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Uptake of a government-funded pertussis-containing booster vaccination program for parents of new babies in Victoria, Australia

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ABSTRACT

Introduction: An epidemic of *Bordetella pertussis* in Victoria, Australia, led to the implementation of a Government-funded vaccination program for parents of new babies. The rationale was to protect unimmunised infants from infection by vaccinating parents with a pertussis-containing vaccine. This is known as cocooning.
Aim: To estimate uptake of the vaccine among parents of new babies, two-and-a-half years after the program was implemented.
Methods: A state-wide cross-sectional survey of parents was conducted to ascertain vaccine uptake, and to identify where and when the vaccination took place. Surveys were administered between 15 February and 14 March 2012, inclusive.
Results: Of 6308 surveys distributed, 2510 completed surveys were returned (response rate 40%). Ninety-five surveys completed outside the study period were excluded, leaving 2415 available for analysis. Overall, 1937 (80%) mothers and 1385 (70%) fathers were vaccinated in relation to the birth of their most recent child. A majority of mothers were vaccinated in hospital (62%). Most fathers were vaccinated by a general practitioner (72%). The most common point at which mothers were vaccinated was before their child turned two weeks of age (65%). Fathers' vaccination time-point varied more widely: during pregnancy (25%); before their child turned two weeks of age (29%); and when their child was between two and eight weeks of age (28%).
Conclusion: Results of this survey indicated excellent uptake of the vaccine among both mothers and fathers under the Government-funded cocooning program. The findings are suggestive of an effective communications program designed to raise awareness of the risks of pertussis, and to promote availability of the funded vaccination program. The results may contribute to policy implementation of adult immunisation programs such as cocooning.

1. Background

An epidemic of *Bordetella pertussis* (pertussis) occurred in Victoria, Australia, in 2008 characterised by increases in the number of pertussis cases notified to the State Government Department of Health. Cases increased by more than two-fold across all age groups from 2008 to 2009 [1]. In 2009, 3698 cases were notified, and by 2011 that number had risen to 8831 [2]. The notification rate amongst infants aged 0–12 months increased by 76% between 2009 and 2010, and by 73% between 2010 and 2011. Increases were also observed among those aged 15–24 years [2]. Epidemics occurred in many other jurisdictions across Australia [3] and internationally [4–7].

In response to the epidemic, between June 2009 and June 2012, the Department of Health introduced a time-limited free vaccination program for parents of new babies. The rationale was to protect infants too young to be immunised against infection by vaccinating parents with a pertussis-containing vaccine, Boostrix®. This strategy is known as cocooning, and often extends to all close contacts

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of the individual the program is endeavouring to protect, including household contacts, grandparents and other adult carers. For this program, parents were targeted as they are known to be the most likely source of infection in infants [8]. Infants infected with pertussis are most susceptible to severe disease, often requiring hospitalisation, and in some instances can die [9].

In 2005, the Global Pertussis Initiative recommended the implementation of cocooning in countries where it is economically feasible [10]. Several countries adopted cocooning as summarised in a review by Chiappin et al. [11]. However, data relating to uptake of vaccine under such programs are lacking. [30] reported uptake of between 75% and 86% in a two-phase, targeted hospital-based cocooning program in Houston, TX [12]. Another hospital-based cocoon program reported a 67% vaccination uptake rate [13]. These are targeted programs in defined cohorts, which would be expected to yield higher rates of uptake when compared with population-wide programs. Overall uptake as part of a nation-wide cocooning program in Switzerland was estimated at 29% and 17% for mothers and fathers, respectively [14]. When vaccination was recommended directly to parents – by, for example, their healthcare providers – the uptake was 64% and 59% for mothers and fathers, respectively [14]. In Victoria, two previous studies examined uptake of our program, which demonstrated parental uptake of 61% [15] and 72% [16], respectively. Another Australian state, which had implemented a similar program, estimated uptake at 30% [17].

In 2012, we conducted a survey examining uptake of the vaccine among parents of new babies, 2.5 years after program implementation.

2. Materials and methods

A cross-sectional survey was administered to a sample of parents of new babies residing in all 79 local government areas (LGAs) in the state of Victoria. Approval to conduct the study was granted by the Department of Education and Early Childhood Development Early Childhood Research Committee.

2.1. Enrolment of participants

Enrolment of participants was through the Victorian Maternal and Child Health (MCH) Service. This is a free service available to all families with children from birth to school age, which provides support on parenting, health promotion, development monitoring and assessment, and social support. The service is provided through a partnership between state and local governments with MCH nurses working within all 79 LGAs in Victoria. The MCH Service provides ten 'Key Ages and Stages' consultations, including an initial home visit, followed by consultations at 2, 4, and 8 weeks; 4, 8, 12 and 18 months; and 2 and 3.5 years of age. MCH nurses were asked to administer the survey to parents attending for their child's four-month consultation between 15 February and 14 March 2012. The number of blank surveys distributed to each LGA was based on data projections indicating the number of four-month-old infants expected to attend during the study period ($n = 6308$). In 2011, attendance at the four-month consultation was 93.7% [18].

Parents' participation was voluntary. Plain Language Statements were provided, and they were asked to give informed consent prior to participation.

2.2. Data collection

The one-page survey was designed to capture whether parent(s) were vaccinated against pertussis, and where and when the vaccination took place. Survey questions were closed, with one open-ended question to enable unvaccinated parents to indicate why they were not vaccinated. No identifying information was collected, and demographic variables were limited to age, sex, country of birth, and Aboriginal and/or Torres Strait Islander status. Responses were able to be captured for both parents (if applicable); however one parent could respond on behalf of the other. Throughout this paper, we refer to the respondents as "mothers" and "fathers", which represent female and male respondents, respectively, whether they identify as such or not.

2.3. Statistical analyses

Percentages were calculated for most responses. Logistic regression was used to identify factors associated with vaccination. Odds ratios and confidence intervals were calculated with a significance level of $p < 0.05$. Data analyses were completed using Stata Version 11. Where a valid date of vaccination and date of birth were provided, the infants' age at vaccination was calculated by subtracting the date of vaccination from the date of birth. Respondents were aggregated into residents of metropolitan or rural Victoria. These are government designations and are themselves aggregates of eight regions in the state of Victoria, each comprising a number of LGAs. The regions are structured around distinct geographical catchments to enhance service planning, delivery, and monitoring and performance of government-funded health care services.

3. Results

Of the 6308 blank surveys distributed, 2510 completed surveys were returned (response rate 40%). Ninety-five surveys completed outside the study period were excluded, leaving 2415 surveys for analysis. At least one survey was received from 70 of the 79 LGAs (89%). Of the completed surveys, none indicated that the parent had refused to participate.

3.1. Respondents

Responses were provided from both parents in 1983 (82%) surveys, the mother only in 424 (18%) surveys, and the father only in eight (<1%). This equates to 4398 individual responses.

The denominator for mothers ($n = 2415$) was obtained by calculating the number of female participants. This included those that classified themselves as a "mother" ($n = 2411$), one grandmother, one female foster parent, and two females who classified themselves as "other". The denominator for fathers ($n = 1983$) was obtained by calculating the number of male participants. This included those that classified themselves as a "father" ($n = 1980$), one male foster parent, and two "other" males.

The age range of mothers was 16 to 61 years (median 31 years). The age range of fathers was 17 to 65 years (median 34 years). Thirteen (<1%) mothers identified as Aboriginal and/or Torres Strait Islander and 2321 (96%) indicated that they were not Aboriginal or Torres Strait Islander. Data were missing for 81 mothers. Among fathers, 13 (<1%) identified as Aboriginal and/or Torres Strait Islander and 1879 (95%) indicated that they were not Aboriginal or Torres Strait Islander. Data were missing for 91 fathers.

Seventy-one per cent of respondents were Australian-born and 28% were overseas-born. Data were missing in 1% of respondents. The ten most commonly reported countries of birth were India, England/United Kingdom, China, Vietnam, New Zealand, Sri Lanka, Philippines, Malaysia, Japan, and the USA.

3.2. Vaccination status

Among mothers, 1937 (80%) were vaccinated in relation to the birth of their most recent child. An additional 312 (13%) mothers