

# Using the Australian Childhood Immunisation Register to track the transition from whole-cell to acellular pertussis vaccines

Siranda Torvaldsen, Brynley P Hull, Peter B McIntyre

National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases

## Abstract

**From 1997 to 1999, Australia changed from a whole-cell based pertussis vaccination program to an acellular one. This paper tracks the transition from whole-cell to acellular pertussis vaccines by calculating the number of whole cell (DTPw) and acellular (DTPa) pertussis vaccines recorded on the Australian Childhood Immunisation Register (ACIR) each month from January 1996 to August 2000. The number of combined diphtheria-tetanus (CDT) vaccines, recommended where DTP is contraindicated and for the fifth dose prior to 1994, was also calculated. The use of DTPa increased following its licensing in 1997, with a corresponding decrease in the use of DTPw. The increase was initially greatest in its use as a fourth and fifth dose, for which it was funded at a national level in 1997. Subsequently, a steep increase in its use for the first three doses followed in 1999, coinciding with it becoming free of charge for infants nationally. The use of CDT has decreased markedly since January 1996 and, since March 2000, fewer than 100 CDT vaccines per month were recorded on the ACIR, suggesting that this vaccine is not being inappropriately used. *Commun Dis Intell* 2002;26:581–583.**

*Keywords: acellular, pertussis, vaccines*

## Introduction

The Australian Childhood Immunisation Register (ACIR) is an important component of the *Immunise Australia Program*. It is administered and operated by the Health Insurance Commission and commenced operation on 1 January 1996.<sup>1</sup> The ACIR is best known for enabling the estimation of vaccination coverage and for allowing immunisation providers to check on the immunisation status of an individual child regardless of where that child was immunised. This paper describes another use of ACIR data — tracking changes in vaccine use — in this case the transition from whole-cell to acellular pertussis vaccines.

In terms of morbidity and mortality, pertussis is the most important vaccine preventable disease in Australia.<sup>2</sup> Complete vaccination of all children is the most important preventive measure for the control of pertussis.<sup>3</sup> In the past, non-compliance with pertussis vaccination was often thought to be due to concerns about the side effects of

whole-cell vaccines. As a result, acellular vaccines have been developed. These new acellular vaccines have fewer side effects<sup>4</sup> and appear to be efficacious,<sup>5</sup> although they are more costly than the whole-cell vaccines.<sup>6,7</sup> A three-component acellular pertussis vaccine combined with diphtheria and tetanus toxoids (DTPa), was licensed for use in Australia in 1997. The Commonwealth Government initially funded acellular vaccines in the national immunisation program for the fourth (18 month) and fifth (preschool) boosters, but since 1999 has also funded acellular vaccines to replace whole-cell (DTPw) vaccines in the primary vaccination course (at 2, 4 and 6 months of age). In South Australia and the Northern Territory, DTPa was funded for all doses in 1997. The fifth dose of DTP has only been included in the schedule since late 1994, when it replaced combined diphtheria-tetanus vaccine (CDT).<sup>8</sup> Since 1994, CDT has only been recommended for the two absolute contraindications to DTP — unexplained encephalopathy within 7 days and anaphylaxis.<sup>8</sup>

Corresponding author: Dr Siranda Torvaldsen, National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, The Children's Hospital at Westmead, Locked Bag 4001, Westmead NSW 2145. Facsimile: +61 2 9845 3082. Email: SirandaT@chw.edu.au.

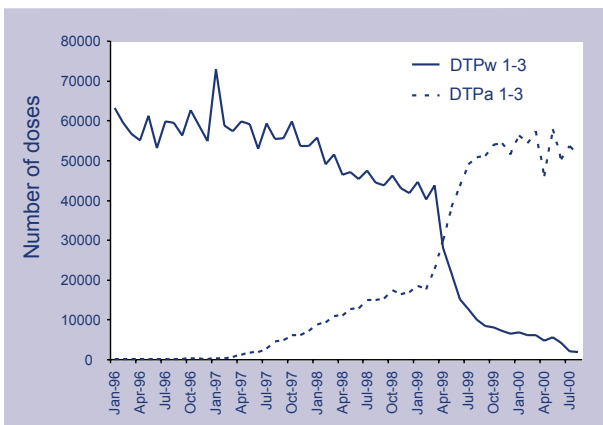
## Methods

The number of CDT, DTPw and DTPa vaccines recorded on the ACIR each month from January 1996 to August 2000 was calculated using SAS.<sup>9</sup> Prior to the licensing of DTPa, vaccination providers were not required to state the type of vaccine when sending vaccination encounter information to the ACIR. In the initial period after the licensing of DTPa, if the vaccine type (DTPa or DTPw) was not specified, it was assumed that DTPw had been given.

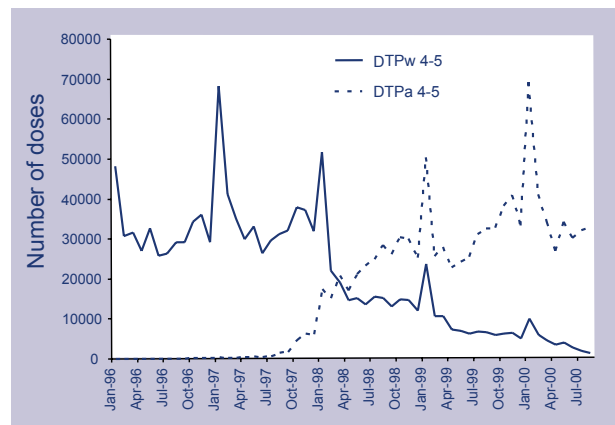
## Results

Since early 1997 the use of DTPa increased, with a corresponding decrease in the use of DTPw (Figures 1–3). By August 2000, only 3 per cent of DTP vaccines were whole-cell vaccines. There was a steep increase in the use of DTPa in the primary course during 1999, and by April 1999 the number of DTPa vaccines given for the first three doses exceeded the number of DTPw vaccines (Figure 1). The number of acellular vaccines given as a fourth or fifth dose exceeded the number of whole-cell vaccines given for these doses by March 1998 (Figure 2), 13 months earlier than for the primary course. The number of DTP vaccines given as a fourth or fifth dose peaked in January each year.

**Figure 1. Number of doses of DTPw and DTPa (doses 1–3) administered each month, January 1996 to August 2000**

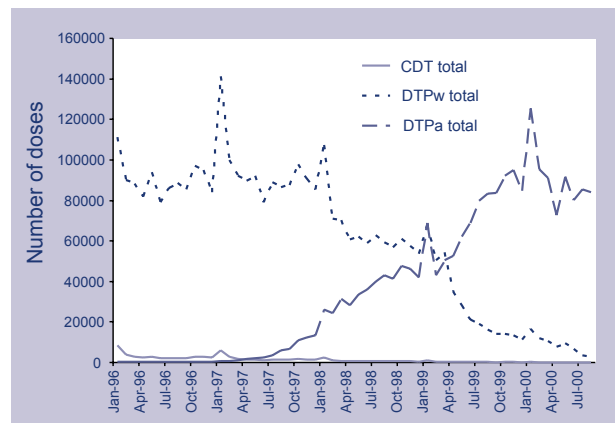


**Figure 2. Number of doses of DTPw and DTPa (doses 4–5) administered each month, January 1996 to August 2000**

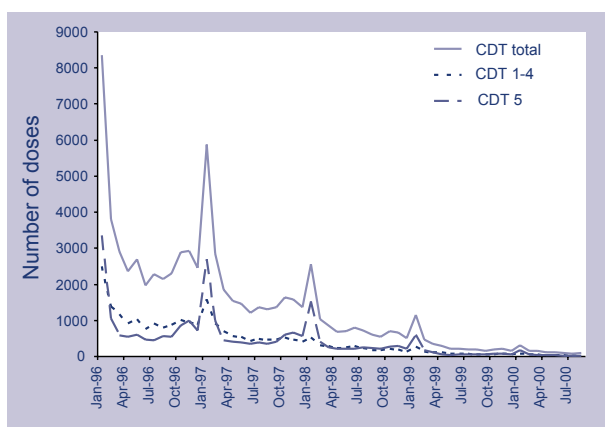


The number of doses of CDT vaccines administered is negligible compared with the number of DTP vaccines (Figure 3). The use of CDT vaccines has decreased markedly since January 1996 (Figure 4). Of all the CDT vaccines administered in the time period examined, 30 per cent were given as a preschool booster dose. The reduction in the number of CDT vaccines given each year in January, particularly CDT 5, indicates that, although CDT use as the preschool booster continued well beyond 1994, its use decreased each year (Figure 4). By January 2000, only 173 doses of CDT 5 were recorded on the ACIR and fewer than 100 CDT vaccines per month were recorded since March 2000.

**Figure 3. Number of doses of DTPw, DTPa and CDT (doses 1–5) administered by month, January 1996 to August 2000**



**Figure 4. Number of doses of CDT (doses 1–5) administered by month, January 1996 to August 2000**



## Discussion

The use of DTPa exceeded the use of DTPw soon after it became available free of charge (in 1997 for DTPa 4–5, and in 1999 for DTPa 1–3) in all states and territories. The peak in the number of DTP vaccines given in January each year coincides with the timing of the preschool fifth dose. The use of DTPa in 1997, and possibly 1998, may have been underestimated if providers administering DTPa did not specify which vaccine they had used. This may explain why there does not appear to be any increase in the use of DTPa in January 1998, in spite of it being available free of charge for the preschool dose.

The very low numbers of CDT vaccines recorded on the ACIR suggest that this vaccine is not being inappropriately used. The decrease in CDT use since the introduction of acellular vaccines could be at least partly due to parents and providers who were concerned about side effects of whole cell vaccines being more willing to have their child vaccinated with an acellular vaccine.

It is not possible from these data to determine whether or not the introduction of DTPa improved vaccination coverage. Coverage figures for DTP 1–3 from the ACIR do suggest that coverage improved from March 1997 (the first birth cohort included on the ACIR), when 77 per cent of children aged 12 months were recorded as having received three doses,<sup>1</sup> to 90 per cent in September 2000.<sup>10</sup> However, much of this increase is believed to be due to increased notification to the ACIR.<sup>2</sup> Any real increase in coverage could also be due to any one of the immunisation incentives schemes introduced during 1998 for both parents and vaccine providers.<sup>11</sup>

From 1997 to 2000, pertussis vaccination in Australia changed from using entirely whole-cell vaccines to almost entirely acellular vaccines. Most of this transition occurred in 1998 and 1999. Since the ACIR commenced operation in January 1996, it has been used for purposes in addition to those for which it was intended. This paper has demonstrated yet another use for the ACIR data, which is important for evaluation of pertussis vaccine effectiveness, as any impact on pertussis cases from acellular vaccines could not be expected until the beginning of 2000.<sup>12</sup> Similar evaluations using ACIR data are also relevant to tracking the introduction by age and geographic area of other recently introduced vaccines such as conjugate pneumococcal vaccine.

## References

- O'Brien ED, Sam GA, Mead C. Methodology for measuring Australia's childhood immunisation coverage. *Commun Dis Intell* 1998;22:36–37.
- McIntyre P, Amin J, Gidding H, Hull B, Torvaldsen S, Tucker A, *et al.* Vaccine preventable diseases and vaccination coverage in Australia, 1993–1998. *Commun Dis Intell* 2000;24 Suppl:1–83.
- Communicable Diseases Network Australia New Zealand. *The Control of Pertussis in Australia* November 1997. *Communicable Diseases Intelligence* Technical Report Series No. 1. Canberra: Commonwealth Department of Health and Family Services, 1998.
- Decker MD, Edwards KM, Steinhof MC, Rennels MR, Pichichero ME, Englund JA, *et al.* Comparison of 13 acellular pertussis vaccines: adverse reactions. *Pediatrics* 1995;96 Suppl:557–566.
- Edwards KM, Meade BD, Decker MD, Reed GF, Rennels MR, *et al.* Comparison of 13 acellular pertussis vaccines: overview and serologic response. *Pediatrics* 1995;96 Suppl:548–557.
- Burgess M, Forrest J. Pertussis and the acellular vaccines. *Commun Dis Intell* 1996;20:192–196.
- Boughton CR. Pertussis vaccines: acellular versus whole-cell. *Med J Aust* 1996;164:564–566.
- National Health and Medical Research Council. *The Australian Immunisation Handbook*, 7th ed. Canberra: Australian Government Publishing Service, 2000.
- SAS Institute Inc. *The SAS System for Windows*. Cary, NC, USA, 1996.
- Childhood immunisation coverage. *Commun Dis Intell* 2000;24:324.
- Achat H, McIntyre P, Burgess M. Health care incentives in immunisation. *Aust N Z J Public Health* 1999;23:285–288.
- Torvaldsen S, Simpson JM, McIntyre PB. Effectiveness of pertussis vaccination in New South Wales, Australia, 1996 to 1998. *Eur J Epidemiol.* In press 2003.