

VI. RECOMMENDATIONS FOR ADULT AND PAEDIATRIC OPPORTUNISTIC INFECTION (OI) PROPHYLAXIS¹

TABLE OF CONTENTS

INTRODUCTION	VI-1
PROPHYLAXIS TO PREVENT FIRST EPISODE OF OPPORTUNISTIC DISEASE IN ADULTS AND ADOLESCENTS WITH HIV INFECTION	VI-2
Strongly Recommended as Standard of Care	VI-2
Generally Recommended as Standard of Care.....	VI-3
Evidence for Efficacy but Not Routinely Indicated.....	VI-4
PROPHYLAXIS TO PREVENT RECURRENCE OF OPPORTUNISTIC DISEASE (AFTER CHEMOTHERAPY FOR ACUTE DISEASE) IN ADULTS AND ADOLESCENTS WITH HIV INFECTION	VI-6
Recommended Only if Subsequent Episodes Are Frequent or Severe	VI-7
RECOMMENDATIONS FOR USE OF SPECIFIC VACCINES IN INDIVIDUALS WITH HIV INFECTION	VI-9
PROPHYLAXIS TO PREVENT FIRST EPISODE OF OPPORTUNISTIC DISEASE IN INFANTS AND CHILDREN WITH HIV INFECTION	VI-14
Strongly Recommended as Standard of Care.....	VI-14
Generally Recommended as Standard of Care.....	VI-15
Not Recommended for Most Children; Indicated for Use Only in Unusual Circumstances	VI-16
PROPHYLAXIS TO PREVENT RECURRENCE OF OPPORTUNISTIC DISEASE (AFTER CHEMOTHERAPY FOR ACUTE DISEASE) IN INFANTS AND CHILDREN WITH HIV INFECTION	VI-17
Recommended for Life as Standard of Care	VI-17
Recommended for Standard of Care Only if Subsequent Episodes Are Frequent or Severe.....	VI-18
CRITERIA FOR STARTING, DISCONTINUING, AND RESTARTING OI PROPHYLAXIS FOR ADULTS WITH HIV INFECTION	VI-19
RECOMMENDATIONS TO HELP PATIENTS AVOID EXPOSURE TO OR INFECTION WITH OPPORTUNISTIC PATHOGENS	VI-21
Sexual Exposures	VI-21
Injection Drug Use Exposures	VI-21
Environmental and Occupational Exposures.....	VI-21
TABLES	
Table 1: <i>Age-Specific CD4+ T Cell Counts Indicating Severe Immunosuppression in HIV Infection</i> ..	VI-9
Table 2: <i>Recommended Immunisation Schedule for HIV-Infected Children</i>	VI-11

¹ This chapter has been adapted from the 2001 United States Public Health Service/Infectious Disease Society of America's *Guidelines for Prevention of Opportunistic Infections in Persons Infected with HIV (2001)*. Accessible online at http://www.aidsinfo.nih.gov/guidelines/op_infections/OI_112801.html

VI. RECOMMENDATIONS FOR ADULT AND PAEDIATRIC OPPORTUNISTIC INFECTION (OI) PROPHYLAXIS

INTRODUCTION

HAART has reduced the incidence of OIs, substantially extended life, and should be considered for all HIV-infected persons who qualify for such therapy. Some patients, however, are not ready or able to take HAART, and others have tried HAART regimens but the therapy has failed. Such patients can still benefit from prophylaxis against OIs. Prophylaxis against specific OIs also continues to provide survival benefits among persons who are receiving HAART.

Since HAART was introduced, it has become increasingly clear that chemoprophylaxis for OIs need not necessarily be life-long because HAART can restore immune function. The period of susceptibility to opportunistic processes continues to be accurately indicated by the CD4+ T cell count for patients receiving HAART. A strategy of stopping primary or secondary prophylaxis for certain patients whose immunity has improved as a consequence of HAART is supported by clinical trials and observational data. Stopping prophylactic regimens can simplify treatment, reduce toxicity and drug interactions, lower the cost of care, and potentially facilitate adherence to HAART regimens. Specific recommendations regarding the discontinuation of prophylaxis depend on factors such as the duration of a patient's CD4+ T cell count increase, and, in the case of secondary prophylaxis, the duration of treatment of the disease's initial episode.

Although considerable data exist regarding the discontinuation of primary and secondary OI prophylaxis, essentially no data are available regarding restarting prophylaxis when the CD4+ T cell count decreases again to levels at which the patient is likely to again be at risk for an OI. For primary prophylaxis, whether to use the same threshold at which prophylaxis was stopped (derived from data in studies addressing prophylaxis discontinuation) or to use the threshold below which initial prophylaxis is recommended, is unknown. In the following guidelines, therefore, in some cases ranges are provided for restarting primary or secondary prophylaxis. For prophylaxis against *Pneumocystis jiroveci* pneumonia (PCP), the suggested threshold for restarting both primary and secondary prophylaxis is 200 cells/mm³.

For each of the nineteen diseases covered in these guidelines, specific recommendations address: a) prevention of exposure to the opportunistic pathogen; b) prevention of the first episode of disease; and c) prevention of disease recurrence. Recommendations for the prevention of OIs are presented separately for adults and children.

PROPHYLAXIS TO PREVENT FIRST EPISODE OF OPPORTUNISTIC DISEASE IN ADULTS AND ADOLESCENTS WITH HIV INFECTION

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
Strongly Recommended as Standard of Care			
<i>Pneumocystis jiroveci</i> (PCP) formerly known as <i>Pneumocystis carinii</i> ¹	CD4+ T cell count <200/mm ³ or oropharyngeal candidiasis	Trimethoprim-sulfamethoxazole (TMP-SMX), 1 double-strength (DS) tablet po q.d TMP-SMX, 1 single-strength (SS) tablet po q.d	Dapsone, 50mg po b.i.d or 100mg po q.d; dapsone, 50mg po q.d plus pyrimethamine, 50mg po q.w plus leucovorin 25mg po q.w Dapsone, 200mg po plus pyrimethamine, 75mg po plus leucovorin, 25mg po q.w Aerosolised pentamidine, 300mg q.m via Respigard II ^(TM) nebuliser Atovaquone, 1,500mg po q.d TMPSMX, 1 DS po t.i.w
<i>Mycobacterium tuberculosis</i> (TB)			
Isoniazid (INH)-sensitive ²	Tuberculin skin test (TST) reaction of ≥5 mm or prior positive TST result without treatment or contact with case of active TB regardless of TST result	INH, 300mg po plus pyridoxine, 50mg po q.d x 9 months or INH, 900mg po plus pyridoxine, 100mg po b.i.w x 9 months	Rifampin (RIF), 600mg po q.d x 4 months or rifabutin, 300mg po q.d x 4 months Pyrazinamide (PZA), 15-20mg/kg po q.d x 2 months plus either RIF, 600mg po q.d x 2 months or rifabutin, 300mg po q.d x 2 months
INH resistant	Same as above; high probability of exposure to INH-resistant TB	RIF, 600mg po or rifabutin, 300mg po q.d x 4 months	PZA 15-20mg/kg po q.d plus either RIF, 600mg po or rifabutin, 300mg po q.d x 2 months
Multi-drug (INH and RIF) resistant	Same as above; high probability of exposure to multi-drug resistant TB	Choice of drugs requires consultation with public health authorities. Depends on susceptibility of isolation from source patient	

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
<i>Toxoplasma gondii</i> ³	IgG antibody to <i>Toxoplasma</i> and CD4+ T cell count of <100/mm ³	TMP-SMX, 1 DS po q.d	TMP-SMX, 1 SS po q.d dapsone, 50mg po q.d plus pyrimethamine, 50mg po q.w plus leucovorin, 25mg po q.w Dapsone, 200mg po plus pyrimethamine, 75mg po plus leucovorin, 25mg po q w Atovaquone, 1500mg po q.d with or without pyrimethamine, 25mg po q.d plus leucovorin, 10mg po q.d
<i>Mycobacterium avium</i> Complex (MAC) ⁴	CD4+ T cell count of <50/mm ³	Azithromycin, 1,200mg po q.w or clarithromycin ⁴ , 500mg po b.i.d	Rifabutin, 300mg po q.d; azithromycin, 1,200mg po q.w plus rifabutin, 300mg po q.d
Varicella zoster Virus (VZV)	Significant exposure to chickenpox or shingles for patients who have no history of either condition or, if available, negative antibody to VZV	Varicella zoster immune globulin (VZIG), 5 vials (1.25 mL each) IM, administered ≤96 hours after exposure, ideally within 48 hours	
Generally Recommended as Standard of Care			
<i>Streptococcus pneumoniae</i> ⁵	CD4+ T cell count >200/mm ³	23-valent polysaccharide vaccine, 0.5mL IM	None
Hepatitis B Virus (HBV) ^{6,7}	All susceptible (anti-HBc-negative) patients	HBV vaccine: 3 doses	None
Influenza Virus ^{6,8}	All patients (annually, before influenza season)	Inactivated trivalent influenza virus vaccine: 1 annual dose (0.5mL) IM	Oseltamivir, 75mg po q.d (influenza A or B) Rimantadine, 100mg po b.i.d, or amantadine, 100mg po b.i.d (influenza A only)
Hepatitis A Virus (HAV) ⁷	All susceptible (anti-HAV-negative) patients at increased risk for HAV infection (e.g. illicit drug users, men who have sex with men (MSM),	HAV vaccine: 2 doses	None

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
	haemophiliacs) or with chronic liver disease, including chronic HBV or hepatitis C		
Evidence for Efficacy but Not Routinely Indicated			
Invasive Bacterial Infections	Neutropaenia	Granulocyte-colony-stimulating factor (G-CSF), 5-10 µg/kg SC q.d x 2-4 weeks or granulocyte-macrophage colony-stimulating factor (GM-CSF), 250 µg/m ² SC IV x 2-4 weeks	None
<i>Cryptococcus neoformans</i>	CD4+ T cell count of <50/mm ³	Fluconazole, 100-200mg po q.d	Itraconazole capsule, 200mg po q.d
<i>Histoplasma capsulatum</i> ⁹	CD4+ T cell count of <100/mm ³ , endemic geographic area	Itraconazole capsule, 200mg po q.d	None
Cytomegalovirus (CMV) ¹⁰	CD4+ T cell count of <50/mm ³ and CMV antibody positivity	Oral ganciclovir, 1g po t.i.d	None

NOTES: The Respigard II™ nebuliser is manufactured by Marquest, Englewood, Colorado, USA.

¹Prophylaxis should also be considered for persons with a CD4+ T cell percentage of <14%, for persons with a history of an AIDS-defining illness, and possibly for those with CD4+ T cell counts of >200 but <250 cells/mm³. TMP-SMX also reduces the frequency of toxoplasmosis and some bacterial infections. Patients receiving dapsone should be tested for glucose-6 phosphate dehydrogenase deficiency. A dosage of 50mg q.d is probably less effective than 100mg q.d. The efficacy of parenteral pentamidine (e.g. 4mg /kg/month) is uncertain. Fansidar® (sulfadoxine-pyrimethamine) is rarely used due to severe hypersensitivity reactions. Patients who are being administered therapy for toxoplasmosis with sulfadiazine-pyrimethamine are protected against PCP and do not need additional prophylaxis against PCP.

²Directly observed therapy (DOT) is recommended for INH, e.g. 900mg b.i.w; INH regimens should include pyridoxine to prevent peripheral neuropathy. If RIF or rifabutin is administered concurrently with protease inhibitors (PIs) or non-nucleoside reverse transcriptase inhibitors (NNRTIs), careful consideration should be given to potential pharmacokinetic interactions. There have been reports of fatal and severe liver injury associated with the treatment of latent TB infection in HIV-uninfected persons treated with the two-month regimen of daily RIF and PZA; therefore, it may be prudent to use regimens that do not contain PZA in HIV-infected persons whose completion of treatment can be assured (Source: CDC. Update: fatal and severe liver injuries associated with rifampin and pyrazinamide for latent tuberculosis infection and revisions in American Thoracic Society/CDC recommendations, United States 2001. MMWR Weekly [serial on the Internet] 2001 Aug 31 [cited 2004] 50(34):[about 2p.]. Available from: <<http://www.cdc.gov/mmwr>>.). Exposure to multidrug-resistant TB might require prophylaxis with two drugs; consult public health authorities. Possible regimens include PZA plus either ethambutol (EMB) or a fluoroquinolone.

³Protection against toxoplasmosis is provided by TMP-SMX, dapsone plus pyrimethamine, and possibly by atovaquone. Atovaquone may be used with or without pyrimethamine. Pyrimethamine alone probably provides little, if any, protection.

⁴See *Treatment Guidelines* for discussion of drug interactions.

*During pregnancy, azithromycin is preferred over clarithromycin due to the teratogenicity in animals of clarithromycin.

⁵Vaccination may be offered to persons who have CD4+ T cell counts of <200 cells/mm³, although the efficacy is likely to be diminished. Revaccination five years after the first dose, or sooner if the initial immunisation was given when the CD4+ T cell count was <200 cells/mm³ and the CD4+ T cell count has increased to >200 cells/mm³ on HAART, is considered optional. Some authorities are concerned that immunisations might stimulate the replication of HIV.

⁶Although data demonstrating the clinical benefit of these vaccines in HIV-infected persons are not available, it is logical to assume that those patients who develop antibody responses will derive some protection. Some authorities are concerned that immunisations might stimulate HIV replication, although for influenza vaccination, a large observational study of HIV-infected persons in clinical care showed no adverse effect of this vaccine, including multiple doses, on patient survival (Ward J, personal communication). Also, this concern may be less relevant in the setting of HAART. However, due to the theoretical concern that increases in HIV plasma RNA following vaccination during pregnancy might increase the risk of perinatal transmission of HIV, providers may wish to defer vaccination for such patients until after HAART is initiated.

⁷HBV vaccine has been recommended for all children and adolescents and for all adults with risk factors for HBV. For persons requiring vaccination against both HAV and HBV, a combination vaccine is now available.

⁸Oseltamivir is appropriate during outbreaks of either influenza A or influenza B. Rimantadine or amantadine is appropriate during outbreaks of influenza A (although neither rimantadine nor amantadine is recommended during pregnancy). Dosage reduction for antiviral chemoprophylaxis against influenza might be indicated for decreased renal or hepatic function and for persons with seizure disorders. Physicians should consult the drug package inserts for more specific information about adverse effects and dosage adjustments.

⁹In a few unusual occupational or other circumstances, prophylaxis should be considered; consult a specialist.

¹⁰Acyclovir is not protective against CMV. Valacyclovir is not recommended because of an unexplained trend toward increased mortality observed in persons with AIDS who were being administered this drug for prevention of CMV disease.

PROPHYLAXIS TO PREVENT RECURRENCE OF OPPORTUNISTIC DISEASE (AFTER CHEMOTHERAPY FOR ACUTE DISEASE) IN ADULTS AND ADOLESCENTS WITH HIV INFECTION

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
<i>Pneumocystis jirovecii</i> (PCP) (formerly known as <i>Pneumocystis carinii</i>)	Prior episode of <i>P. jirovecii</i> pneumonia (PCP)	TMP-SMX, 1 DS po q.d TMP-SMX 1 SS po q.d	Dapsone, 50mg po b.i.d or 100mg po q.d Dapsone, 50mg po q.d plus pyrimethamine, 50mg po q.w plus leucovorin, 25mg po q.w Dapsone, 200mg po plus pyrimethamine, 75mg po plus leucovorin, 25mg po q.w Aerosolised pentamidine, 300mg q.m via Respigard II™ nebuliser Atovaquone, 1,500mg po q.d TMPSMX, 1 DS po t.i.w
<i>T. gondii</i> ¹	Prior toxoplasmic encephalitis	Sulfadiazine, 500-1,000mg po q.i.d plus pyrimethamine, 25-50mg po q.d plus leucovorin, 10-25mg po q.d	Clindamycin, 300-450mg po q6-8h plus pyrimethamine, 25-50mg po q.d plus leucovorin, 10-25mg po q.d Atovaquone, 750mg po q6-12h with or without pyrimethamine, 25mg po q.d plus leucovorin, 10mg po q.d
MAC ²	Documented disseminated disease	Clarithromycin ² , 500mg po b.i.d plus ethambutol (EMB), 15mg/kg po q.d; with or without rifabutin, 300mg po q.d	Azithromycin, 500mg po q.d plus EMB, 15mg/kg po q.d; with or without rifabutin, 300mg po q.d

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
Cytomegalovirus (CMV)	Prior end-organ disease	Ganciclovir, 5-6mg /kg/day IV 5-7 days/week or 1,000mg po t.i.d Foscarnet, 90-120mg/kg IV q.d (For retinitis) ganciclovir sustained-release implant q6-9m plus ganciclovir, 1.0-1.5g po t.i.d	Cidofovir, 5mg/kg IV q.o.w with probenecid 2g po 3 hours before the dose followed by 1g po 2 hours after the dose, and 1g po 8 hours after the dose (total of 4g). Fomivirsen 1 vial (330µg) injected into the vitreous, then repeated q2-4w Valganciclovir, 900mg po q.d
<i>C. neoformans</i>	Documented disease	Fluconazole, 200mg po q.d (AI)	Amphotericin B, 0.6-1.0mg/kg IV q.w.-t.i.w Itraconazole, 200mg capsule po q.d
<i>H. capsulatum</i>	Documented disease	Itraconazole capsule, 200mg po b.i.d (AI)	Amphotericin B, 1.0mg /kg IV q.w (AI)
<i>Coccidioides immitis</i>	Documented disease	Fluconazole, 400mg po q.d (AII)	Amphotericin B, 1.0mg/kg IV q.w Itraconazole, 200mg capsule po b.i.d
<i>Salmonella</i> Species, (non-typhi) ³	Bacteraemia	Ciprofloxacin, 500mg po b.i.d for several months	Antibiotic chemoprophylaxis with another active agent
Recommended Only if Subsequent Episodes Are Frequent or Severe			
Herpes simplex Virus (HSV)	Frequent/severe recurrences	Acyclovir, 200mg po t.i.d or 400mg po b.i.d Famciclovir, 250mg po b.i.d	Valacyclovir, 500mg po b.i.d
<i>Candida</i> (oropharyngeal or vaginal)	Frequent/severe recurrences	Fluconazole, 100-200mg po q.d	Itraconazole solution, 200mg po q.d
<i>Candida</i> (oesophageal)	Frequent/severe recurrences	Fluconazole, 100-200mg po q.d	Itraconazole solution, 200mg po q.d

NOTES: The Respirgard II™ nebuliser is manufactured by Marquest, Englewood, Colorado, USA.

¹Pyrimethamine-sulfadiazine confers protection against PCP as well as toxoplasmosis; clindamycin-pyrimethamine does not offer protection against PCP.

²Many multiple-drug regimens are poorly tolerated. Drug interactions (e.g. those seen with clarithromycin and rifabutin) can be problematic; rifabutin has been associated with uveitis, especially when administered at daily doses of >300mg or concurrently with fluconazole or clarithromycin. During pregnancy, azithromycin is recommended instead of clarithromycin because clarithromycin is teratogenic in animals.

³Efficacy for eradication of *Salmonella* has been demonstrated only for ciprofloxacin.

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	MMR			
Varicella ⁸						Var	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.

PROPHYLAXIS TO PREVENT FIRST EPISODE OF OPPORTUNISTIC DISEASE IN INFANTS AND CHILDREN WITH HIV INFECTION

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
Strongly Recommended as Standard of Care			
<i>Pneumocystis jiroveci</i> (PCP) (formerly known as <i>Pneumocystis carinii</i>) ¹	<p>HIV-infected or HIV-indeterminate, infants aged 1-12 months</p> <p>HIV-infected children aged 1-5 years with CD4+ T cell count <500/mm³ or CD4+ T cell percentage <15%</p> <p>HIV-infected children aged 6-12 years with CD4+ T cell count <200/mm³, or CD4+ T cell percentage <15%</p>	<p>TMP-SMX, 150/750mg/m²/d in 2 divided doses po t.i.w on consecutive days</p> <p>Acceptable alternative dosage schedules:</p> <p>Single dose po t.i.w on consecutive days</p> <p>2 divided doses po q.d; 2 divided doses on alternate days</p>	<p>Dapsone (children aged >1 month), 2mg/kg (max 100mg) po q.d or 4g/kg (max 200mg) po q.w</p> <p>On aerosolised pentamidine (children aged ≥5 years.), 300mg q.m via Respirgard II™ nebuliser atovaquone (children aged 1-3 months and >24 months, 30mg/kg po q.d; children aged 4-24 months, 45mg/kg po q.d)</p>
<i>Mycobacterium tuberculosis</i> ²			
INH-sensitive	<p>TST reaction of ≥5mm or prior positive TST result without treatment</p> <p>Contact with any case of active TB regardless of TST result</p>	<p>INH, 10-15mg/kg (max 300mg) po q.d x 9 months</p> <p>20-30mg/kg (max 900mg) po b.i.w x 9 months</p>	RIF, 10-20mg/kg (max 600mg) po q.d x 4-6 months
INH resistant	Same as above; high probability of exposure to INH-resistant TB	RIF, 10-20mg/kg (max 600mg) po q.d x 4-6 months	Uncertain
Multi-drug (INH and RIF) resistant	Same as above; high probability of exposure to multidrug resistant TB	Choice of drugs requires consultation with public health authorities and depends on susceptibility of isolation from source patient.	
<i>Mycobacterium avium</i> Complex (MAC) ²	<p>For children aged ≥6 years, CD4+ T cell counts of <50/mm³</p> <p>Aged 2-6 years, CD4+ T cell count <75/mm³</p> <p>Aged 1-2 years, CD4+ T cell count <500/mm³</p> <p>Aged <1 year, CD4+ T cell count <750/mm³</p>	<p>Clarithromycin, 7.5mg/kg (max 500mg) po b.i.d</p> <p>Azithromycin, 20mg/kg (max 1,200mg) po q.w</p>	<p>Azithromycin, 5mg/kg (max 250mg) po q.d</p> <p>Children aged ≥6 years, rifabutin, 300mg po q.d</p>

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
<i>Varicella zoster Virus (VZV)</i> ³	Significant exposure to varicella or shingles with no history of chickenpox or shingles	VZIG, 1 vial (1.25mL)/10kg (max 5 vials) IM, administered ≤96 hours after exposure, ideally within 48 hours	None
Vaccine-Preventable Pathogens ⁴	HIV exposure/infection	Routine immunisations (see <i>Table 3</i>)	None
Generally Recommended as Standard of Care			
<i>T. gondii</i> ⁵	IgG antibody to <i>Toxoplasma</i> and severe immuno-suppression	TMP-SMX, 150/750mg/m ² /d in 2 divided doses po q.d	Dapsone (children aged ≥1 month), 2mg/kg or 15mg/m ² (max 25mg) po q.d plus pyrimethamine, 1mg/kg po q.d plus leucovorin, 5mg po every 3 days Atovaquone, (aged 1-3 months and >24 months, 30mg/kg po q.d; aged 14-24 months 45mg/kg po q.d)
<i>Varicella zoster Virus (VZV)</i>	HIV-infected children who are asymptomatic and not immunosuppressed	VZV vaccine (See <i>Vaccine-preventable pathogens</i> section of this table)	None
Influenza Virus	All patients (annually before influenza season)	Inactivated split trivalent influenza vaccine (See <i>Vaccine-preventable pathogens</i> section of this table)	Oseltamivir (during outbreaks of influenza A or B) for children aged ≥13 years, 75mg po q.d Rimantadine or amantadine (during outbreaks of influenza A); aged 1-9 years, 5mg/kg in 2 divided doses (max 150mg /day) po q.d; aged >10 years, use adult doses

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
Not Recommended for Most Children; Indicated for Use Only in Unusual Circumstances			
Invasive Bacterial Infections ⁶	Hypogammaglobulinaemia (e.g. IgG <400mg/dL)	IVIG, 400mg/kg q2-4w	None
<i>C. neoformans</i>	Severe immunosuppression	Fluconazole, 3-6mg/kg po q.d	Itraconazole, 2-5mg/kg po q12-24h
<i>H. capsulatum</i>	Severe immunosuppression, endemic geographic area	Itraconazole, 2-5mg/kg po q12-24h	None
<i>Cytomegalovirus (CMV)</i> ⁷	CMV antibody positivity and severe immunosuppression	Oral ganciclovir, 30mg/kg po t.i.d	None

NOTES: The Respirgard II™ nebuliser is manufactured by Marquest, Englewood, Colorado, USA.

¹Daily TMP-SMX reduces the frequency of some bacterial infections. TMP-SMX, dapson-pyrimethamine, and possibly atovaquone (with or without pyrimethamine) appear to protect against toxoplasmosis, although data have not been prospectively collected. When compared with weekly dapson, daily dapson is associated with lower incidence of PCP but higher haematologic toxicity and mortality (Source: McIntosh K, Cooper E, Xu J, et al. Toxicity and efficacy of daily vs. weekly dapson for prevention of Pneumocystis jiroveci pneumonia in children infected with HIV. Ped Infect Dis J 1999;18:432-9). The efficacy of parenteral pentamidine (e.g. 4mg/kg every 2-4 weeks) is controversial. Patients receiving therapy for toxoplasmosis with sulfadiazine-pyrimethamine are protected against PCP and do not need TMP-SMX.

²Significant drug interactions can occur between rifamycins (RIF and rifabutin) and PIs and NNRTIs. Consult a specialist.

³Children routinely being administered IVIG should receive VZIG if the last dose of IVIG was administered more than twenty-one days before exposure.

⁴HIV-infected and -exposed children should be immunised according to the childhood immunisation schedule in this section (See Table 2), which has been adapted from the January-December 2001 schedule recommended for immunocompetent children by the U.S. Advisory Committee on Immunisation Practices, the American Academy of Paediatrics, and the American Academy of Family Physicians. This schedule differs from that for immunocompetent children in that both the conjugate pneumococcal vaccine (PCV-7) and the pneumococcal polysaccharide vaccine (PPV-23) are recommended, and vaccination against influenza should be offered. MMR should not be administered to severely immunocompromised children. Vaccination against varicella is indicated only for asymptomatic non-immunosuppressed children. Once an HIV-exposed child is determined not to be HIV-infected, the schedule for immunocompetent children applies.

⁵Protection against toxoplasmosis is provided by the preferred anti-Pneumocystis regimens and possibly by atovaquone. Atovaquone may be used with or without pyrimethamine. Pyrimethamine alone probably provides little, if any, protection.

⁶Respiratory syncytial virus (RSV) IVIG (750mg/kg), not monoclonal RSV antibody, may be substituted for IVIG during the RSV season to provide broad anti-infective protection, if this product is available.

⁷Oral ganciclovir and perhaps valganciclovir result in reduced CMV shedding in CMV-infected children. Acyclovir is not protective against CMV.

PROPHYLAXIS TO PREVENT RECURRENCE OF OPPORTUNISTIC DISEASE (AFTER CHEMOTHERAPY FOR ACUTE DISEASE) IN INFANTS AND CHILDREN WITH HIV INFECTION

		PREVENTIVE REGIMENS	
PATHOGEN	INDICATION	FIRST CHOICE	ALTERNATIVES
Recommended for Life as Standard of Care			
<i>Pneumocystis jirovecii</i> (PCP) (formerly known as <i>Pneumocystis carinii</i>)	Prior episode of <i>P. jirovecii</i> pneumonia (PCP)	TMP-SMX, 150/750mg/m ² /day in 2 divided doses po t.i.w on consecutive days Acceptable alternative schedules for same dosage: Single dose po t.i.w on consecutive days; 2 divided doses po q.d; 2 divided doses po; t.i.w on alternate days	Dapsone (children aged ≥1 month), 2mg/kg (max 100mg) po q.d or 4mg/kg (max 200mg) po q.w Aerosolised pentamidine (children aged ≥5 years), 300mg q.m via Respirgard II™ nebuliser Atovaquone (aged 1-3 months and >24 months, 30mg/kg po q.d; aged 4-24 months, 45mg/kg po q.d)
<i>T. gondii</i> ¹	Prior toxoplasmic encephalitis	Sulfadiazine, 85-120mg/kg/d in 2-4 divided doses po q.d plus pyrimethamine, 1mg/kg or 15mg/m ² (max 25mg) po q.d plus leucovorin, 5mg po q3d	Clindamycin, 20-30mg/kg/d in 4 divided doses po q.d plus pyrimethamine, 1mg/kg po q.d plus leucovorin, 5mg po q3d
<i>Mycobacterium avium</i> Complex (MAC) ²	Prior disease	Clarithromycin, 7.5mg/kg (max 500mg) po b.i.d plus EMB, 15mg/kg (max 900mg) po q.d; with or without rifabutin, 5mg/kg (max 300mg) po q.d	Azithromycin, 5mg/kg (max 250mg) po q.d plus EMB, 15mg/kg (max 900mg) po q.d; with or without rifabutin, 5mg/kg (max 300mg) po q.d
<i>C. neoformans</i>	Documented disease	Fluconazole, 3-6mg/kg po q.d	Amphotericin B, 0.5-1.0mg/kg IV q1-3w Itraconazole, 2-5mg/kg po q12-24h
<i>H. capsulatum</i>	Documented disease	Itraconazole, 2-5mg/kg po q12-48h	Amphotericin B, 1.0mg/kg IV q.w
<i>Coccidioides immitis</i>	Documented disease	Fluconazole, 6mg/kg po q.d	Amphotericin B, 1.0mg/kg IV q.w; itraconazole, 2-5mg/kg po q12-48h
<i>Cytomegalovirus</i> (CMV)	Prior end-organ disease	Ganciclovir, 5mg/kg IV q.d; or foscarnet, 90-120mg/kg IV q.d	(For retinitis) Ganciclovir sustained-release implant q6-9m plus ganciclovir, 30mg/kg po t.i.d

PATHOGEN	INDICATION	PREVENTIVE REGIMENS	
		FIRST CHOICE	ALTERNATIVES
<i>Salmonella</i> Species (non-typhi) ³	Bacteraemia	TMP-SMX, 150/750mg/m ² in 2 divided doses po q.d for several months	Antibiotic chemoprophylaxis with another active agent
Recommended for Standard of Care Only if Subsequent Episodes Are Frequent or Severe			
Invasive Bacterial Infections ⁴	>2 infections in 1 year period	TMP-SMX 150/750mg/m ² , in 2 divided doses po q.d; or IVIG, 400mg/kg q2-4w	Antibiotic chemoprophylaxis with another active agent
<i>Herpes simplex</i> Virus (HSV)	Frequent/severe recurrences	Acyclovir, 80mg/kg/day in 3-4 divided doses po q.d	
<i>Candida</i> (oropharyngeal)	Frequent/severe recurrences	Fluconazole, 3-6mg/kg po q.d	
<i>Candida</i> (oesophageal)	Frequent/severe recurrences	Fluconazole, 3-6mg/kg po q.d	Itraconazole solution, 5mg/kg po q.d

NOTES: The Respigard II™ nebuliser is manufactured by Marquest, Englewood, Colorado, USA.

¹Only pyrimethamine plus sulfadiazine confers protection against PCP as well as toxoplasmosis. Although the clindamycin plus pyrimethamine regimen is recommended in adults, it has not been tested in children. However, these drugs are safe and are used for other infections.

²Significant drug interactions might occur between rifabutin and PIs and NNRTIs. Consult an expert.

³The drug should be determined by susceptibilities of the organism isolated. Alternatives to TMP-SMX include ampicillin, chloramphenicol, or ciprofloxacin. However, ciprofloxacin is not approved for use in persons aged less than 18 years; therefore, it should be used in children with caution and only if no alternatives exist.

⁴Antimicrobial prophylaxis should be chosen based on the microorganism and antibiotic sensitivities. TMP-SMX, if used, should be administered daily. Providers should be cautious about using antibiotics solely for this purpose because of the potential for development of drug-resistant microorganisms. IVIG might not provide additional benefit to children receiving daily TMP-SMX but may be considered for children who have recurrent bacterial infections despite TMP-SMX prophylaxis. Choice of antibiotic prophylaxis vs. IVIG should also involve consideration of adherence, ease of IV access, and cost. If IVIG is used, RSV IVIG (750mg/kg), not monoclonal RSV antibody, may be substituted for IVIG during the RSV season to provide broad anti-infective protection, if this product is available.

CRITERIA FOR STARTING, DISCONTINUING, AND RESTARTING OI PROPHYLAXIS FOR ADULTS WITH HIV INFECTION*

	Criteria for Initiating Primary Prophylaxis	Criteria for Discontinuing Primary Prophylaxis	Criteria for Restarting Primary Prophylaxis	Criteria for Initiating Secondary Prophylaxis	Criteria for Discontinuing Secondary Prophylaxis	Criteria for Restarting Secondary Prophylaxis
Opportunistic Illness						
PCP	CD4+ T cell count of <200 cells/mm ³ or oropharyngeal candidiasis	CD4+ T cell count if >200 cells/mm ³ for ≥3 months	CD4+ T cell count of <200 cells/mm ³	Prior PCP	CD4+ T cell count of >200 cells/mm ³ for ≥3 months	CD4+ T cell count of <200 cells/mm ³
Toxoplasmosis	IgG antibody to toxoplasma and CD4+ T cell count of <100 cells/mm ³	CD4+ T cell count of >200 cells/mm ³ for ≥3 months	CD4+ T cell count of <100-200 cells/mm ³	Prior toxoplasmic encephalitis	CD4+ T cell count of >200 cells/mm ³ sustained (e.g. ≥6 months) and Completed initial therapy and Asymptomatic for toxoplasmosis	CD4+ T cell count of <200 cells/mm ³
Disseminated MAC	CD4+ T cell count of <50 cells/mm ³	CD4+ T cell count of >100 cells/mm ³ for ≥3 months	CD4+ T cell count of <50-100 cells/mm ³	Documented disseminated disease	CD4+ T cell count of >100 cells/mm ³ sustained (e.g. ≥6 months) and Completed 12 months of MAC therapy and Asymptomatic for MAC	CD4+ T cell count of <100 cells/mm ³

Cryptococcosis	None	Not applicable	Not applicable	Documented disease	CD4+ T cell count of >100-200 cells/mm ³ sustained (e.g. ≥6 months) and Completed initial therapy and Asymptomatic for cryptococcosis	CD4+ T cell count of <100-200 cells/mm ³
Histoplasmosis	None	Not applicable	Not applicable	Documented disease	No criteria recommended for stopping	Not applicable
Coccidioidomycosis	None	Not applicable	Not applicable	Documented disease	No criteria recommended for stopping	Not applicable
CMV retinitis	None	Not applicable	Not applicable	Documented end-organ disease	CD4+ T cell count of >100-150 cells/mm ³ sustained (e.g. ≥6 months) and No evidence of active disease Regular ophthalmic examination	CD4+ T cell count of <100-150 cells/mm ³

RECOMMENDATIONS TO HELP PATIENTS AVOID EXPOSURE TO OR INFECTION WITH OPPORTUNISTIC PATHOGENS

SEXUAL EXPOSURES

- √ Patients should use a latex condom during every act of sexual intercourse to reduce the risk for acquiring CMV, HSV, and human papillomavirus (HPV), as well as other sexually transmitted pathogens. Condom use also will, theoretically, reduce the risk for acquiring human herpes virus-8 (HHV-8), as well as super-infection with another HIV strain. Condom use will also reduce the risk of transmission of HIV and other sexually transmitted pathogens to others. Data regarding the use and efficacy of female condoms are incomplete, but these devices should be considered as a risk-reduction strategy.
- √ Patients should avoid sexual practices that might result in oral exposure to faeces (e.g. oral-anal contact) to reduce the risk for intestinal infections (e.g. cryptosporidiosis, shigellosis, campylobacteriosis, amebiasis, giardiasis, and HAV). Latex condom use alone may not reduce the risk of acquiring these faecal-orally transmitted pathogens, especially those which have low infectious doses. Persons wishing to reduce their risk of exposure might consider using dental dams or similar barrier methods for oral-anal and oral-genital contact, changing condoms after anal intercourse, and wearing latex gloves during digital-anal contact. Frequently washing hands and genitals with warm soapy water during and after activities that may bring these body parts in contact with faeces may further reduce risk of illness.
- √ HBV immunisation is recommended for all susceptible (anti-HBc-negative) HIV-infected patients.
- √ HAV immunisation is recommended for all susceptible MSM, as well as others with indications for HAV vaccine.

INJECTION DRUG USE EXPOSURES

- √ Injection drug use is a complex behaviour that puts HIV-infected persons at risk for HBV and hepatitis C virus infection; additional, possibly drug-resistant strains of HIV; and other blood-borne pathogens. Providers should assess the individual's readiness to change this practice, and encourage efforts to provide education and support directed at recovery. Patients should be counselled to stop using injection drugs and to enter and complete substance-abuse treatment including relapse prevention programmes.
- √ If they are continuing to inject drugs, patients should be advised:
 - √ to never reuse or share syringes, needles, water, or drug preparation equipment; if, nonetheless, injection equipment that has been used by other persons is shared, to first clean the equipment with bleach and water;³
 - √ to use only sterile syringes obtained from a reliable source (e.g. pharmacies or syringe exchange programmes);
 - √ to use sterile (e.g. boiled) water to prepare drugs; if this is not possible, to use clean water from a reliable source (e.g. fresh tap water); to use a new or disinfected container ("cooker") and a new filter ("cotton") to prepare drugs;
 - √ to clean the injection site with a new alcohol swab before injection; and
 - √ to safely dispose of syringes after one use.
- √ All susceptible injection drug users should be immunised against HBV and HAV.

ENVIRONMENTAL AND OCCUPATIONAL EXPOSURES

- √ Certain activities or types of employment might increase the risk for exposure to TB. These include

³US Public Health Service. HIV prevention bulletin: medical advice for persons who inject illicit drugs. 8 May 1997. Available from: <http://www.cdc.gov/hiv/pubs/guidelines.htm>. Last accessed 2004.

volunteer work or employment in healthcare facilities, correctional institutions, and homeless shelters, as well as other settings identified as high-risk by local health authorities. Decisions about whether to continue with such activities should be made in conjunction with the healthcare provider and should be based on such factors as the patient's specific duties in the workplace, the prevalence of TB in the community, and the degree to which precautions designed to prevent the transmission of TB are taken in the workplace. These decisions will affect the frequency with which the patient should be screened for TB.

- √ Childcare providers and parents of children in childcare are at increased risk for acquiring CMV infection, cryptosporidiosis, and other infections (e.g. HAV and giardiasis) from children. The risk for acquiring infection can be diminished by good hygienic practices, such as handwashing after faecal contact (e.g. during nappy-changing) and after contact with urine or saliva. All children in childcare facilities also are at increased risk for acquiring these same infections; parents and other caretakers of HIV-infected children should be advised of this risk.
- √ Occupations involving contact with animals (e.g. veterinary work and employment in pet stores, farms, or slaughterhouses) might pose a risk for cryptosporidiosis, toxoplasmosis, salmonellosis, campylobacteriosis, or *Bartonella* infection. However, the available data are insufficient to justify a recommendation against work in such settings.
- √ Contact with young farm animals, especially animals with diarrhoea, should be avoided to reduce the risk for cryptosporidiosis.
- √ Handwashing after gardening or other contact with soil might reduce the risk for cryptosporidiosis and toxoplasmosis.
- √ In areas endemic for histoplasmosis, patients should avoid activities known to be associated with increased risk (e.g. creating dust when working with surface soil; cleaning chicken coops that are heavily contaminated with compost droppings; disturbing soil beneath bird-roosting sites; cleaning, remodelling, or demolishing old buildings; and cave exploring).
- √ In areas endemic for coccidioidomycosis, when possible, patients should avoid activities associated with increased risk, including those involving extensive exposure to disturbed native soil (e.g. at building excavation sites or during dust storms).