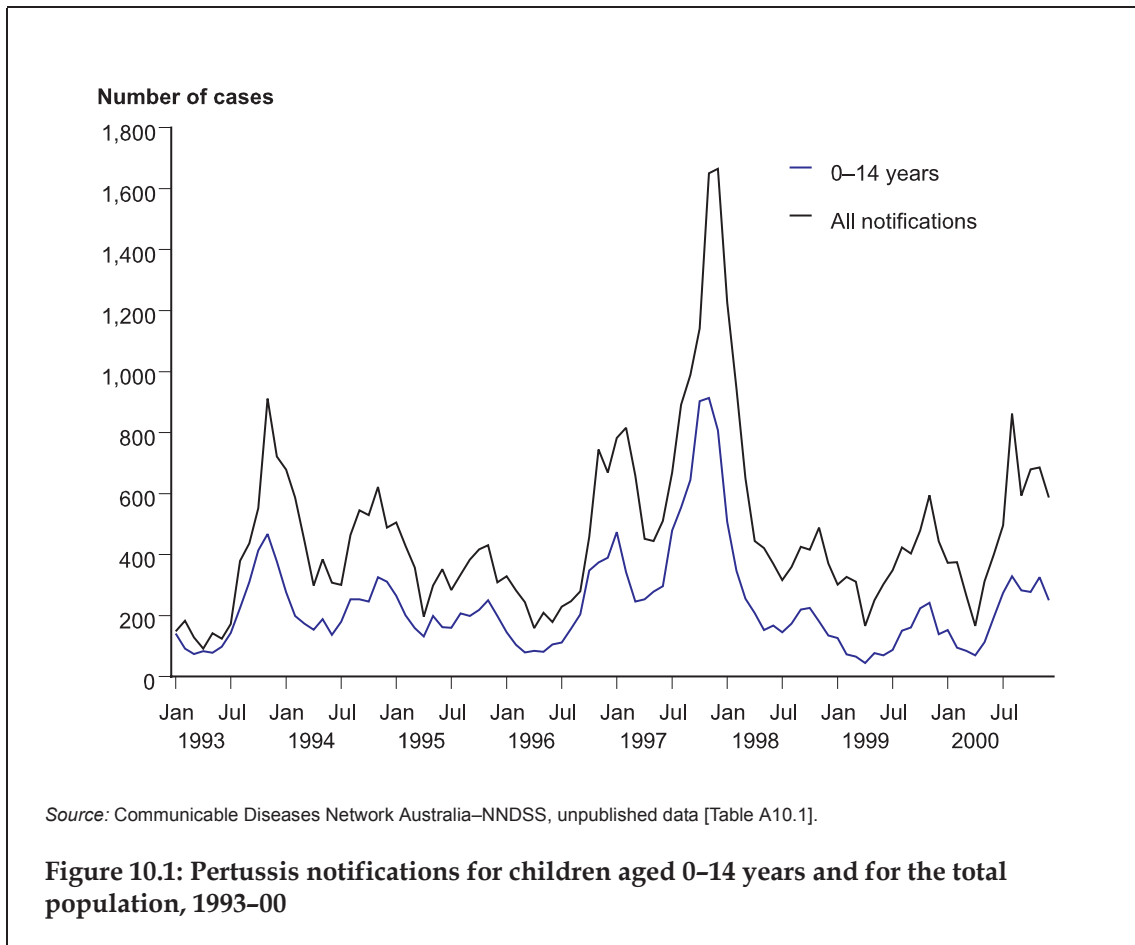
- Over the same period, the vaccine-preventable disease responsible for the most deaths of children in Australia was *Haemophilus influenzae* type b disease (Hib), with 16 deaths.

There have been no notified cases of polio in Australian children since 1972 and no cases of diphtheria since 1993. Only 1 case of tetanus has been notified in children since 1993, and this occurred in 2000.

The impact of vaccine-preventable diseases can be examined by looking at the length of time children spent in hospital. In 1999–00, there were 1,367 bed days for which vaccine-preventable diseases were the principal diagnoses, with an average length of stay of 4.5 days. Of all vaccine-preventable diseases, pertussis was responsible for by far the highest number of bed days (1,037 as a principal diagnosis, with an average length of stay of 5.0 days).

### **Pertussis (whooping cough)**

Pertussis is a highly infectious acute bacterial respiratory infection caused by *Bordetella pertussis* (NHMRC 2000). The symptoms include a severe, violent cough, which may persist for 3 months. Infants are most at risk from the potentially serious consequences of the infection, particularly during the period before they are old enough to be vaccinated. The case fatality rate for babies under 6 months is 0.5%, mainly from pertussis pneumonia or brain damage caused by lack of oxygen in the blood. Pertussis remains one of the most frequently reported vaccine-preventable diseases and cyclic epidemics of pertussis continue to occur. In the 1990s, the highest peak occurred in 1997 (Figure 10.1).



- Between 1993 and 2000, pertussis accounted for the highest number of notifications of all vaccine-preventable diseases. Over the review period, there were 45,215 notifications of pertussis, of which 50% (or 22,555) were for children aged 0–14 years.
- The majority of notifications (76%) among children were for those older than 4 years. For children aged 0–14 years, 48% of the notifications were for boys.
- After relatively low numbers of pertussis notifications in the early part of this period, notifications have increased, particularly during the epidemic in 1997 and early 1998. The highest number received in one month was in December 1997, with 1,665 cases notified.
- There has been a seasonal pattern in the distribution of notifications and hospitalisations for pertussis, with peak notifications in late spring or summer.

The indicator for pertussis notifications is the number of notifications for pertussis in children aged 0–4 years in a given year as a rate per 100,000 children aged 0–4 years. Time series in pertussis notification rates for children aged 0–14 years are shown in Figure 10.2.