

RECOMMENDATIONS FOR USE OF SPECIFIC VACCINES IN INDIVIDUALS WITH HIV INFECTION

The vaccination of HIV-infected individuals is complicated by the fact that the immune response to vaccines may be inadequate. Furthermore, there is a risk that some live vaccines may themselves cause progressive infection. The degree of immunodeficiency induced by HIV varies from insignificant to profound, and this range should be taken into account when considering a schedule of vaccination, as should the risk of acquisition of the infection one is trying to prevent. Although it may be logical to give higher or more frequent doses of vaccines to these patients, in most cases, there are insufficient data to advocate such measures. Children with perinatally-acquired HIV differ substantially from adults, as immunisation and first-exposure to vaccine antigens occurs after HIV infection in these patients. For adults, most vaccines are inducing a secondary immune response. HIV-infected individuals of any age who are well-controlled on HAART (undetected or low viral loads with good preservation of CD4+ T cell counts) are likely to respond well to vaccines.

Diphtheria-Pertussis-Tetanus (DPT) Vaccines: Use the standard schedule.

Haemophilus influenzae Type B (Hib) Vaccine: Use the standard schedule.

Poliomyelitis Vaccines: Due to the theoretical risk of the oral polio vaccine (OPV)'s neurotropic effect on immunocompromised persons, the inactivated polio vaccine (IPV) is preferred for all HIV-positive individuals and their household contacts. OPV has been given to HIV-positive children without adverse effects, but faecal excretion may be prolonged. If OPV is given, family or household contacts should take extra care with handwashing after changing the nappies of a vaccinated child or providing toilet care.

Measles-Mumps-Rubella (MMR) Vaccine: Unless they are severely immunosuppressed, MMR should be routinely administered to HIV-infected children at age twelve months. Table 1 shows age-specific definitions of severe immunosuppression. Measles may cause severe disease in HIV-infected children; severely immunocompromised children who are exposed to measles should therefore be given normal immunoglobulin (in a dose of 0.5 mL/kg), regardless of their vaccination status.

Table 1: Age-Specific CD4+ T Cell Counts Indicating Severe Immunosuppression in HIV Infection*

Age	<12 Months	1-5 Years	>6 Years
CD4+ T Cell Count	<750	<500	<200
	(0.75X10 ⁹ /l)	(0-50X10 ⁹ /l)	(0.20X10 ⁹ /l)

Pneumococcal Vaccine: Pneumococcal disease, both respiratory and invasive, is a frequent cause of morbidity in HIV-infected children and adults. Pneumococcal polysaccharide vaccine is recommended for all HIV-infected patients age two years or older, although there is limited evidence of efficacy in this group.

VZV Vaccine: VZV vaccine should be given only to asymptomatic, non-immunosuppressed children. Eligible children should receive two doses of vaccine with at least a three-month interval between doses. The first dose may be given as early as age twelve months. Varicella zoster immunoglobulin (ZIG or VZIG) should be offered to HIV-positive individuals who have been infected with clinical chickenpox or who can be shown to be non-immune following exposure to chickenpox or shingles. ZIG should be given within seventy-two hours of exposure but may still have some protective effects if administered up to seven days later.

Influenza Vaccine: Because of potential morbidity from influenza, annual vaccination is advisable in

* Australian Government, Dept. of Health and Ageing. *The Australian Immunisation Handbook*. 7th ed. 2000. Available at <<http://immunise.health.gov.au/handbook.htm>>. Last accessed 2004.

symptomatic HIV-infected adults and children because benefit is likely to exceed risk.

BCG Vaccine: BCG must not be given to HIV-infected children or adults due to the risk of disseminated BCG infection. Hence, BCG should not be administered to infants born to HIV-infected mothers shortly after birth. BCG can be administered once HIV infection has been ruled out in the infant.

HBV Vaccine: Recombinant HBV vaccines are safe to use, but the immunological response may be poor. HIV-positive individuals may have to receive twice the normal dosage (e.g. double the normal volume of vaccine on three occasions or a standard dose of the increased strength dialysis formulation of vaccine on three occasions). A patient's antibody level should be measured at the completion of the vaccination schedule. The indications for the use of HBV vaccine are the same as for non-HIV infected individuals. A proportion of HIV-positive MSM may already have been exposed to HBV.

HAV Vaccine: The use of HAV vaccine in HIV-infected individuals has not been evaluated, but there is no reason to believe that the vaccine would pose a risk. It should be given if indicated.

Vaccinations for Travel: Live attenuated typhoid or yellow fever vaccines should not be given to HIV-infected individuals. Meningococcal, typhoid, and rabies vaccines are safe and can be used for the usual indications.

Table 2: Recommended Immunisation Schedule for HIV-Infected Children^a

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.
↓ Recommendations for these vaccines are the same as those for immunocompetent children. ↓												
Hepatitis B ¹	Hep B #1											
		Hep B #2		Hep B #3							Hep B	
Diphtheria and tetanus toxoids, pertussis ²			DTP or DTaP	DTP or DTaP	DTP or DTaP		DTaP			DTP or DTaP	Td	
<i>Haemophilus influenzae</i> type b ³			Hib	Hib	Hib	Hib*						
Inactivated polio ⁴			IPV	IPV	IPV					IPV		
Hepatitis A ⁵									Hep A in selected areas			
↓ Recommendations for these vaccines differ from those for immunocompetent children. ↓												
<i>Pneumococcus</i> ⁶			PCV	PCV	PCV	PCV			PPV23	PPV23 (age 5-7 yrs)		
MMR ⁷	Do not give to severely immunosuppressed (Category 3) children. Give only to asymptomatic non-immunosuppressed (Category 1) children. Contra-indicated in all other HIV-infected children.									MMR	MMR	
Varicella ⁸									Var	Var		
Influenza ⁹					A dose is recommended every year.							



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.

*Fourth dose of Hib is not mandatory.

These Caribbean guidelines for immunisation in HIV-infected and -exposed infants and children primarily reflect the immunisation schedule in the United States, with some modifications made to reflect the WHO/PAHO/CAREC Expanded Programme on Immunisations (EPI) schedule. This document can therefore be reasonably construed to represent the maximum standard of care. Licensed combination vaccines may be used whenever any components of the combination are indicated and the vaccine's other components are not contra-indicated. Providers should consult the manufacturer's package inserts for detailed recommendations.

¹In countries that use the pentavalent-combination vaccine (DPT/Hep B/Hib), four doses of HBV vaccine are administered (along with the DPT and Hib doses). Infants born to hepatitis B surface antigen (HBsAg)-negative mothers should receive the first dose of HBV vaccine soon after birth and before hospital discharge but no later than age two months. Only monovalent HBV can be used for the birth dose. The second dose should be administered at least one month after the first dose, except for combination vaccines that cannot be administered before age six weeks. The third dose should be administered at least four months after the first dose and at least two months after the second dose, but not before age six months. Infants born to HBsAg-positive mothers should receive HBV vaccine and 0.5 mL hepatitis B immune globulin (HBIG) within twelve hours of birth at separate sites. The second dose is recommended at age one to two months and the third dose at age six months. These infants should be tested for HBsAg and antibody to HBsAg (anti-HBs) at age nine to fifteen months. Infants born to mothers whose HBsAg status is unknown should receive the HBV vaccine within twelve 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 one week). All children and adolescents (through age eighteen years) who have not been immunised against HBV should begin the series during any visit. Providers should make special efforts to immunise children who were born in or whose parents were born in areas of the Caribbean where HBV infection is moderately or highly endemic.

²The fourth dose of diphtheria and tetanus toxoids and whole-cell or acellular pertussis vaccine (DTP or DTaP) may be administered as early as age twelve months, provided that six months have elapsed since the third dose and the child is unlikely to return at age fifteen to eighteen months. Tetanus and diphtheria toxoids (Td) is recommended at age eleven to twelve years if at least five years have elapsed since the last dose of DTP, DTaP, or Td. Subsequent routine Td boosters are recommended every ten years.

³Many countries use the pentavalent-combination vaccine (DPT/HepB/Hib).

⁴**If available, all infants and children should get IPV.** All children should receive four doses of IPV at age two months, age four months, between ages six and eighteen months, and between ages four and six years. In areas where IPV is not available, WHO/UNICEF recommend OPV for children with asymptomatic HIV infection. Due to the theoretical risk of OPV's neurotropic effect on immunocompromised persons, IPV is preferred for all HIV-positive individuals and their household contacts. OPV has been given to HIV-positive children without adverse effects, but faecal excretion may be prolonged. If OPV is given, family or household contacts should take extra care with handwashing after changing the nappies of a vaccinated child or after providing toilet care.

⁵HAV vaccine is recommended for certain high-risk groups such as those with HBV or hepatitis C infection. Information is available from local public health authorities.

⁶The heptavalent pneumococcal conjugate vaccine (PCV) is recommended for all children age two to fifty-nine months with HIV. Children age two years and older should also receive the 23-valent pneumococcal polysaccharide vaccine; a single revaccination with the 23-valent vaccine should be offered to children after age three to five years.

⁷MMR should not be administered to severely immunocompromised (Category 3) children. HIV-infected children without severe immunosuppression would routinely receive their first dose of MMR as soon as possible after reaching their first birthday. Consideration should be given to administering the second dose of MMR as soon as one month (e.g. a minimum of twenty-eight days) after the first dose rather than waiting until school entry. An alternative immunisation schedule per WHO recommendation is to give standard measles vaccine at age six months with a second dose as soon after age nine months as possible. Measles may cause severe disease in HIV-infected children. Severely immunocompromised children who are exposed to measles should therefore be given normal immunoglobulin (in a dose of 0.5 mL/kg), regardless of their vaccination status.

⁸VZV vaccine should be given only to asymptomatic, non-immunosuppressed children. Eligible children should receive two doses of vaccine with at least a three-month interval between doses. The first dose may be given as early as age twelve months. ZIG should be offered to HIV-positive individuals who have been infected with clinical

chickenpox or who can be shown to be non-immune following exposure to chickenpox or shingles. ZIG should be given within seventy-two hours of exposure but may still have some protective effects if administered up to seven days later.

⁹Inactivated split influenza virus vaccine should be administered to all HIV-infected children age six months each year. For children age six months to less than nine years who are receiving influenza vaccine for the first time, two doses given one month apart are recommended.