

Immunization Schedule for Children and Teens Updated

January 8, 2008 — The American Academy of Pediatrics has issued an updated immunization schedule for children and adolescents aged 0 to 18 years, as well as a catch-up immunization schedule for those aged 4 months to 18 years who start late or who are more than 1 month behind. The new recommendations appear in the January issue of *Pediatrics*.

The schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2007, for children aged 0 through 6 years, and for those aged 7 through 18 years. It also notes that additional vaccines may be licensed and recommended during the year.

"Any dose not administered at the recommended age should be administered at any subsequent visit, when indicated and feasible," the authors from the Committee on Infectious Diseases write. "Licensed combination vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated and if approved by the Food and Drug Administration for that dose of the series. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations, including for high risk conditions."

If there are any clinically significant adverse events after immunization, these should be reported to the Vaccine Adverse Event Reporting System.

For children aged 0 through 6 years, recommended ages for routine administration of currently licensed childhood vaccines are as follows:

- **Hepatitis B vaccine:** At birth, give monovalent hepatitis B vaccine to all newborns before hospital discharge. If the mother is positive for hepatitis surface antigen (HBsAg), hepatitis B vaccine and 0.5 mL of hepatitis B immune globulin should be given within 12 hours of birth.
 - After the birth dose, the hepatitis B vaccine series should be completed with either monovalent hepatitis B vaccine or a combination vaccine containing hepatitis B vaccine, with the second dose given at age 1 to 2 months and the final dose no earlier than age 24 weeks.
 - After completion of at least 3 doses of a licensed hepatitis B vaccine series, at ages 9 to 18 months (typically at the next well-child visit), infants born to mothers who are positive for HBsAg should be tested for HBsAg and antibody to HBsAg. When combination vaccines are given after the birth dose, 4 doses of hepatitis B vaccine may be given. The 4-month dose is not needed if monovalent hepatitis B vaccine is used for doses after the birth dose.
- **Rotavirus vaccine:** The first dose should be given at ages 6 to 12 weeks, and the final dose in the series by age 32 weeks, because data on safety and efficacy outside of these age ranges are insufficient.
- **Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP):** Minimum age for administration is 6 weeks, and the fourth dose may be given as early as age 12 months, but not sooner than 6 months since the third dose. The final dose in the series is given at ages 4 to 6 years.
- **Haemophilus influenzae type b conjugate vaccine:** Minimum age for administration is 6 weeks. A dose at age 6 months is not needed if *H influenzae* type b *Neisseria meningitidis* outer-membrane complex protein conjugate (*PedvaxHIB* or *ComVax*; Merck) is given at ages 2 and 4 months. In children aged 12 months or older, DTaP/H *influenzae* type b conjugate (*TriHIBit*; Sanofi Pasteur) combination products should not be used for primary immunization but can be used as boosters after any *H influenzae* type b conjugate vaccine.
- **Pneumococcal vaccine:** Minimum age for administration is 6 weeks for pneumococcal conjugate vaccine and 2 years for pneumococcal polysaccharide vaccine. All healthy children aged 24 to 59 months having any incomplete schedule should receive 1 dose of pneumococcal conjugate vaccine. Children aged 2 years or older with underlying medical conditions should receive pneumococcal polysaccharide vaccine.

- **Influenza vaccine:** Minimum age for administration is 6 months for trivalent inactivated influenza vaccine and 2 years for live, attenuated influenza vaccine. Children aged 6 to 59 months and all close contacts of children ages 0 to 59 months should be vaccinated every year, as should children aged 5 years or older with certain risk factors, individuals in close contact with persons in groups at higher risk, and any child whose parents request vaccination.
 - Either live, attenuated or trivalent inactivated influenza vaccine may be administered to healthy, nonpregnant persons, ages 2 to 49 years, without underlying medical conditions that predispose them to influenza complications. Children receiving trivalent inactivated influenza vaccine should receive 0.25 mL if they are 6 to 35 months old or 0.5 mL if they are 3 years or older.
 - Two doses, separated by 4 weeks or longer, should be given to children younger than 9 years who are receiving influenza vaccine for the first time or who were vaccinated for the first time last season, but only received 1 dose.
- **Measles, mumps, and rubella vaccine:** Minimum age for administration is 12 months. The second dose of this vaccine should be given at ages 4 to 6 years, but it may be given sooner, provided 4 weeks or longer have elapsed since the first dose and both doses are administered at age 12 months or older.
- **Varicella vaccine:** Minimum age for administration is 12 months. The second dose should be given at ages 4 to 6 years, but it may be administered 3 months or longer after the first dose. The second dose should not be repeated if administered 28 days or more after the first dose.
- **Hepatitis A vaccine:** Hepatitis A vaccine is recommended for all children aged 12 to 23 months, with 12 months being the minimum age for administration. The 2 doses in the series should be given at least 6 months apart. Children who are not fully vaccinated by age 2 years can be vaccinated at subsequent visits. Hepatitis A vaccine is recommended for certain other groups of children, such as in areas where vaccination programs target older children.
- **Meningococcal vaccine:** Minimum age for administration is 2 years for quadrivalent meningococcal conjugate vaccine and for quadrivalent meningococcal polysaccharide vaccine. Although quadrivalent meningococcal conjugate vaccine is recommended for high-risk groups including children ages 2 to 10 years with terminal complement deficiencies or anatomic or functional asplenia, the quadrivalent meningococcal polysaccharide conjugate vaccine may also be used. Individuals who received quadrivalent meningococcal polysaccharide vaccine 3 years or more previously and who are still at increased risk for meningococcal disease should be vaccinated with the quadrivalent meningococcal conjugate vaccine.

The schedule also gives specific recommendations for vaccinating persons 7 to 18 years of age with tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap); human papillomavirus vaccine; meningococcal vaccine; pneumococcal polysaccharide vaccine; influenza vaccine; hepatitis A and B vaccines; inactivated poliovirus vaccine; measles, mumps, and rubella vaccine; and varicella vaccines.

A separate catch-up immunization schedule is also provided for those aged 4 months to 18 years who start late or who are more than 1 month behind. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses, the Committee on Infectious Diseases concludes.

Pediatrics. 2008;121:219-220.

Learning Objectives for This Educational Activity

Upon completion of this activity, participants will be able to:

1. Describe changes in the recommended immunization schedules for pneumococcal conjugate vaccine and quadrivalent meningococcal conjugate vaccine in children.
2. Describe changes in the recommended immunization schedule for live, attenuated influenza vaccine in children.

Clinical Context

The American Academy of Pediatrics, the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention, and the American Academy of Family Physicians have approved 3 immunization schedules for children in the United States for January through December 2008: children aged 0 to 6 years, children aged 7 to 18 years, and a catch-up schedule for children aged 4 months to 18 years who start late or are more than 1 month behind in vaccinations.

This policy statement from the American Academy of Pediatrics Committee on Infectious Diseases focuses on changes in the schedules vs those in last year's schedules.

Study Highlights

- 1 dose of pneumococcal conjugate vaccine is recommended for incompletely immunized healthy children aged 24 to 59 months.
- Recommendations for live, attenuated influenza vaccine reflect several changes:
 - Lower age limit decreased to age 2 years instead of age 5 years
 - Interval for second dose, if indicated, decreased to 4 weeks instead of 6 weeks
 - New liquid preparation stable in refrigerator
- 1 dose of quadrivalent meningococcal conjugate vaccine is recommended for all children aged 11 to 18 years not previously immunized and is preferred to quadrivalent meningococcal polysaccharide vaccine for children aged 2 to 10 years at increased risk for meningococcal infection.
- Recommended routine administration for other vaccines has not changed from last year:
 - Hepatitis B vaccine at birth, ages 1 to 2 months, and age 6 months; 4-month dose may be given if combination vaccines are used
 - Rotavirus vaccine at ages 2, 4, and 6 months, with first dose by age 12 weeks and last dose by age 32 weeks
 - DTaP vaccine at ages 2, 4, and 6 months, 15 to 18 months, and 4 to 6 years; fourth dose can be given at age 12 months if at least 6 months after third dose
 - *H influenzae* type b conjugate vaccine at ages 2, 4, and 6 months, and 12 to 15 months
 - Inactivated poliovirus vaccine at ages 2 and 4 months, 6 to 18 months, and 4 to 6 years
 - Pneumococcal conjugate vaccine at ages 2 and 4 months, 6 months, and 12 to 15 months; pneumococcal polysaccharide vaccine at age 2 years and older if underlying medical conditions
 - Trivalent inactivated influenza vaccine annually for children aged 6 to 59 months, close contacts of children younger than 5 years, children at least 5 years old who have risk factors, close contacts of high-risk persons, and children whose parents request vaccine
 - Children younger than 9 years receiving influenza vaccine for first time or who only received 1 dose when vaccinated for first time last season should receive 2 doses with at least a 4-week interval
 - Measles, mumps, and rubella vaccine at ages 12 to 15 months and 4 to 6 years old
 - Varicella vaccine at ages 12 to 15 months and ages 4 to 6 years
 - Hepatitis A vaccine at ages 12 to 23 months and at least 6 months after first vaccine
 - Meningococcal polysaccharide vaccine is acceptable alternative to meningococcal conjugate vaccine; meningococcal conjugate vaccine is recommended for those at high risk who received meningococcal polysaccharide vaccine at least 3 years previously
 - Tdap vaccine at ages 11 to 12 years or catch-up vaccine at ages 13 to 18 years if last tetanus and diphtheria toxoids booster or DTaP received 5 years previously
 - Human papillomavirus vaccine at ages 11 to 12 years and then 2 and 6 months after the first dose; minimum age is 9 years
- Specific recommendations for catch-up immunizations, including minimum intervals between doses, are listed for persons aged 4 months to 6 years and for those aged 7 to 18 years who started immunizations late or are more than 1 month behind.
- A delayed vaccine series does not have to be restarted.

Pearls for Practice

- One dose of pneumococcal conjugate vaccine is recommended for incompletely immunized children aged 24 to 59 months. One dose of quadrivalent meningococcal conjugate vaccine is

recommended for children aged 11 to 18 years and is preferred instead of quadrivalent meningococcal polysaccharide vaccine for high-risk children aged 2 to 10 years.

- Live, attenuated influenza vaccine is recommended for healthy children as early as age 2 years and, if needed, the second dose can be given 4 weeks later.