AMERICAN ACADEMY OF PEDIATRICS

Committee on Infectious Diseases

Recommended Childhood Immunization Schedule—United States, January–December 1998

ABBREVIATIONS. AAP, American Academy of Pediatrics; ACIP, Advisory Committee on Immunization Practices; CDC, Centers for Disease Control and Prevention; AAFP, American Academy of Family Physicians; IPV, inactivated poliovirus vaccine; OPV, oral poliovirus vaccine; MMR, measles-mumps-rubella vaccine; Td, tetanus and diphtheria toxoids; Hib, *Haemophilus influenzae* type b vaccine.

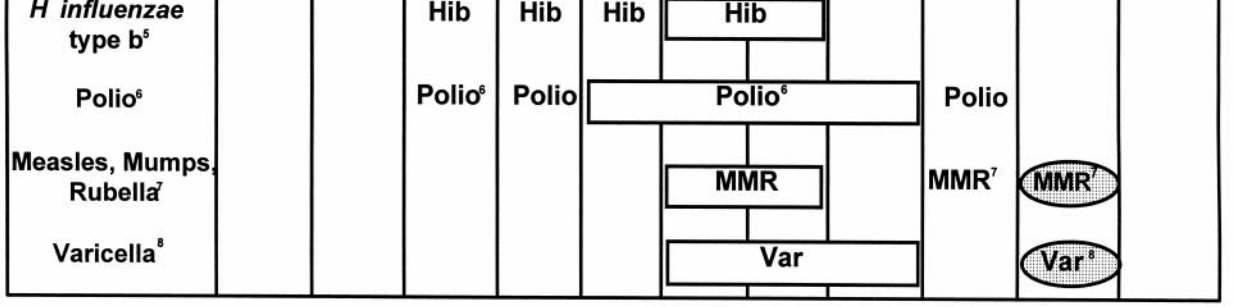
The[1] Recommended Childhood Immunization Schedule is updated every January. This schedule is produced by the American Academy of Pediatrics (AAP), the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC), and the American Academy of Family Physicians (AAFP). Since the last publication of the schedule,[1] several minor changes have been made.

1. The bar indicating the age for the third dose of poliovirus vaccine now covers 6 to 18 months, and the footnote has been modified accordingly. The word "Polio" is placed in the center of the bar indicating no preference for age of administration in this range. In January 1997, the Food and Drug Administration approved a modification in the package labeling for inactivated poliovirus vaccine (IPV) to allow a schedule of 2, 4, and 6 to 18 months of age. Clinical trials have demonstrated that either IPV or oral poliovirus vaccine (OPV) can be administered effectively at 6 months of age to infants who received IPV at 2 and 4 months of age.[2,3] The ACIP recommends the sequential schedule with the first dose of OPV administered at 12 to 18 months of age. The AAP gives no preference for any of the three acceptable schedules and recommends for children who received IPV at 2 and 4 months of age that the third dose (of either IPV or OPV) be given at 6 to 18 months of age.
2. The recommended age for the second dose of measles-mumps-rubella vaccine (MMR) is now 4 to 6 years.[4] Additional details including the rationale for the change in Academy policy are available in an accompanying statement in this issue of *Pediatrics*.[5]
3. The 11- to 12-year visit remains an important time to assure that all children have received two doses of MMR beginning at or after 12 months of age, one dose of varicella vaccine, and that the hepatitis B vaccine series has been initiated or completed. A shaded oval is used to distinguish this assessment from the need to routinely administer the tetanus and diphtheria toxoids (Td) vaccine to all children as indicated by the clear bar. Additional changes have been made in the wording at the top of the chart to clarify this difference.
4. Three *Haemophilus influenzae* type b (Hib) vaccines are licensed for infant immunization: HbOC (HibTITER [Wyeth-Lederle Laboratories]), PRP-T (ActHIB, OmniHIB [Pasteur Merieux Vaccines, distributed by Connaught and SmithKline Beecham], and PRP-OMP (PedvaxHIB [Merck]). These products now are considered interchangeable for primary as well as booster vaccination. Excellent immune responses have been achieved when different manufacturers' vaccines have been interchanged in the primary series.[6–8] If PRP-OMP (PedvaxHIB [Merck]) is given in a series with one of the other two products licensed for infants, the recommended number of doses to complete the series is determined by the other product (and not by PRP-OMP), as given in the *1997 Red Book*.[9] For example, if PRP-OMP is given for the first dose at 2 months and another vaccine is given at 4 months, a third dose of any of the three licensed Hib vaccines is recommended at 6 months to complete the primary series.
5. Minor changes in the footnotes have been made to clarify some recommendations including timing for the third dose of hepatitis B vaccine for children born to HBsAg-negative women and the need for two doses of varicella vaccine for susceptible persons 13 years of age or older.

Committee on Infectious Diseases 1997 to 1998
Neal A. Halsey, MD, Chair
Jon S. Abramson, MD
P. Joan Chesney, MD
Margaret C. Fisher, MD
Michael A. Gerber, MD
S. Michael Marcy, MD
Dennis L. Murray, MD
Gary D. Overturf, MD
Charles G. Prober, MD
Leonard B. Weiner, MD
Richard J. Whitley, MD
Ram Yogev, MD

Ex-Officio
Georges Peter, MD
Larry K. Pickering, MD

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.



Approved by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP).

[1] This schedule indicates the recommended age for routine administration of currently licensed childhood vaccines. Some combination vaccines are available and may be used whenever administration of all components of the vaccine is indicated. Providers should consult the manufacturers' package inserts for detailed recommendations.

[2] ***Infants born to HBsAg-negative mothers*** should receive 2.5 µg of Merck vaccine (Recombivax HB) or 10 µg of SmithKline Beecham (SB) vaccine (Engerix-B). The 2nd dose should be administered at least 1 mo after the 1st dose. The 3rd dose should be given at least 2 mos after the second, but not before 6 mos of age.
Infants born to HBsAg-positive mothers should receive 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hrs of birth, and either 5 µg of Merck vaccine (Recombivax HB) or 10 µg of SB vaccine (Engerix-B) at a separate site. The 2nd dose is recommended at 1-2 mos of age and the 3rd dose at 6 mos of age.
Infants born to mothers whose HBsAg status is unknown should receive either 5 µg of Merck vaccine (Recombivax HB) or 10 µg of SB vaccine (Engerix-B) within 12 hrs of birth. The 2nd dose of vaccine is recommended at 1 mo of age and the 3rd dose at 6 mos of age. Blood should be drawn at the time of delivery to determine the mother's HBsAg status; if it is positive, the infant should receive HBIG as soon as possible (no later than 1 wk of age). The dosage and timing of subsequent vaccine doses should be based upon the mother's HBsAg status.

[3] Children and adolescents who have not been vaccinated against hepatitis B in infancy may begin the series during any visit. Those who have not previously received 3 doses of hepatitis B vaccine should initiate or complete the series during the 11 to 12-year-old visit, and unvaccinated older adolescents should be vaccinated whenever possible. The 2nd dose should be administered at least 1 mo after the 1st dose, and the 3rd dose should be administered at least 4 mos after the 1st dose and at least 2 mos after the 2nd dose.

[4] DTaP (diphtheria and tetanus toxoids and acellular pertussis vaccine) is the preferred vaccine for all doses in the vaccination series, including completion of the series in children who have received 1 or more doses of whole-cell DTP vaccine. Whole-cell DTP is an acceptable alternative to DTaP. The 4th dose (DTP or DTaP) may be administered as early as 12 mos of age, provided 6 mos have elapsed since the 3rd dose and if the child is unlikely to return at age 15-18 mos. Td (tetanus and diphtheria toxoids) is recommended at 11-12 years of age if at least 5 years have elapsed since the last dose of DTP, DTaP or DT. Subsequent routine Td boosters are recommended every 10 years.

[5] Three *H influenzae* type b (Hib) conjugate vaccines are licensed for infant use. If PRP-OMP (PedvaxHIB[Merck]) is administered at 2 and 4 mos of age, a dose at 6 mos is not required.

[6] Two poliovirus vaccines are currently licensed in the US: inactivated poliovirus vaccine (IPV) and oral poliovirus vaccine (OPV). The following schedules are all acceptable to the ACIP, the AAP, and the AAFP. Parents and providers may choose among these options.

1) 2 doses of IPV followed by 2 doses of OPV.
2) 4 doses of IPV.
3) 4 doses of OPV.

The ACIP recommends 2 doses of IPV at 2 and 4 mos of age followed by 2 doses of OPV at 12-18 mos and 4-6 years of age. IPV is the only poliovirus vaccine recommended for immunocompromised persons and their household contacts.

[7] The 2nd dose of MMR is recommended routinely at 4-6 yrs of age but may be administered during any visit, provided at least 1 mo has elapsed since receipt of the 1st dose and that both doses are administered beginning at or after 12 mos of age. Those who have not previously received the second dose should complete the schedule no later than the 11 to 12-year visit.

[8] Susceptible children may receive varicella vaccine (Var) at any visit after the first birthday, and those who lack a reliable history of chickenpox should be immunized during the 11- to 12-year-old visit. Susceptible children 13 years of age or older should receive 2 doses, at least 1 month apart.

Consultant
Carol J. Baker, MD

Liaison Representatives
Anthony Hirsch, MD
AAP Council on Pediatric Practice
Richard F. Jacobs, MD
American Thoracic Society
Noni E. MacDonald, MD
Canadian Paediatric Society
Ben Schwartz, MD
Centers for Disease Control and Prevention
John R. Livengood, MD
Centers for Disease Control and Prevention
M. Carolyn Hardegree, MD
Food and Drug Administration
N. Regina Rabinovich, MD
National Institutes of Allergy and Infectious Diseases
Robert F. Breiman, MD
National Vaccine Program Office

REFERENCES

1. American Academy of Pediatrics, Committee on Infectious Diseases. Recommended childhood immunization schedule. *Pediatrics.* 1997;99: 136–138
2. Modlin JF, Halsey NA, Thoms ML, Meschievitz CK, Patriarca PA, Baltimore Area Polio Vaccine Study Group. Humoral and mucosal immunity in infants induced by three sequential IPV-OPV immunization schedules. *J Infect Dis.* 1997;175(suppl 1):S228-S234
3. Halsey NA, Blatter M, Bader G, et al. Inactivated poliovirus vaccine alone or sequential inactivated and oral poliovirus vaccine in two-, four- and six-month-old infants with combination *Haemophilus influenzae* type b/hepatitis B vaccine. *Pediatr Infect Dis J.* 1997;16:675–679
4. American Academy of Pediatrics. Measles. In: Peter G, ed. *1997 Red Book. Report of the Committee on Infectious Diseases*. 24th ed. Elk Grove Village, IL: American Academy of Pediatrics; 1997:344–357
5. American Academy of Pediatrics, Committee on Infectious Diseases. Age for routine administration of the second dose of measles-mumps-rubella (MMR) vaccine. *Pediatrics*. 1998;101:129–133
6. Anderson EL, Decker MD, Englund JA, et al. Interchangeability of conjugated *Haemophilus influenzae* type b vaccines in infants. *JAMA.* 1995;273:849–853
7. Bewley KM, Schwab JG, Ballanco GA, Daum RS. Interchangeability of *Haemophilus influenzae* type b vaccines in the primary series: evaluation of a two-dose mixed regimen. *Pediatrics.* 1996;98:898–904
8. Greenberg DP, Lieberman JM, Marcy SM, et al. Enhanced antibody responses in infants given different sequences of heterogeneous *Haemophilus influenzae* type b conjugate vaccines. *J Pediatr*. 1995;126: 206–211
9. American Academy of Pediatrics. *Haemophilus influenzae* infections. In: Peter G, ed. *1997 Red Book. Report of the Committee on Infectious Diseases*. 24th ed. Elk Grove Village, IL: American Academy of Pediatrics; 1997: 220–231

Recommended Childhood Immunization Schedule—United States, January–December 1998

Committee on Infectious Diseases

Pediatrics 1998;101;154
DOI: 10.1542/peds.101.1.154

Recommended Childhood Immunization Schedule––United States, January–December 1998

Committee on Infectious Diseases

Pediatrics 1998;101;154
DOI: 10.1542/peds.101.1.154