

Meningococcal disease in Pacific children in New Zealand

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Introduction

Since mid-1991, New Zealand has experienced a serogroup B meningococcal disease hyperendemic, with increasing disease rates over the ensuing period. Total numbers of cases have increased from an average of 51 per annum for the 1989-90 period to 474 cases in 1996 with the greatest number occurring during the winter and spring months (Public Health Advice, 1996).

Correspondingly, disease rates have also increased from 1.5 per 100,000 population to 14.0 per 100,000 population in 1996. In 1997 rates continue to rise and show no sign of having peaked. Rates of meningococcal disease are higher in Maori and Pacific people than in Europeans.

Meningococcal disease is primarily a disease of young children. Of the 474 cases reported in 1996, 84 (17.7%) occurred in children less than 1 year of age. Together with children between 1-4 years (159/474 or 33.5%), pre-school children accounted for 47% of all reported cases. The aim of this paper is to describe rates of meningococcal disease among Pacific children in New Zealand.

Methods

Rates of meningococcal disease by age and ethnicity were calculated to enable ethnic comparisons to be made. In addition disease rates among the different ethnic groups were calculated for Auckland for the period 1 July 1995 - 30

June 1996. To give some indication of the relative importance of meningococcal disease for Pacific children, 1996 rates of meningococcal disease were compared with average annual hospitalisation rates for important conditions affecting Pacific children at ages <12 months, 1-4 years, 5-9 years and 10-14 years.

Results

Table 1 shows the age specific rates of meningococcal disease for New Zealand for the period 1989-1986. Disease rates have increased from 1.5 per 100,000 in 1989/90 to 14.0 per 100,000 in 1996. As can be seen rates have increased within all age groups, however, rates remain highest among those less than five years.

Table 2 shows rates of meningococcal disease among the major ethnic groups in New Zealand for the years 1993-1995. Disease rates are highest among Pacific people, intermediate among Maori and lowest among Europeans.

Table 3 shows national crude rates of meningococcal disease among children from Pacific, Maori and other ethnic groups for 1996 and demonstrates the comparatively higher rates among Pacific children, in particular those less than 5 years of age.

Meningococcal disease rate for children aged <5 years, 5-9 years and 10-14 years within the major ethnic groups in Auckland for the 12 month period 1 July 1995 - 30 June 1996 are shown in Table 4. At all ages rates among Pacific children exceed those found in other ethnic groups.

Tables 5-8 compare major causes of hospitalisation among Pacific children aged 0-14 years during 1987-1991 (rates have been annualised) with meningococcal disease rates for 1996. For children aged 0-9 years rates of meningococcal disease are the seventh highest cause of hospitalisation (presuming all children with meningococcal disease are admitted to hospital). Among those aged 10-14 years meningococcal disease is the ninth highest reason for hospitalisation. In addition some of the disease categories combine a number of causes for hospitalisation for example

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Table 1. Age specific rates of meningococcal disease 1989 - 96

Age group	Rate (cases per 100,000)						
	1989-90	1991	1992	1993	1994	1995	1996
<1	24.8	18.8	35.9	53.0	51.3	112.9	143.7
1-4	4.8	10.1	18.8	30.7	30.3	52.3	72.9
5-9	1.8	2.0	7.2	6.0	8.4	25.5	25.5
10-14	2.0	1.6	3.1	5.9	6.3	14.9	15.3
15-19	2.1	4.2	11.3	10.2	8.5	16.9	14.4
20-29	0.9	2.0	4.1	5.0	5.0	5.4	7.4
30-39	0.4	1.2	1.0	1.6	1.9	2.1	3.3
40+	0.3	0.5	0.6	0.7	1.1	1.9	2.4
Total	1.5	2.3	4.6	6.0	6.2	11.7	14.0

Table 2. Meningococcal disease, by ethnicity, 1993, 1994 and 1995* (Ref. 2)

Ethnic group	1993		1994		1995	
	Number	Rate	Number	Rate	Number	Rate
European	96	4.0	92	3.8	190	7.9
Maori	47	6.9	70	10.0	96	13.7
Pacific People	18	9.1	23	12.3	68	32.9
Other					8	5.7
Not Stated	40	-	18	-	32	-
Total	202	6.0	208	6.2	394	11.7

* Rates per 100,000 standardised to age distribution of the total New Zealand population (1991 census).

Table 3. Absolute numbers and crude rates of meningococcal disease in children in the three major ethnic groups in New Zealand, 1996

Age range (years)	Pacific		Maori		European	
	Number	Rate (per 100,000)	Number	Rate (per 100,000)	Number	Rate (per 100,000)
<1	27	554.8	20	149.2	28	73.5
1-4	54	329.8	46	94.6	41	28.1
5-9	13	77.8	28	54.8	19	11.0
10-14	8	47.8	10	20.0	16	8.9

Table 4. Auckland meningococcal disease among children by ethnicity, July 1995 - June 1996

Ages (years)	Maori		Pacific		Other		Total	
	No.	Rate per 100,000	No.	Rate per 100,000	No.	Rate per 100,000	No.	Rate per 100,000
0-4	23	151	53	358	37	75	113	143
5-9	12	101	13	115	15	34	40	59
10-14	4	34	5	44	4	8	13	9

Table 5. Comparison of average annual hospitalisation data for Pacific Island infants (< 1 yr) for 1987-1991* with meningococcal disease rates for 1996

Cause	Pacific infants < 1yr	
	Number	Rate per 100,000
Acute respiratory infections	274	5630
Other respiratory diseases of the foetus and new-born	148	3041
Pneumonia	95	1952
Infectious and parasitic diseases	73	1504
Asthma	44.8	920
Unintentional injuries	31	628
Meningococcal disease	27	555
Perinatal infections	23.2	476

* Data from Bathgate, et al 1994

Table 6. Comparison of average annual hospitalisation data for Pacific Island infants aged 1-4 years for the period 1987-1991* with meningococcal disease rates for 1996

Cause	Pacific infants < 1yr	
	Number	Rate per 100,000
Asthma	285	1740
Acute respiratory infections	168	1026
Unintentional injuries	161	983
Pneumonia	141	861
Infectious and parasitic diseases	70.4	427
Otitis media	60	366
Meningococcal disease	54	330
Burns	30	183

* Data from Bathgate, et al 1994

Table 7. Comparison of average annual hospitalisation data for Pacific Island children aged 5-9 years for the period 1987-1991* with meningococcal disease rates for 1996

Cause	Pacific children 5-9 yrs	
	Number	Rate per 100,000
Unintentional injuries	138	825
Asthma	67	400
Otitis media	37	221
Pneumonia	25	149.6
Forearm fractures	23	137.6
Acute respiratory infections	20	119.6
Meningococcal disease	13	77.8
Cancer	8	47.9
Acute Rheumatic fever	5	29.9
Acute glomerulonephritis	4	23.9

** Data obtained from Health of the Pacific Island people*

Table 8. Comparison of average annual hospitalisation data for Pacific children aged 10-14 years for the period 1987-1991* with meningococcal disease rates for 1996

Cause	Pacific children 10-14 yrs	
	Number	Rate per 100,000
Unintentional injuries	123	737.6
Asthma	28	167.9
Otitis media	19	113.2
Forearm fractures	17	101.9
Cancer	15	89.9
Infectious and parasitic diseases	13	77.9
Acute rheumatic fever	10	59.9
Pneumonia	10	59.9
Meningococcal disease	8	47.97
Diabetes	0.4	2.39

** Data obtained from Health of the Pacific Island people*

("unintentional injury" and "acute respiratory illness"). If these were broken down into rates for their component illnesses and compared with meningococcal disease rates it is likely that the latter would appear as an even more significant disease among Pacific children.

Discussion

This paper uses routinely published data to demonstrate the significance of meningococcal disease among Pacific children in New Zealand. Not only are disease rates among Pacific children higher than those for children in any other ethnic group in New Zealand, meningococcal disease is a cause of serious morbidity among this sub-population. The comparison of 1996 meningococcal disease rates with the leading causes of hospitalisation among Pacific children may lead to an under-estimation of its significance. This is because some of the causes of hospitalisation eg. infectious and parasitic diseases, refer to a number of diseases which if considered individually would not rank among the leading causes of hospitalisation. In addition, it is likely that many of the admissions for respiratory illness among those under 5 years are for self-limiting conditions which require supportive therapy only. By comparison, there is a 5-10% fatality rate associated with invasive meningococcal disease and serious, long-term sequelae do occur. (Lennon, 1995)

While a lack of certainty exists as to which risk factors are of critical importance in the occurrence of invasive meningococcal disease, particularly within the specific ethnic groups within New Zealand, factors which are considered to pre-dispose to development of meningococcal infection (carrier status or invasive disease) include:

- presence of an existing carrier in the household, in particular one in whom upper respiratory tract symptoms are present
- a crowded household
- immune status of potential hosts
- presence of smokers in the household (affects integrity of the mucosal lining of the upper respiratory tract)
- virulence of the organism (Schwartz, et al 1989)

The Pacific population in New Zealand is characterised by: its relative youthfulness (at the 1991 census, almost 40% of the population were aged 0-14 years); rapid growth predominantly due to relatively high fertility rates; a high level of social disadvantage among its people (among those who were employed at the 1991 census, 80% received an income of <\$20,000 compared with 64% in the general population); relatively large household size (at the 1991 census 42% of

Pacific households contained 6 or more people compared with only 11% of households in the remainder of the population); a higher prevalence of cigarette smoking among Pacific males compared with Europeans (Baker et al 1996).

It is likely that Pacific children have greater exposure to risk factors pre-disposing to the disease eg. smokers in the house, and crowded households (as a result of large family size and relative socio-economic deprivation) than children from other ethnic groups, making them a high risk group for bacterial transmission and subsequent invasive disease. There may also be an inherited factor affecting their immune response to the organism.

In summary, a type B meningococcal disease hyperendemic has been occurring in New Zealand for the past 6-7 years. Disease rates have increased annually and there is currently no evidence that they have peaked. Over the past two years the disease has been more prevalent in the North

Island with South Auckland and Central Auckland two of the worst affected areas. Disease rates are much higher in children less than 5 years of age and in particular in Pacific children. Meningococcal disease is a significant illness for Pacific Island children and is

among the top ten causes of hospitalisation for those aged 0-14 years. It is likely that some of the known risk factors for the disease are more prevalent in the Pacific community than in other ethnic groups. Information is urgently required as to the critical risk factors for meningococcal disease among Pacific children. In addition the Pacific community needs to be aware of the disproportionate impact the current epidemic is having upon their children.

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