



Surveillance for congenital rubella in Australia since 1993: Cases reported between 2004 and 2013



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ABSTRACT

Objective: To describe the epidemiology of congenital rubella infections notified to the Australian Paediatric Surveillance Unit (APSU) from 2004 to 2013 and compare that with previously published APSU data for 1993–2003.

Methods: Active national surveillance for congenital rubella infection has been conducted through the APSU since 1993. Monthly reporting by child health clinicians according to pre-defined case criteria triggers requests for clinicians to provide de-identified clinical, epidemiological, and laboratory information. Data were extracted for cases reported between January 2004 and December 2013 and compared with previous years.

Results: Five cases of confirmed congenital rubella infection were identified during the reporting period. All five infants had defects consistent with congenital rubella syndrome (CRS). Four of the infants were born in Australia during the study period, and all were born to mothers born overseas. Three of the five mothers had not had rubella vaccination, and in two vaccination status was unknown, although both were from countries without routine rubella immunization programmes. Since 1993, there have been 57 notifications of congenital rubella infection to the APSU; 40 of these infants were born between January 1993 and December 2013, of whom 34 had confirmed CRS.

Conclusions: Congenital rubella infection in Australia is predominantly among children born to unimmunized immigrant mothers. Migrant women born in rubella endemic countries without routine immunization remain an important group to target for vaccination. Rubella-susceptible women, especially those in the early stages of pregnancy, should also carefully consider the risks of travelling to rubella endemic countries.

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1. Introduction

Rubella is an acute, usually self-limiting, mild viral infection which has teratogenic potential [1]. Rubella infection during pregnancy, especially during the first trimester, can cause congenital rubella infection that may manifest as foetal death and/or a spectrum of birth defects known as congenital rubella syndrome (CRS). CRS manifestations include deafness, blindness, cardiac anomalies,

growth retardation, and neurological abnormalities (e.g. progressive rubella panencephalitis) [2]. Global estimates suggest that the number of infants born with CRS exceeded 110,000 in 2008 which makes rubella the leading cause of preventable congenital defects [3]. Rubella vaccination has resulted in drastic reductions in CRS in most developed countries including Australia [4,5].

The primary goal of rubella vaccination is to prevent CRS [1]. There are two common methods of using rubella-containing vaccines; immunization of adolescent girls and/or women of child-bearing age to reduce CRS burden or use of rubella-containing vaccine in the childhood immunization schedule in addition to targeted vaccination of susceptible individuals (males and female) in older age groups to interrupt rubella transmission, and ultimately eliminate both CRS and endemic rubella infection [1]. In Australia,

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Table 1
Rubella vaccination practice in Australia [8–13].

Commencement year	Intervention	Target age group (years)
1971	School-based programme for teenage girls and for susceptible women prior to pregnancy	10–14
1989	MMR introduced on the national schedule replacing measles-mumps (MM) vaccine	1 (9 months of age for Aboriginal and Torres Strait Islander infants in the Northern Territory)
1992	2nd dose of MMR vaccine for both males and females	10–14
1998	2nd MMR dose scheduled at 4–5 years instead of 10–14 years	4–5
	National Measles Control Campaign (MCC): one-off school-based catch-up MMR vaccination for children	5–12
2000	2nd dose of MMR scheduled at 4 years instead of 4–5 years	4
	Selective MMR for non-immune women of childbearing age	15–49
2013	MMRV recommended and funded for 2nd MMR dose	1.5

selective vaccination of adolescent girls against rubella commenced in 1971, and the universal measles-mumps-rubella (MMR) vaccination programme for all infants at 12 months of age was introduced in 1989. The adolescent programme was extended to include both males and females in 1994 and the MMR vaccine was used from then on. An extensive catch-up programme for primary school children was introduced in 1998, and later the National Immunization Programme (NIP) schedule recommended the MMR vaccine for all children at 12 months and 4 years of age [6]. Since July 2013, the 4 year MMR vaccine has been replaced in the NIP schedule with a measles-mumps-rubella-varicella (MMRV) vaccine at 18 months of age (Table 1) [7]. Coverage data from the early programmes is limited, however, coverage from the first dose of MMR vaccine (MMR1) has remained high since its introduction in 1999 (89% in 1999 and 94% in 2002–2009) [8,9].

The World Health Organization (WHO) strategy for 2012–2020 to eliminate measles, rubella, and CRS highlighted the need for disease monitoring [3] which could be achieved through effective surveillance and evaluation of programmatic efforts to ensure progress. In Australia, since the implementation of a universal vaccination programme, both the number of cases of rubella infection and CRS cases have dropped significantly [10,11]. The all age notification rate of rubella infection declined from 23.4 to 7.2 per 100,000 population between 1992 and 1997 [12], and from 1998 to 2007, there was a substantial (>100-fold) further reduction in rubella notifications, to an average of 2 cases per million per annum [9]. Although recent serosurveillance and modelling studies suggest progress towards elimination of endemic rubella in Australia [9,13], there have been ongoing reports of several locally acquired CRS cases and small outbreaks of rubella [10,14]. Moreover, rubella virus continues to circulate in other parts of the world, mostly in South-East Asia (about 48% of global burden) and Africa (about 38% of global burden), which puts Australia at risk for imported cases of rubella and CRS [3].

In Australia, CRS is a notifiable condition and the National Notifiable Diseases Surveillance System (NNDSS) coordinates national surveillance of CRS. The quality and completeness of the NNDSS data are limited by several factors. The system relies on treating clinicians identifying and reporting cases without being prompted to do so, and identification of test-positive cases via diagnostic laboratories provides a case count only without any accompanying clinical data. Moreover, the mechanism of notification varies between states and territories [15]. In addition to the NNDSS, the Australian Paediatric Surveillance Unit (APSU) has undertaken active surveillance by child health clinicians for congenital rubella infection since January 1993 so as to collect detailed epidemiological, laboratory, and clinical data. APSU data for 1993–2003 showed that the number of local cases of CRS in Australia has been falling since 1995, except for two local cases from Queensland in 2003, both in women who missed vaccination in adolescence [10,11].

Here we describe the reported incidence and secular trends of congenital rubella infection in Australia notified to the APSU between January 2004 and December 2013 and reflect on ongoing surveillance since 1993.

2. Methods

Active national surveillance of congenital rubella infection by the APSU commenced in January 1993. As part of the standard APSU surveillance process [16] monthly report cards listing the conditions under surveillance are emailed to approximately 1300 paediatricians and other child health specialists who are asked to indicate whether or not they have seen a case of congenital rubella infection in the preceding month according to standardized case definitions. When a case is reported, clinicians are requested to complete a de-identified questionnaire with detailed demographic, diagnostic, and clinical data on the infant (age, gender, birth weight, gestation, country of birth, and the presence or absence of deafness, congenital heart disease, cataracts, retinopathy, developmental delay, laboratory confirmation of rubella), and mother (age, country of birth, Australian Indigenous status, parity, rubella vaccination history antenatal rubella exposure history, rubella like illness with or without rash and rubella laboratory confirmation during pregnancy). Clinicians were asked to return all questionnaires by email, fax or post to the APSU secretariat. Data were extracted from cases notified between January 2004 and December 2013 that met the APSU congenital rubella infection case definition. We also extracted NNDSS data on rubella infections and CRS cases from the same period for comparison [17].

2.1. Case definition

Cases of congenital rubella infection were defined as any child or adolescent less than 16 years of age who, in the opinion of the notifying paediatrician, had definite or suspected congenital rubella, with or without defects, based on history, clinical, and laboratory findings [4,10]. We applied the Australian national notifiable diseases case definition for CRS which requires both definitive laboratory and clinical evidence for confirmation [18]. An imported case of CRS was defined as when the mother was infected with rubella outside Australia. The study protocol and questionnaires are available from www.apsu.org.au.

2.2. Statistical analysis

The yearly incidence of CRS was calculated with 95% confidence intervals (95% CI). The incidence rate per 100,000 births was calculated as the number of reported cases over the sum of the reported number of live births for each year (1993–2013) [19]. We also performed one-sample binomial tests (including *t*-tests) to compare

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