Tdap Vaccination in Pregnancy:
New Guidance, New Challenges

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The incidence of pertussis outbreaks in the United States has increased over the past several years, and infants have been disproportionately affected. As a result, in October 2011 the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) recommended that pregnant women, and other individuals who come into close contact with infants, be vaccinated with a single booster dose of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) to "cocoon" infants against exposure to pertussis [1]. Due to their immature immune system, infants cannot begin to receive the pertussis vaccine before age 6 weeks. To gradually build immunity, the ACIP recommends vaccinations at ages 2, 4, 6 and 15–18 months and 4–6 years [2]. In 2010 a total of 3,350 cases of pertussis occurred in infants younger than 6 months, resulting in 25 deaths; in 30% to 40% of cases in which the source of the infection was identified, the infant had acquired pertussis from his or her mother [3].

In 2012 the ACIP added the recommendation that every pregnant woman should be vaccinated between 27 and 36 weeks of gestation, during each pregnancy [4]. When Tdap is given during the final weeks of pregnancy, it boosts maternal antibodies and maximizes both the mother's protection and the infant's protection through passive immunity. The optimal timing of vaccination is at least 2 weeks prior to delivery and after 30 weeks gestation, when the active transport of maternal immunoglobulin G occurs [4].

Adopting this recommendation will be challenging, however, because of concerns about safety and fetal effects. The ACIP reviewed the best data available and considers administration of Tdap during pregnancy to be safe. The most common adverse events are fever (which occurs in 2.4% to 6.5% of patients) and pain at the site of the injection. The risk of serious adverse events is estimated to be very low, but that estimate is based on data from only a small number of patients. The ACIP has concluded that the benefits of vaccination—reducing the numbers of neonatal infections, hospitalizations, and deaths—are greater than the risks of vaccination. The committee plans to monitor safety through the Vaccine Adverse Event Reporting System (VAERS) and the Vaccine Safety Datalink, and it will assess both adverse events at the time of vaccination and pregnancy and birth outcomes.

Implementing routine Tdap vaccination in maternity care is another challenge. For example, we have yet to do a good job of administering influenza vaccine to pregnant women. In the 2011–2012 influenza season, an Internet panel survey conducted by the CDC found that only 47% of the 1,660 women surveyed received the influenza vaccine either before or during pregnancy [5]. This survey also found that only 43.7% of women had a health care provider recommend and offer the vaccine; however, women who were offered the vaccine had a higher vaccination rate (73.6%) compared with pregnant women whose provider did not offer or recommend the vaccine (11.1%).

all individuals meeting CDC criteria for vaccination.

From November 2011 through October 2012, 173 cases of pertussis were identified in Alamance County (Table 1). The number of cases began to return to baseline in August 2012 and has remained at or below baseline since that time. The number of cases peaked between December 2011 and February 2012, with the highest number of cases diagnosed in December (n = 42). The median age of infected individuals was 8 years, but infected individuals ranged in age from less than 12 months to 87 years. Of note, more than 17% of infected individuals were 18 years of age or older.

In approximately 88% of the laboratory-confirmed cases of pertussis and in 76% of probable cases, the patient was up-to-date on pertussis vaccine. In the cases involving school-age children, almost all (98%) of the patients were up-to-date on pertussis vaccine. In 2 cases, the patient was too young to have received the vaccine. No pertussis-related deaths occurred during this outbreak.

In addition to implementing revised guidelines for antibiotic prophylaxis and redoubling immunization efforts, the health department responded to the outbreak by initiating the Incident Command System—which is often used in preparedness work—to organize staff, community partners, and the overall effort. Under unified command, representatives from the health department, the Alamance-Burlington School System administration, the local hospital, and private practices—along with school principals, school nurses, and public information officers—developed initial action plans, set objectives, and assigned tasks. A 3-pronged approach was used to disseminate information to stakeholders: a letter was sent to all parents with children in the local school system; a communicable-disease bulletin was sent to local medical providers to increase their awareness of pertussis in the community; and press releases were prepared for the community at large. As more and more potential contacts were identified, the health department created a 24/7 communicable-disease phone line to answer questions from parents. Restrictions and cost barriers for booster doses of pertussis vaccine (Tdap) were lifted, allowing the health department to administer the vaccine to anyone meeting

Cost is another barrier that prevents some private maternity care providers from offering vaccines. There is a financial disincentive to stock vaccine, because reimbursement rates are low relative to the cost of purchasing and storing vaccine. Thus, some practices do not stock vaccine. When women must go elsewhere to get the recommended vaccine, their compliance is lower. Until cost and storage considerations can be addressed, practices may not be able to implement the new Tdap recommendations.

Participation in the North Carolina Pregnancy Medical Home program—which was developed by the North Carolina Division of Medical Assistance, the North Carolina Division of Public Health, and Community Care of North Carolina—may help facilitate adoption of Tdap vaccination during pregnancy. This Medicaid-sponsored program has promoted collaboration among maternity practices seeking to adopt evidence-based practices for pregnancy care. The program uses case management services to help expectant mothers achieve health goals. Workgroups meet regionally and regularly to educate prenatal providers statewide. Using this network to spread the word about the new Tdap vaccination recommendations may increase compliance within the Pregnancy Medical Home program. Partnering with local health departments may also help practices gain skills in purchasing and safely storing vaccine.

In my practice at a local health department, we assess the immunization status of pregnant women during their initial prenatal visit by reviewing their record in the North Carolina Immunization Registry and by testing them for immunity to rubella and varicella. If they require a vaccine, we put a note on the problem list. During influenza season, we offer influenza vaccine beginning in October, and we try to catch patients at their next routine visit. We then vaccinate new prenatal patients as they come in, until the end of March. We now also routinely discuss and offer Tdap vaccination at or after 30 weeks gestation. NCMJ

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TABLE 1.
Demographics and Vaccine History of Pertussis Cases in Alamance County, North Carolina, November 2011–October 2012

Case status	No. (%)	Median age (range)	Infants No. (%)	Males No. (%)	Pertussis vaccination status			
					Up-to-date No. (%)	Not up-to-date No. (%)	Not old enough to receive vaccine[a] No. (%)	Unknown No. (%)
Confirmed	87 (50)	9 years (3 weeks–87 years)	5 (42)	40 (46)	76 (88)	—	2[b] (2)	9 (10)
Probable	86 (50)	8 years (2 weeks–75 years)	7 (58)	35 (41)	65 (76)	1 (1)	1 (1)	19 (22)
Total cases	**173 (100)**	**8 years (2 weeks–87 years)**	**12 (100)**	**75 (43)**	**141 (82)**	**1 (1)**	**3 (1)**	**28 (16)**

[a]Pertussis vaccination begins at 2 months of age.
[b]At onset of illness, 1 case was 3 weeks old and other was 5 weeks old.