

## The Northland Emergency Meningococcal C Vaccination Programme

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### Abstract

**Aim** This paper describes an emergency meningococcal C vaccination programme implemented in Northland, New Zealand in 2011. The programme aimed to reduce the impact of a meningococcal group C outbreak on the Northland population, through vaccination of 85% of children and youth 12 months to <20 years with a meningococcal serogroup C conjugate vaccine.

**Method** The emergency vaccination programme targeted an estimated population of 44,000 children and youth. Vaccinations were promoted and delivered by Northland District Health Board Public Health Nursing Service, Primary Health Organisations, General Practice, and Maori provider services, at schools, general practice clinics, via community clinics and outreach home-based vaccination services.

**Results** 32,410 children and youth were vaccinated. Overall coverage reached 73% (72% Māori, 75% non-Māori). Coverage differed across age, ethnic groups, school decile and geographic location. Vaccination coverage was highest for children 5 to <13 years at 84% for Māori and 81% for non-Māori. Coverage was lowest for the 17 to <20 year age group at 46% for Māori and 63% for non-Māori. In the pre-school population, 67% of Māori and 76% of non-Māori children 12 months to <5 years received vaccination. The 13 to <17 year age group reached 71% coverage for Māori and 70% for non-Māori.

**Conclusion** Equitable, high vaccination coverage is attainable in an emergency vaccination programme in New Zealand. However a range of service options, including community outreach, are necessary to reduce access barriers for some groups. The programme presented useful insights into what is possible with focussed attention to adapting services to meet diverse needs.

The Northland region of New Zealand has an estimated population of 158,000, of whom 32% identify as Māori. The median age of Māori is lower than non-Māori, and nearly half of the population under 20 years is Māori. There are small Pacific and Asian communities (together less than 5% of the population), with the remainder being European/Other.<sup>1</sup>

Many Northland communities experience high levels of socioeconomic disadvantage, with poor housing, higher unemployment and lower incomes than the New Zealand average. Māori are disproportionately over-represented in more deprived areas.<sup>1</sup>

During the winter of 2011, a community outbreak of meningococcal group C disease occurred across the Northland District Health Board (NDHB) region, predominantly affecting children and young people. By the end of December 2011, nine cases of meningococcal C had been confirmed, with three deaths.

The rate of group C meningococcal disease for the population in the Whangarei district aged less than 20 years was 27.6 cases per 100,000 population (6 cases) compared with 17.6 cases per 100,000 population under 20 years (8 cases) in the whole region - both higher than the community outbreak “threshold” rate defined by the Ministry of Health.<sup>2,3</sup>

On 12 September 2011, the Ministry of Health recommended an emergency vaccination programme be implemented, offering free, single dose meningococcal C conjugate vaccine (Meningitec®) to all children and young people in the NDHB area between the ages of 12 months and <20 years.

NDHB established a Steering Group on September 13<sup>th</sup> to plan the delivery of the vaccination programme to an estimated 38,224 children and young people (85% of the target age group). The vaccination programme was phased in from 27 September and scaled up to reach the whole eligible population, as the required vaccine stock arrived in New Zealand in three stages. Completion of the vaccination programme was set for 16 December 2011.

## Method

**Programme goal and target**—The goal of the vaccination programme was to reduce the impact of the meningococcal C outbreak in Northland, through vaccination of 85% of the child and youth population aged 12 months to <20 years with Meningitec®. The target 85% vaccination coverage was expected to be met equitably by age, ethnicity and geographic locality.

**Programme planning**—A Steering Group established from the point of programme approval enabled broad stakeholder engagement from primary care and public health services in programme planning and implementation oversight. Māori engagement involved Māori planning and funding expertise, a Māori provider and Whānau Ora Collective representative, and a Māori Nurse Specialist with a communicable disease background, as members of the Steering Group.

The Steering Group had 10 working days to plan the roll out of the programme with the first day of school-based vaccinations planned for September 27<sup>th</sup>. The urgency and short timeframe of the response was not only due to the severity of meningococcal disease, but also the altered timing of school holidays due to the 2011 Rugby World Cup, the need to vaccinate senior students before national school examinations, and limited initial vaccine availability.

Steering Group meetings were held daily, reducing to twice weekly and then weekly as the vaccination programme progressed. The meetings continued after completion of the vaccination programme to oversee coverage data reporting and analysis, options for utilisation of the remaining doses of vaccine, provider payment issues, and the programme evaluation.

**Programme design**—The programme was designed with three main approaches to reaching the eligible population and achieving 85% vaccination coverage:

- A school based campaign managed by the Public Health Nursing (PHN) service to reach students enrolled in schools.
- A General Practice (GP) campaign to reach under 5 year old children, home schooled children, out of school youth, and school enrolled children who preferred vaccination at their GP clinic.
- A community outreach campaign targeting out of school youth and Māori, but which could also provide vaccinations to all the eligible population from 12 months to <20 years. The targeting was in recognition of historically lower coverage for Māori and youth in previous vaccination programmes, both in Northland and nationally.<sup>4,5</sup>

The community outreach campaign was managed by NDHB and supported in its operation by Māori Provider organisations. It utilised fixed locations such as a central shop in the main Northland city of Whangarei, space within Work and Income New Zealand offices, pharmacies, and Māori provider clinics.

Mobile units parked in main streets, shopping centre car parks, suburban streets and rural village locations, and visited Polytechnic and other training facilities. Fixed location clinics and mobile units were staffed by a range of personnel from Māori providers, the PHN service, and new fixed term appointments to the NDHB Public Health Unit specifically for the vaccination programme.

Initially planned only for the school holidays in early October the community clinics were further extended when their success became apparent and populations or areas of low coverage were identified.

**Communications**—A comprehensive communication plan guided utilisation of a full range of media to raise public awareness of the disease outbreak and the immunisation campaign. Television, mainstream and iwi radio, print media, billboards, posters, flyers, windscreen pamphlets, Facebook, Youtube, cinema advertising, and a range of different types of community gatherings communicated the key messages.

Kaimahi and youth health promoters “on the street” in the vicinity of community outreach clinics were key to engaging people in discussion and providing information to support vaccination. Healthcare provider organisations and individual health professionals across public health, primary health and secondary care also played important roles in the communication strategy, ensuring their clients were well informed of the disease, and were aware of protection through immunisation, eligibility for the vaccine, and how to access immunisation services.

**Programme resources**—Despite an environment of fiscal constraint, the NDHB was committed to funding services required to reach and vaccinate the eligible population once the vaccine had been purchased. The general funding approach was to monitor vaccination coverage on a weekly basis and commit the limited additional resources available as required to improve coverage.

Promotion of the vaccination campaign, co-ordination and delivery of immunisation services, were largely conducted by existing public health and primary health care teams. A small number of casual health promoters, registered nurses and data entry staff were recruited to increase capacity to deliver the programme. Existing teams managed the delivery of the programme by forfeiting other non urgent activity and working overtime when necessary.

Additional clinic rooms and mobile units were leased in order to provide community outreach clinics. Some clinic spaces and mobile units were also made available to the NDHB at no cost, by other health and social service providers.

The estimated total cost of the programme including vaccine, immunisation subsidy paid to General Practice and Māori provider organisations, additional staff and materials costs incurred by these primary care providers, all costs associated with the school and community clinics programmes, Primary Health Organisation (PHO) coordination costs, communications, and vaccination data management costs, was estimated at \$3.2 million. This indicates an estimated programme cost of \$98.73 per person vaccinated. The cost of the vaccine amounted to more than 50% of this cost.

**Systems for coverage data collection, reporting and analysis**—Vaccinations given in General Practice were recorded in the emergency vaccination programme area of Practice Management Systems, and this information was transmitted to the National Immunisation Register (NIR) using the emergency vaccination programme function. However the NIR data could not be viewed or queried due to the Ministry of Health’s delayed decision about its use and lack of consent obtained for participant “opt off”.

School-based and community outreach vaccinations provided by PHNs and Māori provider nurses were recorded on paper and entered into the Public Health Unit vaccination database. Weekly reports on vaccination coverage were generated by the Northland Primary Health Organisations and the Public Health Unit and supplied to the Steering Group. Weekly tracking of vaccination coverage by age group, ethnicity and geographic area informed ongoing programme activity.

## Results

**Community response**—A high level of awareness of the meningococcal C outbreak and the vaccination programme was reported by evaluation interview participants and respondents to a Northland wide telephone reminder project.<sup>6</sup> However, some people

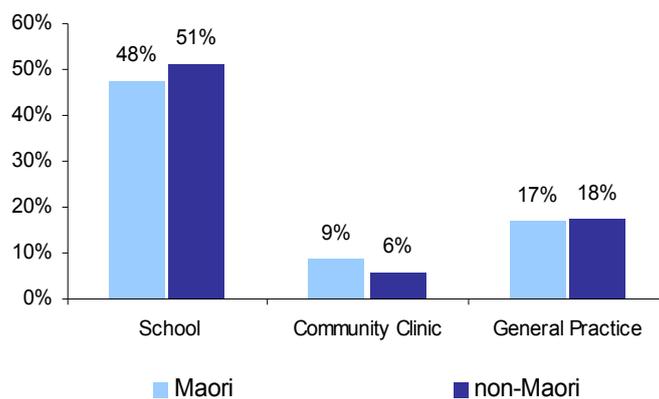
had not heard about the programme and a few were unaware that free Meningitec® vaccinations would only be available for a limited period. There was minimal public questioning of the safety and efficacy of the vaccine, and there were reports of families choosing to have Meningitec® despite declining other vaccinations.

**Vaccination coverage**—A total of 32,410 of the estimated 44,000 eligible children and young people were vaccinated, an overall vaccination coverage rate of 73%.

**Place of vaccination**—Just over half of all vaccinations were given in schools, 38% were given in General Practice clinics and 10% in community outreach clinics. Community outreach clinics were most commonly utilised by Māori (59% of users). Sixteen to <20 year olds were the most common age cohort to utilise community clinics (37% of users).

These were the two target groups for community clinics. However, community outreach clinics were utilised by all age groups and all ethnic groups. Figure 1 below shows community clinic vaccinations increased Māori coverage by 9% and non-Māori coverage by 6%.

**Figure 1: Use of different vaccination services as a proportion of the total Māori and non-Māori populations aged 5 to <20 years**



**Inequities in coverage**—Vaccination coverage differed across age groups, ethnic groups, school deciles and geographic locations.

#### **Age inequities**

- Vaccination coverage was highest for the 5 to <13 year age group at 84% for Māori and 81% for non-Māori.
- Non-Māori 12 months to <5 years coverage reached 76%.
- The 13 to <17 year age group reached 71% coverage for Māori and 70% for non-Māori.
- Vaccination coverage for Māori 12 months to <5 years was low at 67%.

- Vaccination coverage was lowest for the 17 to <20 year age group at 46% for Māori and 63% for non-Māori.

### Inequities by school decile

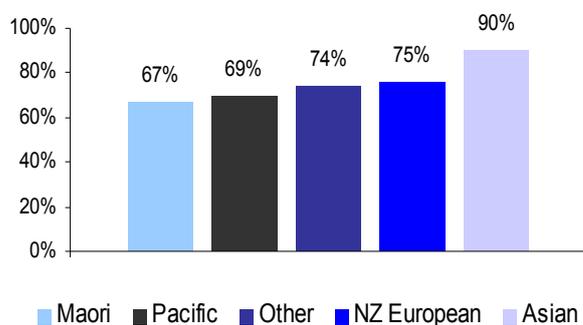
- 68/158 (43%) of schools enrolling 32% of all students (and 54% of Māori students) in Northland are in deciles 1 & 2 [Decile 1 schools in New Zealand are the 10% of schools with the highest proportion of students from low socioeconomic communities (based on residential address of students), whereas decile 10 schools are the 10% of schools with the lowest proportion of these students].<sup>7</sup>
- The overall vaccination consent form return rate was 82%, a lower return than that seen in routine school based vaccination programmes in Years 7 & 8 in Northland.
- There was a considerable range of coverage achieved across schools (from 21% to 98%) but little variance in mean coverage by school decile. Mean coverage in decile 1 & 2 schools was 58.8%, while it was 53.8% in the seven decile 9 schools in Northland (the least deprived - there are no decile 10 schools in Northland). The highest mean school coverage (59.6%) was in decile 3 & 4 schools.

### Ethnic inequities

Ethnic inequities in coverage were most significant in two age groups.

- A large inequity of 17% lower vaccination coverage in Māori aged 17 to <20 years compared with non-Māori.
- Māori coverage was also lower (9%) in the 12 months to <5 year age group compared with non-Māori.
- Pacific under 5 year olds coverage was between Māori and NZ European, and Asian children under 5 years coverage was the highest at 90% (Figure 2).

**Figure 2. Vaccination coverage 12 months to <5 years by ethnicity**



Between general practices there were marked differences in the level of Māori:non-Māori inequities in the 12 months to <5 year age group. The greatest gap was a 35% higher non-Māori vaccination coverage compared with Māori in the under five cohort of one general practice, whilst in a small number of practices equitably high coverage (>85%) was achieved between Māori and non-Māori in this age group.

Higher Māori coverage than non-Māori in the largest age group (5 to <13 years) resulted in a relatively equitable overall coverage from 12 months to <20 years of 72% for Māori and 75% for non-Māori.

**Geographic inequities**—Geographic inequities were observed in the vaccination coverage of the 12 months to <5 year age group with coverage lowest in the following areas:

- Southern boundary of the Northland DHB region
- Dargaville and surrounding rural Kaipara
- Kaitaia, Kaikohe, Hokianga and Kerikeri
- Otaika, Tikipunga, Onerahi, and Kamo suburbs of Whangarei.

Across all age groups vaccination coverage was lowest at the Southern boundary of the Northland DHB region.

## Discussion

The Northland emergency meningococcal C vaccination programme was planned and implemented in an extremely short timeframe. Achieving overall vaccination coverage of 73% of the 12 month to <20 year population in a twelve week programme, given historically low and inequitable immunisation coverage in Northland, is a significant achievement.

Routine well child immunisation coverage in Northland remains below 90% at two years of age, although Māori coverage is now similar to non-Māori.<sup>8</sup> School immunisation programme coverage in Years 7 & 8 in Northland is less than 65%, and previous mass vaccination programmes such as the MeNZB programme have failed to achieve equitable coverage.<sup>5,8</sup> However, in the meningococcal C programme, the combination of general practice, school programmes and community outreach clinics resulted in equitably high coverage in the 5-<13year group.

There were pockets of excellence where some small geographic areas and general practice populations reached 85% coverage across all age and ethnic groups. However, as evidenced by vaccination coverage rates lower than the 85% target, and with significant inequities in coverage especially in the <5years and 13 to <20year age groups, further service developments are clearly necessary to achieve optimal coverage.

Based on 'best practice' examples, our broader programme evaluation, and evidence from New Zealand and international research, the following strategies are proposed for future programmes.

**School programmes**—High, equitable rates of vaccination consent form return are critical to achieving high coverage in school vaccination programmes. The routine

school based immunisation programmes in Northland (Boostrix® in Year 7 and Gardasil® in Year 8) are resourced sufficiently to enable follow up with families who have failed to return consent forms, resulting in consent form return rates of 85-100%.<sup>8</sup>

This type of follow up was also important in achieving high school programme coverage in the MenZB campaign,<sup>5</sup> but was not resourced for the Northland emergency meningococcal C campaign. Had it been, higher vaccination coverage rates—especially amongst school students over 13 years - are likely to have been achieved.

In-depth analysis of previous school consent form return and vaccination coverage rates in routine programmes, to identify individual schools which require additional systematic support, could also assist in improving overall school coverage rates.

Feedback from evaluation interview participants suggests engaging youth in communicating specific vaccination messages aimed at youth in schools could contribute to perceptions of appropriateness and acceptability, and also improve uptake of vaccinations by the older school students.

In addition, school vaccination programmes could enlarge access to vaccination for youth out of school and pre-school populations, if open to these groups, particularly in rural areas where schools may be much more accessible than general practice clinics.

Promoting the availability of vaccination at rural schools for their students' pre-school or youth siblings should be considered for future vaccination campaigns.

**Community clinic services**—A full programme of community outreach clinic services should ideally be planned and funded from the commencement of future programmes, and include fixed and mobile clinics to cover urban and rural localities. In addition community clinics would be enhanced by:

- Development of authorised outreach vaccinator capacity within the primary care and Māori provider sectors to ensure an adequate supply of authorised vaccinators to deliver community outreach clinic services
- Better utilisation of Māori provider health promotion and vaccinator teams in the planning and delivery of community clinics
- Better use of local community knowledge to establish the optimal location of fixed and mobile clinics.
- Availability of community clinics at community events such as sporting and cultural festivals.

**General practice services**—To improve access to general practice vaccination services, strategies observed in general practices with the highest vaccination coverage rates would be applied uniformly. These included:

- A clinical leader or “champion” for immunisation services in every practice, who works with the whole practice team to reach agreement on a plan to achieve high vaccination coverage, to motivate the practice team to achieve vaccination coverage goals, and to monitor and report on vaccination coverage to the whole team.

- Telephone and/or text recall of all eligible patients to advise them of vaccinations due and to book an appointment. This could be undertaken by a practice team member or outsourced to a call centre. However, all call recipients should be given the opportunity to discuss vaccination with a nurse or doctor should they wish to, whether they are called by a call centre or a practice team member.
- Next of kin information utilised to follow up on patients who have changed contact details and are lost to follow up.
- Phone or text reminders of appointments for vaccinations, on the day or day before appointment.
- Systematic opportunistic vaccination, by ensuring all practice staff are primed to invite vaccination eligible patients attending the practice, and that vaccination eligible patients booked for another issue are flagged to be invited to be vaccinated.
- Systematic utilisation of PHO outreach vaccination services, other mobile nursing services, or a practice's own home visiting services, to locate and vaccinate non-responders.

Many of these approaches, as well as the importance of well-informed and confident immunisation providers, have been shown in earlier New Zealand and international research to be associated with higher coverage at practice level.<sup>9-12</sup>

**Vaccination data management**—Quality vaccination coverage analysis requires leadership to plan and oversee data collection, recording, reporting, and analysis from programme commencement. Accurate and timely coverage data, by service, age, ethnicity and small geographic area, is critical to adapting strategies to maximise coverage during programme implementation. In future emergency responses, timely access to the National Immunisation Register to allow querying of individual vaccination status would be an important improvement.

## Conclusion

The collaborative efforts of the Northland health sector enabled the timely delivery of a quality emergency vaccination programme to over 34,000 children and young people (73% of the target population) in twelve weeks. While a significant achievement, it has also provided opportunities to identify gaps and potential for improvements to routine immunisation services.

Equitable vaccination coverage cannot be achieved without implementing strategies to improve the availability of a *range* of accessible and appropriate services. Community clinics, with a “walk in, no appointment” approach, in a range of fixed locations and mobile units, provided an appropriate and accessible option for over three thousand children and young people (10% of the total vaccinated) who may not have otherwise received a Meningitec® vaccination.

General practice services remain an essential option for accessing vaccination, particularly for the pre-school population. General practice services are also the preferred option for some school aged children and youth. However meningococcal C vaccination coverage in Northland suggests general practice teams need to

continuously review and improve their processes in order to optimise access for their patients and reach high equitable vaccination coverage.

School based programmes demonstrate that equitable, high coverage can be achieved when vaccination services are taken to where children are, reducing barriers to access. However, school programmes also need to continuously review their systems and processes to ensure all students have equal opportunity to access vaccination services at school, particularly young adults.

The outstanding lesson for the Northland health sector is that a sharp focus on improving access for those who have previously been missed, and a will to innovate across all parts of the health sector is necessary, if immunisation coverage is to improve. Continuing to deliver vaccination services without system changes will not increase coverage or eliminate inequalities.

**Competing interests:** Nil.

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