

The Decline in Congenital Rubella Syndrome in Western Australia: An Impact of the School Girl Vaccination Program?

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Abstract: Rubella vaccination became available in 1970 in Australia. In Western Australia (WA), a school girl vaccination program was well established by 1971. Mothers under 26 years of age in 1983 would have been eligible for this program and they constitute 40 per cent of WA births. Data on Congenital Rubella Syndrome (CRS) cases were obtained for years of birth 1968–83 inclusive to ascertain if there had been an impact of the program on the CRS rate.

Epidemics of rubella occurred in 1970–71, 1974, and 1979–80. The CRS rate has fallen steadily; it did not rise during the 1979–80 epidemic and was less than one in each year after 1977. All CRS cases born since 1974 were to mothers too old to have been eligible for the program. The data suggest that the vaccination program is effective, but this cannot be proven until data become available on pregnancy terminations (*Am J Public Health* 1986; 76:35–37.)

Introduction

Congenital Rubella Syndrome (CRS) is thought to be one of the major causes of preventable congenital deafness¹ and has been a significant cause of other major defects. Epidemics of CRS occur with rubella epidemics approximately every two to five years.² The rubella vaccine became generally available in 1970 and two different approaches to vaccination have been used. In Australia and the United Kingdom (UK), the aim is to increase the proportion of immune women entering the child bearing age group by vaccinating all school girls at 12–13 years of age. In the United States, the aim is to influence the rubella epidemics in preschool children (who usually infect their pregnant mothers). Thus the vaccine has been given as a combined measles, mumps, and rubella (MMR) vaccination for some years, with recent enforcement of vaccination before school entry.³

Recent data from the US Centers for Disease Control report a fall in congenital infection but debate has centered around whether a combination of the two approaches may not be more effective.⁴

The school girl vaccination program in Western Australia (WA) commenced in 1971. Vaccination acceptance, assessed by school vaccine records, has ranged from 75.3 per cent in 1971 to 88.3 per cent in 1983.* Females born in 1958 or later would have been eligible for the program and would have reached child bearing age (assumed to be 16 years and over) from 1974 onwards.

By 1983, the first rubella vaccinated cohort of women in WA would have been 24–25 years old. As 40 per cent of births in WA in 1983 were to women under age 25, it was felt that an effect of the program on CRS rates might be measurable in 1984. The majority of diagnosed cases of CRS are diagnosed by 2 years of age and thus the rates for 1982–83 would be known fairly accurately by 1984.

Epidemics of rubella occurred in WA in 1970, 1974, and 1979–80.

Methods

The data presented here are from a series of special

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*Personal communication from Dr. Roy Allen, Director of Immunization Services, Health Department of Western Australia (now retired).

studies arising out of the WA Congenital Malformations Register which was established in 1979–80.⁵

Cases of CRS occurring among WA births were sought from multiple sources and agencies. These sources included Princess Margaret Hospital (the one children's teaching hospital), Mental Health Services Division for Intellectually Handicapped, the National Acoustic Laboratory (which assesses all deaf children and fits them with hearing aids), the WA Cerebral Palsy Register,⁶ the WA Congenital Malformations Register,⁵ the Registrar-General (for death certificates), the Public Health Department (for the WA Midwives' Notification of birth forms), King Edward Memorial Hospital (the major obstetric teaching hospital), and the State Health Laboratory services (where all serology for rubella is performed).

CRS cases had been collected for a previous study² for birth years 1968–76. Cases were sought for the present study for birth years 1970–83 and this validated and extended the numbers of the earlier collection.

The criteria for diagnosis of CRS were not standardized and may have varied between individual doctors. The methods of diagnosis included clinical and postmortem examinations, antibody titres, and history of contact in pregnancy. It is possible that some cases were neither diagnosed nor recorded by our sources, but it is unlikely that this has affected the trends observed as under-ascertainment probably occurred at the same level throughout the study period.

Ratios of CRS per 10,000 live births were calculated. The expected number of cases of CRS was calculated for the 1979–80 epidemic by averaging the ratio for the previous epidemic years and applying it to the 1979–80 birth cohort.

Rubella is not a notifiable disease in WA. Evidence for the 1970, 1974, and 1979–80 epidemics exists in the reports of the Commonwealth Department of Health and the State Health Laboratories. Laboratory isolations of the virus or serology verifications were many times greater during epidemic years than during non-epidemic years.

Results

Table 1 and Figure 1 show the rate of CRS per 10,000 live births in WA from 1968 to 1983. Peaks are obvious for the epidemics of 1970 and 1974, but no rise was observed with the 1979–80 epidemic. The CRS rate for years between epidemics has fallen from around 2/10,000 to virtually zero.

Of the cases whose age at diagnosis was recorded, 80 per cent were diagnosed in the first year of life, and 90 per cent by age 4 years. Thus it is unlikely that diagnostic delays resulting in under-ascertainment in 1979–83 are responsible

TABLE 1—Prevalence of CRS in Western Australia, 1968–83

Year	No. CRS Cases	Rate/10,000 Live Births
1968	4	2.05
1969	5	2.41
1970	23	10.50
1971	21	8.56
1972	4	1.78
1973	9	4.33
1974	13	6.35
1975	9	4.37
1976	3	1.44
1977	1	0.48
1978	0	—
1979	2	0.97
1980	2	0.96
1981	0	—
1982	1	0.45
1983	1	0.43

for this trend. The prevalence of congenital deafness and this follows an identical pattern as that shown for total CRS in Figure 1.

Many cases of CRS had multiple defects as shown in Table 2. Deafness was the most frequent single defect (73 per cent) but mental retardation, cerebral palsy, eye defects, and congenital heart defects were all common.

To have been eligible for the school girl vaccination program, a mother had to have been born in 1959 or later. Women born in 1958 would have been 25 years old in 1983. Thus women aged between 16 and 25 years having babies from 1974 to 1983 constitute the group in whom the impact of the program should be measured.

Of the 19 cases born since 1974, *no* mothers were in the age group 16–25 years, compared with an expected 38.3 per cent based on the maternal age distribution of all WA mothers in those years. Data on maternal age of CRS cases' mothers before 1974 were incomplete and thus a comparison of maternal age distribution of CRS cases before and after 1974 was not possible.

The proportion of mothers obtaining abortion by age is unknown, but it is thought to be high (and possibly rising) in

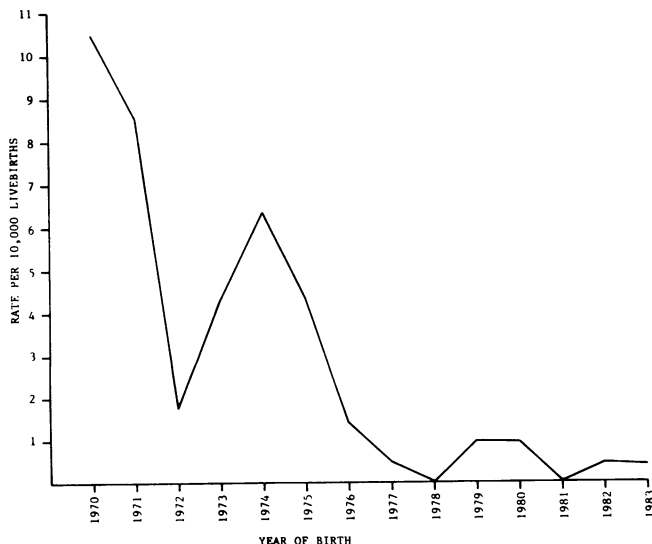


FIGURE 1—Congenital Rubella Syndrome in Western Australia 1970–83, Rate/1,000 Live Births

TABLE 2—Deaths and Congenital Malformations Recorded in 98 Cases of CRS* (1970–83)

Deaths/Malformations	Per Cent
Death (N=16)	
Stillbirth	9.0
Neonatal death	5.6
Postneonatal death	2.2
Deafness (N=71)	
Mild	9.0
Severe	64.0
All	73.0
Eye Defects (N=40)	
Cataract	16.9
Retinopathy	10.1
Other†	13.5
All	40.5
Congenital Heart Defects (N=25)	
Patent Ductus Arteriosus	6.7
Ventricular Septal Defect	5.6
Pulmonary Stenosis	1.1
Other	13.5
All	26.0
Central Nervous System Defects (N=40)	
Mental Retardation	18.0
Microcephaly	13.5
Cerebral Palsy	9.0
All	40.5
Other (N=22)	
Hepatosplenomegaly	14.6
Thrombocytopenic Purpura	7.9

*Many children had multiple problems.

†Strabismus was not included as a congenital eye defect (it was common).

the 16–25 year age group.

No information on parity or type of antenatal care received was available to ascertain if these factors influenced whether a non-immune mother was identified ante- or post-natally and *not* vaccinated.

History of Rubella Contact in Pregnancy

As rubella may be a mild or sub-clinical disease, it may go unrecorded in pregnancy. A history of contact was recorded for 61 per cent (54) of the mothers of CRS cases. In the majority of these cases, exposure was recorded in the first trimester, but a few cases had a history of second trimester exposure. Some of the latter were severely affected with deafness, cerebral palsy, mental retardation, and congenital heart defects. This may reflect inaccurate assessment of gestational age, error in maternal recall, or a real late teratogenic effect of the virus on formed organs.

Discussion

This study clearly demonstrates a fall in CRS prevalence in WA in the last five to six years. We feel that these data support the hypothesis that the school girl rubella vaccination program has decreased CRS prevalence. Two other Australian studies have suggested that the rubella vaccination campaign has resulted in a decreased incidence of congenital deafness⁸ and an increase in the proportion of immune women.⁹

No data on induced or spontaneous abortions are available in WA. Thus we have no idea of the trends in induced abortions over the study period. If the abortion rate had remained constant over time, then the decreased CRS rate could be more readily attributed to vaccination. This aspect should be investigated further. The observed fall may be due to a combination of several factors. In support of the

vaccination program, however, no cases of CRS were born to mothers eligible (by virtue of their age) for the program.

Another important preventive activity is postpartum and post-abortion vaccination of women found to be non-immune. We strongly recommend that a recording system to monitor terminations of rubella-exposed pregnancies be set up in Australia, perhaps on a national basis.

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Forum on Cardiovascular Disease Risk Factors in Minority Populations

The National Heart, Lung, and Blood Institute (NHLBI) and the Ad Hoc Committee on Cardiovascular/Pulmonary Disease Risk Factors in Minority Populations will sponsor a two-day Forum on Cardiovascular Disease Risk Factors in Minority Populations on June 6-7, 1986, at the new Hyatt Regency Hotel in Bethesda, Maryland.

This third minority forum marks 11 years of cooperative efforts of the above-mentioned sponsors. The first two forums primarily focused on high blood pressure in minority populations. The 1986 forum will address other cardiovascular risk factors—in addition to high blood pressure—such as obesity, elevated blood cholesterol, smoking, stress, diabetes, and exercise, as well as their impact on racially and culturally diverse populations.

Forum participants will have an opportunity to share information about current research, demonstrations, and practical experiences in the prevention, detection, treatment, and control of cardiovascular disease risk factors among American Indians/Native Alaskans, Asian/Pacific Islanders, Blacks, and Hispanics. Participants from federal, state, and local health agencies; hospitals, clinics; and other public and private health organizations will highlight problems, issues, and concerns of the ethnic groups they represent.

For more information, contact Nonata G. Garcia, 1986 Forum, c/o Kappa Systems, Inc., 2121 Wisconsin Avenue, NW, Suite 410, Washington, DC 20007, or call (202) 944-3162.