

# Age-specific trends in varicella hospitalisations in Australia prior to a universally funded program

Heywood AE\*, Macartney KK, Hull B, Wang H and McIntyre PB



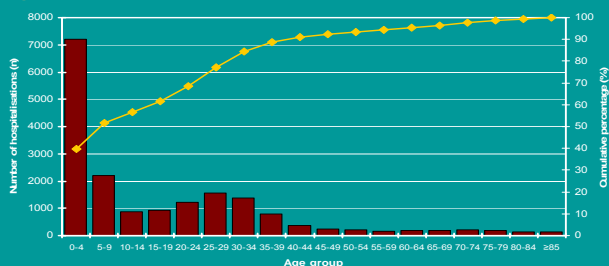
National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases



## Introduction

- The varicella vaccine (VV) became available in Australia on the private market in 2000. It was recommended for use in children at 18 months of age in September 2003<sup>1</sup> but not funded under the National Immunisation Program (NIP) until November 2005. A catch-up program for 10-13 year old children has also been funded since that time.
- Prior to vaccine funding approximately 1,500 varicella hospitalisations occurred each year in Australia, at a rate of approximately 9.0 hospitalisations per 100,000 per year (1996 - 2002).
- Although primary varicella infection is more severe in adolescents and adults, children aged 0-4 represent ~40% of all varicella-related hospitalisations in Australia. See Figure 1.
- Estimates of VV uptake in children under 5 years prior to 2005 were imprecise, and varied from 15.8 - 48%<sup>2,3</sup>.
- The impact of vaccination upon the disease burden of varicella in Australia has not been assessed.

Figure 1: Varicella hospitalisations (all diagnoses), Australia, 1993/94 – 2004/05. Number of admissions and cumulative percentage by age group.



## Aim

- To assess the impact of varicella vaccination in Australia through comparison of national hospitalisation rates by age group using the three approximated time periods:
  - The period prior to the availability of VV (~July 1996-June 1999)
  - The period from vaccine availability to recommendation (~July 1999-June 2003)
  - The period since recommendation but prior to NIP funding (~July 2003-June 2005)
- To determine the uptake of varicella vaccine using Australian Childhood Immunisation Register (ACIR) data.

## Methods

### Hospitalisation Data

- Varicella hospitalisations recorded in the National Hospital Morbidity Database with separation dates between 1 July 1996 and 30 June 2005 were obtained from the Australian Institute of Health and Welfare (AIHW). Hospitalisation separation dates were split into the three time periods, specified above, by financial year. All separations with a principal diagnosis or contributing diagnosis of primary varicella (ICD-10 codes B01) were included in the analysis.
- Age-specific hospitalisation rates were calculated using Australian yearly population estimates from the Australia Bureau of Statistics (ABS). As data was analysed in financial years, yearly age-specific population estimates were averaged over the respective years. Financial year age-specific hospitalisation rates for a principal diagnosis only were also calculated using AIHW hospitalisations data and ABS population estimates.
- Confidence intervals for both analyses were calculated using the Poisson distribution method.

### Vaccination Coverage Data

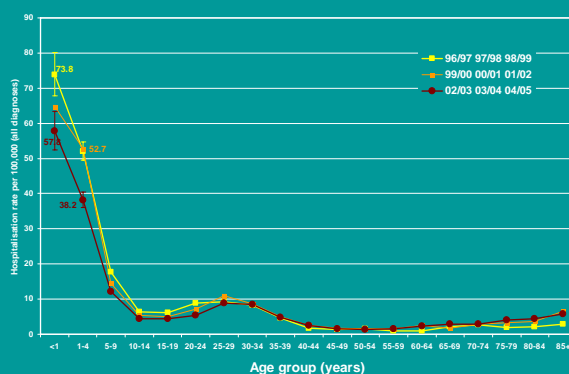
- Trends in VV coverage by 2 years of age, based on reports to the ACIR, were evaluated. ACIR data is described by three monthly birth cohorts. Uptake estimates for varicella are assessed three months after the birth cohort reach 2 years of age.

## Results

### Hospitalisations

- A significant decline in varicella hospitalisations (all diagnoses) in the 1-4 year age group was observed in the period coinciding with the recommendation for use of VV at 18 months, prior to NIP funding. Hospitalisation rates fell from 48.9 per 100,000 (95% CI 46.8-51.1%) in the period prior to VV recommendation to 38.2 per 100,000 (95% CI 35.6-41%) in the period after recommendation. See Figure 2.
- No statistically significant changes in varicella hospitalisations were observed in other age groups. Hospitalisation rates for all age groups declined from a rate of 9.0 per 100,000 between July 1996 and June 1999 to a rate of 8.2 per 100,000 between July 1999 to June 2003 and to a rate of 7.5 per 100,000 between July 2003 and June 2005.
- Using hospital separations limited to varicella as a principal diagnosis, a significant decline was also seen in the 1-4 year age group with a rate of 34.4 per 100,000 (95% CI 30.9-38.2%) between July 1998 to June 1999 to 23.2 per 100,000 between July 2004 and June 2005. See Figure 3.

Figure 2: Varicella hospitalisations (all diagnoses), Australia, per year group per age group



## Results

### Vaccination Coverage

- ACIR data estimated that only ~15.8% of the cohort born between October – December 2003 had received a varicella vaccine by 2 years of age. This cohort would not have been eligible for funded vaccine. However, reporting to ACIR of non-NIP funded vaccines is likely to be low, leading to an underestimate of vaccine uptake.
- The most recent data available from the ACIR is for the birth cohort July – September 2004. This is the first full cohort to have been eligible for vaccination under the NIP. Varicella vaccine coverage at 2 years of age, assessed in December 2006 on the ACIR for this birth cohort is 60.5%. However, reporting of VV to ACIR is still not required under the General Practitioner Incentive Scheme (GPII) and as such, this figure may also underestimate coverage.

Figure 3: Varicella hospitalisations (principal diagnoses), Australia, 1998/99 – 2004/05 in children <20 years of age.



## Conclusions

- The significant reduction in varicella hospitalisations in 1-4 year olds, but not other age groups, is most likely a vaccine effect, following the recommendation for universal vaccination. A further decline in this age group is likely as vaccine coverage increases with the funding of VV under the NIP.
- The data presented show that vaccination coverage has increased considerably since addition of VV to the NIP, as shown by coverage figures for the first eligible cohort. ACIR data on VV coverage are likely to be significantly under-estimated due to incomplete reporting. Also, it is not known how many children in these birth cohorts were ineligible for the vaccine because of previously well documented varicella infection. A further increase in coverage is likely as the program matures.
- This hospitalisation and vaccine coverage data provide an initial assessment of the impact of a universally recommended and subsequently funded varicella vaccination program in Australia.

## References

- National Health and Medical Research Council (NHMRC). The Australian Immunisation Handbook, 8th ed. Canberra: Australian Government Publishing Service; 2003.
- Macartney KK, Beutels P, McIntyre P, Burgess MA. Varicella vaccination in Australia. *Journal of Paediatrics & Child Health* 2005;41:544-52.
- Marshall H, Ryan P, Robertson D. Uptake of varicella vaccine—a cross sectional survey of parental attitudes to nationally recommended but unfunded varicella immunisation. *Vaccine* 2005;23:5389-97.

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