Physician Attitudes and Preferences About Combined Tdap Vaccines for Adolescents


Background: Combined tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) boosters for adolescents are a new strategy to prevent pertussis. We examined the current practices of pediatricians and family physicians regarding adolescent tetanus and diphtheria toxoids (Td) vaccine immunizations and providers’ potential adherence to new Tdap recommendations for adolescents.

Methods: Using a brief survey instrument sent to a random sample of pediatricians and family physicians in January 2005, we assessed providers’ patterns of administration of Td boosters, barriers to Td boosters, and agreement that pertussis vaccination of adolescents is warranted. Results of analyses in February 2005 were presented to the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (CDC) to inform its deliberations regarding adolescent Tdap vaccination.

Results: The overall response rate was 56% (57% pediatricians, 55% family physicians). Among 297 respondents (154 pediatricians, 143 family physicians) eligible for analysis because they provide care to adolescents, pediatricians (77%) were significantly more likely than family physicians (51%, \( p < 0.0001 \)) to report that they routinely administer Td at preventive care visits for adolescents aged 11 to 12 years, but otherwise the specialties were similar in their Td practices. Forty-four percent of respondents cited infrequency of adolescent visits as a barrier to Td immunization. Slightly more than half the sample (57%) agreed or strongly agreed that pertussis is serious enough to warrant replacing Td with Tdap for adolescents; pediatricians (70%) were significantly more likely than family physicians (42%, \( p < 0.0001 \)) to endorse this statement.

Conclusions: This national survey indicates moderate willingness, stronger among pediatricians than among family physicians, to support recommendations for Tdap among adolescents. In February 2006, CDC released recommendations that adolescents aged 11 to 18 (preferred age 11 to 12) receive a single dose of Tdap in place of Td if they have not already received the latter. Near-term efforts regarding Tdap recommendations must address providers’ concerns about infrequent routine visits for adolescents and convince more physicians of the importance of pertussis booster immunization during adolescence.


Introduction

National vaccination rates against pertussis among children aged 19 to 35 months reached an all-time high in 2004.1 Nevertheless, pertussis remains endemic in the United States (25,827 cases reported in 2004),2 and incidence rates of reported pertussis in the United States have climbed steadily over the past 4 decades, especially among adolescents and adults whose immunity from childhood vaccination has waned.3

Providers frequently do not recognize respiratory symptoms in adolescents and adults as signs of pertussis illness,4 yet the health and economic consequences of pertussis in adolescents can be substantial.5 Vaccinating adolescents against pertussis is an appealing strategy to prevent pertussis in this age group, and immunization programs in Australia, Austria, Canada, France, and Germany have recently added adolescent pertussis boosters to their immunization schedules.6,7 Two recently licensed tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) products for adolescents have been shown to induce adequate im-
mune responses to all vaccine antigens, with an overall safety profile similar to that of tetanus and diphtheria toxoids vaccine (Td).8–10 Administering a Tdap booster to adolescents has been estimated to cost $20,000 per quality-adjusted life-year saved.11

In the United States, adolescents visit pediatricians and family physicians in comparable proportions in the outpatient setting.12 Adolescent Td vaccination practices have not been well defined for either group of physicians, and Td coverage estimates have varied widely.13 In addition, several studies have indicated that pediatricians more readily adopt new national vaccine recommendations than do family physicians.14–17 Such studies were conducted regarding vaccinations administered in early childhood, however, not in adolescence. In previous studies, pediatricians and family physicians agree that barriers to adolescent vaccination, such as infrequent preventive care visits and lower rates of insurance coverage compared to younger children, pose specific challenges to successful immunization efforts in this age group.18–20

A survey was conducted of pediatricians and family physicians in order to characterize their current Td booster vaccination practices, perceived barriers to Td vaccination, attitudes regarding pertussis, and their preferences regarding a Tdap recommendation for adolescents. Findings were presented to the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) in February 2005 to inform its deliberations regarding adolescent Tdap vaccination. In June 2005, the ACIP voted to recommend Tdap universally for adolescents; CDC issued final ACIP recommendations in February 2006.21

Methods
Sample

A national random sample of 298 pediatricians and 296 family physicians was drawn from the American Medical Association (AMA) Masterfile, a database of all licensed U.S. physicians, through a contracted vendor (Medical Marketing Services). The sampling frame included all allopathic and osteopathic physicians self-described as a general pediatrician or family physician, in office-based direct patient care. Excluded were physicians with any subspecialty board listing, physicians aged ≥70 years, resident physicians, and physicians practicing at Veterans Administration facilities. The study was approved by the institutional review boards of the University of Michigan Medical School and the CDC.

Instrument

The study team developed a one-page, seven-item survey instrument, accompanied by a one-page “fact sheet” regarding pertussis and Tdap vaccines in development at the time of the survey. The fact sheet presented information about pertussis epidemiology and unlicensed Tdap vac-
cent patients per week (Table 1). Pediatricians and family physicians reported similar Td immunization practices regarding wound management, and also reported similar rates of routine Td immunization at routine preventive care visits for adolescents aged 13 to 18 years. However, pediatricians were significantly more likely than family physicians to report that they routinely administer Td at preventive care visits for adolescents aged 11 to 12 years.

Physicians endorsed barriers at the community and individual level. Overall, 44% of respondents cited the infrequency of adolescent visits as a barrier to Td immunization, but this barrier did not differ by specialty. Forty percent of respondents reported no barriers to Td immunization, but the proportion differed by specialty (pediatricians 47% vs family physicians 32%, \( p < 0.01 \)). Accordingly, family physicians were more likely than pediatricians to report the following barriers to Td administration: inadequate reimbursement (17% vs 3%, \( p < 0.0001 \)), inadequate immunization record-keeping (24% vs 11%, \( p < 0.005 \)), and being too busy in practice (7% vs 2%, \( p < 0.05 \)).

Slightly over half (54%) of the sample reported that schools in their communities enforce a middle- or high-school requirement for Td boosters, 25% reported no enforcement, 17% were unsure, and 4% said that the question was not applicable to their community. Family physicians were significantly more likely than pediatricians to indicate that they were unsure about Td school mandates (22% vs 13%, \( p < 0.05 \)).

**Provider Attitudes Regarding Potential Tdap Recommendations**

Slightly more than half the sample (57%) agreed or strongly agreed with the statement that “pertussis is a serious enough disease to warrant administering a vaccine that includes an acellular pertussis component (Tdap), rather than Td, for adolescents.” As shown in Figure 1, pediatricians were significantly more likely than family physicians to endorse this statement, with 70% of pediatricians indicating that they agreed or strongly agreed versus only 42% of family physicians (\( p < 0.0001 \)). Few physicians disagreed or strongly disagreed with this statement, and the remainder—including more than one of every three family physicians—were neutral.

Pediatricians and family physicians were in broad agreement about how new adolescent vaccine recommendations should be structured, with 60% favoring the consolidation of recommendations at a single age and 40% favoring recommendations targeted to specific ages based on incidence of disease.

**Discussion**

In February 2006, the CDC released final ACIP recommendations that adolescents aged 11 to 18 receive a single dose of Tdap in place of Td if they have not already received the latter (the preferred age for Tdap vaccination is 11 to 12 years). Results of this national survey, which informed the recommendations, indicate

![Figure 1. Physician attitudes regarding future Tdap recommendations. Response to the statement: “Pertussis is a serious enough disease to warrant administering a vaccine that includes an acellular pertussis component (Tdap), rather than Td, for adolescents.”](image-url)
a moderate willingness among physicians to support replacement of the adolescent Td booster with Tdap.

Most of the surveyed physicians reported routinely administering Td to adolescents for wound care and during routine preventive care visits when indicated. However, pediatricians were more likely than family physicians to report using Td routinely at the 11- to 12-year-old preventive visit, which has been the preferred age for Td administration since 1995. Assuming that physicians use Tdap in a similar manner to Td, pediatricians might be more likely than family physicians to vaccinate younger adolescents with Tdap to reduce morbidity associated with pertussis in adolescents.

These findings present two central challenges in interpreting the clinical implications of this study. First, this survey was an effort to measure providers’ potential adoption of adolescent Tdap recommendations, rather than responses to an existing recommendation. The extent to which providers’ current adolescent Td vaccination practices will predict their Tdap vaccination practices is unknown. Second, it cannot be said with certainty how the proportions of providers who agree, in this survey, that adolescent Tdap vaccination is warranted will correspond to post-recommendation adoption rates. However, disparities between pediatricians and family physicians in potential support for Tdap are similar to those reported in post-recommendation surveys for several other vaccines, which suggests that these pre-recommendation findings may offer an informative preview of post-recommendation practice patterns.

Differences in Td vaccination practices and current support for Tdap among pediatricians and family physicians underscore the importance of visit patterns for adolescents to these providers for future vaccination efforts. A recent analysis of national visit trends for adolescents indicates that comparable proportions of adolescent encounters occur in pediatric and family medicine settings, a balance that contrasts starkly with the predominance of pediatric settings for infant visits. In the current sample, pediatricians reported higher volumes of adolescent patients than family physicians on average, but this may be offset at the national level by greater numbers of office-based family physicians than pediatricians. Therefore, whereas pediatricians’ typically stronger support for vaccinations may drive high pertussis (diphtheria and tetanus toxoids and acellular pertussis vaccine [DTPaP]) coverage rates in early childhood, family physicians’ lower enthusiasm for Tdap measured in this study may pose a barrier to the success of a national adolescent Tdap campaign. Potential remedies for this challenge include attempts to educate family physicians and prompt greater concern about the morbidity of pertussis in adolescents, particularly if family physicians are generally less aware of pertussis morbidity because of fewer infant visits. Other initiatives that address perceived barriers to adolescent vaccination, emphasize efforts to identify missed opportunities to vaccinate adolescents (e.g., at acute care visits and sports physicals), and induce public demand for Tdap regardless of providers’ attitudes may be helpful.

As a group, adolescents are the least likely pediatric population to have routine preventive care visits, and therefore many providers agree that adolescent vaccines may need to be administered across a variety of settings including schools and teen clinics. Nevertheless, challenges of insurance reimbursement for vaccines administered at school, in addition to problems ensuring medical record continuity between school and medical home settings, may pose formidable obstacles to the use of schools and other community venues as alternative immunization sites. Even at doctors’ offices, the steadily rising costs of the recommended childhood immunization series and some private health plans’ reluctance to cover the costs of newer vaccines may also present barriers to the rapid adoption of Tdap recommendations by physicians and parents.

Limitations

Studies utilizing mailed surveys have inherent limitations, chiefly the possibility of response bias. It is possible that those who responded to the survey were more interested in vaccination issues; at the same time, it is likely that nonrespondents were less interested in the survey because they do not as actively endorse childhood immunizations. The potential for response bias exists, but it is impossible to detect its direction. Although differences in attitudes between respondents and nonrespondents could not be assessed, there were no differences in the practice and demographic data available regarding the two groups. Furthermore, the interpretation of these findings is bolstered by the pediatrician versus family physician differences that are consistent with post-recommendation studies, as well as with specialty differences in a recent pre-recommendation study of early childhood influenza vaccine.

In addition, the overall response rate for this national, time-sensitive, one-wave survey is consistent with those of other published studies of physician behavior, suggesting that the study sample was neither more nor less likely to answer questions about future immunization practices than about other issues.

Conclusion

These study findings suggest that most physicians will accept the February 2006 ACIP recommendations to routinely vaccinate adolescents with Tdap instead of Td. However, securing sufficient physician support, especially among family physicians, to ensure a rapid
uptake of the Tdap recommendation for adolescents aged 11 to 12 years and a high Tdap coverage of adolescents may require additional efforts to educate and motivate physicians. It is not yet clear whether the high level of adherence to the recommendation for infant immunization against pertussis can be replicated for adolescent care. Therefore, near-term efforts in support of a Tdap recommendation must first focus on convincing physicians who are not yet persuaded of the importance of pertussis booster immunization during adolescence.

This work was funded by the Centers for Disease Control and Prevention. We recognize the ACIP Pertussis Working Group and CDC Pertussis Team for their contributions to this study. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the funding agency.

No financial conflict of interest was reported by the authors of this paper.

References

FACT SHEET on the Upcoming Tdap Vaccine Recommendation

The Advisory Committee on Immunization Practices (ACIP) is expected to discuss a future recommendation about a new tetanus-diphtheria-pertussis combination vaccine (Tdap) at its February 2005 meeting. The ACIP seeks to balance scientific issues of disease incidence and vaccine effectiveness with practical issues related to implementation of the recommendations. To do so, the ACIP needs to understand current practices for the administration of adolescent Td boosters, as well as physicians' preferences regarding a new recommendation.

Responses to the enclosed survey will assist the ACIP in its deliberations. The University of Michigan is collaborating with the CDC on this study, to ensure that the perspectives of vaccine providers are considered appropriately. Background information on pertussis disease and the new Tdap vaccine is provided below.

**Pertussis disease.** Although 85% of US children receive a primary series of 3 doses of DTaP and at least one booster dose, pertussis continues to cause substantial disease. In 2003, a total of 11,647 cases of pertussis were reported to CDC—the highest number reported since 1964. Of these, 4,540 occurred in adolescents (see Figure below). Moreover, the true number of cases is unknown, as pertussis often is unreported.

Adolescents and adults become susceptible to pertussis when immunity wanes, approximately 5-10 years after childhood vaccination. Adolescents and adults can transmit pertussis to infants who have not completed the primary vaccine series, and can perpetuate pertussis disease in the community. Currently, no pertussis vaccines are licensed in the United States for use in persons over 6 years of age.

**Figure: Age Distribution of Reported Pertussis Cases, United States, 2003**

![Age Distribution of Reported Pertussis Cases, United States, 2003](image_url)

**New Tdap vaccines.** In the summer of 2004, two manufacturers submitted licensure applications to the FDA for adolescent/adult pertussis booster vaccines (Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine Adsorbed), referred to as Tdap. The licensing indication for one vaccine is for persons 10-18 years of age, while the other is for persons 11-64 years of age. Adolescents may not be eligible to receive Tdap within 5 years of receiving the Td booster. Costs for the new vaccines are not yet known.