



Pertussis vaccine for adults: Knowledge, attitudes, and vaccine receipt among adults with children in the household



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ABSTRACT

Background: Pertussis is a highly contagious vaccine preventable disease resulting in significant infant morbidity and mortality. Despite the recommendations for pertussis vaccine (Tdap) in adults, coverage rates in this age group remain suboptimal. We sought to determine factors associated with Tdap receipt among adults with children in the household who live in central New York.

Methods: The study team surveyed Tdap immunization status of adults who accessed medical services for their children provided by Golisano Children's Hospital, Syracuse, New York. Adults who did not know their Tdap vaccine status were excluded. Each participant was asked a standard set of questions to determine factors associated with Tdap receipt. Logistic regression was used to calculate simple and adjusted odds ratios for Tdap receipt in relation to adults' demographic characteristics, knowledge of Tdap and physician recommendations.

Results: Eight hundred twenty four participants were included in this study; 34% had received Tdap in the past 5 years; 58% reported that their provider or child's pediatrician recommended adult Tdap vaccination. Tdap receipt was associated with knowing the symptoms of pertussis infection, female gender, younger age, and provider recommendation ($p < 0.05$). Participants whose provider recommended Tdap vaccine were 24.6 times more likely to receive vaccine when compared to those whose providers did not recommend vaccine (95% CI: 16.3, 37.2, $p < 0.05$).

Conclusion: Tdap coverage rates are low among this study population, with provider recommendation most strongly associated with Tdap receipt. Future steps to improve vaccine coverage should include both increasing community awareness and determining barriers to provider recommendation.

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1. Introduction

Pertussis is a highly contagious, vaccine preventable disease, resulting in a protracted coughing illness. While infection in adults may range from minimally symptomatic presentations to 6 weeks of coughing spells with weight loss, syncope, and/or rib fractures, infants are at risk for more severe complications, including apnea, pneumonia, seizures, and death [1].

In 2005, in an effort to reduce morbidity of pertussis infection in adults and to decrease transmission to infants, the Advisory Committee on Immunization Practices (ACIP) recommended the use of

Tdap (tetanus–diphtheria–acellular pertussis) vaccine for all adults between the ages of 19 and 64 years, with a particular focus on those with close contact with an infant younger than 12 months of age [2]. In 2010, these recommendations expanded to include adults older than 65 years of age, particularly those in close contact with infants younger than 12 months. In 2012, these recommendations were further expanded to include women in the third trimester of each pregnancy [3,4]. Despite the now expanded Tdap vaccine recommendations, adult immunization uptake remains low while reports of pertussis infection continues to rise. In 2012 alone, there were over 48,000 (incidence of 15.2/100,000) and 2175 (incidence of 24.2/100,000) pertussis cases reported in the United States and New York State, excluding New York City, respectively [5]. Of these cases, 10% were infants younger than one year of age and 67% were in children 1 through 19 years of age [5]. These school-aged children and adolescents are at risk for pertussis, likely due to waning

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Table 1
Set of standard questions answered by enrolled participants.

What are the symptoms of pertussis (whooping cough)?			
Who is at risk for dying from pertussis (whooping cough)?			
Has your doctor recommended that you get a pertussis vaccine (Tdap)?			
Yes	No	Do not know	
Has your child's doctor discussed the pertussis vaccine (Tdap) with you?			
Yes	No	Do not know	
Where do you get your information about vaccines?			
Doctor	Internet	News	Family/Friends Other
Where do you receive your vaccines?			
Doctor's office	Pharmacy	Other	

immunity from the acellular pertussis vaccine, and contribute substantially to transmission of infection to the infants.

Understanding factors associated with and obstacles preventing Tdap receipt will aid in the development of future interventions to improve Tdap vaccine coverage in this population. It has been well described in the pediatric population that provider recommendation and source of vaccine information play an important role in parental vaccine decision making [6–11]. However few studies have described the association between these factors and adult vaccine receipt. In this study, we aim to describe factors associated with Tdap receipt in adults with children 18 years of age or younger in the household who live in central New York, a population where understanding of pertussis infection and vaccine recommendations is of great importance.

2. Methods

The study team surveyed families who accessed services provided by Golisano Children's Hospital between December 2013 and April 2014. These services included both hospital-based encounters and community outreach services. Inclusion criteria included adults older than 18 years of age with children aged 0 through 18 years in the household. Exclusion criteria included participants who did not know their pertussis vaccine (Tdap) status. Each adult approached was asked to anonymously answer a standard set of questions to assess understanding and attitudes regarding pertussis infection and adult vaccination. The survey was self-administered (Table 1). Demographic data including age (≤ 25 , 26–33, 34–50, > 50 years), gender, and age of children in the household (<1, 1–3, 4–6, 7–10, 11–12, 13–18 years) were collected. After completion of the questions, participants received educational materials regarding pertussis infection and vaccine recommendations, both in the form of written material and audio visual media. This study was approved by the SUNY Upstate Medical University institutional review board (IRB 462683, 582889).

Statistical analysis: Binary logistic regression was used to calculate bivariate odds ratios for receipt of Tdap by gender, age groups (≤ 25 , ≤ 33 (median), ≤ 50 years) and other independent demographic variables (Table 2), by pertussis knowledge and provider recommendations (Table 3), and by vaccination information source (Table 3). Exact likelihood ratio tests were used in exploratory analysis of associations among all dependent and independent variables (Table 4).

Binary logistic regression was used to calculate multivariate adjusted odds ratios for Tdap receipt. Potential predictors of Tdap receipt were screened for strength of association with Tdap receipt and for covariance with other independent variables prior to selection for multivariate modeling, which used simultaneous variable entry.

All statistical analyses were carried out using SPSS (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). All significance tests and interval estimations used a priori $\alpha = 0.05$.

3. Results

A total of 1364 adults were approached for this study, 250 (18%) declined participation. An additional 290 adults were excluded because they did not have children at home or did not know their Tdap vaccine status. The remaining 824 (60%) participants enrolled in this study were included in the analysis.

Of the 794 participants who provided their gender, 698 (88%) were female (Table 2). The ages of the participants ranged from 18 to 69 years, with a median age of 33 years. 118 (14%) of participants had infants younger than a year of age at home. At the time of study enrollment, 279 (34%) of the 824 participants stated they had been immunized against pertussis in the past five years.

Pertussis symptoms were correctly identified by 581 (71%) of the participants (Table 3), while only 155 (19%) correctly identified infants as the population at high risk for developing severe complications of pertussis. Of the participants who answered the following questions, 298 (42%) stated that their primary medical provider recommended that they receive Tdap vaccine, while 455 (59%) stated that their child's pediatrician discussed the Tdap vaccine with them.

Physicians (711, 89%) were the most common source for vaccine information, followed by the internet (110, 14%), news and/or television (107, 13%), then family and or/friends (76, 10%) (Table 3). The majority of the participants stated they receive immunizations at their physician's office (759, 96%) compared to 29 (4%) who received vaccines at a pharmacy.

Demographic factors associated with Tdap receipt in the past five years included female gender and younger age ($p < 0.05$). On the other hand, there was no association between the age of children in the household and receipt of the Tdap vaccine ($p > 0.05$) (Table 2). Tdap receipt was associated with correctly identifying pertussis symptoms (OR 1.69, $p < 0.05$), but not with correctly identifying infants as a population at highest risk for development of pertussis complications ($p > 0.05$). Primary provider vaccine recommendation (OR 24.63) and discussing vaccine with the child's pediatrician (OR 19.14) were both strongly associated with Tdap receipt in the past five years ($p < 0.05$) (Table 3).

Participants who stated that they received their vaccine information from physicians were more likely to have received Tdap in the past five years ($p < 0.05$), whereas participants who stated they received their vaccine information from the news or television were less likely to have been immunized against pertussis ($p < 0.05$). There was no association between Tdap receipt and those participants who received their vaccine information from the internet or family and friends. Similarly, participants whose vaccine information source included a physician were more likely to have been immunized against pertussis when compared to participants who received vaccine information from non-physician sources ($p < 0.05$) (Table 3). After adjusting for physicians as a source of vaccine information, participants whose primary provider recommended Tdap vaccine were still 23 times more likely to receive vaccine when compared to those whose providers did not recommend vaccine (95% Bootstrapped CI: 14.68, 36.31, $p < 0.05$).

Younger individuals were more likely to have discussed Tdap vaccine with their pediatricians and were more likely to have been recommended to receive Tdap vaccine than older participants. This observation remained valid when the study population was divided into younger and older than 25 years, 33 years (median age), and 50 years ($p < 0.05$). Provider recommendation for Tdap vaccine is also associated with participants correctly identifying symptoms of pertussis infections, discussing Tdap vaccine with their child's pediatricians, receiving vaccine information from physicians, and not receiving vaccine information from the news or television ($p < 0.05$) (Table 4).

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