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## Pertussis booster vaccination in pregnancy: women who had it compared to those who waited.

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### Abstract

**Background:** Guidelines for protecting young infants from pertussis now recommend maternal pertussis booster vaccination (dTpa) during pregnancy (3<sup>rd</sup> trimester) over postpartum maternal vaccination.

**Methods:** We undertook a cross-sectional survey of 723 postpartum women on the postnatal ward of a private hospital in Sydney, Australia. We excluded 47% of women who were 'up to date' with their pertussis booster prior to pregnancy. We surveyed the remaining 53% of women who were eligible for the pertussis booster vaccine during their pregnancy (no dTpa < 5 years).

**Results:** In our study, pertussis booster vaccine uptake during pregnancy was only 8.7%. We confirmed that vaccination mostly occurred at the family doctor's practice (25/33; 75.8%), at an average of 34 weeks gestation ( $\pm 5$  wks). Women vaccinated during pregnancy were more likely to report that they received a pregnancy-specific pertussis vaccine recommendation ( $< 0.001$ ), and had no vaccine safety concerns (0.004) or transport difficulties in accessing an immunization provider (0.032). They also had twice the odds of receiving an influenza vaccine during pregnancy (0.002). Additionally, 70% of vaccinated women reported that their partner had also been recently vaccinated against pertussis. Amongst unvaccinated women we found that 80% intended to be vaccinated, yet 33% would only do so if the vaccine was free (publically funded). Additionally, 40% of unvaccinated women would have agreed to pertussis vaccination during pregnancy had their doctor recommended it.

**Conclusion:** Providers should highlight pertussis vaccine safety and recommend vaccination during late pregnancy.

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## Nomenclature

ACIP	Advisory Committee on Immunization Practices
CDC	Centre for Disease Control and Prevention
dTpa	Diphtheria, tetanus and acellular pertussis (' <i>pertussis booster vaccine</i> ')
Family doctor	Also known as 'general practitioner'

## 1. Introduction

Pertussis still remains a prominent public health issue despite sustained high coverage of the primary vaccination series. This is due to immunization being delayed until after the newborn period, which leaves infants under 6 months with little or no protection<sup>1</sup>. Maternal vaccination during pregnancy addresses this gap, and is recommended when a mother or an infant are at significant risk of disease for which a safe and effective vaccine is available<sup>2</sup>. A key example is vaccination against tetanus during pregnancy, resulting in a 93% reduction in deaths from neonatal tetanus due to high coverage (>80%) among childbearing women this decade<sup>3</sup>. Maternal immunization against pertussis at 30-32 weeks gestation optimizes placental antibody transfer to the fetus, which, in turn, provides some direct protection to the newborn<sup>4</sup>. This differs to the indirect protection afforded by postpartum immunization, which may not provide sufficient protection to newborns due to a lag in maximal maternal antibody response (~14 days)<sup>5</sup>.

Maternal vaccination during pregnancy (27-36 weeks gestation) has been recommended since 2011 by the Advisory Committee on Immunization Practices (ACIP) of the Centre for Disease Control and Prevention (CDC)<sup>4</sup>. Implementation in the USA (2011) and UK (2012) has yielded a 49%-79% uptake (4, 6, 7). Since 2013, Australian Immunization Guidelines have included pertussis vaccination during pregnancy<sup>8</sup>, with a media release by the State Ministry of Health alerting providers and the general public to this change in pertussis control<sup>9</sup>. As part of a larger study of the impact of education on vaccine uptake on the postnatal ward, we surveyed postpartum women for vaccination status during pregnancy, and associated factors.

## 2. Methods

The questionnaire formed part of the baseline data for the Maternal Pertussis Randomized Control Trial, approved by the North Shore Private Hospital Ethics Committee and registered with the Australia New Zealand Clinical Trials Registry<sup>10</sup>. Written informed consent was obtained from all participants. Details of the control trial, including results from the public hospital site, have been published elsewhere<sup>11</sup>.

### 2.1. Patients

From June to December 2013, we approached postpartum mothers receiving private obstetric care on the postnatal ward of a metropolitan hospital in Sydney, Australia. This hospital caters for around 2700 births per year(12). We surveyed postpartum women ( $\leq$ day 7 of childbirth) who were eligible for the pertussis booster vaccine during their pregnancy (no dTpa<5years). We excluded those who had been up to date prior to pregnancy (dTpa $\leq$ 5years). Of women who self-reported vaccination during pregnancy, we confirmed 75% by comparing with their family doctor vaccination records.

### 2.2. Questionnaire

Participating women completed an electronic-based knowledge and attitudes survey on an Apple iPad® (Figure 1). It was powered by web-based survey software (Peoplepulse®) and managed by The University of Sydney Information Technology Department. The survey was based on the Health Belief Model (HBM) constructs<sup>13</sup> and

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