

Pertussis epidemiology in Australia over the decade 1995-2005: trends by region and age group



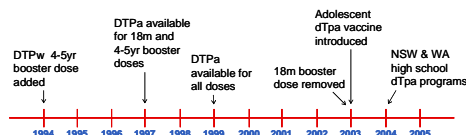
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Introduction

- * Pertussis remains endemic in Australia despite a long history of routine immunisation.
- * There have been important changes in the national immunisation program during the last decade.



* Immunisation coverage estimates have increased during this period.

Aim

Summarise age-specific trends in pertussis notifications between 1995-2005, at the regional and national level, in the context of the vaccine schedule and vaccine coverage changes during this period.

Methods

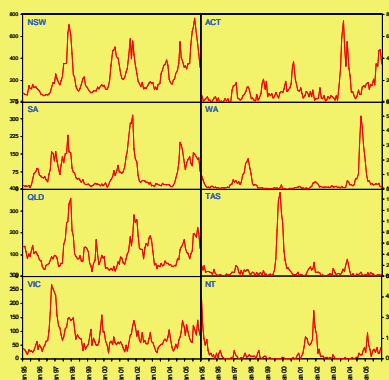
- * Pertussis cases notified to the National Notifiable Diseases Surveillance System with a diagnosis date between 1st January 1995 and 31st December 2005.
- * Rates calculated using Australian Bureau of Statistics estimated resident populations.
- * Incidence rate ratios were calculated to compare annual notification rates to state averages.

Results

National and state incidence

- * There were 75,458 notifications nationally between 1995 and 2005, with an average annual rate of 39.6 per 100,000 population. The annual notification rate ranged from 23.1 - 58.1 per 100,000 population.
- * A seasonal pattern could be observed, with peak notifications in spring.
- * 62% of cases occurred in New South Wales and Queensland, and the highest average annual notification rate was in South Australia (63.9 per 100,000 population).
- * All states and territories have had incidence rates higher than the average annual national notification rate.
- * The magnitude and pattern of epidemics varied greatly at the regional level (Figure 1). Epidemic cycles in New South Wales, Queensland and South Australia have followed a similar pattern, whereas epidemics in less populated and/or geographically isolated states and territories such as Western Australia, the Northern Territory and Tasmania, have been spaced further apart.

Figure 1. Pertussis notification patterns in Australian states and territories, between 1995 and 2005. Note the scales vary between jurisdictions.



Results

Laboratory diagnosis method

- * Serology was the predominant diagnostic method for pertussis (74%), followed by Nucleic Acid Testing (12%).
- * Diagnosis by serology increased from 41% of cases in 2000, to 65% of cases in 2005.
- * The proportion of notifications diagnosed by Nucleic Acid Testing declines with increasing age. Culture is now used rarely, principally for diagnosis in infants <1 year of age (Table).

Table. Age-specific pertussis diagnostic methods for New South Wales, Queensland and the Northern Territory, 2000-2005.

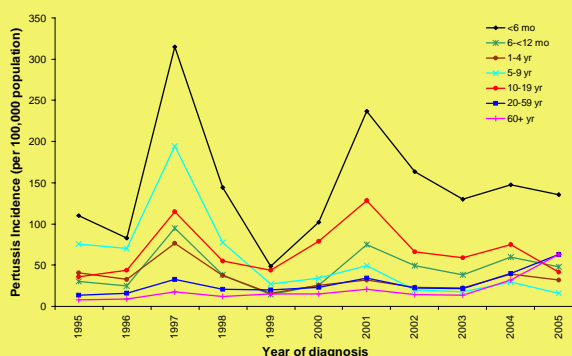
Diagnostic method	% by age group					
	<1	1-4	5-9	10-19	20-59	60+
Culture	9.6	3.1	1.9	1.3	0.9	0.9
Nucleic Acid testing	59.7	39.1	21.3	11.1	7.1	4.3
Serology	8.7	26.4	52.5	73.8	81.3	88.0

Results

Age-specific incidence

- * Children less than 6 months of age had the highest annual notification rate in all of the analysed years, with an average annual notification rate of 147 cases per 100,000 population (Figure 2).
- * High notification rates occurred among children aged 5-9 years at the beginning of the decade, however there has been a dramatic decline, from a peak of 194 cases per 100,000 population in 1997 to less than 50 cases per 100,000 population since 1999.
- * The notification rates for the 20-59 and 60 years and over age groups have recently risen to record highs and the majority of cases from year to year are now in the adult population.
- * The age distribution of cases varies among states and territories
 - pertussis does not appear to be as well controlled in 1-4 and 5-9 year olds in Western Australia, where incidence for these age groups was high in the 2004 epidemic.
 - in New South Wales and Western Australia, the incidence in the 10-19 year age group fell in 2005 to 37.2, from 85.7 per 100,000 population between 1999-2003. This followed the implementation of dTpa immunisation programs in 2004 for the entire high school population.
 - the increasing notification rate in the over 60 years age group observed nationally is seen to varying degrees in all jurisdictions except the Northern Territory.

Figure 2. Age-specific incidence of pertussis in Australia, 1995-2005.



Conclusions

- * Pertussis remains the most common vaccine preventable disease in Australia.
- * There are regional differences in epidemic patterns by magnitude and inter-epidemic period. Differences among states and territories in terms of case ascertainment and notification rates may be a result of variation in the use and availability of diagnostic tests.
- * Age-specific patterns of notification have reflected changes in vaccination practice, with successive falls by age group (eg. in 5-9 year olds after introducing the pre-school dose).
- * Despite successive falls by age group, the total number of notifications has not changed, with upward trends in older age groups not targeted for immunisation.
- * The increasing adult burden of pertussis raises new issues and challenges for diagnosis and potential immunisation strategies
 - diagnosis occurs by serology, but the available serological test may not have low specificity without adequate follow-up of cases and after adult dTpa immunisation.
 - adults are traditionally a difficult group to reach for immunisation, the current strategy aims to cocoon infants by immunising parents, health-care workers, child-care workers.

Recommendations

- * With the burden of disease now largely in adults, the current focus needs to be in protecting infants too young to be vaccinated and further defining the true morbidity of the disease in the elderly population.

Acknowledgements

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