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Divide and Conquer: The 2007 Child and Adolescent Immunization Schedule

The recently published recommended immunization schedule for children and adolescents in the United States has been endorsed by the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics, and the American Academy of Family Physicians. Due to their increasing complexity, the 2007 vaccine recommendations have been divided into two separate schedules: one for children 0–6 years of age and one for those 7–18 years of age.¹ The major changes to the schedule published in January 2006 are as follows.

Rotavirus vaccine approved

Oral live rotavirus vaccine is recommended for routine administration to all infants at ages, 2, 4, and 6 months of age. The first dose should be administered at ages 6–12 weeks with subsequent doses given at 4–10 week intervals. Rotavirus vaccine should not be initiated for infants ages >12 weeks and should not be administered after age 32 weeks.²

Flu Recommendations Broadened

The influenza vaccine is now recommended for all children aged 6–59

months.³

Varicella Vaccine now a 2-dose series

A 2nd dose of varicella vaccine is recommended at 4–6 years of age.⁴

New HPV vaccine to protect females from cervical cancer

The new human papillomavirus vaccine (HPV) is recommended in a 3–dose schedule with the 2nd and 3rd doses administered 2 months and 6 months after the first dose. Routine vaccination with HPV is recommended for girls aged 11–12 years; the vaccination series can be started in girls as young as age 9 years; and catch-up vaccination is recommended for girls aged 13–26 years who have not been vaccinated previously or who have not completed the full vaccine series.⁵

Misadministration of Tdap or Pediatric DTaP

Since Tdap products ADACEL® and BOOSTRIX® were licensed in 2005 many vaccine administrators have mistakenly given these products to infants and children instead of the recommended pediatric DTaP products of Daptacel®, Tripedia®, or Infanrix®. To help prevent inadvertent administration of Tdap to children or DTaP to adolescents, vac-

cine providers should review product labels carefully before administering these vaccines; the packaging might appear similar. If Tdap is mistakenly given instead of pediatric DTaP to a child aged <7 years as any one of the first three doses of the tetanus-diphtheria-pertussis series, the Tdap dose should not be counted as valid, and the vaccine needs to be repeated with DTaP to ensure that the child receives adequate protection against diphtheria and pertussis. However, if pediatric DTaP is administered to an adolescent aged 11–18 years, the dose should be counted as the adolescent dose.⁶

For the most up-to-date model immunization standing orders for Oregon, check our Immunization Program’s web site at <http://oregon.gov/DHS/ph/imm/provider/stdgordr.shtml>. Detailed recommendations for vaccines are also available in the manufacturers’ package inserts, ACIP statements on specific vaccines, and the American Academy of Pediatrics Committee on Infectious Diseases.

See references on page 4

**Recommended Immunization Schedule for Persons Aged 0–6 Years
United States, 2007**

Table 1

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B ¹	HepB		HepB	^{see footnote 1}		HepB				HepB Series		
Rotavirus ²			Rota	Rota	Rota							
Diphtheria, Tetanus, Pertussis ³			DTaP	DTaP	DTaP		DTaP					DTaP
<i>Haemophilus influenzae</i> type b ⁴			Hib	Hib	Hib ⁴		Hib			Hib		
Pneumococcal ⁵			PCV	PCV	PCV		PCV				PCV PPV	
Inactivated Poliovirus			IPV	IPV			IPV					IPV
Influenza ⁶							Influenza (Yearly)					
Measles, Mumps, Rubella ⁷							MMR					MMR
Varicella ⁸							Varicella					Varicella
Hepatitis A ⁹							HepA (2 doses)				HepA Series	
Meningococcal ¹⁰												MPSV4

-  Range of recommended ages
-  Catch-up immunization
-  Certain high-risk groups

See footnotes on page 2

Footnotes to Table 1 (verso)

1. Hepatitis B vaccine (HepB). (*Minimum age: birth*)

At birth:

- Administer monovalent HepB to all newborns before hospital discharge.
- If mother is hepatitis surface antigen (HBsAg)-positive, administer HepB and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth.
- If mother's HBsAg status is unknown, administer HepB within 12 hours of birth. Determine the HBsAg status as soon as possible and if HBsAg-positive, administer HBIG (no later than age 1 week).
- If mother is HBsAg-negative, the birth dose can only be delayed with physician's order and mother's negative HBsAg laboratory report documented in the infant's medical record.

After the birth dose:

- The HepB series should be completed with either monovalent HepB or a combination vaccine containing HepB. The second dose should be administered at age 1–2 months. The final dose should be administered at age ≥ 24 weeks. Infants born to HBsAg-positive mothers should be tested for HBsAg and antibody to HBsAg after completion of ≥ 3 doses of a licensed HepB series, at age 9–18 months (generally at the next well-child visit).

4-month dose:

- It is permissible to administer 4 doses of HepB when combination vaccines are administered after the birth dose. If monovalent HepB is used for doses after the birth dose, a dose at age 4 months is not needed.

2. Rotavirus vaccine (Rota). (*Minimum age: 6 weeks*)

- Administer the first dose at age 6–12 weeks. Do not start the series later than age 12 weeks.
- Administer the final dose in the series by age 32 weeks. Do not administer a dose later than age 32 weeks.
- Data on safety and efficacy outside of these

age ranges are insufficient.

3. Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP). (*Minimum age: 6 weeks*)

- The fourth dose of DTaP may be administered as early as age 12 months, provided 6 months have elapsed since the third dose.
- Administer the final dose in the series at age 4–6 years.

4. Haemophilus influenzae type b conjugate vaccine (Hib). (*Minimum age: 6 weeks*)

- If PRP-OMP (PedvaxHIB® or ComVax® [Merck]) is administered at ages 2 and 4 months, a dose at age 6 months is not required.
- TriHiBit® (DTaP/Hib) combination products should not be used for primary immunization but can be used as boosters following any Hib vaccine in children aged ≥ 12 months.

5. Pneumococcal vaccine. (*Minimum age: 6 weeks for pneumococcal conjugate vaccine [PCV]; 2 years for pneumococcal polysaccharide vaccine [PPV]*)

- Administer PCV at ages 24–59 months in certain high-risk groups. Administer PPV to children aged ≥ 2 years in certain high-risk groups. See MMWR 2000;49(RR-9):1–35.

6. Influenza vaccine. (*Minimum age: 6 months for trivalent inactivated influenza vaccine [TIV]; 5 years for live, attenuated influenza vaccine [LAIV]*)

- All children aged 6–59 months and close contacts of all children aged 0–59 months are recommended to receive influenza vaccine.
- Influenza vaccine is recommended annually for children aged ≥ 59 months with certain risk factors, health-care workers, and other persons (including household members) in close contact with persons in groups at high risk. See MMWR 2006;55(No. RR-10):1–41.
- For healthy persons aged 5–49 years, LAIV may be used as an alternative to TIV.
- Children receiving TIV should receive 0.25 mL if aged 6–35 months or 0.5 mL if aged ≥ 3 years.

- Children aged < 9 years who are receiving influenza vaccine for the first time should receive 2 doses (separated by ≥ 4 weeks for TIV and ≥ 6 weeks for LAIV).

7. Measles, mumps, and rubella vaccine (MMR). (*Minimum age: 12 months*)

- Administer the second dose of MMR at age 4–6 years. MMR may be administered before age 4–6 years, provided ≥ 4 weeks have elapsed since the first dose and both doses are administered at age ≥ 12 months.

8. Varicella vaccine. (*Minimum age: 12 months*)

- Administer the second dose of varicella vaccine at age 4–6 years. Varicella vaccine may be administered before age 4–6 years, provided that ≥ 3 months have elapsed since the first dose and both doses are administered at age ≥ 12 months. If second dose was administered ≥ 28 days following the first dose, the second dose does not need to be repeated.

9. Hepatitis A vaccine (HepA). (*Minimum age: 12 months*)

- HepA is recommended for all children aged 1 year (i.e., aged 12–23 months). The 2 doses in the series should be administered at least 6 months apart.
- Children not fully vaccinated by age 2 years can be vaccinated at subsequent visits.
- HepA is recommended for certain other groups of children, including in areas where vaccination programs target older children. See MMWR 2006;55(RR-7):1–23.

10. Meningococcal polysaccharide vaccine (MPSV4). (*Minimum age: 2 years*)

- Administer MPSV4 to children aged 2–10 years with terminal complement deficiencies or anatomic or functional asplenia and certain other high-risk groups. See MMWR 2005;54(RR-7):1–21.

Recommended Immunization Schedule for Persons Aged 8–18 Years United States, 2007

Table 2

Vaccine ▼	Age ►	7-10 years	11-12 years	13-14 years	15 years	16-18 years
Tetanus, Diphtheria, Pertussis ¹	see footnote 1	Tdap		Tdap		
Human Papillomavirus ²	see footnote 2	HPV (3 doses)		HPV Series		
Meningococcal ³	MPSV4	MCV4		MCV4 ³ MCV4		
Pneumococcal ⁴		PPV				
Influenza ⁵		Influenza (Yearly)				
Hepatitis A ⁶		HepA Series				
Hepatitis B ⁷		HepB Series				
Inactivated Poliovirus ⁸		IPV Series				
Measles, Mumps, Rubella ⁹		MMR Series				
Varicella ¹⁰		Varicella Series				

-  Range of recommended ages
-  Catch-up immunization
-  Certain high-risk groups

Footnotes to Table 2 (opposite)

1. Tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap). (Minimum age: 10 years for BOOSTRIX® and 11 years for ADACEL™)

- Administer at age 11–12 years for those who have completed the recommended childhood DTP/DTaP vaccination series and have not received a tetanus and diphtheria toxoids vaccine (Td) booster dose.

- Adolescents aged 13–18 years who missed the 11–12 year Td/Tdap booster dose should also receive a single dose of Tdap if they have completed the recommended childhood DTP/DTaP vaccination series.

2. Human papillomavirus vaccine (HPV).

(Minimum age: 9 years)

- Administer the first dose of the HPV vaccine series to females at age 11–12 years.

- Administer the second dose 2 months after the first dose and the third dose 6 months after the first dose.

- Administer the HPV vaccine series to females at age 13–18 years if not previously vaccinated.

3. Meningococcal vaccine. (Minimum age: 11 years for meningococcal conjugate vaccine [MCV4]; 2 years for meningococcal polysaccharide vaccine [MPSV4])

- Administer MCV4 at age 11–12 years and to previously unvaccinated adolescents at high school entry (at approximately age 15 years).

- Administer MCV4 to previously unvaccinated college freshmen living in dormitories; MPSV4 is an acceptable alternative.

- Vaccination against invasive meningococcal disease is recommended for children and adolescents aged ≥2 years with terminal complement deficiencies or anatomic or functional asplenia and certain other high-risk groups. See MMWR 2005;54(No. RR-7):1–21. Use MPSV4 for children aged 2–10 years and MCV4 or MPSV4 for older children.

4. Pneumococcal polysaccharide vaccine (PPV). (Minimum age: 2 years)

- Administer for certain high-risk groups. See MMWR 1997;46(No. RR-8):1–24, and MMWR 2000;49(No. RR-9):1–35.

5. Influenza vaccine. (Minimum age: 6 months for trivalent inactivated influenza vaccine [TIV]; 5 years for live, attenuated influenza vaccine [LAIV])

- Influenza vaccine is recommended annually for persons with certain risk factors, health-care workers, and other persons (including household members) in close contact with persons in groups at high risk. See MMWR 2006;55 (No. RR-10):1–41.

- For healthy persons aged 5–49 years, LAIV may be used as an alternative to TIV.

- Children aged <9 years who are receiving influenza vaccine for the first time should receive 2 doses (separated by ≥4 weeks for TIV and ≥6 weeks for LAIV).

6. Hepatitis A vaccine (HepA). (Minimum age: 12 months)

- The 2 doses in the series should be administered at least 6 months apart.

- HepA is recommended for certain other groups of

children, including in areas where vaccination programs target older children. See MMWR 2006;55 (No. RR-7):1–23.

7. Hepatitis B vaccine (HepB). (Minimum age: birth)

- Administer the 3-dose series to those who were not previously vaccinated.

- A 2-dose series of Recombivax HB® is licensed for children aged 11–15 years.

8. Inactivated poliovirus vaccine (IPV). (Minimum age: 6 weeks)

- For children who received an all-IPV or all-oral poliovirus (OPV) series, a fourth dose is not necessary if the third dose was administered at age ≥4 years.

- If both OPV and IPV were administered as part of a series, a total of 4 doses should be administered, regardless of the child's current age.

9. Measles mumps and rubella vaccine (MMR). (Minimum age: 12 months)

- If not previously vaccinated, administer 2 doses of MMR during any visit, with ≥4 weeks between the doses.

10. Varicella vaccine. (Minimum age: 12 months)

- Administer 2 doses of varicella vaccine to persons without evidence of immunity.

- Administer 2 doses of varicella vaccine to persons aged <13 years at least 3 months apart. Do not repeat the second dose, if administered ≥28 days after the first dose.

- Administer 2 doses of varicella vaccine to persons aged ≥13 years at least 4 weeks apart.

Table 3

Catch-up Immunization Schedule

CATCH-UP SCHEDULE FOR PERSONS AGED 4 MONTHS–6 YEARS					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B ¹	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Rotavirus ²	6 wks	4 weeks	4 weeks		
Diphtheria, Tetanus, Pertussis ³	6 wks	4 weeks	4 weeks	6 months	6 months ³
<i>Haemophilus influenzae</i> type b ⁴	6 wks	4 weeks if first dose administered at age <12 months 8 weeks (as final dose) if first dose administered at age 12–14 months No further doses needed if first dose administered at age ≥15 months	4 weeks ⁴ if current age <12 months 8 weeks (as final dose) ⁴ if current age ≥12 months and second dose administered at age <15 months No further doses needed if previous dose administered at age ≥15 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Pneumococcal ⁵	6 wks	4 weeks if first dose administered at age <12 months and current age <24 months 8 weeks (as final dose) if first dose administered at age ≥12 months or current age 24–59 months No further doses needed for healthy children if first dose administered at age ≥24 months	4 weeks if current age <12 months 8 weeks (as final dose) if current age ≥12 months No further doses needed for healthy children if previous dose administered at age ≥24 months	8 weeks (as final dose) This dose only necessary for children aged 12 months–5 years who received 3 doses before age 12 months	
Inactivated Poliovirus ⁶	6 wks	4 weeks	4 weeks	4 weeks ⁶	
Measles, Mumps, Rubella ⁷	12 mos	4 weeks			
Varicella ⁸	12 mos	3 months			
Hepatitis A ⁹	12 mos	6 months			
CATCH-UP SCHEDULE FOR PERSONS AGED 7–18 YEARS					
Tetanus, Diphtheria/ Tetanus, Diphtheria, Pertussis ¹⁰	7 yrs ¹⁰	4 weeks	8 weeks if first dose administered at age <12 months 6 months if first dose administered at age ≥12 months	6 months if first dose administered at age <12 months	
Human Papillomavirus ¹¹	9 yrs	4 weeks	12 weeks		
Hepatitis A ⁹	12 mos	6 months			
Hepatitis B ¹	Birth	4 weeks	8 weeks (and 16 weeks after first dose)		
Inactivated Poliovirus ⁶	6 wks	4 weeks	4 weeks	4 weeks ⁶	
Measles, Mumps, Rubella ⁷	12 mos	4 weeks			
Varicella ⁸	12 mos	4 weeks if first dose administered at age ≥13 years 3 months if first dose administered at age <13 years			



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Footnotes to Table 3 (verso)

- 1. Hepatitis B vaccine (HepB).** (*Minimum age: birth*)
- Administer the 3-dose series to those who were not previously vaccinated.
 - A 2-dose series of Recombivax HB® is licensed for children aged 11–15 years.
- 2. Rotavirus vaccine (Rota).** (*Minimum age: 6 weeks*)
- Do not start the series later than age 12 weeks.
 - Administer the final dose in the series by age 32 weeks. Do not administer a dose later than age 32 weeks.
 - Data on safety and efficacy outside of these age ranges are insufficient.
- 3. Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP).** (*Minimum age: 6 weeks*)
- The fifth dose is not necessary if the fourth dose was administered at age ≥ 4 years.
 - DTaP is not indicated for persons aged ≥ 7 years.
- 4. Haemophilus influenzae type b conjugate vaccine (Hib).** (*Minimum age: 6 weeks*)
- Vaccine is not generally recommended for children aged ≥ 5 years.
 - If current age < 12 months and the first 2 doses were PRP-OMP (PedvaxHIB® or Com-Vax® [Merck]), the third (and final) dose should be administered at age 12–15 months and at least 8 weeks after the second dose.
- 5. Pneumococcal conjugate vaccine (PCV).** (*Minimum age: 6 weeks*)
- Vaccine is not generally recommended for children aged ≥ 5 years.
- 6. Inactivated poliovirus vaccine (IPV).** (*Minimum age: 6 weeks*)
- For children who received an all-IPV or all-oral poliovirus (OPV) series, a fourth dose is not necessary if third dose was administered at age ≥ 4 years.
 - If both OPV and IPV were administered as part of a series, a total of 4 doses should be administered, regardless of the child's current age.
- 7. Measles, mumps, and rubella vaccine (MMR).** (*Minimum age: 12 months*)
- The second dose of MMR is recommended routinely at age 4–6 years but may be administered earlier if desired.
 - If not previously vaccinated, administer 2 doses of MMR during any visit with ≥ 4 weeks between the doses.
- 8. Varicella vaccine.** (*Minimum age: 12 months*)
- The second dose of varicella vaccine is recommended routinely at age 4–6 years but may be administered earlier if desired.
 - Do not repeat the second dose in persons aged < 13 years if administered ≥ 28 days after the first dose.
- 9. Hepatitis A vaccine (HepA).** (*Minimum age: 12 months*)
- HepA is recommended for certain groups of children, including in areas where vaccination programs target older children. See MMWR 2006;55(No. RR-7):1–23.
- 10. Tetanus and diphtheria toxoids vaccine (Td) and tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap).** (*Minimum ages: 7 years for Td, 10 years for BOOSTRIX®, and 11 years for ADACEL™*)
- Tdap should be substituted for a single dose of Td in the primary catch-up series or as a booster if age appropriate; use Td for other doses.
 - A 5-year interval from the last Td dose is encouraged when Tdap is used as a booster dose. A booster (fourth) dose is needed if any of the previous doses were administered at age < 12 months. Refer to ACIP recommendations for further information. See MMWR 2006;55(No. RR-3).
- 11. Human papillomavirus vaccine (HPV).** (*Minimum age: 9 years*)
- Administer the HPV vaccine series to females at age 13–18 years if not previously vaccinated.

The three schedules in this *CD Summary* indicate the recommendations for routine administration of currently licensed childhood vaccines, as of December 1, 2006, for children aged 0–18 years. Additional information is available at <http://www.cdc.gov/nip/recs/child-schedule.htm>. Any dose not administered at the recommended age should be administered 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 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. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

References

- ¹CDC. Recommended Immunization Schedules for Persons Aged 0–18 Years—United States. 2007. MMWR 2007; 55: 51–4.
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