

Moving the second dose of measles-mumps-rubella vaccine to school entry: implications for control of rubella

Timothy C Heath, Margaret A Burgess, Jill M Forrest

The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases,
The New Children's Hospital, PO Box 3515, Parramatta, New South Wales 2141

Rationale for moving the second dose of measles-mumps-rubella vaccine

Currently, the first dose of measles-mumps-rubella vaccine (MMR1) is given at the age of 12 months, making up to 95% of those vaccinated immune to the measles virus.¹ Children and adolescents receive a second vaccination between the ages of 10-16 years (MMR2). The majority of children who do not respond to a first dose (primary vaccine failure) will respond to a second dose. At least 99% of children who receive two doses of MMR will become immune.¹ In April 1998, The Australian Technical Advisory Group on Immunisation recommended that the MMR2 given at 10-16 years should cease and that the vaccine be brought forward and given prior to school entry. MMR2 will now be given at the same time as acellular DTP and OPV booster vaccinations to children aged 4-5 years. This recommendation has been endorsed by the National Health and Medical Research Council. The principal objective of this schedule change is to improve measles control by strengthening the two-dose MMR strategy and reducing build-up of susceptibles. Currently, MMR coverage in primary school and high school based campaigns is sub optimal and poorly documented. It is hoped that incorporating MMR2 into the Standard Vaccination Schedule prior to school entry will:

- achieve higher measles protection sooner and prevent measles outbreaks in school aged children;
- improve MMR2 coverage by taking advantage of existing strategies to improve immunisation coverage in pre-school children. School entry certificates, the Australian Childhood Immunisation Register (ACIR)

recall-reminders, general practice and child care incentives, will now all be applicable to MMR2; and

- improve data regarding MMR2 coverage by administering it at an age at which it can be monitored using the ACIR. Feedback of coverage data to immunisation program managers and providers is also expected to help improve coverage.

Moving MMR2 to preschool age means that all children currently in primary school, and some Year 7 and 8 children, will need to have a second dose of MMR. The Measles Control Campaign, which is being conducted in the second half of this year, will offer MMR vaccination to these children. In addition, by vaccinating a large proportion of the childhood population at once during the Campaign, it should be possible to more rapidly reduce the circulation of measles in the community.²

Implications for rubella control

What effect will this schedule change have upon rubella control? The primary objective of rubella immunisation is to prevent congenital rubella syndrome (CRS) by:

- ensuring that women of child-bearing age are immune; and
- reducing the circulation of rubella in the community by vaccinating all children.³

Many of the factors that favour moving MMR2 to school entry also apply to rubella control. This schedule change will improve coverage and reduce transmission in school aged children. However, moving the second dose to preschool will lengthen the period between MMR2

Table 1. Notifications of rubella and congenital rubella syndrome in Australia, 1993-1997.

Year	Notifications of rubella to NNDSS ¹	Notifications of congenital rubella to NNDSS ²	Notifications of congenital rubella to Australian Paediatric Surveillance Unit ³
1993	3,636	-	4
1994	3,371	3	5
1995	4,589	1	4
1996	2,552	4	5
1997	1,343	0	1

1. National Notifiable Diseases Surveillance System at April 1998.

2. Only NSW and ACT contribute notifications of congenital rubella to NNDSS.

3. Notifications of congenital rubella with a demonstrable clinical defect.

administration and reproductive age. This raises the theoretical concern that rubella titres will be lower in child-bearing women than if they were last boosted in adolescence. It has been demonstrated that rubella titres after MMR1 do wane with time, more so than after natural infection.^{4,6} Despite this, booster responses to MMR2 seem to be equivalent whether MMR2 is given at age 6 or 11-13 years.⁵

It is well recognised that single-dose rubella immunisation strategies for children shift susceptibility to older age groups, and paradoxically are capable of increasing congenital rubella syndrome (CRS) rates, especially if coverage is poor.⁷ However, seroepidemiological studies in countries with established two-dose strategies show very low susceptibility amongst women of child-bearing age, whether MMR2 is given at age 6 (Finland) or 11-12 years (Sweden).^{8,9} Finland has successfully eliminated congenital rubella syndrome with this strategy, and rubella is now rare in that country.¹⁰ The United States of America has also achieved excellent rubella control using a two-dose strategy with MMR2 given prior to school entry. United States of America notification data suggest that rubella transmission was interrupted altogether in late 1996.¹¹ Therefore, it appears that concerns about waning immunity following MMR2 are more theoretical than real.

Another consideration, especially when rubella is well controlled, is the risk of adverse events following MMR vaccination. The risk of adverse events following rubella vaccination, including arthropathy and arthritis, is greater amongst adolescents than in children.¹²⁻¹⁴ This argues in favour of earlier booster vaccination.

Screening and surveillance

Regardless of the rubella schedule, there will be a continuing need to screen high-risk groups, and conduct surveillance to evaluate the success of the program. Immigrants from countries where rubella immunisation is not routine will remain a group at high risk.¹⁵ Education about immunisation at the time of immigration is likely to be the most practical intervention. Meanwhile, pregnant women should continue to be screened for rubella antibodies in every pregnancy and receive immunisation after delivery if they are not immune.¹⁶ The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) is establishing a national serosurveillance system similar to the system established in the United Kingdom.¹⁷ This will monitor the age-specific prevalence of rubella susceptibility, and will allow long-term effects of the new two-dose strategy to be monitored. This surveillance system will also provide data for mathematical modelling, thus allowing long-term predictions regarding rubella control.¹⁷ At present the incidence of congenital rubella is low in Australia. The Australian Paediatric Surveillance Unit has documented 19 CRS cases for the years 1993-7, including only one case in 1997.¹⁸ However, consideration should be given to implementing surveillance for abortions performed because of intrauterine rubella infection, a more sensitive indicator than CRS for monitoring the success of a rubella immunisation program.³

In summary, the new two-dose schedule offers substantial benefits for rubella control, as well as for measles. So far,

theoretical concerns about waning immunity have not materialised as a problem in countries with established two-dose strategies, but ongoing surveillance of coverage and serological immunity is needed to monitor the success of this strategy. It is essential that we ensure high coverage with both doses of MMR; a half hearted program could worsen control of Congenital Rubella Syndrome.

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