Reasons for use and non-use of the pertussis vaccine during pregnancy: an interview study

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ABSTRACT

INTRODUCTION: In New Zealand, pertussis vaccination is recommended and governmentfunded during every pregnancy to protect the infant after birth. However, uptake is low and needs to be increased.

AIM: To investigate enablers and barriers for uptake of the pertussis vaccination by pregnant women in New Zealand, and explore the acceptability of provision in pharmacies.

METHODS: Women with infants were recruited in selected pharmacies and interviewed using a brief structured interview. Transcripts were analysed using a framework approach.

RESULTS: Thirty-seven women aged 18–43 years provided data for analysis. Seventeen women reported receiving a pertussis vaccination during their pregnancy. Information from health professionals appeared important to encourage vaccination, but other sources of information (eg antenatal groups and media) were also cited. Non-vaccination arose from being unaware of the need for pertussis vaccination during pregnancy, concerns about safety, and misinformation. Participants supported pertussis vaccination in pharmacies to help access or increase the opportunity for health professionals to inform women.

DISCUSSION: The information received by participants affected their uptake of the pertussis vaccine during pregnancy. Education of the public and health professionals about the pertussis vaccine during pregnancy is necessary.

Introduction

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The greatest burden of pertussis is borne by infants, particularly infants too young to have received the recommended vaccines.1 In the latest New Zealand (NZ) pertussis epidemic (2010-2013), 673 infants were hospitalised and three died. Higher hospitalisation rates are reported for infants from households with higher levels of deprivation and Māori or Pacific ethnicity.² In NZ, rates of hospitalisation of infants with pertussis are approximately three-fold higher than in Australia and the United States.3 Given the difficulty in treating the illness and its high transmissibility, prevention is the primary

strategy to reduce pertussis disease burden and hospitalisations.4

Pertussis vaccine has long been included and funded in the childhood vaccine schedule.1 A combination tetanus, diphtheria, acellular pertussis vaccine (Tdap) is available for adults. Pertussis vaccination is recommended during every pregnancy, with funding for women between 28 and 38 weeks' gestation. Such vaccination has an effectiveness of ~91%.5 Tdap is also recommended but not funded for health care personnel exposed to infants, household contacts of newborns and early childhood workers

('cocooning'). The uptake of the Tdap vaccine in NZ by pregnant women was estimated in 2014 as ~13%.⁶ This is considerably lower than in the UK in 2013 (~56–60%).⁵

International research found a lack of awareness of pertussis and pertussis vaccines in pregnant or post-partum women.7-11 Contributing to non-uptake in women who were recommended to have the vaccine post-partum or during pregnancy are safety concerns,79,11 'missed opportunity' or forgot,9 lack of encouragement from familiar health care professionals,11 belief that pertussis infection was unlikely^{7,11} or the busyness of pregnancy.¹² Ethnic variation in uptake has also been found in London.¹¹ In NZ, for human papillomavirus vaccination and the influenza vaccine, Māori and Pacific Island children have differed in uptake or location of administration compared with other ethnicities.^{13,14} To our knowledge, despite the estimated low uptake and high disease burden relative to other countries, prior to this study no evidence had been collected on why women do or do not receive the pertussis vaccine during pregnancy in NZ.

Internationally, pharmacists are increasingly administering vaccinations. Pharmacies offer accessibility and convenience and can increase vaccine uptake15-17 with high patient satisfaction.17,18 Vaccination in NZ pharmacies is relatively new but expanding. A survey of adults receiving non-funded influenza vaccinations in community pharmacies found that this service was well received and possibly reached different sectors of society, with 42% of recipients not vaccinated for influenza the previous year.18 Qualified pharmacist vaccinators could administer Tdap vaccines to people aged \geq 18 years from 2014. However, pregnant women can receive a fully funded Tdap vaccine only at their general practice or from hospitals. It is unknown how acceptable pharmacist-administered pertussis vaccinations would be for pregnant women, funded or unfunded.

The aim of this study was to investigate the enablers and barriers for uptake of the pertussis vaccine by pregnant women, including various ethnicities and areas of high or low deprivation. A secondary objective was to explore the acceptability of providing the pertussis vaccine for pregnant women in pharmacies, and whether having funded pertussis vaccines in pharmacies might encourage Tdap vaccination during pregnancy.

Methods

The University of Otago Human Ethics Committee approved the study (D14/219).

Women who had given birth to a child in the last 12 months were interviewed in NZ community pharmacies by final year pharmacy students in July 2014. The pharmacies were purposively selected from five regions to include rural, town and city locations, and ensure variation in socioeconomic status and ethnicities of respondents and their access to services. The interviewers (eight pharmacy students) were placed in pharmacies for three consecutive week days. The aim was to achieve a maximum variation sample rather than to stop after data saturation. Women who appeared to be of child-bearing age were approached for the study. Women with a child aged 1 year or younger, who provided written informed consent, were interviewed in a private room in the pharmacy or by telephone. No information was collected on the number of, or reasons for, women declining invitations to participate.

Women were interviewed for 4–10 min using a structured questionnaire. The questionnaire, developed following a literature review and with input from the supervisors, explored who or what influenced women's decisions to obtain the pertussis vaccine during pregnancy, their opinions on vaccination, who they spoke to about getting the vaccine, whether cost was a factor, their interest in receiving the vaccine at a pharmacy, and demographic information. Two interviewers trialled the questionnaire with one woman fitting the inclusion criteria and modified it before use. Interviews were audio-recorded and transcribed verbatim by interviewers, with a second interviewer checking accuracy.

Questionnaire data were entered into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA), and interview transcripts were analysed using a framework approach (a deductive approach starting from the aims and questions,

as well as recurring views or experiences in the data, annotating the transcripts and mapping the data).¹⁹ A mind-map was developed using the Mindmeister Software (MeisterLabs, Munich, Germany). All interviewers read all transcripts in full, as did the lead author. All interviewers and the supervisors contributed to the analysis. The interviewers were female (n = 7) and male (n = 1), aged in their early 20s. All interviewers were informed about pertussis and pertussis vaccination, and interview technique before the interviews, and all had positive views on vaccination. The lead author, a female pharmacist, has supported pharmacy vaccination, and the final author is a female academic in immunology.

Table 1. Pharmacy Recruitment Site Details

Code	Location	Deprivation index	No. of interviews (<i>n</i>)
A1-A7	West Auckland, suburban strip shops	4	7
B1-B4	Dunedin, suburban strip shops	3	4
C1-C2	South Auckland, suburban strip shops	7	2
D1	Hutt Valley, Wellington, suburban medical centre pharmacy	2	1
D2-D5	Hutt Valley, Wellington, suburban mall	2	4
E1-E5	Dunedin, Central city mall	8	5
F1-F5	Waikato, small town	10	4
G1-G5	Central Auckland, Suburban strip shops	3	5
H1-H5	Canterbury, rural	3	5*

* One excluded because of ineligibility.

Figure 1. Number of participants reporting receiving pertussis vaccination while pregnant by age



Results

Thirty-eight women were interviewed in pharmacies (n = 37) or by telephone (n = 1). One participant was excluded because of ineligibility. Pharmacy recruitment site details are shown in Table 1. Participants were aged 18 to 43 years (Figure 1) and most were NZ European, with a minority identifying as having Māori (n = 4), Pacific Island (n = 6), Indian (n = 3), or other ethnicity (n = 3). Most were married or had partners; one was single. Ten participants had one child, the remainder had two to five other children. Only one of the 33 participants who were asked if their children had been vaccinated answered in the negative. Most women were aware that whooping cough could be a very serious illness.

In total, 17 of the 37 women interviewed (46%) reported receiving a pertussis vaccination (at their general practice or in hospital (three cases)) during their last pregnancy or post-partum. Five women who reported not having the vaccine were aware of the vaccine recommendation. Vaccination was uncommon in women reporting Māori or Pacific Island ethnicity. Half of the women identifying as being NZ European had been vaccinated. Only one of the six women aged < 26 years had been vaccinated. Four of the 10 women with only one child reported being vaccinated. Most participants in the two least deprived areas were vaccinated. No participants from the pharmacy in the most deprived area were vaccinated.

Influences for women who received the Tdap vaccination during pregnancy

Participants who received the Tdap vaccine were influenced by information from public health campaigns, news media, antenatal classes, friends and health professionals. General practitioners' (GPs) or husbands' influence were mentioned by one person each. Multiple influences were common.

'Advertising on the TV, news reports... and my GP is very pro-vaccination.' [Participant A4, 36 years old] 'My midwife has told me and I've done a lot of my own research on vaccines, so I knew I wanted to get the vaccination. I'm also part of a pre-natal group and was during my first pregnancy, so we discussed many important issues like... vaccinations. My mum also had us vaccinated so that has contributed, I guess.' [Participant D4, 24 years old]

Some participants noted a proactive role of health professionals (often midwives) who sometimes alleviated concerns about the vaccination.

'The nurse from the clinic rang up and said we'd just been told you're pregnant, you could come in for whooping cough vaccination... and so I did.... I wasn't actually going to get it and then I decided to. I don't know why. Well, my friends actually don't vaccinate anybody so me vaccinating my kids is kind of a big deal and vaccinating myself I just thought uh whatever, but then I thought about him ...' [Participant E2, 35 years old]

Some women initiated the topic with their health professional. Three participants were positively influenced by their occupation. Two teachers were vaccinated, worried that their occupation could expose them to pertussis. A hospital employee mentioned the influence of medical colleagues and ease of vaccination at the hospital.

Reasons for not getting the Tdap vaccine during pregnancy

Lack of knowledge was common. Approximately one-third of respondents could not recall any discussion about pertussis vaccination duing pregnancy. All three women who identified their ethnicity solely as Māori and three women with Pacific Island ethnicity were unaware of the vaccine, with another possibly unaware also.

One participant who was not vaccinated during pregnancy knew about vaccinating adults in contact with their child, but not about its use during pregnancy:

'I've seen fliers through doctors...in the doctor's rooms, but I haven't had anyone discuss it with me, not even when I was pregnant. My midwife didn't tell me either...' [Participant B4, 26 years old] Misinformation contributed to three nonvaccinations. Two women from the same pharmacy who had the booster within the last 2 years (Participants A1 and A6) thought they were up-to-date. Participant A1, a woman with good awareness of pertussis, received a funded influenza vaccine during pregnancy but no advice about pertussis vaccination. Participant A6 reported that her GP said that her pertussis vaccination was recent, so she did not need another. Her baby's grandparents and the woman's husband received a Tdap booster to protect the infant. A third participant thought her influenza vaccine was enough:

'I didn't do it during my pregnancy because I got the flu vaccine, but I did do it straight after I gave birth... I didn't know a lot about the vaccine and I had not done any research plus I had already got the flu vaccine... it was just a personal decision.' [Participant G1, 32 years old]

Five women had personal reasons or safety concerns for not vaccinating during pregnancy, with concerns primarily for the baby, or their own health.

[it] gives you a dose of *[pertussis]* for you to get the immunity, and your body is already trying to produce a human...' [Participant E2, 36 years old]

'I've heard about it from my midwife, but my family told me not to take any vaccines because it may affect my child. I thought vaccines were usually given after the baby was born anyways, nothing much is taken during pregnancy - my sisters were like that and they had healthy bubs *[babies]* it's just really the way we've done things especially with vaccinations. I look towards my mum and two other sisters for advice with my kids.' [Participant C2, 24 years old]

One participant declined the vaccine, having passed out and had a seizure when blood was taken earlier in her pregnancy. However, she was open to having the vaccine post-partum or during another pregnancy.

Some participants thought that pertussis risk was generally low or believed that their baby was not at risk for developing the disease. Two women

mentioned time and access as reasons not to be vaccinated, including a student who said she was too busy with her studies to get the vaccine. Many women who had not been vaccinated wanted more information, and indicated that a recommendation from their midwife, GP or pharmacist would have convinced them.

Anti-vaccination sentiments

No participants appeared to be anti-vaccination, despite anti-vaccination lobby groups operating in New Zealand. Two participants had doubts before receiving the vaccination, with one affected by an anti-vaccination lobby group and another by anti-vaccination friends.

Potential role of pharmacists in community pharmacy

No participants reported pharmacists influencing their pertussis vaccination decisions. Some (including women not vaccinated) thought pharmacy availability would help raise awareness and provide convenience, but most wanted it to be free.

'...going to the pharmacy is generally a lot easier and way more convenient than the doctors...' [Participant C1, 29 years old]

'I live so close to the pharmacy so it's easily accessible. A lot of people where I live would be more likely to visit a pharmacy I'd think since they don't have cars.' [Participant D4, 24 years old]

No participants raised concerns about pharmacists vaccinating. Participant E5 noted that 'vaccine is something that you do at the doctors not at the chemist' but appeared open to pharmacy vaccination. Some participants preferred to be vaccinated at their GP surgery because of other appointments, or 'because I know the nurses... and the visit is free'.

Discussion

We found barriers and enablers to uptake of the Tdap vaccine by study participants. Most participants had high awareness of pertussis as a disease, but many were not vaccinated, and

there was low literacy about maternal pertussis vaccination. Many did not recall being informed about the vaccination. Similar to other research,^{8,9,20,21} we found that awareness from various sources, particularly health professional recommendations, but also antenatal groups, friends and family, encouraged uptake of Tdap vaccination during pregnancy. However, this recommendation is sometimes not followed because of concerns over safety, misinformation (including from health care professionals), belief their child is not at risk, and being busy. Beliefs by mothers of low risk of exposure and concerns about safety were common in Taiwan.7 In contrast, vaccination safety was of little concern to Australian pregnant women.^{12,22} Tdap use during pregnancy is relatively new, so knowledge deficiencies in women and health professionals, as found by others,²³ are unsurprising. Multifaceted education of health professionals has helped raise uptake of Tdap during pregnancy elsewhere²⁴ and appears necessary in NZ to reduce misinformation.

In NZ, midwives are commonly lead maternity carers and most need to refer women to their general practices for pertussis vaccination. Health care providers in Australia were concerned that such referral could discourage or delay vaccination,23 and difficulty travelling to a vaccine provider contributed to nonvaccination.²¹ Our participants did not report non-vaccination for these reasons. In NZ, providing human papillomavirus vaccinations outside general practice (eg in schools)²⁴ and 'walk in' community and mobile clinics providing meningococcal C vaccinations²⁵ have helped address Māori, Pacific and youth access. Shortages of general practice staff are associated with delayed vaccination.²⁶ In our study, some women received Tdap at hospitals.

Women in our study who were young, had Māori or Pacific ethnicity, or who attended a pharmacy located in high deprivation areas tended to lack knowledge about Tdap vaccination during pregnancy, even when otherwise well informed about pertussis and, sometimes, cocooning. Quantitative research is required to understand if this is a national effect. Other researchers have found lower Tdap pregnancy vaccination rates in minority ethnicities.^{11,24} As the highest rates of hospitalisation for pertussis during the recent epidemic in NZ were for Māori and Pacific children,¹ barriers to vaccination for pertussis for these populations must be particularly addressed. Further efforts to strengthen communication to health professionals and women about the pertussis vaccine during pregnancy are needed. Integrating pertussis vaccination better into routine antenatal care could also help uptake.

Pharmacists can help increase uptake of vaccines.^{17,27} We did not find this, possibly because Tdap became available from pharmacists only 4 months before this study. Most NZ community pharmacists were not trained vaccinators when data were collected, and Tdap was unfunded in pharmacies. Tdap recommendations from multiple providers can increase uptake compared with single recommendations.⁹ Having health professionals routinely offer funded Tdap vaccination during pregnancy in multiple settings, including pharmacies, hospitals and general practices, may help uptake.

Strengths and limitations

Our sampling achieved contributions from a variety of ethnicities and locations. Sampling aimed to get multiple views from different groups (ethnicity, location and age) rather than data saturation. While participants represented a spread of ages, we interviewed only one teenager, who was 18 years old. We only included one very high deprivation area and low numbers of Māori and Pacific people. It is possible that women who declined to participate could have held different views. Further quantitative research would provide more generalisable data.

The women would have been eligible for funded Tdap vaccination up to about a year before we interviewed them, thus recall may be affected. Aware that the interviewers were pharmacy students, the women may have answered to please the researchers. Confusion between influenza vaccine and Tdap vaccine may have occurred when answering the questions. Using multiple relatively inexperienced interviewers created some data variability, but the initial literature review and interview guide ensured the students understood the topic and certain areas were covered in all interviews.

Recruitment and interviewing in pharmacies enabled access to women with young children and a private room for interviews. This approach could have biased the sample towards participants likely to interact with the health system, and more of our sample reported Tdap vaccination during pregnancy than a previous NZ estimate.⁶ Interviews were brief because the women had young children with them, limiting the potential to build rapport, the depth of the interview and the range of questions asked.

Further research

Further research could usefully explore Tdap usage and barriers and enablers to use in a quantitative fashion ensuring the inclusion of teenage mothers, Māori and Pacific Island populations and participants from high deprivation areas. It would be useful to ascertain whether funded pharmacy availability of Tdap increases uptake in these groups and helps to reduce the disparities seen in hospitalisation of infants with pertussis.

Conclusion

Many barriers to Tdap uptake exist. Increased education of women and health professionals is needed. Widening access to vaccines, for example, through pharmacy availability and encouraging more health professionals to routinely inform pregnant women of current recommendations, may help to address the low rates of pertussis immunisation during pregnancy and the health disparities found in pertussis.

References

- 1. Ministry of Health. Immunisation Handbook. Wellington, New Zealand: Ministry of Health; 2014.
- Somerville RL, Grant CC, Grimwood K, et al. Infants hospitalised with pertussis: estimating the true disease burden. J Paediatr Child Health. 2007;43:617–22. doi:10.1111/j.1440-1754.2007.01154.x
- Grant CC. Recent indication of progress in pertussis hospitalisation rates in New Zealand. Aust N Z J Public Health. 2012;36(4):398. doi:10.1111/j.1753-6405.2012.00903.x
- Grant CC, Reid S. Pertussis continues to put New Zealand's immunisation strategy to the test. N Z Med J. 2010;123(1313):46–61.

- Amirthalingam G, Andrews N, Campbell H, et al. Effectiveness of maternal pertussis vaccination in England: an observational study. Lancet. 2014;384:1521–8. doi:10.1016/S0140-6736(14)60686-3
- 6. Anonymous. Pertussis immunisation in pregnancy. Best Pract J. 2014;60:34–7.
- Cheng PJ, Huang SY, Shaw SW, et al. Factors influencing women's decisions regarding pertussis vaccine: A decision-making study in the Postpartum Pertussis Immunization Program of a teaching hospital in Taiwan. Vaccine. 2010;28:5641–7. doi:10.1016/j.vaccine.2010.05.078
- Varan AK, Esteves-Jaramillo A, Richardson V, et al. Intention to accept *Bordetella pertussis* booster vaccine during pregnancy in Mexico City. Vaccine. 2014;32:785–92. doi:10.1016/j.vaccine.2013.12.054
- Urwyler P, Heininger U. Protecting newborns from pertussis – the challenge of complete cocooning. BMC Infect Dis. 2014;14:397. doi:10.1186/1471-2334-14-397
- Frère J, De Wals P, Ovetchkine P, et al. Evaluation of several approaches to immunize parents of neonates against *B. pertussis*. Vaccine. 2013;31:6087–91. doi:10.1016/j.vaccine.2013.09.043
- Donaldson B, Jain P, Holder BS, et al. What determines uptake of pertussis vaccine in pregnancy? A cross sectional survey in an ethnically diverse population of pregnant women in London. Vaccine. 2015;33:5822–8. doi:10.1016/j.vaccine.2015.08.093
- Wiley KE, Cooper SC, Wood N, Leask J. Understanding pregnant women's attitudes and behavior toward influenza and pertussis vaccination. Qual Health Res. 2015;25(3):360–70. doi:10.1177/1049732314551061
- Calder K, Bidwell S, Brunton C, Pink R. Evaluation of the Canterbury under-18 seasonal influenza vaccination programme. N Z Med J. 2014;127:19–27.
- Poole T, Goodyear-Smith F, Petousis-Harris H, et al. Human papillomavirus vaccination in Auckland: reducing ethnic and socioeconomic inequities. Vaccine. 2012;31:84–88. doi:10.1016/j.vaccine.2012.10.099
- Grabenstein JD, Guess HA, Hartzema AG, et al. Effect of vaccination by community pharmacists among adult prescription recipients. Med Care. 2001;39:340–8. doi:10.1097/00005650-200104000-00005
- Steyer TE, Ragucci KR, Pearson WS, Mainous AG III. The role of pharmacists in the delivery of influenza vaccinations. Vaccine. 2004;22:1001–6. doi:10.1016/j.vaccine.2003.08.045
- Warner JG, Portlock J, Smith J, Rutter P. Increasing seasonal influenza vaccination uptake using community pharmacies: experience from the Isle of Wight, England. Int J Pharm Pract. 2013;21:362–67. doi:10.1111/ijpp.12037
- Hook S, Windle J. Community pharmacy influenza immunisation increases vaccine uptake and gains public approval. Aust N Z J Public Health. 2013;37:489–90. doi:10.1111/1753-6405.12109
- Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. BMJ. 2000;320:114–6. doi:10.1136/bmj.320.7227.114
- 20. Beel ER, Rench MA, Montesinos DP, et al. Knowledge and attitudes of postpartum women toward immunization during pregnancy and the peripartum period. Hum Vaccin Immunother. 2013;9:1926–31. doi:10.4161/hv.25096
- Hayles EH, Cooper SC, Wood N, et al. Pertussis booster vaccination in pregnancy: women who had it compared to those who waited. Procedia Vaccinol. 2015;9:59–65. doi:10.1016/j.provac.2015.05.010
- 22. Wiley KE, Massey PD, Cooper SC, et al. Pregnant women's intention to take up a post-partum pertussis vaccine,

and their willingness to take up the vaccine while pregnant: a cross sectional survey. Vaccine. 2013;31:3972–8. doi:10.1016/j.vaccine.2013.06.015

- Webb H, Street J, Marshall H. Incorporating immunizations into routine obstetric care to facilitate health care practitioners in implementing maternal immunization. Hum Vaccin Immunother. 2014;10:1114–21. doi:10.4161/ hv.27893
- Healy CM, Ng N, Taylor RS, et al. Tetanus and diphtheria toxoids and acellular pertussis vaccine uptake during pregnancy in a metropolitan tertiary care center. Vaccine. 2015;33(38):4983–7. doi:10.1016/j.vaccine.2015.07.018
- 25. Mills C. Invasive meningococcal disease in Northland, New Zealand. N Z Med J. 2011;124:95–7.
- 26. Petousis-Harris H, Grant CC, Goodyear-Smith F, et al. What contributes to delays? The primary care determinants of immunisation timeliness in New Zealand. J Prim Health Care. 2012;4:12–20.
- Clarke C, Wall GC, Soltis DA. An introductory pharmacy practice experience to improve pertussis immunization rates in mothers of newborns. Am J Pharm Educ. 2013;77:29. doi:10.5688/ajpe77229

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COMPETING INTERESTS

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