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Issue Brief – Prevention of Pertussis in Infants

Pertussis typically follows a cyclical pattern, with peaks in incidence every 3 to 5 years, leaving vulnerable infants and others at ongoing risk. In 2012, pertussis infections in Washington grew to their highest level since 1942, with 4,918 confirmed cases, including 792 in King County. During that outbreak, 43 (5.6%) of King County cases were in infants < 12 months of age and 10 (23.3%) of those infants were hospitalized.

Young infants are at increased risk for severe pertussis, including hospitalization and death, compared to any other age group. Infants < 6 months account for 90% of all pertussis-related deaths and the majority of hospitalizations.¹ **For this reason, vaccination of pregnant women with Tdap vaccine is the top priority to prevent infant pertussis.**

To protect infants, pregnant women should receive a dose of Tdap during each pregnancy.

- In 2013, the Advisory Committee on Immunization Practices (ACIP) recommended that women receive a dose of Tdap with each pregnancy in response to research showing that maternal antibodies wane quickly and that one dose of Tdap in a pregnancy is unlikely to be protective in subsequent pregnancies.² Infants depend on maternal antibody transfer for protection during the first months of life.
- The American College of Obstetricians and Gynecologists recommends that healthcare providers administer a dose of Tdap with each pregnancy.³
- To maximize protection through passive maternal antibody transfer to the infant, Tdap vaccine should be given between 27-36 weeks gestation – preferably during the earlier part of this period.
- If not vaccinated during pregnancy, women should be vaccinated in the immediate post-partum period before hospital discharge, however this is inferior to vaccination during pregnancy because it provides no direct protection to the newborn.

Vaccination during pregnancy has been shown to be highly effective in maximizing infant protection from pertussis.

- Research shows that passive maternal antibody transfer to the infant offers significantly more protection to the infant than vaccination of close-contacts. A 2017 retrospective study published in *Pediatrics* showed that vaccination with Tdap during the third trimester of pregnancy was 91% effective in preventing pertussis among infants younger than two months, and 69% effective during the entire first year of life.⁴
- Infants who do contract pertussis experience less severe illness. A 2016 study in *Clinical Infectious Disease* found that infants with pertussis whose mothers received Tdap during pregnancy had a significantly lower risk of hospitalization and intensive care unit admission as well as shorter hospital stays.⁵

Tdap in pregnancy is immunogenic and safe for mothers and their infants.

- A 2017 literature review published in the journal *Obstetrics and Gynecology* found that Tdap administered during pregnancy is not associated with clinically significant harms for the fetus or neonate. Medically attended events in pregnant women are similar between vaccinated and unvaccinated groups.⁶

- A study published in the *Journal of the American Medical Association* found no association between Tdap vaccination during pregnancy and increased risk for hypertensive disorders of pregnancy, preterm birth, or having a small-for-gestational age baby.⁷

Pregnant women with unknown or incomplete tetanus vaccination should complete their vaccine series.

- To ensure protection against maternal and neonatal tetanus, pregnant women who have never been vaccinated against tetanus should receive three vaccinations containing tetanus and reduced diphtheria toxoids during pregnancy. The recommended schedule is 0, 4 weeks, and 6 to 12 months. Tdap should replace one of the Td doses, preferably during the third trimester of pregnancy to maximize maternal antibody response and passive antibody transfer to the infant.

Susceptible adolescents and adults, in whom the disease is underdiagnosed, may serve as a reservoir for transmission to infants.

- Although the national adolescent Tdap coverage rate was 88% in 2016⁸ coverage is substantially lower for adults. Less than half of pregnant women (49%) had received Tdap vaccination during pregnancy in 2016⁹, and less than a quarter of adults age 19 and older had received the recommended lifetime dose of Tdap in 2015.¹⁰
- From 2010-2014, a household contact was identified as the most likely source of infection for approximately 50% of all King County cases < 12 months of age and for 60% of all cases < 3 months of age. Other studies have shown household members are responsible for 75%–83% of pertussis transmission to infants, with parents representing more than half of the source cases; mothers, in particular, were the source in more than one-third.¹¹⁻¹³
- Adolescents and adults with pertussis may be asymptomatic or have mild disease, but can also suffer complications such as urinary incontinence, rib fracture and pneumonia. Regardless of disease severity, infection may be transmitted to close contacts, including vulnerable infants.¹⁴

Adolescents and adults should receive one dose of Tdap, regardless of interval since last tetanus- or diphtheria toxoid-containing vaccine, and at least 2 weeks before close contact with an infant.^{15, 16}

- Tdap is routinely recommended for children aged 11 to 12 years and for all adolescents and adults who have not received a dose of Tdap.
- Unvaccinated children aged 7 years and older and unvaccinated adults should receive three vaccinations containing tetanus and reduced diphtheria toxoids. The recommended schedule is one dose of Tdap, followed by a dose of Td \geq 4 weeks later and another Td in 6 to 12 months.
- After receiving Tdap or completing their three-dose series, adults should receive Td every ten years per routine recommendations.
- Infants and children aged 2 months through 6 years are recommended to receive 5 doses of DTaP per the routine childhood immunization schedule.
- No booster dose of Tdap is currently recommended for non-pregnant adults.

Pertussis Testing and Reporting

Pertussis should be suspected in the differential diagnosis of:

- Respiratory tract symptoms of any duration in infants <12 months, even if they have been immunized against pertussis or test positive for RSV (respiratory syncytial virus) because co-infections have been documented
- Cough illness >2 weeks duration in patients of any age, even if they have been immunized against pertussis

- Respiratory illness of any duration in patients of any age who have had contact with persons with a prolonged cough illness, or a confirmed pertussis case

If you suspect pertussis, a nasopharyngeal specimen for pertussis polymerase chain reaction (PCR) is the preferred test because it is more sensitive and more rapid than culture. Pertussis cases are reportable to Public Health at (206) 296-4774.

- PCR testing is available through the King County Public Health Laboratory (206-744-8950) and at many commercial reference labs.

REFERENCES

1. Tanaka M. Trends in pertussis among infants in the United States, 1980-1999. *JAMA*. 2003;290:2968.
2. CDC. Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine in pregnant women. *MMWR* 2013;62(07):131-135.
3. Update on immunization and pregnancy: tetanus, diphtheria, and pertussis vaccination. Committee Opinion No. 718. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2017;130:e153–7.
4. Baxter R, Bartlett J, Fireman B. Effectiveness of Vaccination During Pregnancy to Prevent Infant Pertussis. *Pediatrics*. 2017 May;139(5).
5. Winter K, Cherry JD, Harriman K. Effectiveness of Prenatal Tetanus, Diphtheria, and Acellular Pertussis Vaccination on Pertussis Severity in Infants. *Clinical Infectious Disease* 2016; 64(1):9-14.
6. McMillan M, Clarke M, Parrella A. Safety of Tetanus, Diphtheria, and Pertussis Vaccination During Pregnancy: A Systematic Review. *Obstetrics and Gynecology*. 2016; Mar;129(3):560-573.
7. Kharbanda EO, Vazquez-Benitez, G, Lipkind HS, et al. Evaluation of the association of maternal pertussis vaccination with obstetric events and birth outcomes. *JAMA*. 312(18):1897-1904.
8. Walker TY, Elam-Evans LD, Singleton JA, et al. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2016. *MMWR Morb Mortal Wkly Rep* 2017;66:874–882.
9. Centers for Disease Control. Pregnant Women and Tdap Vaccination, Internet Panel Survey, United States, April 2016. Retrieved from <https://www.cdc.gov/vaccines/imz-managers/coverage/adultvaxview/tdap-report-2016.html>
10. Williams WW, Lu P, O'Halloran A, et al. Surveillance of Vaccination Coverage among Adult Populations – United States, 2015. *MMWR Surveill Summ* 2017;66(No.SS-11):1-28.
11. Wendelboe AM, Njamkepo E, Bourillon A, et al. Transmission of bordetella pertussis to young infants. *Pediatric Infectious Disease Journal*. 2007;26:293-299.
12. Bisgard KM, Pascual FB, Ehresmann KR, et al. Infant pertussis: who was the source? *Pediatric Infectious Disease Journal*. 2004;23:985-989.
13. Gerbie MV, Tan TQ. Pertussis disease in new mothers: effect on young infants and strategies for prevention. *Obstetrics & Gynecology*. 2009;113(2 Pt 1):399-401.
14. Cherry JD. Epidemiological, clinical, and laboratory aspects of pertussis in adults. *Clinical Infectious Disease*. 1999;Jun;28 Suppl 2:S112-7.
15. CDC. Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine. *MMWR*. 2011;60(01):13-15.
16. CDC. Updated recommendations for use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine in adults aged 65 years and older. *MMWR*. 2012;61(25):468-470.