Protecting Infants and Children from Pertussis and Influenza

Background

This document is meant to provide background and guidelines for the care of infants and children, as related to pertussis (whooping cough) and influenza (flu), two infections that are potentially deadly in infants. It includes statistics and recommendations published by the American Academy of Pediatrics (AAP), the Centers for Disease Control and Prevention (CDC) and the California Department of Public Health (CDPH). Further information can be found in the references listed in the last section.

Vaccine recommendations apply only if there are no medical contraindications for an individual to receive the vaccine.

General principles – Vaccinations during pregnancy and cocooning

Infants younger than 6 months old are more likely to develop certain infectious diseases than older children and are more likely to develop complications of those diseases, including hospitalization and even death. At the same time, our ability to protect infants is hindered by the fact that their immune response to vaccines is limited. Two important strategies are used to protect vulnerable infants: vaccination of women during their pregnancies and “cocooning”. Vaccinating pregnant women during their pregnancy can help because some protective maternal antibodies are transferred to the infant. Unfortunately, for a variety of reasons, many women do not receive recommended vaccinations during pregnancy. “Cocooning” refers to vaccinating family members and caregivers to make sure they stay healthy and do not spread a communicable disease to a vulnerable infant. Case report reviews have shown that infants and children who develop complications from influenza (the flu) or pertussis (whooping cough) generally acquire the diseases from close contacts.
It is most vital to vaccinate the mother, followed by other close contacts. Close contacts include but are not limited to full and part-time caregivers, any household contacts, friends and healthcare providers. For both pertussis and influenza, our ability to protect infants and children is limited by several factors: (1) neither vaccine is 100% effective, (2) protection from vaccination wanes over time (years), and (3) protection is not adequate until a primary vaccine series has been completed (6 months age for pertussis, after three doses of vaccine, and 7 months age for influenza, after two doses). Therefore, it is also important to minimize an infant’s contact with unvaccinated people until vaccine protection is adequate.

**Pertussis: Outbreak trends**

Pertussis, also known as whooping cough, is very contagious and is spread from person to person, usually by coughing or sneezing while in close contact with others. It can be deadly for infants.

Pertussis is cyclical and peaks every 3 to 5 years. California experienced an epidemic in 2014, with 11,203 cases reported. Of all reported cases 456 were hospitalized and 119 required intensive care; of all hospitalized cases 278 (61%) were infants < 4 months of age. Three deaths were reported; all were infants who were \( \leq 5 \) weeks old at the time of disease onset. In 2014, Sonoma County reported 143 cases/100,000 persons, the highest rate of all California counties that year.

As illustrated by the numbers above, serious life-threatening complications can occur in infants under 6 months who contract pertussis. Half of all infected infants require hospitalization; of those, about one in four will develop pneumonia, and one to two percent will die from the disease.\(^5\)

**Pertussis: Prevention in Children**

Vaccination for pertussis is accomplished with Tdap vaccine (the “p” stands for pertussis). ACIP (the CDC’s Advisory Committee on Immunization Practices) recommends that all persons age 11 and up who will have close contact with an infant aged <12 months should receive a single dose of Tdap to protect against pertussis (if they have not received a Tdap previously).\(^1\) Ideally, Tdap should be given at least 2 weeks before close contact with a newborn, to allow the vaccine to have its maximal effect.

In addition, ACIP recommends that pregnant women should receive the Tdap during each pregnancy, ideally between 27 and 36 weeks gestation. Administering the vaccine during pregnancy causes a bump in the level of maternal pertussis antibodies and facilitates transfer of those to the newborn, providing some level of protection until the baby can receive the primary vaccine series. If a woman has not received Tdap during pregnancy and has never received it in the past, she should receive it before being discharged home. Although it will be too late to transfer her antibodies directly to the baby, the cocooning effect of vaccinating the mother is important for protecting the baby.\(^3\)
Influenza: Outbreak Trends

Children with influenza, especially those under 5 years old, commonly need medical care. Hospitalization and other severe complications of influenza are most common before 2 years of age; children with chronic health problems, including asthma, diabetes, and disorders of the brain or nervous system are at highest risk at any age. Each year, across the United States approximately 20,000 children under age 5 years are hospitalized because of influenza complications. During the flu season of 2014-15, more than 140 flu-related pediatric deaths were reported in the US and 9 were reported in California. Data collected during the same 2014-15 season showed that 60% of flu-related deaths occurred in those under 5 years of age and those with chronic health conditions. About 90% of pediatric deaths due to influenza occur in unvaccinated children.

Influenza: Prevention in Children

Each year, researchers predict which strains of influenza viruses will be common during the upcoming season, and the top three and sometimes four are formulated into that year’s influenza vaccine. Since the virus mix changes every year, children and their close contacts should be vaccinated every flu season. CDC recommends everyone over age 6 months receive the flu vaccine, especially close contacts of at-risk children (those under 5 years of age and those with chronic health conditions). The CDC’s Advisory Committee on Immunization Practices (ACIP) recommends all household contacts and caregivers of children under 5 years of age receive influenza vaccine, with greatest emphasis on households containing children of under 6 months.

Children under 9 years of age who have received fewer than two doses of influenza vaccine in the past (during any season) need to receive two doses of vaccine during the current season, with the second dose at least one month after the first, to produce an effective response.

Children at highest risk of flu-related complications include: 6

1) Infants under 6 months age are at the greatest risk, as they cannot be vaccinated
2) Children from 6 months up to their 5th birthday
3) American Indian and Alaskan Native Children (studies have shown they tend to have the highest risk of hospitalizations and death)
4) Children from 6 months to 18 years with chronic health problems, which include:
   • Asthma
   • Neurological/neurodevelopmental conditions, including cerebral palsy, seizure disorders, stroke, intellectual disability (mental retardation), developmental delay, muscular dystrophy, spinal cord injury
   • Chronic lung disease (COPD, cystic fibrosis)
   • Heart disease (congenital heart disease, congestive heart failure, coronary artery disease)
   • Blood disorders (sickle cell disease)
• Endocrine disorders (diabetes)
• Kidney disorders
• Liver disorders
• Metabolic disorders, including mitochondrial disorders
• Weakened immune system, due to disease or medication (those with HIV, AIDS, or cancer, and those on long-term steroids)
• Children receiving long-term aspirin therapy

The American Academy of Pediatrics recommends that during the 2016-2017 season a special effort should be made to vaccinate the following groups for influenza:

1) All children greater than 6 months old, including former preterm infants based on age from birth date, with chronic health conditions that increase risk of complications from flu

2) American Indian/Alaskan Native Children

3) All household contacts and out-of-home care providers of:
   a. Children with high-risk conditions
   b. Children younger than 5 years, especially infants younger than 6 months

4) All health care personnel

5) All child care providers and staff

6) All women who are pregnant, are considering pregnancy, are in the postpartum period or who are breastfeeding are during the influenza season.

Again, immunizing close contacts of children at high risk of influenza-related complications is intended to reduce their risk of contagion (i.e. cocooning). Vaccination should be offered until June 30th, which marks the end of the influenza season.

Summary of recommendations for pertussis vaccine in close contacts:

1) Adolescents and adults, including pregnant women, ages 11 and up, who have or anticipate having close contact with an infant aged <12 months or any child with a chronic health condition should receive a single dose of Tdap vaccine to protect against pertussis if they have not received a Tdap previously.

2) Children under 11 years old who have close contact with infants under 12 months of age or with a child with a chronic health condition need to be up-to-date for pertussis vaccination per CDC immunization guidelines, which include the 5-dose series of DTaP vaccine at ages 2 months, 4 months, 6 months, 15-18 months, and 4-6 years. Full details, including contraindications and catch-up schedule, are on www.cdc.gov/vaccines/schedules.

3) The ideal time to vaccinate is greater than 2 weeks prior to contact with the infant or child.
Summary of recommendations for influenza vaccine in close contacts:

1) Administer influenza vaccines in all close contacts over 6 months of age and all pregnant women. Full details, with contraindications and types of flu vaccine to be used, are on www.cdc.gov/vaccines/schedules.

2) There should be a special effort to vaccinate all household contacts and out-of-home care providers who will be in contact with children with high-risk conditions and children younger than 5 years, especially infants younger than 6 months.

3) The ideal time to vaccinate is greater than 2 weeks prior to contact with the infant or child.

References

1. Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis (Tdap) in Pregnant Women –Advisory Committee on Immunization Practices (ACIP). MMWR 2013:62(07); 131-135
2. FDA Approval of Expanded Age Indication for a Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine. MMWR 2011:60(37);1279-1280