

Top End rural and remote Indigenous women: an Australian population group vulnerable to rubella

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Abstract

Australian efforts to prevent cases of congenital rubella syndrome have been largely successful, although concerns that eradication has not yet been achieved are ongoing. This paper describes an Australian population group with a vulnerability to rubella which has not previously been reported. Fewer than 75 per cent of Indigenous women from rural and remote communities who gave birth at Royal Darwin Hospital in 1999 and were tested for rubella antenatally had adequate levels of immunity. By comparison Indigenous and non-Indigenous women living in the Darwin urban area had a prevalence of adequate immunity to rubella on antenatal testing of >90 per cent, similar to estimates for other Australian-born population groups. Action is required to reduce the risk of cases of congenital rubella syndrome occurring in rural and remote Indigenous communities in the Top End, and may be needed in rural and remote settings elsewhere in Australia. Ensuring each child, adolescent and young adult has received two doses of Measles Mumps Rubella vaccine as part of their primary immunization course will provide increased protection. In addition, more women lacking adequate rubella immunity need to be vaccinated postnatally than was found in this study. Providers of women's care would be assisted in this task if laboratories adopted a standardized approach to reporting the results of antenatal rubella serology tests. *Commun Dis Intell* 2004;28:499–503.

Keywords: rubella, Indigenous, vaccination, congenital rubella syndrome

Introduction

The primary objective of rubella immunization programs is to prevent cases of congenital rubella syndrome (CRS).¹ In Australia, an organized approach to CRS prevention began in 1971 with the introduction of the schoolgirl rubella vaccination program, for girls aged 10–16 years.² In 1989, Measles Mumps Rubella (MMR) vaccine was recommended for all 12-month old children.³ In 1993, a second dose of MMR was added to the standard vaccination schedule for 10–16 year olds, and its timing was shifted to 4–5 years in 1998, and to 4 years in 2000.⁴ These Australian rubella immunization programs have had a major impact on reducing the incidence of CRS. Before they began, about 120 cases were diagnosed annually, whereas between 1993 and 1997 a total of only 19 children were diagnosed with CRS.² There were no locally acquired cases of CRS reported between 1997 and 2002, and no cases at all were detected between 1998 and 2000.⁵

Despite the apparent success of these efforts to prevent CRS, there remain several areas of concern. The first is illustrated by a recent report of two cases of CRS in 2003 for babies of Australian-born women living in south-eastern Queensland.⁵ Low levels of rubella immunity among young men and lack of universal rubella immunity among childbearing women have been identified as likely contributory factors.⁶ These cases of CRS prompted calls for a greater effort to ensure that all children are immunized with two doses of MMR and that all women are screened antenatally and vaccinated postnatally if not immune to rubella, as well as the suggestion that an adult male rubella vaccination campaign may be necessary to interrupt rubella virus transmission and prevent further cases of CRS.^{6,7}

Another ongoing concern is the occurrence of CRS cases among the babies of women who have migrated to Australia from the many countries where there are no universal rubella immunization programs.^{5,8,9} Seroprevalence studies have demonstrated high levels of vulnerability to rubella infection

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for some groups of overseas-born women, prompting recommendations for both targeted vaccination programs and ongoing surveillance.^{1,8,10}

This paper reports for the first time on a high level of vulnerability to rubella infection for another Australian population sub-group—Indigenous women living in rural and remote communities in the Top End of the Northern Territory. Antenatal screening for rubella immunity for Indigenous and non-Indigenous women living in the Top End is reviewed here, together with documentation about postnatal vaccination for women with inadequate immunity.

Methods

The results presented are from a project evaluating a broad range of aspects of pregnancy care for Indigenous and non-Indigenous women giving birth at Royal Darwin Hospital, which is located in the Top End of the Northern Territory.¹¹ More than 90 per cent of Indigenous women and 60–65 per cent of non-Indigenous women who usually reside in the Darwin urban area or the rural and remote communities around Darwin give birth at Royal Darwin Hospital.¹²

All women giving birth at Royal Darwin Hospital in 1999 and usually resident in the Northern Territory were identified from the Northern Territory Midwives Data Collection data set. Four Indigenous women whose names could not be matched with existing Royal Darwin Hospital files were excluded; the remaining 516 Indigenous women giving birth were included. Available resources limited the number of files of non-Indigenous women able to be reviewed. A random sample of 150 of the 1,035 births occurring in 1999 for non-Indigenous women was selected by matching a computer-generated list of random numbers against the list of births, sorting the random numbers and selecting the first 150 births. Four women could not be matched with existing hospital files, two were 'duplicates' relating to twin births and one woman was excluded because she had delivered at home. This left a final sample of 143 non-Indigenous women.

One of the authors (JH) reviewed hospital files for all included women, and extracted a large number and range of data items about pregnancy care. Royal Darwin Hospital files usually include records of antenatal care provided in other settings as well as at the hospital, and this is particularly the case for the results of antenatal screening tests.¹¹ No additional information was sought from community clinics or other health providers as part of this project.

The analyses presented here report on data collected about rubella serology tests and results, and evidence of rubella vaccination being given following

delivery for women who lacked immunity. All data were entered directly into an Microsoft Access¹³ database which was used for subsequent analyses. Analysis involved calculating simple proportions, and the proportions of women in each group with documented immunity to rubella were compared statistically using Epi Info.¹⁴

Place of usual residence was used to allocate women to one of three groups used for analyses, based on the regions defined and commonly used in administrative health data collections in the Northern Territory:^{12,18}

1. The 'Darwin urban' area (159 Indigenous women, 127 non-Indigenous women);
2. The rural and remote area surrounding Darwin ('Darwin Rural' region). Women from this region usually came to Darwin to give birth (220 Indigenous women, 10 non-Indigenous women);
3. Outside the Darwin region. Women in this group were most often referred from other parts of the Top End to Darwin to give birth because of pregnancy problems (137 Indigenous women, 6 non-Indigenous women).

Results are presented here for Indigenous women from each of these groups, and for non-Indigenous women from the Darwin urban area. Results for the 16 women classified as both non-Indigenous and living outside the Darwin urban area are not reported. This is because of their small numbers, and also because hospital records for six of these women contained information suggesting they were Indigenous. Evidence available in hospital records suggested Indigenous status misclassification was not a significant issue for the other groups studied.¹¹

The project evaluating pregnancy care for women giving birth at Royal Darwin Hospital was developed in consultation with local practitioners, policy makers, Indigenous community members and the local Aboriginal community controlled health service, and was approved by the Top End Joint Institutional and La Trobe University Human Ethics Committees.

Results

Records and results of antenatal testing for rubella are shown in Table 1. More than 90 per cent of Indigenous and non-Indigenous women had records in their hospital files of antenatal rubella serology tests having been performed, and more than 97 per cent of these had results recorded. Laboratories reported the results of rubella serological tests in

a variety of formats. These included a quantified rubella antibody titre; a categorically reported rubella antibody titre, for example <16 IU; and/or a descriptive statement about rubella immunity such as 'low level', 'doubtful' or 'adequate'. The level of quantitative antibody titre used by different laboratories to report whether a woman's rubella immunity was adequate was not consistent, varying from 16 to 25 IU/ml. Because of this variability, results are presented in three categories, 'low/no immunity', 'immune', and a 'borderline' category which includes reports where this term was used or where quantitative titres in the 16 to 25 IU range were reported.

Indigenous women from the Darwin urban area had a similar frequency of documented immunity to rubella (90.3% immune) to non-Indigenous women from the Darwin urban area (94.2% immune, Chi-square=1.45, $p=0.23$). By contrast, Indigenous women from rural and remote communities were significantly less likely to have documented immunity to rubella. Compared to urban Indigenous women, lower levels of rubella immunity were recorded for both Darwin rural region Indigenous women (72.9% immune, Chi-square=16.4, $p<0.001$) and for Indigenous women from outside the Darwin region (65.6% immune, Chi-square=24.6, $p<0.001$).

Vaccination following delivery was recorded inconsistently in hospital notes for Indigenous and non-Indigenous women regardless of their place of usual residence. As shown in Table 2, only 62–75 per cent of women with low/no immunity had records of vaccination in hospital, and vaccination was even less

likely to be documented for women with 'borderline' rubella immunity. All postnatal vaccinations were with MMR rather than a monovalent rubella vaccine, and there were no documented cases of women refusing vaccination. Hospital discharge summaries rarely recorded the need for community follow up and vaccination when women with low or no immunity to rubella had not been vaccinated postnatally in hospital.

Discussion

Women giving birth at Royal Darwin Hospital almost universally had rubella tests and results recorded antenatally, consistent with rubella immunity testing being a common and longstanding recommendation in Australian protocols about routine antenatal care.

Because 90 per cent of Indigenous women living in Darwin urban and Darwin rural regions give birth at Royal Darwin Hospital, estimates of the prevalence of rubella immunity for these groups made in this study are likely to approximate population-based measures. More than 90 per cent of urban Indigenous and non-Indigenous women having tests indicates immunity to rubella similar to reported estimates for other Australian population groups. More than 90 per cent of women giving birth at Victorian hospitals between 1976 and 1990 were immune to rubella,¹⁰ and a 1998 national seroprevalence survey reported 97 per cent of women aged 16 to 39 years as immune.⁹ Indigenous women living in rural and remote Top End communities were much

Table 1. Antenatal rubella serological tests and results

	Number in group	Percentage with antenatal rubella tests	Results (% women with tests)*			
			Results not recorded	Low/no immunity	Borderline immunity	Immune
Urban Indigenous	159	91.2	0.7	5.5	3.4	90.3
Darwin rural Indigenous	220	95.5	1.9	17.6	7.6	72.9
Indigenous out of Darwin	137	93.4	2.4	25.6	6.4	65.6
Urban non-Indigenous	127	96.8	0.0	3.3	2.5	94.2

* Women without tests recorded have been excluded from results columns.

Table 2. Postnatal vaccination for women with low or borderline rubella immunity

	Low/no immunity		Borderline immunity	
	Number	Percentage vaccinated	Number	Percentage vaccinated
Urban Indigenous	8	62.5	5	0.0
Darwin rural Indigenous	37	64.9	16	37.5
Indigenous out of Darwin	32	71.9	8	12.5
Urban non-Indigenous	4	75.0	3	33.3

less likely than this to be immune to rubella. Women from outside the Darwin region had a similarly low prevalence of immunity to rubella to that of women from the Darwin rural region, despite being a highly selected high risk group. This suggests that vulnerability to rubella may be widespread among Indigenous women usually living in Top End rural and remote communities. Whether or not this is true in other similar regions of Australia could be investigated relatively easily through hospital or community based audits of rubella immunity for women tested antenatally.

There are several possible explanations for the high levels of non-immunity to rubella reported here for Top End rural and remote Indigenous women. Residents in a rural and remote community may have limited past exposure to the rubella virus, resulting in an immune response to a previously acquired infection being less likely. All but a few of the rural and remote Indigenous women giving birth at Royal Darwin Hospital in 1999 would have been of an age eligible to receive rubella vaccination through school-based immunization programs. However, it appears that a significant proportion may have missed out, perhaps because they were not at school. Another possibility is that women were vaccinated but did not achieve an adequate or persistent immune response to rubella. Cold-chain breaches have previously been identified as a problem with vaccine transport to rural and remote communities in the tropical climate of the Top End.¹⁵ As rubella vaccines are sensitive to both heat and light,¹⁶ cold-chain and other transport problems in past years may have impacted on its immunogenicity and the consequent strength or duration of women's immune responses. The contributions of these and other possible explanations could be further explored by determining the vaccination histories of non-immune women.

Although a rural and remote setting may confer some protection against exposure to rubella virus to its residents, high and increasing levels of population mobility mean it is probably only a matter of time before exposure occurs. Only three cases of rubella have been notified from the Northern Territory in the years since the 1999 data reported here.¹⁷ However, only limited reassurance can be gained from this report. Notification rates for rubella are acknowledged as unreliable because the notification is primarily based on the results of serological testing for what is often a mild disease not investigated with tests.² In addition, there are other factors in Northern Territory settings that may act to reduce the likelihood of cases of rubella being notified, particularly in rural and remote Indigenous communities. These include rubella's relatively recent inclusion as a notifiable disease in the Northern Territory (in 1994),² barriers to accessing health services particularly for Indigenous people,¹⁸ the high prevalence of

other more serious health problems experienced by Indigenous people taking priority, and the high workloads and turnover of clinic staff. It is fortunate there have been no cases of CRS reported from the Northern Territory in recent years.^{2,5} However, the level of vulnerability to rubella demonstrated here for women from rural and remote Indigenous communities suggests a future outbreak of rubella in the Northern Territory could have tragic consequences in terms of the potential for rubella infection to result in cases of CRS.

It is disappointing that many Top End women considered to lack adequate immunity to rubella on antenatal testing in this study were not vaccinated in hospital following delivery, or did not have clear documentation of the need for vaccination recorded on their hospital discharge summary. Working with hospital and community providers to promote the importance of offering non-immune women vaccination, and improving communication between hospital and community based services are measures that may help improve postnatal vaccination rates. In addition the presentation by laboratories of the results of antenatal rubella serology tests could be improved. Laboratories using different methods to test for rubella antibodies may account for some of the variability in test reporting formats noted in this study, and the most recent *Australian Immunization Handbook* notes the lack of an Australian standard for levels of rubella antibodies required to confer adequate levels of immunity.¹⁶ However, the lack of consistency of laboratory reporting practices for rubella has been noted elsewhere.¹⁹ Australian laboratories agreeing on a standard approach for presenting the results of antenatal rubella serology tests may result in less confusion for antenatal care providers, and more women lacking adequate rubella immunity being vaccinated postnatally.

MMR vaccination has recently been promoted in the Northern Territory, and elsewhere in Australia, for young adults who have not received two previous doses as part of efforts to improve measles control.^{16,20} This measure may also have the effect of improving levels of immunity to rubella, and ongoing efforts to encourage young adults to be vaccinated with MMR are justified for both reasons. In addition, increased promotion of the importance of postnatal vaccination of non-immune women, including system changes to ensure opportunities for postnatal vaccination are not missed, and ongoing monitoring of levels of rubella non-immunity among pregnant women are recommended.

Acknowledgements

We would like to acknowledge the assistance of the Northern Territory Department of Health and Community Services's Epidemiology Branch staff

for facilitating access to Midwives Data Collection data; and the Royal Darwin Hospital staff who assisted with the project, in particular Dr Margaret O'Brien and the Medical Records Department. Dr J Hunt's work on this project formed part of her PhD studies, which were supported by an NH&MRC Aboriginal Health Training Scholarship.

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