

# Low uptake of maternal vaccination in notified pertussis cases aged less than 20 weeks

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**P**ertussis (whooping cough) is characterised by a prolonged illness with severe forceful coughing occurring in paroxysms, leading to vomiting, cyanosis and can be fatal. Pertussis in infants under one year old can be severe—60% of cases are hospitalised, and 90% of the all fatalities occur in this age group.<sup>1,2</sup> The highest risk period for pertussis for infants is in the first six months of life before the primary series of immunisations is completed.

A recent viewpoint in NZMJ<sup>3</sup> showed that immunisation coverage and timeliness are important, but that maternal vaccination was also key to protect very young infants from pertussis as the New Zealand immunisation rate approaches the World Health Organisation (WHO) and New Zealand government target of 95%. Recent literature has shown pertussis vaccination during late pregnancy can provide antibody transferred across the placenta, and this passive immunity confers protection to the infant during their first months of life.<sup>4</sup> Such an approach was introduced in 2011 in certain New Zealand regions in response to the recent pertussis epidemic as an emergency measure. The initiative was subsequently incorporated into the New Zealand immunisation schedule in 2013 with the maternal dose of tetanus, diphtheria and acellular pertussis (Tdap - Boostrix®, GSK) vaccine at 28–38 weeks gestation.

The actual rate of uptake for maternal vaccination is unknown, with estimates as low as 13%.<sup>5</sup> The data are not yet captured on the National Immunisation

Register (NIR) and estimates based on GP vaccine claims to the Ministry of Health are considered unreliable.

We have carried out a preliminary analysis of the vaccine histories of pertussis cases aged less than 20 weeks notified to Auckland Regional Public Health Service (ARPHS). Twenty weeks corresponds to the period of increasing *de novo* immunity from the primary series of immunisations.<sup>6</sup> ARPHS receives and investigates all direct laboratory, GP and hospital notifications for pertussis cases within the greater Auckland region across all three metropolitan district health boards (DHBs).

Since 1 April 2015, if the case was aged less than 20 weeks, then contact is made with the mother to determine if Tdap had been given during later stages of pregnancy, and whether this was offered or discussed by the lead maternity carer (LMC). Maternal vaccination of Tdap is confirmed by contact with the mother's general practice. If the mother was not offered Tdap, the LMC is then contacted to discuss any barriers to vaccination. Information and links to printable patient pamphlets are also provided.

For the 12 months from 1 April 2015 to 31 March 2016, there have been 18 laboratory confirmed pertussis cases aged less than 20 weeks reported in the Auckland region. The histogram for the age at proven pertussis diagnosis (notification) for the 18 cases is demonstrated in Figure 1, showing the majority of cases between three and 12 weeks of age.

Of the 18 cases:

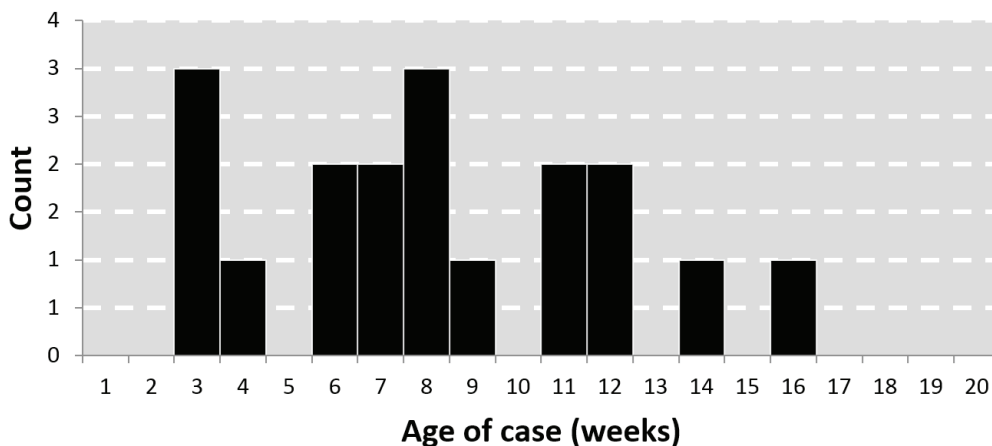
- Fifteen mothers (83.3%) did not receive the maternal vaccine during pregnancy
  - Seven mothers (38.9%) were not offered maternal vaccine by their LMC
  - Three mothers (16.7%) were offered vaccine by their LMC, and the mother chose not to have Tdap
  - Five mothers (27.8%) reported being offered Tdap in the antenatal period, but the maternal vaccine was not given due to recall systems failure
  - Three mothers (16.7%) had Tdap in the third trimester, and all three cases under 20 weeks of age also received their six-week pertussis containing vaccine (Diphtheria–Tetanus–Pertussis–Polio–Hepatitis B–*Haemophilus influenzae* type B–Infanrix-Hexa®, GSK). This group represents true maternal vaccine failure.
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- Twelve cases under 20 weeks of age (66.7%) had their six-week pertussis containing vaccine (one given at eight weeks) indicating that the first dose of the primary vaccine series for these children was insufficient to protect against disease
  - Four cases were premature (22.2%), with two born at 32 weeks and one each born at 33 and 35 weeks respectively
  - One case (5.6%) was unimmunised
  - Five cases (27.8%) were too young to receive primary immunisations before six weeks.

These results demonstrate maternal vaccination is not given in the vast majority of pertussis cases (83.3%) under 20 weeks of age in Auckland. The high percentage (38.9%) of women who report not being offered the vaccination is also demonstrated, and suggests the need for health professional education. The maternal vaccination strategy has been shown to be safe in overseas<sup>7</sup> and local studies.<sup>8</sup> Vaccine effectiveness at preventing newborn infants from pertussis has been estimated at 91–93%.<sup>9</sup> Any interference of the *de novo* immune response by maternally transferred antibody to the infant primary series is being closely examined.<sup>10</sup>

The low maternal vaccine uptake in Auckland is concerning because this represents a missed opportunity to protect

those at most risk of serious infection with a proven intervention. The reason for the low uptake in Auckland is uncertain, but likely represents a suboptimal system of delivery of vaccine to pregnant women. Vaccine delivery for infants and children is primarily co-ordinated in general practice from six weeks post-partum. The maternal dose of vaccine is required at a time when pregnant women are redirected into maternity care and are potentially less engaged with their general practice. The recall systems in general practice are well tested and could encourage maternal vaccination in the third trimester. This could also be audited to estimate maternal vaccine uptake. While there is already funding for administration of the maternal vaccination, uptake is low for uncertain reasons, but may simply

Figure 1: A histogram showing the age of the infant (in weeks) at time of confirmed pertussis notification.



be due to practitioner unawareness of immunisation schedule changes and their importance. Lack of patient awareness of the vaccine and the absence of a clear recommendation were cited as important reasons

for women choosing not to be vaccinated in a recent Christchurch study.<sup>11</sup> These results suggest a strong need to promote the effectiveness of the maternal vaccine to would-be parents, LMCs and general practitioners.

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Nil.

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