

VACCINATION SCHEDULE: HIV-INFECTED CHILDREN 7–18 YEARS OF AGE (Part 1 of 2)

This schedule summarizes recommendations for routine administration of vaccines for HIV-infected children and adolescents aged 7–18 yrs and indicates the recommended ages for administration of commercially available vaccines. Licensed combination vaccines may be used whenever a component of the combination is indicated and other components of the vaccine are not contraindicated and if approved by the FDA for that dose of the series, unless otherwise specified. 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 www.vaers.hhs.gov or call (800) 822-7967.

Vaccine	Range of recommended ages for vaccination		Certain high-risk groups		Catch-up immunization	
	Age	7–10 yrs	11–12 yrs	13–14 yrs	15 yrs	16–18 yrs
Diphtheria, Tetanus, Pertussis ¹	see footnote 1		Tdap		Tdap	
Human Papillomavirus ²	see footnote 2		HPV (3 doses)		HPV Series	
Meningococcal ³		MCV				
Influenza ⁴		IIV (Yearly)				
Pneumococcal ⁵		PCV13 or PPSV23				
Hepatitis A ⁶		Hep A Series				
Hepatitis B ⁷		Hep B Series				
Inactivated Poliovirus ⁸		IPV Series				
Measles, Mumps, Rubella ⁹		MMR Series				
		Do not administer to severely immunosuppressed children or adolescents				
Varicella ¹⁰		Varicella Series				
		Do not administer to severely immunosuppressed children or adolescents				

1. Tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap)

(Minimum age: 10yrs for Boostrix and Adacel)

- Give 1 dose of Tdap vaccine at aged 11–12yrs.
- Individuals aged ≥7yrs who are not fully immunized with DTaP should receive 1 dose of Tdap. Refer to the catch-up schedule if additional doses of tetanus and diphtheria toxoid-containing vaccine are needed.
- Individuals aged 11–18yrs who have not received Tdap should receive a dose followed by Tetanus Diphtheria (Td) booster doses every 10yrs thereafter.
- Tdap can be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine

2. Human papillomavirus vaccine (HPV)

(Minimum age: 9yrs for 4vHPV [Gardasil] and 9vHPV [Gardasil 9])

- Give a 3-dose series of HPV vaccine at 0, 1–2, 6mos to HIV-infected adolescents aged 11–12yrs. The vaccination series can start at age 9yrs.
- Minimum intervals are 4wks between 1st and 2nd dose, 12wks between 2nd and 3rd dose, and 5mos between 1st and 3rd dose. If dose given at a shorter interval, it should be readministered after another minimum interval has been met since the most recent dose.
- Administer the series at ages 13–18yrs if not previously vaccinated.

3. Meningococcal vaccine

(meningococcal conjugate vaccine [MCV4]: Hib–MenCY [MenHibrix], MenACWY–CRM [Menveo], MenACWY–D [Menactra]; serogroup B meningococcal [MenB] vaccines: MenB-4C [Bexsero] and MenB-FHbp [Trumenba])

- Unvaccinated children 7–18yrs with HIV who have not receive a complete series of meningococcal conjugate ACWY vaccines should get 2 primary doses at least 8wks apart.
- Administer MenB vaccine in persons with an additional risk factor for which the vaccine would be indicated.

4. Influenza vaccine

(inactivated influenza vaccine [IIV])

- Administer annually to HIV-infected children and adolescents. Either trivalent or quadrivalent IIV can be used. Recombinant influenza vaccine [RIV] may be used in patients ≥18yrs.
- Administer 2 doses (separated by at least 4wks) to children aged younger than 9yrs who are receiving influenza vaccine for the first time or based on previous influenza vaccine history, per current influenza vaccine recommendations.

5. Pneumococcal vaccine

(pneumococcal conjugate vaccine [PCV13]; pneumococcal polysaccharide vaccine [PPSV23])

- Give 1 dose of PCV13 followed by 1 dose of PPSV23 at least 8wks later in HIV-infected children aged 6–18yrs who did not previously receive a dose of PCV13 or PPSV23 before age 6yrs.
- If PCV13 has been received previously but PPSV23 has not, give 1 dose of PPSV23 at least 8wks after the most recent PCV13 dose. If PPSV23 has been received but PCV13 has not, give 1 dose of PCV13 at least 8wks after the most recent PPSV23 dose.
- A single revaccination with PPSV23 should be given 5yrs after the first dose.

6. Hepatitis A vaccine (Hep A)

- Hep A is recommended for children >23mos who live in areas where vaccination programs target older children, who are at increased risk of infection, or for whom immunity against Hepatitis A is desired. See *MMWR* 2006;55(No. RR-7).

7. Hepatitis B vaccine (Hep B)

- Administer the 3-dose series to those who were not previously vaccinated.
- Post-vaccination testing is recommended for HIV-infected individuals. Testing should be performed 1–2mos after administration of the final dose. Persons found to have anti-HBs levels <10 mIU/mL after the primary series should be revaccinated.

(continued)

7. Hepatitis B vaccine (Hep B) (continued)

Administration of 3 doses on an appropriate schedule, followed by anti-HBs testing 1–2mos after the third dose, is usually more practical than serologic testing after 1 or 2 doses of vaccine. Modified dosing regimens, including doubling of the standard antigen dose, may increase response rates. However, data are limited on response to these alternative vaccination schedules.

- In HIV-infected individuals, the need for booster doses has not been determined. Annual anti-HBs testing and booster doses when anti-HBs levels decline to <10 mIU/mL should be considered in individuals with ongoing risk of exposure. See *MMWR* 2005;54(No. RR-16).

8. Inactivated poliovirus vaccine (IPV)

- The final dose in the series should be administered on or after the fourth birthday and at least 6mos after the previous dose.
- A fourth dose is not necessary if the third dose was administered at age ≥ 4 yrs and ≥ 6 mos after the previous dose.
- If both OPV and IPV were administered as part of a series, a total of 4 doses should be administered, regardless of a child's current age.

9. Measles, mumps, and rubella vaccine (MMR)

- If eligible and not previously vaccinated, administer 2 doses with the second dose at least 28 days after the first dose, or administer the second dose for those who received only 1 dose, with at least 28 days between doses.
- Two doses of MMR vaccine are recommended for all HIV-infected individuals aged ≥ 12 mos who do not have evidence of current severe immunosuppression (i.e., individuals aged > 5 yrs must have CD4 T lymphocyte [CD4] percentages $\geq 15\%$ and CD4 ≥ 200 lymphocytes/mm³ for ≥ 6 mos) or other current evidence of measles, rubella, and mumps immunity. In cases when only CD4 counts or only CD4 percentages are available for those > 5 yrs, assessment of severe immunosuppression can be based on the CD4 values (count or percentage) that are available.
- Individuals with perinatal HIV infection who were vaccinated prior to establishment of effective combination antiretroviral therapy (cART) should receive two appropriately spaced doses of MMR vaccine once effective cART has been established

(individuals aged > 5 yrs: must have CD4 percentages $\geq 15\%$ and CD4 ≥ 200 lymphocytes/mm³ for ≥ 6 mos) unless they have other acceptable current evidence of measles, rubella, and mumps immunity.

10. Varicella vaccine

- Limited data are available on safety and immunogenicity of varicella vaccine in HIV-infected children 1–8 yrs old in CDC immunologic categories 1 and 2 (CD4+ percentages $\geq 15\%$) and clinical categories N, A, and B. Varicella vaccine should be considered for HIV-infected children aged 1–8 yrs with CD4 percentages $\geq 15\%$. Eligible children should receive 2 doses at least 3mos apart.
- Data are lacking on use of varicella vaccine in HIV-infected children > 8 yrs old. However, on the basis of expert opinion, the safety of varicella vaccine in HIV-infected individuals > 8 yrs with similar levels of immune function (CD4+ age-specific percentages $\geq 15\%$ or count ≥ 200 cells/mm³) is likely to be similar to that for children aged ≤ 8 yrs. Immunogenicity may be lower in HIV-infected adolescents (and adults). However, weighing the risk of severe disease from wild varicella zoster virus and the potential benefit of vaccination, vaccination (2 doses administered 3mos apart) can be considered for children and adolescents 9–18 yrs old who lack evidence of immunity.
- Varicella vaccine is not recommended for HIV-infected children or adolescents who have evidence of severe immunosuppression (CD4+ percentage $< 15\%$ at any age; for those > 5 yrs old, CD4 count < 200 cells/mm³).
- MMRV vaccine has not been studied in HIV-infected children and should not be substituted for single-antigen varicella vaccine.
- For evidence of immunity guidance and other details, see *MMWR* 2007;56(No. RR-4).

Note: Haemophilus influenzae type b conjugate vaccine (Hib)

- Hib conjugate vaccines are available in single- or combined-antigen preparations. Hib is recommended routinely for all children through age 59mos. In HIV-infected children ≥ 5 yrs who have not received a primary series and booster dose or at least 1 dose of Hib after 14mos of age, 1 dose of Hib vaccine should be given.

REFERENCES

Guidelines for Prevention and Treatment of Opportunistic Infections among HIV-Exposed and HIV-Infected Children. November 2013. Available at: http://aidsinfo.nih.gov/contentfiles/lvguidelines/oi_guidelines_pediatrics.pdf
 Advisory Committee on Immunization Practices (ACIP). Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger — United States, 2017. <https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html>. (Rev. 9/2017)