

Childhood immunization: Schedule for 2000

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Vaccines are among the 20th century's most successful and cost-effective public health tools for preventing disease, disability, and death. Not only do they prevent a vaccinated person from developing a potentially serious disease, but they are also routinely recommended for children to help protect the community from the spread of infections.^{1,2}

Every year, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) reviews the recommended childhood immunization schedule with three aims: to provide current information on vaccine formulations, revise recommendations on the use of licensed vaccines, and recommend new vaccines. In January, the ACIP, in conjunction with the American Academy of Pediatrics and the American Academy of Family Physicians, released the recommended childhood immunization schedule for 2000.^{3,4}

For this year

The vaccination schedule (see Figure 1), which must be administered in an established sequence over the first 16 years of life, has been simplified. Following are updates to the schedule.

- The *rotavirus vaccine* (Rotashield) recommendation for infants was withdrawn by the ACIP on October 22, 1999, because of a strong association between the vaccine and development of intussusception (a form of bowel obstruction) in some infants during the 2 weeks after vaccination.⁵⁻⁷

- The *inactivated poliovirus vaccine* (IPV) is now recommended by the ACIP as the *only* acceptable polio vaccine for routine childhood vaccination in the United States. (Children should receive four doses: at 2 months, 4 months, 6 to 18 months, and 4 to 6 years of age.)

This recommendation was based on the need to eliminate the risk of vaccine-associated paralytic polio. Oral poliovirus vaccine (OPV) may, however, be used in special circumstances, such as to control an outbreak of paralytic polio, in an unvaccinated child who will be traveling within the next 4 weeks to an area where polio is endemic, and in a child of parents who do not accept the recommended number of vaccines. Clinicians should administer OPV only after discussing the risk of vaccine-associated paralytic polio with parents or caregivers.⁸

- The *acellular pertussis vaccine*, given in-combination with diphtheria and tetanus toxoids (the DTaP vaccine), is the recommended product for pertussis vaccination in the United States. The four approved DTaP products are equally acceptable.^{9,10}

- The *hepatitis A vaccine* (Hep A) is recommended in certain states or regions where the prevalence of disease is high. Consult your local public health authority regarding recommendations in the area where you practice.¹¹

Additional updates

Two other important updates on vaccines in the past year should be noted. First, the ACIP recommends that the polysaccharide meningococcal vaccine is to be provided or made easily available to first-year college students who live in a dormitory and who want to reduce their risk of meningococcal meningitis. This group has been found to be at a modestly increased risk, prompting revision of the guidelines.

Second, in the autumn of 1999, an advisory announcement was issued on the appropriate use of a single-antigen hepatitis B vaccine that does not contain the preservative thimerosal. When available, the single-antigen, preservative-free hepatitis B vaccine should be given to infants younger than 6 months

do not delay vaccination, however, if only thimerosal-containing vaccine is available. Hepatitis B vaccine that contains thimerosal can still be used to vaccinate children older than 6 months, adolescents, and adults.¹²⁻¹⁴

Vaccine	Age											
	Birth	1 mo	2 mos	4 mos	6 mos	12 mos	15 mos	18 mos	24 mos	4-6 yrs	11-12 yrs	14-16 yrs
Hepatitis B [†]	Hep B											
		Hep B			Hep B						Hep B	
Diphtheria and tetanus toxoids and pertussis [§]			DTaP	DTaP	DTaP		DTaP			DTaP	Td	
<i>H. influenzae</i> type b [¶]			Hib	Hib	Hib	Hib						
Polio ^{**}			IPV	IPV	IPV					IPV		
Measles-mumps-rubella ^{††}						MMR				MMR	MMR	
Varicella ^{§§}						Var					Var	
Hepatitis A ^{¶¶}									Hep A in selected areas			

■ Range of recommended ages for vaccination.

■ Vaccines to be given if previously recommended doses were missed or were given earlier than the recommended minimum age.

■ Recommended in selected states and/or regions.

On October 22, 1999, the Advisory Committee on Immunization Practices (ACIP) recommended that Rotashield[®] (rhesus rotavirus vaccine-tetavalent [RRV-TV]), the only U.S.-licensed rotavirus vaccine, no longer be used in the United States (*MMWR*, Vol. 48, No. 43, November 5, 1999). Parents should be reassured that children who received rotavirus vaccine before July 1999 are not now at increased risk for intussusception.

*This schedule indicates the recommended ages for routine administration of licensed childhood vaccines as of November 1, 1999. Any dose not given at the recommended age should be given as a "catch-up" vaccination at any subsequent visit when indicated and feasible. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination are indicated and the vaccine's other components are not contraindicated. Providers should consult the manufacturers' package Inserts for detailed recommendations.

†Infants born to hepatitis B surface antigen (HBsAg)-negative Mothers should receive the first dose of hepatitis B vaccine (Hep B) by age 2 months. The second dose should be administered at least 1 month after the first dose. The third dose should be administered at least 4 months after the first dose and at least 2 months after the second dose, but not before age 6 months. Infants born to HBsAg-positive mothers should receive Hep B and 0.5 mL hepatitis B immune globulin (HBIG) within 12 hours of birth at separate sites. The second dose is recommended at age 1-2 months and the third dose at age 6 months. Infants born to mothers whose HBsAg status is unknown should receive Hep B within 12 hours of birth. Maternal blood should be drawn at delivery to determine the mother's HBsAg status; if the HBsAg test is positive, the infant should receive HBIG as soon as possible (no later than age 1 week). All children and adolescents (through age 18 years) who have not been vaccinated against hepatitis B may begin the series during any visit. Providers should make special efforts to vaccinate children who were born in or whose parents were born in areas of the world where hepatitis B virus infection is moderately or highly endemic.

§The fourth dose of diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) can be administered as early as age 12 months, provided 6 months have elapsed since the third dose and the child is unlikely to return at age 15-18 months. Tetanus and diphtheria toxoids (Td) is recommended at age 11-12 years if at least 5

years have elapsed since the last dose of diphtheria and tetanus toxoids and pertussis vaccine (DTP), DTaP, or diphtheria and tetanus toxoids (DT). Subsequent routine Td boosters are recommended every 10 years.

[¶]Three *Haemophilus influenzae* type b (Hib) conjugate vaccines are licensed for Infant use. If Hib conjugate vaccine (PRP-OMP) (PedvaxHIB[®]) or ComVax[®] [MerckD]) is administered at ages 2 months and 4 months, a dose at age 6 months is not required. Because clinical studies in infants have demonstrated that using some combination products may induce a lower immune response to the Hib vaccine component, DTaP/Hib combination products should not be used for primary vaccination in infants at ages 2, 4, or 6 months unless approved by the Food and Drug Administration for these ages.

**To eliminate the risk for vaccine-associated paralytic poliomyelitis (VAPP), an all-inactivated poliovirus vaccine (IPV) schedule is now recommended for routine childhood polio vaccination in the United States. All children should receive four doses of IPV: at age 2 months, age 4 months, between ages 6 and 18 months, and between ages 4 and 6 years. Oral poliovirus (OPV) (if available) may be used only for the following special circumstances: 1) mass-vaccination campaigns to control outbreaks of paralytic polio; 2) unvaccinated children who will be traveling in < 4 weeks to areas where polio is endemic or epidemic; and 3) children of parents who do not accept the recommended number of vaccine injections. Children of parents who do not accept the recommended number of vaccine injections may receive OPV only for the third or fourth dose or both; in this situation, health-care providers should administer OPV only after discussing the risk for VAPP with parents or caregivers. During the transition to an all-IPV schedule, recommendations for the use of remaining OPV supplies in physicians' offices and clinics have been issued by the American Academy of Pediatrics (*Pediatrics*, Vol. 104, No. 6, December 1999).

††The second dose of measles, mumps, and rubella vaccine (MMR) is recommended routinely at age 4-6 years but may be administered during any visit, provided at least 4 weeks have elapsed since receipt of the first dose and that both doses are administered beginning at or after age 12 months. Those who previously have not received the second dose should complete the schedule no later than the routine visit to a health-care provider at age 11-12 years.

^{§§}Varicella (Var) vaccine is recommended at any visit on or after the first birthday for susceptible children, i.e., those who lack a reliable history of chickenpox (as judged by a health-care provider) and who have not been vaccinated. Susceptible persons aged >13 years should receive two doses given at least 4 weeks apart.

^{¶¶}Hepatitis A vaccine (Hep A) is recommended for use in selected states and regions. Information is available from local public health authorities and *MMWR*, Vol. 48, No. RR-12, Oct. 1, 1999.

In addition, clinicians should be prepared to discuss with parents a misconception about a causal association between vaccination and autism. According to recently published data, no evidence demonstrates that any vaccine increases the risk of autism or other behavioral disorders.^{15,16}

Continuing a great public good

Vaccination was one of the greatest public health achievements in the United States in the 20th century. Immunizations have eradicated smallpox, eliminated poliomyelitis in the Americas, and controlled measles, rubella, tetanus, diphtheria, *Haemophilus influenzae* type b infection, and other infectious diseases. It is essential that Children receive all vaccines on the recommended schedules.

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