

## 2017 Immunization Schedules: Children and adolescents

On February 7, 2017 the Advisory Committee on Immunization Practices (ACIP) released its 2017 recommended schedule for children and adolescents aged  $\leq 18$  years of age. Along with the new title are changes to Table 1; the addition of Table 3; and new recommendations in the footnotes for influenza, human papillomavirus (HPV), hepatitis B (hepB), *Haemophilus influenzae* type b (Hib), pneumococcal, meningococcal, and diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccines.<sup>1</sup>

### ROUTINE SCHEDULE

In Table 1: Changes to the 2017 table from the 2016 schedule are as follows:

- The 16-year age column has been separated from the 17–18 -year age column to highlight the need for a meningococcal conjugate vaccine booster at age 16 years.
- Live attenuated influenza vaccine (LAIV) is not currently recommended has been removed.
- For HPV vaccine for children aged 9–10 years, a blue bar was added to indicate that persons in this age group may be vaccinated even in the absence of a high-risk condition.

In Table 3: Vaccines are grouped by medical condition and show when children can (and should) be vaccinated. The Table identifies when a medical condition is a precaution or contraindication to a vaccination and when additional doses may be needed.

### 2017 FOOTNOTES

- The hepatitis B vaccine footnote was revised to reflect that the birth dose should be administered within 24 hours of birth.
- The DTaP vaccine footnote was revised to more present more clearly ACIP's recommendations following the inadvertently early administration of the fourth dose of DTaP.\*
- Within the *Haemophilus influenzae* type b vaccine (Hib) footnote, Comvax was

\*Inadvertently early administration of the fourth DTaP dose early: If the fourth dose of DTaP was administered at least 4 months after the third dose of DTaP, and the child was 12 months of age or older, it does not need to be repeated.

- Within the (Hib) footnote, Comvax® (Hib+hepB combination vaccine) was removed from routine vaccination portion because it has been removed from the market and all available doses have expired. Hiberix® has been added to the list of vaccines that may be used for the primary vaccination series.
- Within the pneumococcal vaccine footnote, references to 7-valent pneumococcal conjugate vaccine (PCV7) have been removed. PCV13 has replaced PCV7, and all healthy children who might have received PCV7 as part of a primary series have now aged out of the recommendation for pneumococcal vaccine.
- The influenza vaccine footnote has been updated to indicate that LAIV should not be used during the 2016–2017 influenza season.
- The meningococcal vaccines footnote has been updated to include recommendations for meningococcal vaccination of children with human immunodeficiency virus (HIV) infection; and to reflect recommendations for the use of a 2-dose Trumenba® schedule for meningococcal B vaccination.
- The tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap) footnote for vaccination of pregnant adolescents between gestational weeks 27–36 has been updated to reflect a preference for vaccination during the early part of this gestational window. Currently available data suggest that vaccinating earlier in the 27–36- week period will maximize passive antibody transfer to the infant.
- The footnote for HPV vaccine has been updated to include the new 2-dose schedule for persons initiating the HPV vaccination series before age 15 years. In addition, bivalent HPV vaccine (Cervarix®) has been removed from the schedule; it has been withdrawn from the U.S. market, and all available vaccine doses have expired.

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

Routine vaccination:

At birth:

- Administer monovalent HepB vaccine to all newborns within 24 hours of birth.
- For infants born to hepatitis B surface antigen (HBsAg)-positive mothers, administer HepB vaccine and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth. These infants should be tested for HBsAg and antibody to HBsAg (anti-HBs) at age 9–12 months (preferably at the next well-child visit) or 1 to 2 months after completion of the HepB series if the series was delayed.
- If mother's HBsAg status is unknown, within 12 hours of birth, administer HepB vaccine regardless of birth weight. For infants weighing less than 2,000 grams, administer HBIG in addition to HepB vaccine within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if mother is HBsAg-positive, also administer HBIG to infants weighing 2,000 grams or more as soon as possible, but no later than age 7 days.

Doses following the birth dose:

- The second dose should be administered at age 1 or 2 months. Monovalent HepB vaccine should be used for doses administered before age 6 weeks.
- Infants who did not receive a birth dose should receive 3 doses of a HepB-containing vaccine on a schedule of 0, 1 to 2 months, and 6 months, starting as soon as feasible (see Table 2).
- Administer the second dose 1 to 2 months after the first dose (minimum interval of 4 weeks); administer the third dose at least 8 weeks after the second dose AND at least 16 weeks after the first dose. The final (third or fourth) dose in the HepB vaccine series should be administered no earlier than age 24 weeks.
- Administration of a total of 4 doses of HepB vaccine is permitted when a combination vaccine containing HepB is administered after the birth dose.

**Table 1. Recommended Immunization Schedule for Persons aged 0 through 18 years**  
United States, 2017

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]). These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Table 1. To determine minimum intervals between doses, see the catch-up schedule (Table 2). School entry and adolescent vaccine age groups are shaded.

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Hepatitis B <sup>1</sup> (HepB)	1 <sup>st</sup> dose	2 <sup>nd</sup> dose			3 <sup>rd</sup> dose												
Rotavirus <sup>2</sup> (RV) RV1 (2-dose series); RV5 (3-dose series)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See footnote 2												
Diphtheria, tetanus, & acellular pertussis <sup>3</sup> (DTaP: <7 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose			4 <sup>th</sup> dose				5 <sup>th</sup> dose					
<i>Haemophilus influenzae</i> type b <sup>4</sup> (Hib)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See footnote 4		3 <sup>rd</sup> or 4 <sup>th</sup> dose, See footnote 4										
Pneumococcal conjugate <sup>5</sup> (PCV13)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose		← 4 <sup>th</sup> dose →										
Inactivated poliovirus <sup>6</sup> (IPV: <18 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose							4 <sup>th</sup> dose					
Influenza <sup>7</sup> (IIV)					Annual vaccination (IIV only) 1 or 2 doses							Annual vaccination (IIV) 1 dose only					
Measles, mumps, rubella <sup>8</sup> (MMR)					See footnote 8		1 <sup>st</sup> dose					2 <sup>nd</sup> dose					
Varicella <sup>9</sup> (VAR)							1 <sup>st</sup> dose					2 <sup>nd</sup> dose					
Hepatitis A <sup>10</sup> (HepA)							2-dose series, See footnote 10										
Meningococcal <sup>11</sup> (Hib-MenCY ≥ 6 weeks; MenACWY-D ≥ 9 mos; Men-ACWY-CRM ≥ 2 mos)			See footnote 11										1 <sup>st</sup> dose		2 <sup>nd</sup> dose		
Tetanus, diphtheria, & acellular pertussis <sup>12</sup> (Tdap: ≥ 7 yrs)														(Tdap)			
Human papillomavirus <sup>13</sup>														See footnote 13			
Meningococcal B <sup>11</sup>														See footnote 11			
Pneumococcal polysaccharide <sup>5</sup> (PPSV23)												See footnote 5					

Range of recommended ages for all children
  Range of recommended ages for catch-up immunization
  Range of recommended ages for certain high risk groups
  Range of recommended ages for non-high-risk groups that may receive vaccine, subject to individual clinical decision making
 No recommendations

This schedule includes recommendations in effect as of January 1, 2017. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at <http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>. Clinically significant adverse events that follow vaccinations should be reported to the Vaccine Adverse Event Reporting System (VAERS) online (<http://www.vaers.hhs.gov>) or by telephone (800-822-7967). Suspected cases of vaccine-preventable disease should be reported to the state or local health department. Additional information, including precautions and contraindications for vaccination is available from CDC online (<http://www.cdc.gov/vaccines/res/vac-admin/contraindications.htm>) or by telephone (800-CDC-INFO or 800-232-4636).

This schedule is approved by the Advisory Committee on Immunization Practices (<http://www.cdc.gov/vaccines/acip>), the American Academy of Pediatrics (<http://www.aap.org>), the American Academy Family Physicians (<http://www.aafp.org>), and the American College of Obstetricians and Gynecologists (<http://www.acog.org>).

NOTE: The above recommendations must be read along with the footnotes of this schedule.

Catch-up vaccination (HepB cont.):

- Unvaccinated persons should complete a 3-dose series.
- A 2-dose series (doses separated by at least 4 months) of adult formulation Recombivax HB is licensed for use in children aged 11–15 years.
- For other catch-up guidance, see Table 2.

## 2. Rotavirus (RV) vaccines. (Minimum age: 6 weeks for both RV1 [Rotarix] and RV5 [RotaTeq])

Routine vaccination:

Administer a series of RV vaccine to all infants as follows:

1. If Rotarix is used, administer a 2-dose series at 2 and 4 months of age.
2. If RotaTeq is used, administer a 3-dose series at ages 2, 4, and 6 months.
3. If any dose in the series was RotaTeq or vaccine product is unknown for any dose in the series, a total of 3 doses of RV vaccine should be administered.

Catch-up vaccination:

- The maximum age for the first dose in the series is 14 weeks, 6 days; vaccination should not be initiated for infants aged 15 weeks, 0 days or older.
- The maximum age for the final dose in the series is 8 months, 0 days.
- For other catch-up guidance, see Table 2.

## 3. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine. (Minimum age: 6 weeks. Exception: DTaP-IPV [Kinrix, Quadracel]); 4 years)

Routine vaccination:

- Administer a 5-dose series of DTaP vaccine at ages, 2, 4, 6, 15–18 months, and 4–6 years. The fourth dose may be administered as early as 12 months of age, provided at least 6 months have elapsed since the third dose.
- Inadvertent administration of 4th DTaP dose early: If the fourth dose of DTaP was administered at least 4 months after the third dose of DTaP and the child was  $\geq 12$  months of age, it does not need to be repeated

Catch-up vaccination:

- The fifth dose of DTaP vaccine is not necessary if the fourth dose was administered at age  $\geq 4$  years.
- For other catch-up guidance, see Table 2.

## 4. *Haemophilus influenzae* type b (Hib) conjugate vaccine. (Minimum age: 6 weeks for PRP-T [ActHIB, DTaP-IPV/Hib (Pentacel), Hiberix, and Hib-MenCY (MenHibrix)], PRP-OMP [PedvaxHIB])

Routine vaccination:

- Administer a 2- or 3-dose Hib vaccine primary series and a booster dose (dose 3 or 4 depending on vaccine used in primary series) at age 12–15 months to complete a full Hib vaccine series.
- The primary series with ActHIB, MenHibrix, Hiberix, or Pentacel consists of 3 doses and should be administered at ages 2, 4, and 6 months. The primary series with PedvaxHIB consists of 2 doses and should be administered at ages 2 and 4 months; a dose at age 6 months is not indicated.
- One booster dose (dose 3 or 4 depending on vaccine used in primary series) of any Hib vaccine should be administered at age 12–15 months.
- For recommendations on the use of MenHibrix in patients at increased risk for meningococcal disease, please refer to the meningococcal vaccine footnotes and also to MMWR February 28, 2014;63[RR01]:1–13, available at <http://www.cdc.gov/mmwr/PDF/rr/rr6301.pdf>.

Catch-up vaccination:

- If dose 1 was administered at ages 12–14 months, administer a second (final) dose at least 8 weeks after dose 1, regardless of Hib vaccine used in the primary series.
- If both doses were PRP-OMP (PedvaxHIB or COMVAX) and were administered before the first birthday, the third (and final) dose should be administered at age 12–59 months and at least 8 weeks after the second dose.
- If the first dose was administered at age 7–11 months, administer the second dose at least 4 weeks later and a third (and final) dose at age 12–15 months or 8 weeks after second dose, whichever is later.
- If first dose is administered before the first birthday and second dose administered at  $< 15$  months, a third (and final) dose should be administered 8 weeks later.
- For unvaccinated children aged 15–59 months, administer only 1 dose.
- For other catch-up guidance, see Table 2. For catch-up guidance related to MenHibrix, please see the meningococcal vaccine footnotes and also MMWR February 28, 2014;63[RR01]:1–13, available at <http://www.cdc.gov/mmwr/PDF/rr/rr6301.pdf>.

Vaccination of persons with high-risk conditions:

- Children aged 12–59 months who are at increased risk for Hib disease, including chemotherapy recipients and those with anatomic or functional asplenia (including sickle cell disease), human immunodeficiency virus (HIV) infection, immunoglobulin deficiency, or early component complement deficiency, who have received either no doses or only 1 dose of Hib vaccine at  $< 12$  months of age, should receive 2 additional doses of Hib vaccine

8 weeks apart; children who received 2 or more doses of Hib vaccine at <12 months of age should receive 1 additional dose.

- For patients <5 years of age undergoing chemotherapy or radiation treatment who received a Hib vaccine dose(s) within 14 days of starting therapy or during therapy, repeat the dose(s) at least 3 months following therapy completion.
- Recipients of hematopoietic stem cell transplant (HSCT) should be revaccinated with a 3-dose regimen of Hib vaccine starting 6 to 12 months after successful transplant, regardless of vaccination history; doses should be administered at least 4 weeks apart.
- A single dose of any Hib-containing vaccine should be administered to unimmunized\* children and adolescents  $\geq 15$  months of age undergoing an elective splenectomy; if possible, vaccine should be administered at least 14 days before the procedure.
- Hib vaccine is not routinely recommended for patients  $\geq 5$  years of age. However, 1 dose of Hib vaccine should be administered to unimmunized\* persons aged  $\geq 5$  years who have anatomic or functional asplenia (including sickle cell disease) and to unvaccinated persons 5–18 years of age with HIV infection.

\* Patients who have not received a primary series and booster dose or at least 1 dose of Hib vaccine after 14 months of age are considered unimmunized.

## 5. Pneumococcal vaccines. (Minimum age: 6 weeks for PCV13, 2 years for PPSV23)

Routine vaccination with PCV13:

- Administer a 4-dose series of PCV13 vaccine at ages 2, 4, and 6 months and at age 12–15 months.

Catch-up vaccination with PCV13:

- Administer 1 dose of PCV13 to all healthy children aged 24–59 months who are not completely vaccinated for their age.
- For other catch-up guidance, see Table 2.

Vaccination of persons with high-risk conditions with PCV13 and PPSV23:

- All recommended PCV13 doses should be administered prior to PPSV23 vaccination if possible.
- For children 2–5 years of age with any of the following conditions: chronic heart disease (particularly cyanotic congenital heart disease and cardiac failure); chronic lung disease (including asthma if treated with high-dose oral corticosteroid therapy); diabetes mellitus; cerebrospinal fluid leak; cochlear implant; sickle cell disease or other hemoglobinopathies; anatomic or functional asplenia; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; solid organ transplantation; or congenital immunodeficiency:
  1. Administer 1 dose of PCV13 if any incomplete schedule of 3 doses of PCV13 was received previously
  2. Administer 2 doses of PCV13 at least 8 weeks apart if unvaccinated or any incomplete schedule of fewer than 3 doses of PCV13) was received previously.
  3. The minimum interval between doses of PCV13 is 8 weeks.
  4. For children with no history of PPSV23 vaccination, administer PPSV23 at least 8 weeks after the most recent dose of PCV13.
- For children aged 6–18 years who have cerebrospinal fluid leak; cochlear implant; sickle cell disease or other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiencies; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; generalized malignancy; solid organ transplantation; or multiple myeloma:
  1. If neither PCV13 nor PPSV23 has been received previously, administer 1 dose of PCV13 now and 1 dose of PPSV23 at least 8 weeks later.
  2. If PCV13 has been received previously but PPSV23 has not, administer 1 dose of PPSV23 at least 8 weeks after the most recent dose of PCV13.
  3. If PPSV23 has been received but PCV13 has not, administer 1 dose of PCV13 at least 8 weeks after the most recent dose of PPSV23.
- For children aged 6–18 years with chronic heart disease (particularly cyanotic congenital heart disease and cardiac failure), chronic lung disease (including asthma if treated with high-dose oral corticosteroid therapy), diabetes mellitus, alcoholism, or chronic liver disease, who have not received PPSV23, administer 1 dose of PPSV23. If PCV13 has been received previously, then PPSV23 should be administered at least 8 weeks after any prior PCV13 dose.
- A single revaccination with PPSV23 should be administered 5 years after the first dose to children with sickle cell disease or other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiencies; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment

**Table 2. Catch-up Immunization schedule for persons aged 4 months through 18 years who start late or who are more than 1 month behind United States, 2017**

The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. Always use this table in conjunction with Table 1 and the footnotes that follow.

Children age 4 months through 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 <sup>1</sup>	Birth	4 weeks	8 weeks and at least 16 weeks after first dose. Minimum age for the final dose is 24 weeks.		
Rotavirus <sup>2</sup>	6 weeks	4 weeks	4 weeks <sup>2</sup>		
Diphtheria, tetanus, and acellular pertussis <sup>3</sup>	6 weeks	4 weeks	4 weeks	6 months	6 months <sup>3</sup>
<i>Haemophilus influenzae</i> type b <sup>4</sup>	6 weeks	4 weeks if first dose was administered before the 1st birthday. 8 weeks (as final dose for healthy children) if first dose was administered at 12–14 months. No further doses needed if first dose was administered at age ≥15 months.	4 weeks <sup>4</sup> if current age is <12 months and first dose was administered at age <7 months, and at least 1 previous dose was PRP-T (ActHib, Hiberix, Pentacel) or unknown. 8 weeks and age 12–59 months (as final dose) <sup>4</sup> • if current age is <12 months and first dose was administered at age 7 – 11 months OR • if current age is 12–59 months and first dose was administered before the 1 <sup>st</sup> birthday, and second dose administered at <15 months; OR • if both doses were PRP-OMP (PedvaxHIB; Comvax) and were administered before the 1 <sup>st</sup> birthday No further doses needed if previous dose was administered at age ≥15 months.	8 weeks (as final dose) This dose only necessary for children age 12– 59 months who received 3 doses before the 1 <sup>st</sup> birthday.	
Pneumococcal <sup>5</sup>	6 weeks	4 weeks if first dose administered before the 1 <sup>st</sup> birthday. 8 weeks (as final dose for healthy children) if first dose was administered at the 1 <sup>st</sup> birthday or after. No further doses needed for healthy children if first dose administered at age ≥24 months	4 weeks if current age is <12 months and previous dose given at <7months old. 8 weeks (as final dose for healthy children) if previous dose given between 7-11 months (wait until at least 12 months old); OR if current age is ≥12 months and at least 1 dose was given before 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 –59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
-Inactivated poliovirus <sup>6</sup>	6 weeks	4 weeks <sup>5</sup>	4 weeks <sup>5</sup>	6 months <sup>6</sup> (minimum age 4 years for final dose).	
Measles, mumps, rubella <sup>8</sup>	12 months	4 weeks			
Varicella <sup>9</sup>	12 months	3 months			
Hepatitis A <sup>10</sup>	12 months	6 months			
Meningococcal <sup>11</sup> (Hib-MenCY ≥6 weeks; MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)	6 weeks	8 weeks <sup>11</sup>	See footnote 11	See footnote 11	
Children and adolescents age 7 through 18 years					
Meningococcal <sup>11</sup> (Hib-MenCY ≥ 6 weeks; MenACWY-D ≥9 mos; MenACWY-CRM ≥ 2 mos)	Not Applicable (N/A)	8 weeks <sup>11</sup>			
Tetanus, diphtheria; tetanus, diphtheria, and acellular pertussis <sup>12</sup>	7 years <sup>12</sup>	4 weeks	4 weeks if first dose of DTaP/DT was administered before the 1 <sup>st</sup> birthday. 6 months (as final dose) if first dose of DTaP/DT or Tdap/Td was administered at or after the 1 <sup>st</sup> birthday.	6 months if first dose of DTaP/DT was administered before the 1 <sup>st</sup> birthday.	
Human papillomavirus <sup>13</sup>	9 years				
Hepatitis A <sup>10</sup>	N/A	6 months			
Hepatitis B <sup>1</sup>	N/A	4 weeks	8 weeks and at least 16 weeks after first dose.		
Inactivated poliovirus <sup>6</sup>	N/A	4 weeks	4 weeks <sup>5</sup>	6 months <sup>6</sup>	
Measles, mumps, rubella <sup>8</sup>	N/A	4 weeks			
Varicella <sup>9</sup>	N/A	3 months if <13 years of age 4 weeks if ≥13 years of age.			

### Table 3. Vaccines that might be indicated for children and adolescents aged 18 years or younger based on medical indications United States, 2017

The recommendations must be read along with the footnotes for this section.

Vaccine	Pregnancy	Immunocomprised status (excluding HIV infection)	HIV infection CD4+ count (cells/u/L)		Men who have sex with men (MSM)	Kidney failure, end-stage renal disease, on hemodialysis	Heart disease, chronic lung disease	CSF leaks, cochlear implants	Asplenia & persistent complement component deficiencies	Chronic liver disease	Diabetes
			<15% of total CD4 cell count	≥15% of total CD4 cell count							
Hepatitis B <sup>1</sup>											
Rotavirus <sup>2</sup>		SCID*									
Diphtheria, tetanus, & acellular pertussis <sup>3</sup> (DTaP)											
<i>Haemophilus influenzae</i> type b (Hib) <sup>4</sup>											
Pneumococcal conjugate <sup>5</sup>											
Inactivated poliovirus <sup>6</sup>											
Influenza <sup>7</sup>											
Mumps, measles, rubella <sup>8</sup>											
Varicella <sup>9</sup>											
Hepatitis A <sup>10</sup>											
Meningococcal ACWY <sup>11</sup>											
Tetanus, diphtheria, & acellular pertussis <sup>12</sup> (Tdap)											
Human papillomavirus <sup>13</sup>											
Meningococcal B <sup>11</sup>											
Pneumococcal polysaccharide <sup>5</sup>											

Vaccination according to routine schedule recommended
  Recommended for persons with additional risk factor for which the vaccine would be indicated,
  Vaccination is recommended, and additional doses may be necessary based on medical condition. See Footnotes
  No recommendations
  Contraindicated
  Precaution for vaccination

with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; generalized malignancy; solid organ transplantation; or multiple myeloma.

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

Routine vaccination:

- Administer a 4-dose series of IPV at ages 2, 4, 6–18 months, and 4–6 years. The final dose in the series should be administered on or after the fourth birthday and at least 6 months after the previous dose.

Catch-up vaccination:

- In the first 6 months of life, minimum age and minimum intervals are only recommended if the person is at risk of imminent exposure to circulating poliovirus (i.e., travel to a polio-endemic region or during an outbreak).
- If 4 or more doses are administered before age 4 years, an additional dose should be administered at age 4–6 years and at least 6 months after the previous dose.
- A fourth dose is not necessary if the third dose was administered at age  $\geq 4$  years and at least 6 months after the previous dose.
- If both oral polio vaccine (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. If only OPV was administered, and all doses were given prior to age 4 years, 1 dose of IPV should be given at  $\geq 4$  years at least 4 weeks after the last OPV dose.
- IPV is not routinely recommended for U.S. residents aged  $\geq 18$  years.
- For other catch-up guidance, see Table 2.

7. Influenza vaccines. (Minimum age: 6 months for inactivated influenza vaccine [IIV], 18 years for recombinant influenza vaccine [RIV])

Routine vaccination:

- Administer influenza vaccine annually to all children beginning at age 6 months. For the 2016–17 season, use of live attenuated influenza vaccine (LAIV) is not recommended.

For children aged 6 months through 8 years:

- For the 2016–17 season, administer 2 doses (separated by at least 4 weeks) to children who are receiving influenza vaccine for the first time or who have not previously received  $\geq 2$  doses of trivalent or quadrivalent influenza vaccine before July 1, 2016. For additional guidance, follow dosing guidelines in the 2016–17 ACIP influenza vaccine recommendations (see MMWR August 26, 2016;65(5):1–54, available at [www.cdc.gov/mmwr/volumes/65/rr/pdfs/rr6505.pdf](http://www.cdc.gov/mmwr/volumes/65/rr/pdfs/rr6505.pdf)).
- For the 2017–18 season, follow dosing guidelines in the 2017–18 ACIP influenza vaccine recommendations.

For persons aged  $\geq 9$  years:

- Administer 1 dose.

8. Measles, mumps, and rubella (MMR) vaccine. (Minimum age: 12 months for routine vaccination)

Routine vaccination:

- Administer a 2-dose series of MMR vaccine at ages 12–15 months and 4–6 years. The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose.
- Administer 1 dose of MMR vaccine to infants aged 6–11 months before departure from the United States for international travel. These children should be revaccinated with 2 doses of MMR vaccine, the first at age 12–15 months (12 months if the child remains in an area where disease risk is high), and the second dose at least 4 weeks later.
- Administer 2 doses of MMR vaccine to children aged  $\geq 12$  months before departure from the United States for international travel. The first dose should be administered at age  $\geq 12$  months and the second dose at least 4 weeks later.

Catch-up vaccination:

- Ensure that all school-aged children and adolescents have had 2 doses of MMR vaccine; the minimum interval between the 2 doses is 4 weeks.

9. Varicella (VAR) vaccine. (Minimum age: 12 months)

Routine vaccination:

- Administer a 2-dose series of VAR vaccine at ages 12–15 months and 4–6 years. The second dose may be administered before age 4 years, provided at least 3 months have elapsed since the first dose. If the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid.

Catch-up vaccination:

- Ensure that all persons aged 7–18 years without evidence of immunity (see MMWR 2007;56[No. RR-4], available at [www.cdc.gov/mmwr/pdf/rr/rr5604.pdf](http://www.cdc.gov/mmwr/pdf/rr/rr5604.pdf)) have 2 doses of varicella vaccine. For children aged 7–12 years, the recommended minimum interval between doses is 3 months (if the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid); for persons aged  $\geq 13$  years, the minimum interval between doses is 4 weeks.

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

Routine vaccination:

- Initiate the 2-dose HepA vaccine series at ages 12–23 months; separate the 2 doses by 6 to 18 months.
- Children who have received 1 dose of HepA vaccine before age 24 months should receive a second dose 6 to 18 months after the first dose.
- For any person aged  $\geq 2$  years who has not already received the HepA vaccine series, 2 doses of HepA vaccine separated by 6 to 18 months may be administered if immunity against hepatitis A virus infection is desired.

Catch-up vaccination:

- The minimum interval between the 2 doses is 6 months.

Special populations:

- Administer 2 doses of HepA vaccine at least 6 months apart to previously unvaccinated persons who live in areas where vaccination programs target older children, or who are at increased risk for infection. This includes persons traveling to or working in countries that have high or intermediate endemicity of infection; men having sex with men; users of injection and non-injection illicit drugs; persons who work with HAV-infected primates or with HAV in a research laboratory; persons with clotting-factor disorders; persons with chronic liver disease; and persons who anticipate close, personal contact (e.g., household or regular babysitting) with an international adoptee during the first 60 days after arrival in the United States from a country with high or intermediate endemicity. The first dose should be administered as soon as the adoption is planned, ideally, 2 or more weeks before the arrival of the adoptee

11. Meningococcal vaccines. (Minimum age: 6 weeks for Hib-MenCY [MenHibrix], 2 months for Men-ACWY-CRM [Menveo], 9 months for MenACWY-D [Menactra], 10 years for serogroup B meningococcal [MenB] vaccines: MenB-4C [Bexsero] and MenB-FHbp [Trumenba])

Routine vaccination:

- Administer a single dose of Menactra or Menveo vaccine at age 11–12 years, with a booster dose at age 16 years.
- For children aged 2 months through 18 years with high-risk conditions, see “Meningococcal conjugate ACWY vaccination of persons with high-risk conditions and other persons at increased risk” and “Meningococcal B vaccination of persons with high-risk conditions and other persons at increased risk of disease” below.

Catch-up vaccination:

- Administer Menactra or Menveo vaccine at age 13–18 years if not previously vaccinated.
- If the first dose is administered at age 13–15 years, a booster dose should be administered at age 16–18 years, with a minimum interval of at least 8 weeks between doses.
- If the first dose is administered at age  $\geq 16$  years, a booster dose is not needed.
- For other catch-up guidance, see Table 2.

Clinical discretion:

- Young adults aged 16–23 years (preferred age range is 16–18 years) who are not at increased risk for meningococcal disease may be vaccinated with a 2-dose series of either Bexsero (0,  $\geq 1$  month) or Trumenba (0, 6 months) vaccine to provide short-term protection against most strains of serogroup B meningococcal disease. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses.
- If the second dose of Trumenba is given at an interval of  $< 6$  months, a third dose should be given at least 6 months after the first dose; the minimum interval between the second and third doses is 4 weeks.

Meningococcal conjugate ACWY vaccination of persons with high-risk conditions and other persons at increased risk: Children with anatomic or functional asplenia (including sickle cell disease), children with HIV infection, or children with persistent complement component deficiency (includes persons with inherited or chronic deficiencies in C3, C5-9, properdin, factor D, factor H, or taking eculizumab [Soliris]):

- Menveo
  - Children who initiate vaccination at 8 weeks. Administer doses at ages 2, 4, 6, and 12 months.
  - Unvaccinated children who initiate vaccination at 7–23 months. Administer 2 primary doses, with the second dose at least 12 weeks after the first dose AND after the first birthday.
  - Children  $\geq 24$  months and older who have not received a complete series. Administer 2 primary doses at least 8 weeks apart
- MenHibrix
  - Children who initiate vaccination at 6 weeks. Administer doses at ages 2, 4, 6, and 12–15 months.
  - If the first dose of MenHibrix is given at or after age 12 months, a total of 2 doses should be given at least 8 weeks apart to ensure protection against serogroups C and Y meningococcal disease.
- Menactra
  - Children with anatomic or functional asplenia or HIV infection
    - Children  $\geq 24$  months who have not received a complete series. Administer 2 primary doses at least 8 weeks apart. If Menactra is administered to a child with asplenia (including sickle cell disease) or HIV infection, do not administer Menactra until age 2 years and at least 4 weeks after the completion of all PCV13 doses.

- Children with persistent complement component deficiency
  - o *Children 9–23 months.* Administer 2 primary doses at least 12 weeks apart.
  - o *Children ≥24 months who have not received a complete series.* Administer 2 primary doses at least 8 weeks apart.
- All high-risk children
  - o If Menactra is to be administered to a child at high risk for meningococcal disease, it is recommended that Menactra be given either before or at the same time as DTaP.

Meningococcal B vaccination of persons with high-risk conditions and other persons at increased risk of disease: Children with anatomic or functional asplenia (including sickle cell disease) or children with persistent complement component deficiency (includes persons with inherited or chronic deficiencies in C3, C5-9, properdin, factor D, factor H, or taking eculizumab [Soliris]):

- Bexsero or Trumenba
  - *Persons ≥10 years who have not received a complete series.* Administer a 2-dose series of Bexsero, with doses at least 1 month apart, or a 3-dose series of Trumenba, with the second dose at least 1–2 months after the first and the third dose at least 6 months after the first. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses.

For children who travel to or reside in countries in which meningococcal disease is hyperendemic or epidemic, including countries in the African meningitis belt or the Hajj:

- Administer an age-appropriate formulation and series of Menactra or Menveo for protection against serogroups A and W meningococcal disease. Prior receipt of MenHibrix is not sufficient for children traveling to the meningitis belt or the Hajj because it does not contain serogroups A or W.

For children at risk during an outbreak attributable to a vaccine serogroup:

- *For serogroup A, C, W, or Y:* Administer or complete an age- and formulation-appropriate series of MenHibrix, Menactra, or Menveo.
- *For serogroup B:* Administer a 2-dose series of Bexsero, with doses at least 1 month apart, or a 3-dose series of Trumenba, with the second dose at least 1–2 months after the first and the third dose at least 6 months after the first. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses.

For MenACWY booster doses among persons with high-risk conditions, refer to MMWR 2013;62(RR02):1–22, at [www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a1.htm), MMWR June 20, 2014 / 63(24):527–30, at [www.cdc.gov/mmwr/pdf/wk/mm6324.pdf](http://www.cdc.gov/mmwr/pdf/wk/mm6324.pdf), and MMWR November 4, 2016 / 65(43):1189–94, at [www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6543a3.pdf](http://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6543a3.pdf).

For other catch-up recommendations for these persons and complete information on use of meningococcal vaccines, including guidance related to vaccination of persons at increased risk of infection, see meningococcal MMWR publications, available at: [www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html](http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html).

## 12. Tetanus and diphtheria toxoids and acellular pertussis (Tdap) vaccine. (Minimum age: 10 years for both Boostrix and Adacel)

Routine vaccination:

- Administer 1 dose of Tdap vaccine to all adolescents aged 11–12 years.
- Tdap may be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine.
- Administer 1 dose of Tdap vaccine to pregnant adolescents during each pregnancy (preferably during the early part of gestational weeks 27–36), regardless of time since prior Td or Tdap vaccination.

Catch-up vaccination:

- Persons aged ≥7 years who are not fully immunized with DTaP vaccine should receive Tdap vaccine as 1 dose (preferably the first) in the catch-up series; if additional doses are needed, use Td vaccine. For children 7–10 years who receive a dose of Tdap as part of the catch-up series, an adolescent Tdap vaccine dose at age 11–12 years may be administered.
- Persons aged 11–18 years who have not received Tdap vaccine should receive a dose, followed by tetanus and diphtheria toxoids (Td) booster doses every 10 years thereafter.

Inadvertent doses of DTaP vaccine:

- If administered inadvertently to a child aged 7–10 years, the dose may count as part of the catch-up series. This dose may count as the adolescent Tdap dose, or the child may receive a Tdap booster dose at age 11–12 years.
- If administered inadvertently to an adolescent aged 11–18 years, the dose should be counted as the adolescent Tdap booster.

For other catch-up guidance, see Table 2.

## 13. Human papillomavirus (HPV) vaccines. (Minimum age: 9 years for 4vHPV [Gardasil] and 9vHPV [Gardasil 9])

Routine and catch-up vaccination:

- Administer a 2-dose series of HPV vaccine on a schedule of 0, 6–12 months to all adolescents aged 11 or 12 years. The vaccination series can start at age 9 years.

- Administer HPV vaccine to all adolescents through age 18 years who were not previously adequately vaccinated. The number of recommended doses is based on age at administration of the first dose.
- For persons initiating vaccination before age 15, the recommended immunization schedule is 2 doses of HPV vaccine at 0, 6–12 months.
- For persons initiating vaccination at age  $\geq 15$  years, the recommended immunization schedule is 3 doses of HPV vaccine at 0, 1–2, 6 months.
- A vaccine dose administered at a shorter interval should be readministered at the recommended interval.
  - In a 2-dose schedule of HPV vaccine, the minimum interval is 5 months between the first and second dose. If the second dose is administered at a shorter interval, a third dose should be administered a minimum of 12 weeks after the second dose and a minimum of 5 months after the first dose.
  - In a 3-dose schedule of HPV vaccine, the minimum intervals are 4 weeks between the first and second dose, 12 weeks between the second and third dose, and 5 months between the first and third dose. If a vaccine dose is administered at a shorter interval, it should be readministered after another minimum interval has been met since the most recent dose.

#### Special populations:

- For children with history of sexual abuse or assault, administer HPV vaccine beginning at age 9 years.
- Immunocompromised persons\*, including those with human immunodeficiency virus (HIV) infection, should receive a 3-dose series at 0, 1–2, and 6 months, regardless of age at vaccine initiation.
- Note: HPV vaccination is not recommended during pregnancy, although there is no evidence that the vaccine poses harm. If a woman is found to be pregnant after initiating the vaccination series, no intervention is needed; the remaining vaccine doses should be delayed until after the pregnancy. Pregnancy testing is not needed before HPV vaccination.

\*See MMWR December 16, 2016;65(49):1405–8, available at [www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6549a5.pdf](http://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6549a5.pdf).

## Footnotes

For further guidance on the use of the vaccines mentioned below and older, see the Adult Immunization Schedule.

### Additional information

- For information on contraindications and precautions for the use of a vaccine and for additional information regarding that vaccine, vaccination providers should consult the ACIP General Recommendations on Immunization and the relevant ACIP statement, available online at [www.cdc.gov/vaccines/hcp/acip-recs/index.html](http://www.cdc.gov/vaccines/hcp/acip-recs/index.html).
- For purposes of calculating intervals between doses, 4 weeks = 28 days. Intervals of 4 months or greater are determined by calendar months.
- Vaccine doses administered  $\leq 4$  days before the minimum interval are considered valid. Doses of any vaccine administered  $\geq 5$  days earlier than the minimum interval or minimum age should not be counted as valid doses and should be repeated as age-appropriate. The repeat dose should be spaced after the invalid dose by the recommended minimum interval. For further details, see Table 1, Recommended and minimum ages and intervals between vaccine doses, in MMWR, General Recommendations on Immunization and Reports / Vol. 60 / No. 2, available online at [www.cdc.gov/mmwr/pdf/rr/rr6002.pdf](http://www.cdc.gov/mmwr/pdf/rr/rr6002.pdf).
- Information on travel vaccine requirements and recommendations is available at [wwwnc.cdc.gov/travel/](http://wwwnc.cdc.gov/travel/).
- For vaccination of persons with primary and secondary immunodeficiencies, see Table 13, Vaccination of persons with primary and secondary immunodeficiencies, in General Recommendations on Immunization (ACIP), available at [www.cdc.gov/mmwr/pdf/rr/rr6002.pdf](http://www.cdc.gov/mmwr/pdf/rr/rr6002.pdf); and Immunization in Special Clinical Circumstances, (American Academy of Pediatrics). In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book: 2015 report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015:68–107.
- The National Vaccine Injury Compensation Program (VICP) is a no-fault alternative to the traditional legal system for resolving vaccine injury petitions. Created by the National Childhood Vaccine Injury Act of 1986, it provides compensation to people found to be injured by certain vaccines. All vaccines within the recommended childhood immunization schedule are covered by VICP except for pneumococcal polysaccharide vaccine (PPSV23). For more information; see [www.hrsa.gov/vaccinecompensation/index.html](http://www.hrsa.gov/vaccinecompensation/index.html).

## References

1. Candice L. Robinson CL, Romero J. R., Kempe A, Pellegrini C, ACIP Child/Adolescent Immunization Work Group. Advisory Committee on Immunization Practices recommended immunization schedule for children and adolescents aged 18 years or younger—United States, 2017. MMWR 2017; 66:134–5 Morbidity and Mortality Weekly Report (pp. 1-3). Atlanta: CDC. Available at: [www.cdc.gov/mmwr/volumes/66/wr/pdfs/mm6605e1.pdf](http://www.cdc.gov/mmwr/volumes/66/wr/pdfs/mm6605e1.pdf). Accessed 12 Apr 2017.

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