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WOMEN'S HEALTH CARE PHYSICIANS

COMMITTEE OPINION

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Committee on Obstetric Practice

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Update on Immunization and Pregnancy: Tetanus, Diphtheria, and Pertussis Vaccination

ABSTRACT: In the face of dramatic and persistent increases in pertussis disease in the United States, the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices has updated its guidelines for the use of the tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine (Tdap) for pregnant women. The new guidance was issued based on an imperative to minimize the significant burden of pertussis disease in vulnerable newborns, the reassuring safety data on the use of Tdap in adults, and the evolving immunogenicity data that demonstrate considerable waning of immunity after immunization. The revised Advisory Committee on Immunization Practices guidelines recommend that health care personnel administer a dose of Tdap during each pregnancy, irrespective of the patient's prior history of receiving Tdap. To maximize the maternal antibody response and passive antibody transfer and levels in the newborn, optimal timing for Tdap administration is between 27 weeks and 36 weeks of gestation, although Tdap may be given at any time during pregnancy. However, there may be compelling reasons to vaccinate earlier in pregnancy. There is no evidence of adverse fetal effects from vaccinating pregnant women with an inactivated virus or bacterial vaccines or toxoids, and a growing body of robust data demonstrates safety of such use. For women who previously have not received Tdap, if Tdap was not administered during pregnancy it should be administered immediately postpartum to the mother in order to reduce the risk of transmission to the newborn. Additionally, other family members and planned direct caregivers also should receive Tdap as previously recommended (sustained efforts at cocooning). Given the rapid evolution of data surrounding this topic, immunization guidelines are likely to change over time and the American College of Obstetricians and Gynecologists will continue to issue updates accordingly.

The overwhelming majority of morbidity and mortality attributable to pertussis infection occurs in infants who are less than or equal to 3 months of age (1). Infants do not begin their own vaccine series against pertussis (with the diphtheria, tetanus and acellular pertussis vaccine [DTaP]) until 2 months of age (2). This situation leaves a window of significant vulnerability for newborns, many of whom appear to contract serious pertussis infections from family members and caregivers, including the mother (3). Starting in 2006, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) recommended an approach to combat neonatal pertussis infection referred to as "cocooning" (4). This approach essentially consisted of a recommendation to administer Tdap to all women in the immediate postpartum period and all other family members and caregivers who had not previously received the vaccine in order to provide a protective cocoon of immunity around the newborn. This approach has proved challenging and insufficient when used alone at preventing neonatal pertussis infections for a variety of reasons. Importantly, cocooning leaves vulnerable infants without any endogenous protective antibody until they begin their own vaccine series at 2 months of age. Thus, they are solely dependent on the immunity of those around them for pertussis protection in the critical first 2–3 months of life.

In June of 2011, the ACIP considered this situation and issued a new recommendation that pregnant women who had not previously received a dose of Tdap should

receive it during pregnancy (preferably after 20 weeks of gestation). The recommendation suggested that the third trimester or the late second trimester would be optimal timing for the administration of Tdap (5). Additionally, the ACIP stated that women who did not receive Tdap during pregnancy should still be immunized in the immediate postpartum period, along with all others who will have close contact with the newborns (sustained efforts at cocooning). Preliminary data on this new approach suggests that uptake of the maternal immunization recommendation has been suboptimal (2.6%), although robust data are not yet available (6).

The ACIP again reconsidered this topic in October 2012 in the face of dramatic and persistent increases in pertussis disease in the United States. Issues considered included an imperative to minimize the significant burden of disease in vulnerable newborns, the reassuring safety data on use of Tdap in adults, and the evolving immunogenicity data that demonstrate considerable waning of immunity after immunization (7). The ACIP published its updated recommendation in February 2013, which recommends that health care personnel administer a dose of Tdap during each pregnancy, irrespective of the patient's prior history of receiving Tdap (6). To maximize the maternal antibody response and passive antibody transfer and levels in the newborn, optimal timing for Tdap administration is between 27 weeks and 36 weeks of gestation, although Tdap may be given at any time during pregnancy (6). Receipt of Tdap at some point during pregnancy is critical, and there may be compelling reasons to vaccinate earlier in pregnancy (see examples under "Special Situations During Pregnancy). For women who previously have not received Tdap, if Tdap was not administered during pregnancy, it should be administered immediately postpartum to the mother in order to reduce the risk of transmission to the newborn (6). Additionally, other family members and planned direct caregivers also should receive Tdap at least 2 weeks before planned infant contact, as previously recommended (sustained efforts at cocooning) (4). The American College of Obstetricians and Gynecologists' (the College) Committee on Obstetric Practice supports these revised recommendations. Given the rapid evolution of data surrounding this topic, immunization guidelines are likely to change over time, and the College will continue to issue updates accordingly.

General Considerations Surrounding Immunization During Pregnancy

The American College of Obstetricians and Gynecologists recommends routine assessment of each pregnant woman's immunization status and administration of indicated immunizations. The benefits of nonlive vaccines outweigh any unproven potential concerns. Importantly, evolving data demonstrate both maternal and neonatal protection against an increasing number of aggressive newborn pathogens through the use of maternal immunization programs, suggesting pregnancy is an optimal time to immunize for disease prevention in both mothers and newborns (8, 9). There is no evidence of adverse fetal effects from vaccinating pregnant women with an inactivated virus or bacterial vaccines or toxoids, and a growing body of robust data demonstrates safety of such use. Co-administration of indicated inactivated vaccines during pregnancy (ie, Tdap and influenza) is also acceptable, safe, and may optimize effectiveness of immunization efforts (10). Furthermore, no evidence exists that suggests that any vaccine is associated with an increased risk of autism or adverse effects due to exposure to traces of the mercury-containing preservative thimerosal (11–14). It should be remembered, however, that live attenuated vaccines (eg, measles-mumps-rubella [MMR], varicella, and live attenuated influenza vaccine) do pose a theoretical risk (although never documented or proved) to the fetus and generally should be avoided during pregnancy. All vaccines administered during pregnancy as well as health care provider-driven discussions about the indications and benefits of immunization during pregnancy should be fully documented in the patient's prenatal record. In addition, if a patient declines vaccination, this should be documented in the patient's prenatal record, and the health care provider is advised to revisit the issue of vaccination at subsequent visits.

Special Situations During Pregnancy

Ongoing Epidemics

Pregnant women who live in geographic regions with epidemics of pertussis should be immunized as soon as feasibly possible for their own protection in accordance with local recommendations for nonpregnant adults. Less emphasis should be given to targeting the proposed optimal gestation window (between 27 weeks and 36 weeks of gestation) in these situations given the imperative to protect the mother from locally prevalent disease. Newborn protection will still be garnered from vaccination earlier in the same pregnancy. Importantly, a pregnant woman should not be re-vaccinated later in the same pregnancy if she already received the vaccine in the first or second trimester (6).

> *Example case:* A pregnant woman at 8 weeks of gestation with one kindergarten-aged child at home calls the office and mentions that pertussis has recently been diagnosed in four different children by their pediatricians in her neighborhood. She is not sure what to do and has heard that she is supposed to get a Tdap shot in the third trimester. How should you best manage this patient?
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> *Answer:* She should be advised to come that day and receive Tdap in your office. She should be reassured that Tdap is safe to give at any point in pregnancy and that getting the vaccine now will directly protect her, indirectly protect her fetus, and also may provide some protection for her newborn from pertussis.

She will only need to receive Tdap once during pregnancy. All other adolescent and adult family members also should be advised to get a dose of Tdap to protect themselves and the newborn.

Wound Management

As part of standard wound management care to prevent tetanus, a tetanus toxoid-containing vaccine is recommended in a pregnant woman if 5 years or more have elapsed since her previous tetanus and diphtheria (Td) vaccination. If a Td booster vaccination is indicated in a pregnant woman for acute wound management, health care providers should administer Tdap irrespective of gestational age (6). A pregnant woman should not be re-vaccinated with Tdap in the same pregnancy if she received the vaccine in the first or second trimester.

Example case: An emergency department (ED) physician calls you about a patient, gravida 4, para 3, at 13 weeks of gestation who is being seen after accidentally stepping on a rusty nail in the house her family is renovating. The patient cannot remember when she last received a tetanus booster and the ED physician is confused about when to administer the indicated tetanus booster because the CDC guidelines recommend the administration of Tdap between 27 weeks and 36 weeks of gestation. How should you advise the ED physician?

Answer: The ED physician should be advised that the appropriate acute wound management strategy for the patient is to receive a dose of Tdap now. This vaccine replaces the solitary tetanus booster vaccine, and administering it now as part of acute wound management is the most important factor. The patient should be told that getting Tdap now will preclude her getting it again between 27 weeks and 36 weeks of gestation in this pregnancy. She and her baby will likely still receive pertussis prevention benefits from receipt at 13 weeks of gestation.

Due for Tetanus and Diphtheria Booster Vaccination

If a Td booster vaccination is indicated during pregnancy (ie, more than 10 years since the previous Td vaccination) then health care providers should administer Tdap during pregnancy, preferably between 27 weeks and 36 weeks of gestation (6). Because of the nonurgent nature of this indication, waiting until 27–36 weeks of gestation appears to be the appropriate management plan to obtain maternal immunity and maximize antibody transfer to the newborn.

Unknown or Incomplete Tetanus Vaccination

To ensure protection against maternal and neonatal tetanus, pregnant women who have never been vaccinated against tetanus should begin the three-vaccination series, containing tetanus and reduced diphtheria toxoids, during pregnancy. The recommended schedule for this vaccine series is 0, 4 weeks, and 6–12 months; Tdap should replace one dose of Td, preferably given between 27 weeks and 36 weeks of gestation (6).

Vaccination of Adolescents and Adults in Contact With Infants

The ACIP recommends that all adolescents and adults who have or who anticipate having close contact with an infant younger than 12 months (eg, siblings, parents, grandparents, child care providers, and health care providers) who previously have not received Tdap should receive a single dose of Tdap to protect against pertussis and reduce the likelihood of transmission (6). Ideally, these adolescents and adults should receive Tdap at least 2 weeks before they have close contact with the infant (4).

Current Immunization Guidelines and Information

Extensive information for health care providers and consumers about vaccines can be obtained at www.cdc.gov/vaccines and on the College's immunization web site at www.immunizationforwomen.org/. The ACIP issues recommendations on immunization that are updated regularly and are available at www.cdc.gov/vaccines/pubs/ACIP-list.htm.

Resources

American College of Obstetricians and Gynecologists' immunization web site, available at http://www.immunizationforwomen.org

Advisory Committee for Immunization Practices Recommendations, available at http://www.cdc.gov/vaccines/pubs/ACIP-list.htm

Centers for Disease Control and Prevention Vaccines and Immunizations Information Page, available at http://www.cdc.gov/vaccines

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