

Guidelines for the Prevention and Treatment of Opportunistic Infections in Children With and Exposed to HIV



Developed by the HHS Panel on Opportunistic Infections in Children With and Exposed to HIV—A Working Group of the NIH Office of AIDS Research Advisory Council (OARAC) and in collaboration with the National Institutes of Health, the HIV Medicine Association of the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the American Academy of Pediatrics

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It is emphasized that concepts relevant to HIV management evolve rapidly. The Panels have a mechanism to update recommendations on a regular basis, and the most recent information is available on the Clinicalinfo website (<https://clinicalinfo.hiv.gov/>).

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Bacterial Infections

Updated: November 21, 2024

Reviewed: November 21, 2024

Panel's Recommendations
• Status of vaccination should be reviewed at every clinical encounter and indicated vaccinations provided, according to the established recommendations for immunization of children with HIV (AIII). • Routine use of antibiotics solely for primary prevention of serious bacterial infections is not recommended (BIII). Discontinuation of antibiotic prophylaxis is recommended for children with HIV who are receiving antibiotics for the purpose of primary or secondary prophylaxis of serious bacterial infections once they have achieved sustained (≥ 3 months) immune reconstitution (CD4 T lymphocyte [CD4] cell percentage $\geq 25\%$ if < 6 years old; CD4 percentage $\geq 20\%$ and CD4 count > 350 cells/mm³ if ≥ 6 years old) (AII). • Intravenous immune globulin is recommended to prevent serious bacterial infections in children with HIV who have hypogammaglobulinemia (IgG < 400 mg/dL) (AI). • Children with HIV whose immune systems are not seriously compromised (Stages 1 and 2) and who are not neutropenic can be expected to respond the same as children without HIV and should be treated with the usual antimicrobial agents recommended for the most likely bacterial organisms (AIII). • Severely immunocompromised children with HIV and invasive or recurrent bacterial infections require expanded empiric antimicrobial treatment covering a broad range of resistant organisms (AIII). • Initial empiric therapy for children with HIV with suspected intravascular catheter sepsis should target both gram-positive and enteric gram-negative organisms, with combinations that have activity against <i>Pseudomonas</i> spp. and methicillin-resistant <i>Staphylococcus aureus</i> or MRSA (AIII).
<i>Rating of Recommendations: A = Strong; B = Moderate; C = Optional</i> <i>Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = expert opinion</i> <i>[†]Studies that include children or children/adolescents but not studies limited to postpubertal adolescents</i>

Candida Infections

Updated: December 22, 2025

Reviewed: December 22, 2025

Panel's Recommendations
Oropharyngeal Candidiasis • Topical therapy using clotrimazole troches or nystatin suspension for 7–14 days is recommended to treat uncomplicated oropharyngeal candidiasis (OPC) (AI*). • Oral fluconazole for 7–14 days is recommended for moderate to severe OPC disease (AI). ◦ For fluconazole-refractory OPC, itraconazole oral solution is recommended, although itraconazole is less well tolerated than fluconazole (AI*). Posaconazole is an alternative, particularly for fluconazole- and itraconazole-refractory OPC (AI*). • Chronic suppressive therapy for OPC is not routinely recommended (AII*), as treatment of recurrence is typically effective and potential risks include toxicities, resistance, drug–drug interactions, adherence challenges, and costs; the primary modality of preventing recurrences is immune reconstitution via antiretroviral therapy. If required on a case-by-case basis (e.g., due to frequent or severe recurrences despite antiretroviral therapy), fluconazole three times weekly is preferred (AI*). Esophageal Candidiasis • Systemic therapy is always required for esophageal disease (AI*). • Oral fluconazole for 14–21 days is recommended as first-line therapy, but intravenous fluconazole, an echinocandin (caspofungin, micafungin, anidulafungin), or amphotericin B^a can be used in those who cannot tolerate oral therapy (AI*). • For refractory esophageal disease, oral therapy should include itraconazole solution or voriconazole for 14–21 days (AI*). • If required, suppressive therapy with fluconazole three times weekly is recommended for recurrent infection, pending immune reconstitution on antiretroviral therapy (AII*). Invasive Candidiasis • In moderately severe to severely ill children with invasive candidiasis, an echinocandin is recommended. In less severely ill children who have not had previous azole therapy, fluconazole is recommended (AI*). • Alternatively, an initial course of amphotericin B^a therapy can be administered for invasive candidiasis (BI*) with careful transition to fluconazole therapy to complete the treatment course (BII*). • For central nervous system (CNS) candidiasis, initial treatment should use amphotericin B^b (AIII). • Children with candidemia should be treated for ≥14 days after documented clearance of <i>Candida</i> from the last positive blood culture, resolution of neutropenia, and resolution of clinical signs and symptoms of candidemia (AIII). • Central venous catheters should be removed when feasible in children with candidemia (AII*). For CNS candidiasis, infected CNS devices should be removed if possible (AIII). Antiretroviral Therapy • Antiretroviral therapy should be initiated in all infants and children with HIV, particularly those with candidiasis (AI for children aged <3 months, AI* for older children).

^a Amphotericin B lipid formulations are generally preferred in children based on non-inferior efficacy and lower toxicity compared to conventional amphotericin B (deoxycholate), particularly in children who are at high risk of nephrotoxicity because of preexisting renal disease or use of other nephrotoxic drugs (AI). Amphotericin B deoxycholate is acceptable if a lipid formulation is unavailable or infeasible (BI*).

^b For initial treatment in neonates, amphotericin B deoxycholate or liposomal amphotericin B (caution with suspected urinary tract involvement) is recommended (BIII). Beyond the neonatal/infant period, liposomal amphotericin B is recommended with or without flucytosine (AIII).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = expert opinion*

[†]Studies that include children or children/adolescents but not studies limited to postpubertal adolescents

Coccidioidomycosis

Updated: June 05, 2025

Reviewed: June 05, 2025

Panel's Recommendations
• Routine use of antifungal medications for primary prophylaxis of coccidioidal infections in children is not recommended (BIII). • Amphotericin B is recommended as initial therapy for the treatment of diffuse pulmonary or disseminated coccidioidomycosis (in the absence of central nervous system involvement) (AII*). • There is no evidence that lipid preparations of amphotericin B are more effective than amphotericin B deoxycholate for the treatment of coccidioidomycosis in children. Lipid preparations are often preferred because they are better tolerated and associated with less nephrotoxicity than amphotericin B deoxycholate (AII*). • A triazole agent such as fluconazole or itraconazole should be used as consolidation therapy at the completion of amphotericin B therapy (BIII). Alternatively, some experts initiate therapy with amphotericin B combined with a triazole, such as fluconazole, in patients with disseminated disease and continue the triazole after amphotericin B is stopped (BIII). • For patients with mild disease (e.g., focal pneumonia), initial therapy with fluconazole or itraconazole is appropriate (AII*). • Itraconazole is preferred for treatment of skeletal infections (AII*). • Voriconazole (as a single agent or in combination with caspofungin), posaconazole, isavuconazole, and amphotericin B have been used as salvage therapy in patients with refractory disease (AII*). • Because absorption varies from patient to patient, serum itraconazole, voriconazole, and posaconazole levels should be measured to ensure effective and nontoxic concentrations, monitor drug levels following changes in dosage, and assess compliance (BIII). • Fluconazole is the preferred agent for treating coccidioidal meningitis (AII*). Intravenous amphotericin B preparations are not preferred for treating coccidioidal meningitis (AII*). Intrathecal, intracisternal, or intraventricular amphotericin B deoxycholate has been used to treat people with refractory disease (AIII). • Lifelong antifungal suppression (secondary prophylaxis) with either fluconazole or itraconazole is recommended for children with HIV after disseminated, diffuse pulmonary, and/or meningeal coccidioidomycosis, even if immune reconstitution is achieved with antiretroviral therapy (AII*). • Lifelong secondary prophylaxis should be considered for children with mild disease and CD4 T lymphocyte (CD4) cell count <250 cells/mm³ or CD4 percentage <15% (BIII). Despite immune reconstitution, relapse of coccidioidomycosis may occur in children with HIV who initiated secondary prophylaxis due to mild disease and immunosuppression. Therefore, lifelong azole prophylaxis should be considered (BIII).
Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion [†]Studies that include children or children/adolescents, but not studies limited to post-pubertal adolescents.

COVID-19

Updated: July 03, 2024

Reviewed: July 03, 2024

Panel's Recommendations
COVID-19 Vaccination and Pre-Exposure Prophylaxis to Prevent COVID-19, Including Severe Disease • Children with HIV aged ≥ 6 months should receive COVID-19 vaccination, regardless of CD4 T lymphocyte cell count or viral load (AI). • Household members and close contacts of children with HIV aged ≥ 6 months should receive COVID-19 vaccination (AIII). • Although vaccine responses are likely to improve after initiation of antiretroviral therapy, vaccination against COVID-19 should not be delayed while awaiting immune reconstitution (AIII). • Pemivibart (Pemgarda) should be considered for the prevention of COVID-19 in children aged ≥ 12 years and who weigh ≥ 40 kg with HIV with severe immunosuppression (stage 3 – see HIV Infection Stage table in the Introduction) regardless of COVID-19 vaccination status (BIII) and may be considered for the prevention of COVID-19 in children aged ≥ 12 years and who weigh ≥ 40 kg with HIV with moderate to no immunosuppression (stage 1 or 2 – see HIV Infection Stage table in the Introduction) in whom COVID-19 vaccines are contraindicated or unavailable (CIII). Monoclonal antibodies, including pemivibart, are not a substitute for vaccination in people who are eligible for COVID-19 vaccines. Treatment of COVID-19 in the Outpatient Setting • Ritonavir-boosted nirmatrelvir (Paxlovid) should be considered in the outpatient setting for treatment of laboratory-confirmed or clinically suspected mild to moderate COVID-19 in children with HIV who are aged ≥ 12 years, weigh ≥ 40 kg, and are at high risk of progressing to severe COVID-19 due to advanced or untreated HIV or another high-risk condition as defined by the Centers for Disease Control and Prevention (CDC) (BI*). • Ritonavir-boosted nirmatrelvir should be started within 5 days of symptom onset (BI*). • Ritonavir-boosted nirmatrelvir may be administered with antiretrovirals, including those that contain ritonavir or cobicistat, without any interruption of or modification to the antiretroviral therapy (AIII). • Remdesivir (Veklury) may be considered in the outpatient setting for treatment of laboratory-confirmed or clinically suspected mild to moderate COVID-19 in children with HIV who are aged ≥ 28 days, weigh ≥ 3 kg, and are at high risk of progressing to severe COVID-19 due to advanced or untreated HIV or another high-risk condition as defined by CDC (CIII). • Remdesivir should be started within 7 days of symptom onset, but its use could be considered in children with HIV with severe immunosuppression who have had >7 days of symptoms (CIII). • For non-hospitalized children with HIV aged ≥ 12 years at high risk of progressing to severe COVID-19, ritonavir-boosted nirmatrelvir is the preferred treatment, but remdesivir may be considered if ritonavir-boosted nirmatrelvir is unavailable or contraindicated (BI*). Treatment of COVID-19 in the Inpatient Setting • Remdesivir should be considered for treatment of laboratory-confirmed or clinically suspected acute COVID-19 in children with HIV who are aged ≥ 28 days, weigh ≥ 3 kg, require hospitalization, and are receiving supplemental oxygen (BI*). • Remdesivir should be administered for treatment of laboratory-confirmed or clinically suspected acute COVID-19 in children with HIV who are aged ≥ 28 days, weigh ≥ 3 kg, are severely or critically ill, have a rapidly increasing oxygen requirement, and/or are at high risk of progressing to severe COVID-19 due to advanced or untreated HIV or another high-risk condition as defined by CDC (AI*). • Remdesivir should be started within 7 days of symptom onset, but its use could be considered in children with HIV with severe immunosuppression who have had >7 days of symptoms (CIII).

- Corticosteroids (such as dexamethasone) should be considered for the treatment of laboratory-confirmed or clinically suspected acute COVID-19 in children with HIV who require hospitalization and are receiving supplemental oxygen (BIII).
- Corticosteroids should be administered for the treatment of laboratory-confirmed or clinically suspected acute COVID-19 in children with HIV who are severely or critically ill, have a rapidly increasing oxygen requirement, and/or who are at high risk of progressing to severe COVID-19 due to advanced or untreated HIV or [another high-risk condition as defined by CDC](#) (AIII).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion*

[†]Studies that include children or children/adolescents, but not studies limited to postpubertal adolescents

Cryptococcosis

(Last Updated November 6, 2013; last reviewed November 6, 2013)

Panel's Recommendations
• Routine use of antifungal medications is not recommended for primary prophylaxis of cryptococcal infections in children (BIII). • Combination therapy with amphotericin B deoxycholate (or liposomal amphotericin B) and flucytosine for 2 weeks (induction therapy) followed by fluconazole for a minimum of 8 weeks (consolidation therapy) is recommended for central nervous system disease (AI*). Amphotericin B lipid complex is another alternative to amphotericin B deoxycholate (BII*). • Liposomal amphotericin B is preferred over amphotericin B deoxycholate for patients with or at risk of renal insufficiency (AI*); amphotericin B lipid complex is an alternative (BII*). • In patients who cannot tolerate flucytosine or if flucytosine is unavailable, amphotericin B deoxycholate (or liposomal amphotericin B or amphotericin B lipid complex) with or without high-dose fluconazole can be used for initial therapy (BI*). Fluconazole plus flucytosine is superior to fluconazole alone and an option in patients who cannot tolerate any form of amphotericin (BII*). • Echinocandins are not active against cryptococcal infections and should not be used (AIII). • After a minimum of 2 weeks of induction therapy, if there is clinical improvement and a negative cerebrospinal fluid culture after repeat lumbar puncture, amphotericin B and flucytosine can be discontinued and consolidation therapy with fluconazole administered for a minimum of 8 weeks (AI*); itraconazole is a less preferable alternative to fluconazole (BI*). • Secondary prophylaxis with fluconazole (AI*) or itraconazole (less preferable) (BI*) is recommended for a minimum of 1 year. • Discontinuing secondary prophylaxis (after receiving secondary prophylaxis for ≥ 1 year) can be considered for asymptomatic children aged ≥ 6 years with CD4 counts ≥ 100 cells/mm³ and an undetectable viral load on ≥ 3 months of combination antiretroviral therapy (CIII). Secondary prophylaxis should be reinitiated if the CD4 count decreases to < 100 cells/mm³ (AIII). Most experts would not discontinue secondary prophylaxis for patients younger than age 6 years (CIII). • Patients with severe pulmonary disease or disseminated cryptococcosis should be treated with amphotericin B with or without the addition of flucytosine, as for CNS disease (AIII). Those with mild-to-moderate pulmonary illness or other localized disease can be managed with fluconazole monotherapy (AIII). • In antiretroviral-naïve patients newly diagnosed with cryptococcal meningitis or disseminated disease, delay in initiation of potent antiretroviral therapy may be prudent until the end of the first 2 weeks of induction therapy (CIII).
Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials <u>in children</u>[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials <u>in adults</u> with clinical outcomes and/or validated laboratory endpoints with accompanying data <u>in children</u>[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies <u>in children</u>[†] with long-term clinical outcomes; II* = One or more well-designed, nonrandomized trials or observational studies <u>in adults</u> with long-term clinical outcomes with accompanying data <u>in children</u>[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion [†]Studies that include children or children/adolescents but not studies limited to post-pubertal adolescents

Cryptosporidiosis

Updated: August 29, 2019

Reviewed: August 29, 2019

Panel's Recommendations
• In children with HIV infection, what are the best interventions (compared with no intervention) to prevent episodes of cryptosporidiosis? • Cryptosporidiosis can be prevented by practicing good hygiene (e.g., frequent handwashing), avoiding drinking water that might be contaminated, avoiding high-risk swimming exposures (e.g., drinking swimming water, especially in pools and water playgrounds frequented by very young children), and not eating food that might be contaminated (expert opinion). • Children with HIV infection should avoid contact with pre-weaned bovine calves, lambs, goat kids, ill animals, young dogs and cats, stray animals, and animal or human feces or any feces-contaminated surfaces (expert opinion). • In children with HIV infection, combination antiretroviral therapy (ART) to reverse or prevent severe immunodeficiency is the primary mode of prevention of severe enteric cryptosporidiosis (strong, low). • In children with HIV infection, what are the best interventions (compared with no intervention) to treat cryptosporidiosis? • Effective ART is the primary initial treatment for cryptosporidiosis in children (strong, moderate). • Nitazoxanide, in addition to ART, can be considered to treat cryptosporidiosis in children with HIV infection (strong, moderate). • Dehydration and electrolyte abnormalities should be corrected, and nutritional support should be provided as appropriate (expert opinion).
<i>Rating System</i> <i>Strength of Recommendation: Strong; Weak</i> <i>Quality of Evidence: High; Moderate; Low; or Very Low</i>

Cytomegalovirus Infection

Updated: August 3, 2023

Reviewed: August 3, 2023

Panel's Recommendations
I. Is there an indication for cytomegalovirus (CMV) antibody testing in children with asymptomatic HIV (versus not testing) to guide clinical management? - CMV antibody testing is recommended at age 1 year (or at baseline evaluation if age >1 year at initial visit) and then annually for CMV-seronegative infants and children with HIV who are immunosuppressed (i.e., CD4 T lymphocyte [CD4] cell count <100 cells/mm³ or CD4 percentage <10%) (strong, low). II. Should infants born to mothers with HIV undergo screening for congenital CMV infection (versus not screening)? - Testing for congenital CMV infection in the first 21 days of life is recommended for infants with vertically transmitted HIV (strong, low). CMV testing is also suggested for all infants exposed to HIV since their HIV status will be indeterminate during the first 21 days of life when congenital CMV infection can be diagnosed (weak, low). Infants with confirmed congenital CMV infection should be evaluated regularly for early detection of hearing loss and appropriate intervention. III. Is primary prophylaxis against CMV recommended for children with HIV who are CMV-seropositive (versus not providing prophylaxis)? - Primary prophylaxis against CMV disease is not recommended for children with HIV who are not severely immunocompromised (strong, moderate). CMV end-organ disease is best prevented by antiretroviral therapy (ART) to maintain the CD4 count >100 cells/mm³ in children aged ≥6 years, or CD4 percentage >10% in children aged <6 years (strong, moderate). - Prophylaxis with valganciclovir may be appropriate for CMV-seropositive children with HIV who are severely immunosuppressed (i.e., CD4 count <50 cells/mm³ in children aged ≥6 years, or CD4 percentage <5% in children aged <6 years) (weak, low). - Cessation of primary prophylaxis can be considered when the CD4 count is sustained at >100 cells/mm³ for children ≥6 years of age, or CD4 percentage >10% in children <6 years (weak, low). IV. In CMV-seropositive children with HIV age <5 years, is routine ophthalmologic examination recommended to screen for CMV retinitis (versus not providing routine ophthalmologic examination)? - Children with HIV aged <5 years who are CMV infected and severely immunosuppressed (i.e., CD4 count <50 cells/mm³ or CD4 percentage <5%) should have a dilated retinal examination performed by an ophthalmologist every 6 months (strong, low). As CMV retinitis can occur in patients with higher CD4 counts, ophthalmologic screening can be considered for young children with lesser degrees of immunosuppression who are unable to report visual symptoms. V. Among children with HIV and CMV disease, is treatment with anti-CMV antiviral agents in addition to ART (versus ART alone) associated with higher rates of remission, decreased mortality, or both? - Treatment with antiviral therapy against CMV in addition to ART is recommended for CMV disease in children with HIV (strong, moderate). Intravenous (IV) ganciclovir is the drug of choice for initial treatment for acquired CMV disease, including retinitis and other end-organ disseminated CMV disease (e.g., colitis, esophagitis, and CNS disease). Transition from IV ganciclovir to oral valganciclovir can be considered for patients who improve on IV therapy (strong, moderate). - Foscarnet is an alternative drug for treating CMV disease or for use in ganciclovir-resistant CMV infections in children with HIV (strong, moderate). - Combination therapy with ganciclovir and foscarnet may delay progression of retinitis in certain patients in whom monotherapy fails and can be used as initial therapy in children with sight-threatening disease (weak, very low). Combination treatment with IV ganciclovir and foscarnet may also be preferable as initial therapy to stabilize CMV neurologic disease and maximize response (weak, very low).

Panel's Recommendations
• In children with HIV and symptomatic congenital CMV infection, treatment with valganciclovir (or IV ganciclovir) for 6 months is recommended provided it can be started during the first month of life (strong, moderate). This recommendation is based on studies among children with symptomatic congenital CMV infection but without HIV. VI. Is secondary prophylaxis after treatment of CMV disease (versus no secondary prophylaxis) recommended in severely immunocompromised children with HIV? • After induction therapy, secondary prophylaxis (chronic maintenance therapy) is recommended for most forms of CMV disease until immune reconstitution or, in the absence of immune reconstitution, for the remainder of a patient's life. Regimens for chronic suppression include IV ganciclovir, oral valganciclovir, IV foscarnet, combined IV ganciclovir and foscarnet, and IV cidofovir (strong, moderate). • Secondary prophylaxis (chronic maintenance therapy) is not routinely recommended for CMV gastrointestinal disease but should be considered if relapses occur (expert opinion). A role for secondary prophylaxis (maintenance therapy) for CMV pneumonitis also has not been established. VII. Is discontinuation of secondary prophylaxis for CMV disease recommended in children with HIV who have well-controlled HIV (versus continuation of secondary prophylaxis)? • Discontinuation of secondary prophylaxis may be considered for children who are receiving ART and have a sustained (e.g., >6 months) increase in CD4 count, defined as an increase in CD4 percentage to >15% for children aged <6 years, or an increase in CD4 count to >100 cells/mm³ for children aged ≥6 years (weak, low). • All patients with CMV ophthalmic disease in whom anti-CMV maintenance therapy (secondary prophylaxis) has been discontinued should continue to undergo regular ophthalmologic monitoring for early detection of CMV relapse and for immune reconstitution uveitis (strong, low). • Secondary prophylaxis discontinued in children with HIV because of immune reconstitution should be resumed when the CD4 percentage decreases to <15% in those aged <6 years and when the CD4 count decreases to <100 cells/mm³ in those aged ≥6 years (strong, moderate).
Rating System <i>Strength of Recommendation: Strong or Weak</i> <i>Quality of Evidence: High, Moderate, Low, or Very Low</i>

Giardiasis

(Updated August 22, 2019; last reviewed August 22, 2019)

Panel's Recommendations
I. In children with HIV infection, what are the best interventions (compared with no intervention) to prevent initial episodes of giardiasis? • Giardiasis can be prevented by practicing good hygiene, not drinking or swimming in water that may be contaminated, and not eating food that may be contaminated (expert opinion). • Frequent hand washing can help reduce the incidence of diarrheal illnesses, including giardiasis (strong, moderate). • Initiating combination antiretroviral therapy (ART) in children with HIV infection to reverse or prevent severe immunodeficiency is the primary intervention to prevent severe enteric giardiasis (strong, very low). II. In children with HIV infection, what are the best interventions (compared with no intervention) to treat giardiasis? • Tinidazole and nitazoxanide are preferred therapies; metronidazole is the alternative recommended treatment for giardiasis in children (strong, moderate). • Dehydration and electrolyte abnormalities should be corrected (expert opinion). III. In children with HIV infection, what are the best interventions (compared with no intervention) to prevent recurrent episodes of giardiasis? • Recurrent episodes of giardiasis can be prevented by practicing good hygiene and avoiding contaminated food and water (expert opinion). • Frequent hand washing can help reduce the incidence of diarrheal illnesses, including giardiasis (strong, moderate).
Rating System <i>Strength of Recommendation:</i> Strong; Weak <i>Quality of Evidence:</i> High; Moderate; Low; or Very Low

Hepatitis B Virus Infection

Updated: June 05, 2025

Reviewed: June 05, 2025

These recommendations are intended to focus on prepubertal children with HIV and hepatitis B virus (HBV) coinfection.

Panel's Recommendations	
I.	Should all pregnant women with HIV routinely undergo testing for hepatitis B virus (HBV) as part of antenatal care? All pregnant women with HIV should be tested for HBV with hepatitis B surface antigen (HBsAg) as part of the pregnancy/obstetric panel during the first trimester of each pregnancy regardless of hepatitis B (HepB) vaccination history or prior testing. Testing should be repeated in late pregnancy or at the time of admission to the hospital for infant delivery for HBsAg-negative people at high risk of HBV infection (e.g., people who inject drugs, have intercurrent sexually transmitted infections, have multiple sex partners, or have clinical hepatitis). Pregnant women with HIV who do not have documentation of HepB vaccination should be vaccinated against hepatitis B (strong, moderate). Pregnant women who are HBsAg positive should also have an HBV DNA quantitative test and a hepatitis B e antigen (HBeAg) test and be referred to appropriate specialists for hepatitis B–related clinical management; HBV specialists can ensure essential follow-up of the pregnant woman and the hepatitis B–exposed infant(s), as well as provision of HepB vaccines for sexual and household contacts. Prevention of hepatitis B in newborn infants relies on providing a birth dose (within 12 hours after birth is optimal) of the HepB vaccine to all infants. In addition to HepB vaccine, infants born to women known to be HBsAg positive should receive hepatitis B immune globulin (HBIG) within 12 hours of birth. Infants born to women with unknown HBsAg status should receive HepB vaccine within 12 hours of birth in conjunction with HBIG provided within 12 hours of birth (for infants <2,000 grams) or within 7 days (for infants ≥2,000 grams) unless the pregnant woman is confirmed to be HBsAg negative by this time. When indicated, HBIG should be administered concurrently with the birth dose of HepB vaccine at a different anatomic site. Infants born to women who are HBsAg negative but who have other evidence of HBV infection (e.g., detection of HBV DNA HBeAg-positive, or known chronic HBV infection) should be managed as though they have been born to HBsAg-positive women. See Hepatitis B Virus/HIV Coinfection in the Perinatal Guidelines for more information.
II.	What is the optimal antiretroviral (ARV) regimen for people with HIV/HBV coinfection in the antenatal period? Antiretroviral therapy (ART) that is active against both HIV and HBV is recommended; the preferred regimen should include tenofovir (tenofovir disoproxil fumarate [TDF] or tenofovir alafenamide [TAF]) and either lamivudine (3TC) or emtricitabine (FTC) (strong, high). See Hepatitis B Virus/HIV Coinfection in the Perinatal Guidelines for more information.
IIIa.	What is the optimal HBV prevention strategy for infants born to women with HIV/HBV coinfection? All infants ≥2,000 grams born to HBsAg-positive women should receive single-antigen HepB vaccine and HBIG within 12 hours after birth, a second dose of HepB vaccine at age 1 to 2 months, and a third dose of HepB vaccine at age ≥6 months. All infants <2,000 grams born to HBsAg-positive women should receive single-antigen HepB vaccine and HBIG within 12 hours after birth, a second dose of HepB vaccine at age 1 month, a third dose of HepB vaccine at age 2–3 months, and a fourth dose of HepB vaccine at age ≥6 months and not before 24 weeks (strong, high). See Hepatitis B Virus/HIV Coinfection in the Perinatal Guidelines for more information.
IIIb.	What is the optimal initial HepB vaccination strategy for children with HIV? Children with HIV should receive a standard dose of HepB vaccine at 0, 1, and 6 months (strong, high). A double dose at 0, 1, and 6 months may also be considered (weak, moderate).

IV. When should infants born to women with HIV/HBV coinfection undergo post-HepB vaccination serologic testing after completion of the HepB vaccine series?

Infants born to women with HIV/HBV coinfection should have serologic testing for antibody to hepatitis B surface antigen (anti-HBs) and HBsAg at age 9 to 12 months (i.e., the next well-child visit after completion of the HepB vaccine series) or 1 to 2 months after completion of the vaccine series if the final dose is delayed to assess for vaccine response and failure of perinatal prophylaxis (strong, moderate).

V. When should children and adolescents with HIV have post-HepB vaccination serologic testing after completion of the HepB vaccine series?

Due to the high prevalence of HBV infection, all infants, children, and adolescents with HIV should be tested for HBsAg as soon as possible after HIV diagnosis (strong, high). If there is no documentation of routine infant/child vaccination for hepatitis B, initial screening with the triple panel consisting of HBsAg, anti-HBs, and total antibody to hepatitis B core antigen (anti-HBc) will determine infection and immune status and guide clinical management. In addition, individuals with the isolated anti-HBc serologic profile should also be vaccinated for hepatitis B.

Anti-HBs titers should be evaluated 4 to 6 weeks after completion of the vaccination series (strong, moderate). See Advisory Committee on Immunization Practices' (ACIP) recommendations on [eliminating transmission of HBV infection](#) and [preventing HBV infection](#) for more information.

VI. What is the best strategy for HepB revaccination of children with HIV who have not responded to the primary HepB vaccine series (anti-HBs <10 mIU/mL)?

If anti-HBs levels are <10 mIU/mL and the HBsAg result is negative, the Panel on Opportunistic Infections in Children With and Exposed to HIV now recommends that children should be revaccinated with a single dose of HepB vaccine and receive postvaccination serologic testing 1 to 2 months later. Infants whose anti-HBs remains <10 mIU/mL following single-dose revaccination should receive two additional doses of HepB vaccine to complete the second series, followed by postvaccination serologic testing 1 to 2 months after the final dose. Alternatively, based on clinical circumstances or family preference, HBsAg-negative infants with anti-HBs <10 mIU/mL may instead be revaccinated with a second, complete three-dose series, followed by postvaccination serologic testing performed 1–2 months after the final dose of vaccine (strong, moderate). See ACIP's HBV [immunization strategy](#) for more information.

VII. Should individuals with HIV who have responded to HepB vaccination have ongoing assessment of hepatitis B immunity?

In individuals who respond to HepB vaccination (anti-HBs ≥10 mIU/mL), periodic assessment of anti-HBs titers can be considered every 5 years. A booster dose should be provided if anti-HBs titer falls below 10 mIU/mL. Anti-HBs titers should be checked 4 to 6 weeks after a booster dose (weak, very low). If anti-HBs is still <10 mIU/mL, the standard three-dose series should be completed. See ACIP's [recommendations on hepatitis B prevention](#) for more information.

VIII. What ART regimens should be considered for ARV-naïve children with HIV/HBV coinfection who are immunotolerant to HBV?

- For children aged <2 years, a [standard preferred ART regimen](#) should be provided. Although there is a risk for development of 3TC-resistant HBV, the need to provide optimal HIV therapy outweighs this risk (strong, high).
- For children aged ≥2 years to <12 years, a standard preferred ART regimen should be provided. If feasible (weight ≥14 kg), the ART regimen should include TDF (or TAF) + 3TC or FTC (strong, low).
- For children aged ≥12 years, a standard preferred ART regimen including TDF (or TAF) + 3TC or FTC should be provided (strong, low).

IX. Should 3TC or FTC be the only HBV therapy for children with HIV/HBV coinfection who require treatment of both infections?

- Children with HIV/HBV coinfection who require treatment of both infections should not be treated with 3TC or FTC as the only HBV-active agent in the regimen (strong, moderate). In addition to 3TC or FTC, inclusion of tenofovir (TDF or TAF) in the ART regimen is recommended for most children with HIV/HBV coinfection.

X. What treatment regimens should be considered for children with HIV/HBV coinfection who require treatment of both infections?

- For children aged ≥ 2 years who require treatment for both infections, a combination ARV regimen that includes TDF (or TAF) and an anti-HBV nucleoside (either 3TC or FTC) should be considered for treatment (strong, low).
- For children aged ≥ 2 years, if TDF (or TAF) is not available or not tolerated, entecavir can be added to a fully suppressive ARV regimen for HBV treatment (weak, low).

XI. How often should children with HIV/HBV coinfection be monitored for HBV status and disease activity?

Children with HIV/HBV coinfection who are not receiving HBV-directed treatment should have disease monitoring (alanine aminotransferase [ALT] for inflammation, complete blood count for platelet count and leukopenia, HBeAg/anti-HBe serostatus, HBV DNA, and HBsAg/anti-HBs serostatus) like children with HBV mono-infection (strong, moderate). The value of intermittent noninvasive assessment of hepatic fibrosis with such techniques as transient elastography is unclear (see the [Phases of Chronic Hepatitis B Infection table](#)).

XII. How should children with HIV/HBV coinfection be monitored for hepatocellular carcinoma?

There is no difference in screening recommendations for hepatocellular carcinoma (HCC) in children with HIV/HBV infection compared to children with HBV mono-infection. Surveillance of chronic HBV infection using abdominal ultrasound every 6 months should be performed to detect early HCC in people at risk: people with cirrhosis and those with HBsAg positivity without cirrhosis but with active hepatitis or family history of HCC. Children with a lower risk of HCC should be screened every 1 to 2 years with alpha-fetoprotein (AFP) and every 1 to 2 years with ultrasound, or sooner if AFP is >10 mcg/mL (weak, low).

XIII. How should children with HIV who are anti-HBc positive be monitored for reactivation of HBV infection?

Children with HIV who are anti-HBc positive are at risk for reactivation of HBV infection if HIV-related immunodeficiency worsens or if they are treated with agents associated with a risk of HBV reactivation (cancer chemotherapy, biologics such as anti-tumor necrosis factor-alpha, and direct-acting antivirals [DAAs] for hepatitis C curative treatment). For children initiating rituximab or other B-cell-depleting agents who are not on HBV-active ART, HBV antiviral therapy should be initiated. For children experiencing worsening HIV-related immunodeficiency or who are receiving cancer chemotherapy or high-dose steroids, periodic ALT and HBV DNA monitoring should be considered. For children receiving DAAs for hepatitis C curative treatment, HBsAg-positive children should receive prophylactic HBV treatment as part of HIV ART, and HBV DNA should be assessed at regular intervals to monitor for hepatotoxicity (weak, very low).

Rating of Evidence

Strength of Recommendation: Strong; Weak

Quality of Evidence: High; Moderate; Low; Very Low

Hepatitis C Virus Infection

Updated: January 28, 2026

Reviewed: January 28, 2026

Panel's Recommendations	
I.	Do children with HIV/hepatitis C virus (HCV) coinfection warrant any specific surveillance or monitoring beyond what is recommended for HIV mono-infection and HCV mono-infection? Children with HIV/HCV coinfection should receive the same routine care and monitoring that is recommended for children with HIV mono-infection and children with HCV mono-infection (strong, moderate).
II.	Should infants born to women known to have hepatitis C be tested for HCV infection, and if yes, when and how? Testing for HCV infection should be performed on any infant or child whose mother is known to have hepatitis C (strong, high). As per Centers for Disease Control and Prevention guidelines, all pregnant women should be tested for hepatitis C with each pregnancy. All children perinatally exposed to HCV should receive a nucleic acid test (NAT) for HCV RNA at age 2–6 months. If not performed earlier, NAT for HCV RNA can be performed at age 7–17 months (strong, high). A negative NAT for HCV RNA at age 2–6 months is highly suggestive (>99% negative predictive value) of no perinatal transmission. For those not tested earlier, negative anti-HCV immunoglobulin G testing at 18 months is confirmatory of no HCV (strong, low). In consultation with a health care provider with expertise in pediatric hepatitis C management, children who test positive for HCV RNA should have follow-up care through age 3 years to assess eligibility for HCV treatment (strong, high).
III.	For infants and children born to women with HIV/HCV coinfection, do specific obstetric or infant feeding practices reduce the risk of perinatal transmission of HCV? Recommendations on route of delivery and intrapartum management are the same for HIV/HCV coinfection and HIV mono-infection. Unlike HIV, available data suggest breastfeeding does not pose an appreciable risk of transmission to infants of mothers with HCV. Risk of HCV transmission via breastfeeding in the setting of HIV/HCV coinfection is likely similar to HCV mono-infection, although no data currently exist. Decisions regarding appropriate feeding practices in infants born to mothers with HIV/HCV coinfection should be determined on a case-by-case basis guided by shared decision making and driven by maternal HIV virological status. Mothers should abstain from breastfeeding from nipples that are cracked or bleeding or breasts affected by mastitis (strong, moderate).
IV.	For women with HIV/HCV coinfection, does treatment of HCV infection with sustained virologic response prior to pregnancy (as opposed to no treatment or treatment failure) reduce the risk of HCV perinatal transmission? Women with HIV/HCV coinfection who are of childbearing potential and wish to become pregnant should be evaluated for treatment of HCV infection prior to conception. They should be treated for HCV infection to reduce their risk of liver disease progression and perinatal transmission of HCV (strong, high). Ribavirin-containing regimens are no longer recommended for treatment of HCV infection given the availability of safer and more efficacious treatment options (strong, high). There are no large-scale clinical trials evaluating the safety of pangenotypic direct-acting antiviral (DAA) regimens during pregnancy. Treatment can be considered on an individual basis after a discussion of the potential risks and benefits (strong, low).

See details in the [HCV/HIV Coinfection](#) section of the [Perinatal Guidelines](#) and the [American Association for the Study of Liver Diseases \(AASLD\)/Infectious Diseases Society of America \(IDSA\) HCV guidance for pregnancy](#).

V. What counseling should an adolescent with HIV receive to reduce the risk of HCV acquisition/transmission?

All adults and adolescents with HIV should be counseled to avoid injection drug use. If using drugs, they should—

- Avoid reusing and/or sharing needles, *and*
- Be tested for HCV and hepatitis B virus, *and*
- Receive appropriate referral and therapy for substance use disorder (strong, high).

Unprotected sex has been linked to HCV transmission, so all adolescents—including those with HIV, multiple sex partners, or sexually transmitted infections—should be advised to use barrier protection (strong, moderate).

VI. Among children with HIV/HCV coinfection, which vaccinations to reduce risk of liver disease are available?

Hepatitis A and hepatitis B vaccines are recommended for all children, including those with hepatitis C with or without HIV coinfection, with follow-up serologic confirmation of vaccine response (strong, low).

VII. For all children with HCV mono-infection or HIV/HCV coinfection, what are the indications for HCV treatment?

Any child aged 3 years or older with HCV mono-infection or HIV/HCV coinfection should receive treatment with a pangenotypic DAA regimen (strong, moderate).

VIII. For all children with hepatitis C, what U.S. Food and Drug Administration (FDA)–approved medications are available for those requiring treatment?

Either of the FDA-approved pangenotypic DAA regimens (sofosbuvir/velpatasvir or glecaprevir/pibrentasvir) can be used for treatment (strong, high).

For more information about evaluation for DAA treatment, visit the [AASLD/IDSA HCV in Children webpage](#).

IX. When treating children with HIV/HCV coinfection, are there significant drug–drug interactions between HCV and HIV treatment regimens that require consideration?

Clinically relevant drug–drug interactions have been identified between current FDA-approved pediatric DAA regimens and multiple classes of antiretroviral drugs that may warrant alternate therapy, dose adjustment, or extra monitoring. Reference to [current AASLD/IDSA HCV guidance on patients with HIV/HCV coinfection](#) is recommended (strong, high).

Rating of Evidence

Strength of Recommendation: Strong; Weak

Quality of Evidence: High; Moderate; Low; Very Low

Herpes Simplex Virus Infections

Updated: June 27, 2018

Reviewed: June 27, 2018

Panel's Recommendations	
I.	Will condoms (compared with not using condoms) prevent herpes simplex virus (HSV) infection in sexually active adolescents and young adults with HIV? Condoms should be used to prevent HSV infection (and other sexually transmitted diseases) in adolescents and young adults with HIV (strong; low). The data regarding the level of protection provided by condoms are very limited for individuals with HIV in general, and for youth specifically.
II.	Will adolescents and young adults with HIV who have recurrent, genital HSV infection benefit from suppressive anti-HSV antiviral therapy (compared with not using suppressive therapy)? Adolescents and young adults with HIV who suffer severe, frequent, and/or troubling recurrent genital HSV infection will benefit from anti-HSV suppression therapy (strong; moderate).
III.	Should children and adolescents with HIV who have severe primary or recurrent HSV (genital or orolabial) infection receive intravenous (IV) acyclovir (compared with receiving oral antiviral therapy)? Children and youth with HIV who have severe mucocutaneous HSV infections should be treated with IV acyclovir. When improvement is noted, they can be switched to oral therapy until healing is complete (strong; moderate).
IV.	Should children and adolescents with HIV be treated with oral acyclovir, valacyclovir, or famciclovir for non-severe primary episodes or recurrent episodes of orolabial or genital HSV (compared with no antiviral therapy)? Oral anti-HSV drugs will shorten the duration and reduce the severity of non-severe HSV infections in children and adolescents with HIV. Oral valacyclovir and famciclovir have superior pharmacokinetic profiles compared with oral acyclovir (strong; moderate).
V.	Is foscarnet the best choice for anti-HSV therapy for children and adolescents with HIV in whom therapy is failing because of acyclovir-resistant HSV? Foscarnet is the therapy of choice for acyclovir-resistant HSV (strong, very low). Ideally, the viral isolate should be tested to determine the antiviral resistance pattern.
Rating System <i>Strength of Recommendation: Strong; Weak</i> <i>Quality of Evidence: High; Moderate; Low; or Very Low</i>	

Histoplasmosis

(Last updated November 6, 2013; last reviewed November 6, 2013)

Panel's Recommendations
• Routine use of antifungal medications for primary prophylaxis of histoplasmosis in children is not recommended (BIII). • Amphotericin B is preferred for initial treatment of moderately severe to severe infections (AI*). • Itraconazole is the azole preferred for treatment of histoplasmosis (AIII). • In manifestations of histoplasmosis in which antigenuria is demonstrated, antigen levels should be monitored during therapy and for 1 year thereafter to identify relapse (AIII). • For severe or moderately severe acute primary pulmonary histoplasmosis, amphotericin B should be administered for at least 1 to 2 weeks (and clinical improvement) (AIII). After treatment with amphotericin, patients with intact immunity should receive itraconazole for at least 12 weeks (AIII). Adults with CD4 T lymphocyte (CD4) cell counts <150 cells/mm³ and HIV-infected children with severe immunosuppression should receive itraconazole consolidation therapy for at least 12 months (AIII). • The preferred treatment for severe or moderately severe progressive disseminated histoplasmosis is initial (induction) therapy with amphotericin B for ≥2 weeks (and favorable clinical response), followed by consolidation therapy with itraconazole for at least 12 months (AI*). • Itraconazole monotherapy for 12 months is recommended for HIV-infected children with mild to moderate progressive disseminated histoplasmosis (AI*). • Liposomal amphotericin B for 4 to 6 weeks is the preferred initial treatment in the presence of focal brain lesions (BIII*). Thereafter, children should receive itraconazole consolidation therapy for at least 12 months and until cerebrospinal fluid abnormalities, including histoplasma antigen, have resolved (AI*). • In the event of immune reconstitution inflammatory syndrome, antiretroviral therapy should be continued along with antifungal therapy (AIII). • Longer-term suppressive therapy (secondary prophylaxis) with itraconazole may be required in HIV-infected children who are severely immunosuppressed (meaning CD4 percentage <15% at any age or CD4 count <150 cells/mm³ in children aged ≥6 years) and patients who experience relapse despite receipt of appropriate therapy (AIII).
Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials <u>in children</u>[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials <u>in adults</u> with clinical outcomes and/or validated laboratory endpoints with accompanying data <u>in children</u>[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies <u>in children</u>[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies <u>in adults</u> with long-term clinical outcomes with accompanying data <u>in children</u>[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion [†]Studies that include children or children/adolescents, but not studies limited to post-pubertal adolescents

Human Papillomavirus Disease

Updated: December 22, 2025

Reviewed: December 22, 2025

Panel's Recommendations
- Human papillomavirus (HPV) vaccination is recommended in people with HIV aged 9–12 (AIII) and for those aged 13–26 years who have not been previously vaccinated or have not completed the vaccine series (AIII). - Ideally, HPV vaccine should be administered before an individual becomes sexually active (AIII). - HPV vaccination is recommended starting at the age of 9 years for children with a history of sexual abuse. - Bivalent, quadrivalent, and nonavalent HPV vaccines are approved in the United States, but only the nonavalent vaccine is currently available in the United States. Three doses are recommended for all people with HIV, regardless of sex or age at which the vaccine was administered. - If the bivalent or quadrivalent vaccine was previously administered, revaccinating with a three-dose series using the nonavalent vaccine should be considered (CIII). - Regardless of vaccination status, screening for cervical cancer should start at age 21 years (see the Human Papillomavirus Disease section of the Adult and Adolescent Opportunistic Infection Guidelines) (AIII). - Latex condoms should be used during every act of vaginal, anal, and oral sexual intercourse to reduce the risk of exposure to sexually transmitted pathogens, including HPV (AII). - Anogenital warts in children should be treated per the 2021 Centers for Disease Control and Prevention Sexually Transmitted Infections Treatment Guidelines.
<i>Rating of Recommendations: A = Strong; B = Moderate; C = Optional</i> <i>Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion</i> <i>[†]Studies that include children or children/adolescents, but not studies limited to postpubertal adolescents</i>

Isosporiasis (Cystoisosporiasis)

(Updated February 8, 2019; last reviewed February 8, 2019)

Panel's Recommendations	
I.	In children with HIV infection, what are the best interventions (compared with no intervention) to prevent initial episodes of isosporiasis (cystoisosporiasis)? Careful hand washing and thorough washing of fruits and vegetables are recommended to prevent exposure. Travelers to isosporiasis-endemic areas should avoid untreated water for drinking, brushing teeth, and in ice, as well as unpeeled fruits and vegetables (expert opinion).
II.	In children with HIV infection, what are the best interventions (compared with no intervention) to treat isosporiasis (cystoisosporiasis)? - Trimethoprim-sulfamethoxazole (TMP-SMX) is recommended for treatment of isosporiasis in children with HIV infection (strong, high). - Supportive care, including replenishment of fluids and electrolytes, should be provided (expert opinion).
III.	In children with HIV infection, what are the best interventions (compared with no intervention) to prevent recurrent episodes of isosporiasis (cystoisosporiasis)? - Antiretroviral therapy (ART) administered to children with HIV infection to reverse or prevent severe immunodeficiency may be effective in preventing recurrence of isosporiasis (weak, very low). - In children with severe immunosuppression, treatment of isosporiasis should be followed by secondary prophylaxis with TMP-SMX (strong, high).
IV.	In children with HIV infection receiving secondary prophylaxis for isosporiasis (cystoisosporiasis), when can secondary prophylaxis be safely discontinued? Clinicians may consider discontinuing secondary prophylaxis in patients without evidence of active <i>Isospora</i> infection who have sustained improvement in immunologic status (CDC immunologic category 1 or 2) for >6 months in response to ART (weak, very low).
Rating System <i>Strength of Recommendation:</i> Strong; Weak <i>Quality of Evidence:</i> High; Moderate; Low; or Very Low	

Malaria

Updated: November 6, 2013

Reviewed: November 6, 2013

Panel's Recommendations
- Families traveling to malaria-endemic countries should receive pre-travel counseling, including information on insecticide-treated bed nets, N,N-Diethyl-meta-toluamide, and country-specific antimalarial prophylaxis (AII). - Trimethoprim-sulfamethoxazole is not recommended for antimalarial prophylaxis (AIII). - Treatment of malaria is based on disease severity, patient age, parasite species, pregnancy status, and local resistance patterns where the malaria infection was acquired (AI). - The choice of malaria therapy is not affected by HIV status but can be modified based on potential interactions between antiretroviral and antimalarial drugs (AIII). Quinidine is not recommended for patients who are taking ritonavir (AIII) (ritonavir may be replaced if quinidine is needed for severe malaria) and should be administered with caution with atazanavir, darunavir and fosamprenavir (AIII). - The treatment options for uncomplicated chloroquine-susceptible <i>Plasmodium falciparum</i> malaria include chloroquine phosphate, atovaquone-proguanil, artemether-lumefantrine, and quinine sulfate plus either doxycycline, tetracycline (in children aged ≥ 8 years), or clindamycin. Mefloquine is considered an alternative regimen (AIII). - Chloroquine should not be used to treat malaria infections acquired in areas with chloroquine resistance (AIII). - Treatment of uncomplicated chloroquine-resistant malaria may include atovaquone-proguanil, quinine sulfate plus either doxycycline or tetracycline (specifically in children aged ≥ 8 years) or clindamycin or artemether-lumefantrine (AIII). - Treat for presumptive chloroquine-resistant <i>P. falciparum</i> malaria in symptomatic patients who have traveled to a region with chloroquine-resistant <i>P. falciparum</i> and for whom reliable identification of the malaria species is not possible or who are severely ill (AIII). - After initial treatment for <i>Plasmodium vivax</i> and <i>Plasmodium ovale</i> (same as for uncomplicated <i>P. falciparum</i>), primaquine is recommended for treatment of the dormant liver stage (hypnozoites) (AIII). - Glucose-6-phosphate dehydrogenase deficiency must be excluded before use of primaquine because of risk of severe hemolytic anemia (AIII). - Treatment of severe malaria includes both IV quinidine gluconate plus either doxycycline OR clindamycin OR tetracycline. Alternatives include artesunate IV (under Investigational New Drug protocol: Contact the Centers for Disease Control and Prevention Malaria Hotline at (770) 488-7788) followed by either doxycycline OR atovaquone-proguanil OR mefloquine OR clindamycin (AIII).
Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion [†]Studies that include children or children/adolescents, but not studies limited to post-pubertal adolescents

Microsporidiosis

(Last updated December 15, 2016; last reviewed December 15, 2016)

Panel's Recommendations	
I.	In children with HIV infection, what are the best interventions (compared with no intervention) to treat microsporidiosis? - Effective antiretroviral therapy (ART) is the primary initial treatment for microsporidiosis in HIV-infected children (strong, very low). - Supportive care with hydration, correction of electrolyte abnormalities, and nutritional supplementation should be provided (expert opinion). - Albendazole, in addition to ART, is also recommended for initial therapy of microsporidiosis caused by microsporidia other than <i>Enterocytozoon bienersi</i> and <i>Vittaforma corneae</i> (strong, low). - Systemic fumagillin (where available), in addition to ART, is recommended for microsporidiosis caused by <i>E. bienersi</i> and <i>V. corneae</i> (strong, moderate). - Topical therapy with fumagillin eye drops, in addition to ART, is recommended in HIV-infected children with keratoconjunctivitis caused by microsporidia (strong, very low). - Oral albendazole can be considered in addition to topical therapy for keratoconjunctivitis due to microsporidia other than <i>E. bienersi</i> and <i>V. corneae</i> (expert opinion).
II.	In HIV-infected children who have been treated for microsporidiosis, when can treatment (secondary prophylaxis) be safely discontinued? Clinicians may consider continuing treatment for microsporidiosis until improvement in severe immunosuppression is sustained (more than 6 months at Centers for Disease Control and Prevention immunologic category 1 or 2) and clinical signs and symptoms of infection are resolved (weak, very low).
Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials <u>in children</u>¹ with clinical outcomes and/or validated endpoints; I* = One or more randomized trials <u>in adults</u> with clinical outcomes and/or validated laboratory endpoints with accompanying data <u>in children</u>¹ from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies <u>in children</u>¹ with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies <u>in adults</u> with long-term clinical outcomes with accompanying data <u>in children</u>¹ from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion ¹Studies that include children or children/adolescents, but not studies limited to post-pubertal adolescents	

Mycobacterium avium Complex Disease

Updated: April 23, 2026

Reviewed: April 23, 2026

Panel's Recommendations
Primary Prevention of <i>Mycobacterium avium</i> Complex (MAC) • Prophylaxis with either clarithromycin or azithromycin should be offered to children with HIV who have advanced immunosuppression, as defined by CD4 T lymphocyte (CD4) cell count below, and who are not on a fully suppressive antiretroviral (ARV) regimen (AIII). Disseminated MAC should be excluded prior to initiating prophylaxis. - o Children Aged <1 Year: <750 cells/mm³ - o Children Aged 1–5 Years: <500 cells/mm³ - o Children Aged ≥6 Years: <200 cells/mm³ • For children who cannot tolerate azithromycin or clarithromycin, rifabutin may be used despite concerns of drug interactions and lack of efficacy data in children (BIII). <i>Discontinuing Primary Prophylaxis</i> • Primary prophylaxis cannot be discontinued in children with HIV aged <2 years and should be discontinued in children with HIV ≥2 years receiving stable antiretroviral therapy (ART) for ≥6 months and experiencing sustained (>3 months) CD4 count recovery well above the age-specific target for initiation of prophylaxis (A*). Treatment of MAC in Children With HIV • Testing of all MAC isolates for susceptibility to clarithromycin or azithromycin, in addition to amikacin, linezolid, and moxifloxacin, is recommended (AIII). • Combination therapy with a minimum of two drugs for ≥12 months (e.g., clarithromycin or azithromycin plus ethambutol) is recommended to prevent or delay the emergence of resistance (AIII). Monotherapy is associated with the emergence of high-level drug resistance. • Clarithromycin is suggested as the preferred macrolide, although azithromycin is preferred by many experts because of better tolerance and fewer drug interactions (BIII). • Some experts would add rifabutin as a third drug to the macrolide/ethambutol regimen (CIII), particularly in the absence of suppressive ART and in the presence of severe illness; however, with such combination therapy, drug interactions should be checked carefully, and more intensive toxicity monitoring may be warranted (AIII). Ritonavir may increase the concentration of rifabutin and its active metabolite(s). Other experts recommend against the use of rifabutin as a third agent in children due to increased cytochrome P450 activity, which leads to increased clearance of other drugs, such as protease inhibitors and non-nucleoside reverse transcriptase inhibitors, and the potential for increased toxicity associated with concomitant administration of drugs. • In children with HIV and disseminated MAC disease who have no prior ART experience or are not receiving effective ART, ART should be started at the same time as antimycobacterial therapy (BII*). The regimens should be modified when there is potential for an adverse drug–drug interaction(s) between the ARV and antimycobacterial drugs (BII*). <i>Management of Treatment Failure</i> • Children who fail to respond clinically and have persistent mycobacteremia after 8–12 weeks of treatment should undergo repeat susceptibility testing of MAC isolates and should subsequently start a new multidrug regimen involving at least two drugs not previously used and to which the isolate is susceptible (AIII). Drugs that should be considered for this scenario include rifabutin (if not previously used), amikacin, ciprofloxacin, moxifloxacin, and/or bedaquiline (age 5 and older and at least 15 kg).

Secondary Prophylaxis

- Children with a history of disseminated MAC and continued immunosuppression should receive lifelong prophylaxis to prevent recurrence (AIII). Secondary prophylaxis typically consists of continued multidrug therapy used in the treatment of disease.
- Some experts recommend discontinuation of therapy in children with HIV who meet all the following criteria:
 - Aged ≥ 2 years and have completed ≥ 12 months of treatment for MAC; *and*
 - Remain asymptomatic for MAC; *and*
 - Receiving stable ART (i.e., ART not requiring change for virologic or immunologic failure); *and*
 - Have sustained (≥ 6 months) CD4 count recovery well above the age-specific target for initiation of primary prophylaxis (i.e., as in adults, >100 cells/mm³ for children aged ≥ 6 years [AII] and >200 cells/mm³ for children aged 2 to <6 years [CII]).
- There are limited data to recommend discontinuation of secondary prophylaxis in children <2 years. However, if continuation of secondary prophylaxis for MAC is complicating ART compliance, discontinuation of MAC prophylaxis may be appropriate (CIII).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion*

[†]Studies that include children or children/adolescents, but not studies limited to postpubertal adolescents

Mycobacterium tuberculosis

Updated: September 14, 2023

Reviewed: September 14, 2023

Panel's Recommendations	
I.	Among children <15 years old with HIV, do interferon-gamma release assays (IGRAs) compared to tuberculin skin test (TST) reliably identify latent tuberculosis (TB) infection (LTBI)? • IGRAs and TSTs can be used to diagnose LTBI in children 5 years or older (strong, moderate). IGRAs are preferred for diagnosing LTBI in Bacille Calmette-Guerin–vaccinated people and those who are not likely to return for interpretation of TST results (strong, moderate). • Centers for Disease Control and Prevention (CDC) currently recommends TSTs for diagnosing LTBI in children 2–5 years old (strong, low); some experts and the American Academy of Pediatrics (AAP) Red Book recommend using IGRAs to diagnose LTBI in children ≥2 years old (strong, low). • CDC and the AAP Red Book recommend TSTs for diagnosing LTBI in children <2 years old (expert opinion). • Younger age (<5 years), HIV infection itself, and lower CD4 T lymphocyte (CD4) cell counts have been associated with indeterminate IGRA results and false negative TST results.
II.	Among children <15 years old with HIV, does a negative TST or IGRA reliably exclude TB infection or disease? • Neither TST nor IGRA results definitively exclude LTBI or TB disease. Therefore, testing for LTBI with TST or IGRA should not replace regular screening questions to ascertain exposures to TB disease and presence of clinical, epidemiologic, and social risk factors for LTBI or TB disease in addition to HIV infection (strong, moderate).
III.	Among children <15 years old with HIV, does LTBI treatment result in fewer cases of TB disease, compared to no treatment? • LTBI treatment is highly effective for preventing TB disease. Therefore, after TB disease (also referred to as “active TB disease”) has been excluded, children with HIV should receive treatment for LTBI as soon as possible after a positive TST or IGRA result and presumptive LTBI treatment after exposure to infectious TB (regardless of whether the child has a negative TST or IGRA result or was previously treated for TB) (strong, high).
IV.	Among children <15 years old with HIV, does a 12-dose combination of once-weekly isoniazid and rifapentine in place of 9 months of daily isoniazid result in comparable outcomes for TB prevention? • Clinical trials have demonstrated that LTBI treatment with a 12-dose combination of once-weekly isoniazid and rifapentine has similar efficacy to 9 months of daily isoniazid for preventing TB disease; in practice, treatment adherence with the 12-dose regimen might be higher, resulting in higher real-world effectiveness. Therefore, the 12-dose regimen of once-weekly isoniazid and rifapentine for treatment of LTBI can be used in adults and children ≥2 years old with HIV who are on antiretroviral regimens with acceptable drug–drug interactions with rifapentine (strong, moderate).
V.	Among children <15 years old with HIV and exposure to a person with drug-resistant TB, would 9 months of daily isoniazid compared to other regimens result in fewer cases of TB disease? • Some studies have demonstrated successful prevention of presumed drug-resistant TB through treatment of LTBI with regimens informed by the drug-susceptibility test (DST) results of the presumed source case. • After exposure to TB caused by isoniazid mono-resistant organisms, preventive therapy with 4 months of daily rifampin is recommended for children with HIV. Adjustment of antiretroviral therapy to consider drug–drug interactions between rifampin and antiretroviral therapy (ART) might be necessary (expert opinion).

- After exposure to TB caused by organisms with other drug resistance patterns (e.g., multidrug-resistant [MDR]), expert consultation should be obtained to determine optimal LTBI treatment regimens. DST results for the TB index patient are important considerations in the management of children exposed to drug-resistant TB (expert opinion).
- VI. Among children <15 years old with HIV who are diagnosed with TB while not yet on ART, does early initiation of ART (2–8 weeks) compared to delayed ART initiation result in improved treatment outcomes?
- Children with HIV who are diagnosed with non–central nervous system (CNS) TB disease and who are not yet receiving ART should be evaluated for early ART initiation, preferably within 2 to 8 weeks of starting TB therapy (strong, moderate).
 - Children with HIV who are diagnosed with CNS TB disease, including TB meningitis, should be evaluated for ART initiation within 2 to 8 weeks (expert opinion).
- VII. Among children <15 years old with HIV diagnosed with TB disease, does therapy administered by directly observed therapy (DOT) or administered by self or family members result in improved medication adherence?
- Daily DOT (by a trained health care worker) should be used to maximize adherence and minimize treatment failures, relapse rates, and emergence of acquired drug resistance (strong, moderate).
- VIII. Among children <15 years old with HIV who are diagnosed with intrathoracic TB disease (e.g., pulmonary or intrathoracic lymph nodes), does treatment with a four-drug regimen during the 2-month intensive phase compared to a three-drug regimen during the 2-month intensive phase result in better treatment outcomes? Among children <15 years old with HIV who are diagnosed with TB disease and treated with a four-drug regimen during the 2-month intensive phase, does a 7-month continuation phase using isoniazid and rifampin or a 4-month continuation phase using isoniazid and rifampin result in better treatment outcomes?
- In children with HIV, the recommended treatment for drug-susceptible TB is a four-drug regimen consisting of isoniazid, rifampin, pyrazinamide, and ethambutol given daily during the 2-month intensive phase, followed by a ≥4-month continuation phase using only daily isoniazid with daily rifampin (strong, moderate) and adjusting of ART as required for drug–drug interactions (expert opinion).
 - For children with well-controlled HIV, minimal TB disease, and confirmed drug-susceptible TB, some experts would consider a standard three-drug regimen (isoniazid, rifampin, pyrazinamide) during the 2-month intensive phase followed by a ≥4-month continuation phase using only isoniazid and rifampin (expert opinion).
- IX. Among children <15 years old with HIV who are taking isoniazid or cycloserine, should adjunctive pyridoxine supplementation versus no adjunctive pyridoxine supplementation be recommended routinely to improve clinical outcomes?
- Pyridoxine supplementation (1–2 mg/kg body weight/day, maximum 50 mg/day) is recommended for all children with HIV who are taking isoniazid or cycloserine (expert opinion).
- X. Among children <15 years old with HIV in whom TB disease is diagnosed, what evidence-based antiretroviral treatment regimens result in better treatment outcomes?
- Among children >20 kg, dolutegravir (DTG)-based ART (dose increased to 50 mg twice daily) is preferred during TB treatment because DTG-based regimens are associated with better HIV treatment outcomes in the absence of TB (strong, moderate). Twice-daily DTG is safe and has favorable pharmacokinetic parameters in children >20 kg when co-administered with rifampin (strong, moderate).
 - Children <20 kg receiving raltegravir (RAL)-based ART who begin TB treatment should increase RAL dose to 12 mg/kg twice daily for the duration of TB treatment. Among children <20 kg who are receiving lopinavir (LPV)/ritonavir-based ART regimens, LPV should be super-boosted to achieve a 1:1 ratio between LPV and ritonavir (strong, moderate). Alternately, children <20 kg can receive an efavirenz (EFV)-based regimen (expert opinion).
 - If the EFV-based regimen is used, CYP2B6-516 genotype-directed EFV dosing is recommended.

XI. Among children <15 years old with HIV who are diagnosed with extrapulmonary TB disease, does TB treatment for 12 months compared to standard 9-month treatment result in better treatment outcomes? - For children with extrapulmonary disease caused by drug-susceptible TB involving the bones or joints, CNS, or disseminated/miliary disease, the recommended duration of treatment is ≥ 12 months (expert opinion). XII. Among children <15 years old with HIV who are diagnosed with TB meningitis (TBM), does the standard four-drug TB regimen compared to a regimen using ethionamide result in better treatment outcomes? - For TBM, while DST results are pending, ethionamide can replace ethambutol (or an injectable aminoglycoside) as the fourth drug because of its superior cerebrospinal fluid penetration (expert opinion). - For TBM, some experts recommend adding a fluoroquinolone to the treatment regimen pending the results of DST (expert opinion). XIII. Among children <15 years old with HIV who are diagnosed with TBM, pericardial or pleural effusion, airway compression, or severe immune reconstitution inflammatory syndrome, does adjunctive treatment with corticosteroids result in improved clinical outcomes? - Adjunctive corticosteroids (with concurrent treatment for TB disease) should be considered for children with TBM (strong, moderate). Adjunctive corticosteroids should also be considered in the context of severe immune reconstitution inflammatory syndrome, airway compression, pleural effusion, or pericarditis (expert opinion). XIV. Among children <15 years old who are diagnosed with MDR-TB disease, does the use of individualized treatment regimens based on DST results compared to a standardized regimen result in better treatment outcomes? - Whenever possible, treatment regimens for MDR-TB should be individualized (expert opinion); considerations include phenotypic and molecular DST results for the child or the presumed source case (when results of DST results are not available for the child) (strong, moderate). Expert consultation should be obtained for clinical management of suspected and laboratory-confirmed MDR-TB (i.e., resistance to both isoniazid and rifampin) (expert opinion). - For treatment of drug-resistant TB, a minimum of five drugs to which the isolate is susceptible should be administered, including two or more bactericidal drugs (strong, moderate). Fluoroquinolones can be used to treat MDR-TB in children (strong, moderate). - For treatment of TB that is resistant only to isoniazid, isoniazid should be discontinued, and the patient should be treated with 6 to 9 months of a rifampin-containing regimen (e.g., rifampin, pyrazinamide, ethambutol, and levofloxacin or moxifloxacin) (expert opinion). XV. Among children <15 years old with HIV who are receiving treatment for TB disease, does liver chemistry testing at 2-week intervals during the first 2 months of treatment compared to less frequent monitoring result in better clinical outcomes? - Routine monitoring of liver enzymes is not necessary in children who have no risk factors for hepatotoxicity. For children with additional risk factors (such as concomitant ART), routine monitoring of liver enzymes should be performed before initiation and 2, 4, and 8 weeks after starting TB treatment (the same monitoring schedule as for ART initiated while a patient is receiving treatment for TB) (expert opinion). Beyond 2 months, routine testing every 2 to 3 months is advisable for all children receiving ART, or more frequently if clinically indicated (expert opinion). - Mild elevations in serum transaminase concentration (i.e., less than five times the upper limit of normal) do not require drug discontinuation in children who are asymptomatic and in whom other findings (including bilirubin) are normal (expert opinion). XVI. Among children <15 years old who are diagnosed with TB disease, does routine HIV testing compared to HIV testing and counseling upon request identify more cases of HIV? - All people diagnosed with TB disease should be tested for HIV (expert opinion).
Rating System <i>Strength of Recommendation: Strong or Weak</i> <i>Quality of Evidence: High, Moderate, Low, or Very Low</i>

Pneumocystis Pneumonia

Updated: December 22, 2025

Reviewed: December 22, 2025

Panel's Recommendations
Prevention of Primary Exposure - At-risk immunocompromised patients should not share a room with a patient who has known <i>Pneumocystis</i> pneumonia (PCP) or an undiagnosed respiratory tract infection (strong, low). Primary Prophylaxis - PCP prophylaxis is recommended for all children with HIV with stage 3 CD4 T lymphocyte (CD4) cell count (strong, moderate): - Aged ≥6 years: CD4 count <200 cells/mm³ or CD4 percentage <14% if CD4 count is unavailable - Aged 1 year to <6 years: CD4 counts <500 cells/mm³ or CD4 percentages <22% if CD4 count is unavailable - For infants, PCP prophylaxis is recommended beginning at age 4–6 weeks and continuing until age 12 months, regardless of CD4 count or percentage (moderate, low). At age 12 months, infants should be reassessed based on the CD4 count or percentage thresholds above (moderate, low). - PCP prophylaxis should also be considered in infants with perinatal HIV exposure if HIV infection cannot be presumptively excluded by 4–6 weeks of age (strong, low). Prophylaxis should be continued until HIV infection can be presumptively excluded. - HIV infection may be presumptively excluded in non-breastfed infants with two or more negative virologic tests (one at age ≥2 weeks and one at age ≥4 weeks) or one negative virologic test at age ≥8 weeks at least 2 weeks after discontinuing multidrug antiretroviral (ARV) prophylaxis/presumptive therapy. In breastfed infants of individuals on antiretroviral therapy (ART) with sustained viral suppression and ongoing close monitoring, the risk of postnatal HIV transmission is extremely low (<1%). In this context, the benefits of trimethoprim-sulfamethoxazole (TMP-SMX; cotrimoxazole) are unlikely to outweigh its risks, and most experts would not administer PCP prophylaxis for breastfed infants otherwise meeting the above criteria for negative virologic testing. - TMP-SMX administered daily or 3 days/week (either consecutively or on alternating days [e.g., Monday, Wednesday, Friday]), is the drug of choice for PCP prophylaxis because of its high efficacy, relative safety, low cost, and broad antimicrobial spectrum (strong, high). - For children with HIV who are unable to take TMP-SMX, atovaquone (strong, high) or dapsone (strong, moderate) is recommended. - Intravenous (IV) or aerosolized (for children old enough to use Respigard II nebulizer) pentamidine administered monthly can be used for children unable to take TMP-SMX, atovaquone, or dapsone (strong, moderate). Of note, atypical systemic presentations of PCP can occur in children on aerosolized pentamidine. Discontinuing Primary Prophylaxis - Discontinuation of PCP prophylaxis is recommended for children with HIV who have received stable ART for ≥6 months and meet the following age-specific criteria for >3 consecutive months (strong, moderate): - Aged ≥6 years: CD4 count ≥200 cells/mm³, or CD4 percentage ≥14% if CD4 count unavailable - Aged 1 to <6 years: CD4 count ≥500 cells/mm³, or CD4 percentage ≥22% if CD4 count unavailable - Discontinuation of PCP prophylaxis can be considered in patients aged ≥6 years who have had an undetectable viral load for >6 months with a CD4 count 101 to 200 cells/mm³ and are intolerant of prophylaxis medications (weak, low).

Panel's Recommendations
- CD4 count and CD4 percentage should be reevaluated every 3–4 months until stabilized, and according to HIV treatment guidelines thereafter. Prophylaxis should be reinstituted if the age-specific criteria for prophylaxis are reached (strong, low). Treatment - IV TMP-SMX is the recommended initial treatment for PCP (strong, high). - As the acute pneumonitis subsides, children with mild-to-moderate PCP who do not have malabsorption or diarrhea can be transitioned to oral treatment with the same total daily dose of TMP-SMX, administered in 3 or 4 divided doses to complete a 21-day course (strong, low). - IV pentamidine isethionate once daily is recommended for patients who cannot tolerate TMP-SMX or who demonstrate clinical treatment failure after 5–7 days of TMP-SMX therapy (strong, moderate). Daily IV pentamidine is associated with significant adverse effects (such as renal dysfunction and electrolyte and glucose abnormalities) and requires close monitoring. Allergy consultation and desensitization to TMP-SMX when appropriate should be attempted prior to initiating IV pentamidine. Atovaquone is a suitable alternative for patients with mild-to-moderate PCP (weak, low). - Ideally starting within 72 hours of diagnosis, a 21-day tapering course of corticosteroids is recommended in cases of moderate-to-severe PCP (defined as PaO₂ <70 or alveolar-arterial gradient ≥35 mmHg) (strong, moderate). Secondary Prophylaxis - Children with HIV who have experienced an episode of PCP should continue PCP prophylaxis after completion of treatment until their CD4 counts exceed the threshold for initiating prophylaxis, using criteria described for discontinuation of primary prophylaxis (strong, high). - Children who present with clinical signs and symptoms compatible with PCP after discontinuation of prophylaxis should be evaluated thoroughly despite having normal or high CD4 counts or percentages (strong, moderate). Rating System <i>Strength of Recommendation:</i> Strong; Weak <i>Quality of Evidence:</i> High; Moderate; Low; Very Low

Syphilis

(Last updated: October 6, 2013; last reviewed: January 24, 2022)

Panel's Recommendations
Congenital Syphilis - Infants should be evaluated and treated per guidelines for congenital syphilis, given the following maternal factors: - Untreated or inadequately treated syphilis (including treatment with erythromycin or any other non-penicillin regimen) - Lack of documentation of having received treatment, - Receipt of treatment <30 days before delivery, - Treatment with penicillin but maternal nontreponemal antibody titer at delivery is fourfold higher than the pretreatment titer, or - Fourfold or greater increase in nontreponemal antibody titer suggesting relapse or reinfection (AII). Note: For comprehensive discussion and recommendations, see the Centers for Disease Control and Prevention Sexually Transmitted Disease Treatment Guidelines, 2010. - Treatment for proven or highly probable congenital syphilis is aqueous crystalline penicillin G for 10 days (AII). - If congenital syphilis is diagnosed after age 1 month, the dosage of aqueous crystalline penicillin G should be increased per treatment guidelines (AII). - An alternative to aqueous crystalline penicillin G is procaine penicillin G for 10 days (BII). - All seroreactive infants (or infants whose mothers were seroreactive at delivery) should receive careful follow-up examinations and serologic testing (a nontreponemal test) every 2 to 3 months until the test becomes nonreactive or the titer has decreased fourfold (AIII). Infants whose initial cerebrospinal fluid (CSF) evaluations are abnormal should undergo repeat lumbar puncture approximately every 6 months until the results are normal (AII). - After treatment of congenital syphilis, children with increasing or stable nontreponemal titers at ages 6 to 12 months should be evaluated (i.e., including a CSF examination) and treated with a 10-day course of parenteral penicillin (AIII). - Infants in whom the nontreponemal test is reactive at age 18 months should be fully evaluated or re-evaluated (physical, serological, CSF, radiographic exams) and treated or re-treated for congenital syphilis (AIII). Sexually-Acquired Syphilis Early Syphilis - Acquired syphilis in children and adolescents is treated with a single dose of benzathine penicillin G for early-stage disease (i.e., primary, secondary, and early latent disease) (AII). - HIV-infected children and adolescents with early syphilis (i.e., primary, secondary, early latent) should receive a single dose of benzathine penicillin G. Those with primary and secondary syphilis should have clinical and serologic response monitored at 3, 6, 9, 12, and 24 months after therapy, and those with early latent syphilis should have clinical and serologic response monitored at 6, 12, 18, and 24 months after therapy (AIII) (For comprehensive discussion and recommendations, see the Centers for Disease Control and Prevention STD Treatment Guidelines, 2010). - Re-treatment of patients with early-stage syphilis (i.e., primary, secondary, early latent) and evaluation for HIV infection is recommended for those who: - Do not experience at least a fourfold decrease in serum nontreponemal test titers 6 to 12 months after therapy, - Have a sustained fourfold increase in serum nontreponemal test titers after an initial reduction post-treatment, or - Have persistent or recurring clinical signs or symptoms of disease.

- Individuals whose titers do not decline should at a minimum receive additional clinical and serologic follow-up. If such additional follow-up cannot be ensured, re-treatment is recommended. Because occult central nervous system infection may be signaled by persistently elevated serum nontreponemal test titers, evaluation of CSF can be considered in the event of such persistently elevated titers (BIII).
- If initial CSF examination demonstrates pleocytosis, repeat lumbar puncture should be conducted, and then every 6 months until the cell count is normal (AIII).

Late Latent Syphilis

- For late latent disease, 3 doses of benzathine penicillin G should be administered over 3 weeks (AIII).
- Patients with late-latent syphilis should have CSF examination if they have clinical signs or symptoms attributable to syphilis, a fourfold increase in serum nontreponemal test titer, or experience an inadequate serologic response (i.e., less than fourfold decline in nontreponemal test titer) within 12 to 24 months after therapy if initial titer was high (>1:32) (BIII). CSF examination should also be performed. Treatment for neurosyphilis should be initiated if CSF examination is positive for neurosyphilis.
- Benzathine penicillin G should be administered at 1-week intervals for 3 weeks to patients in whom CSF examination does not confirm the diagnosis of neurosyphilis (AIII).

Neurosyphilis

- Neurosyphilis should be treated with aqueous penicillin G for 10 to 14 days (AII).
- If a patient has signs or symptoms consistent with neurosyphilis, and repeat CSF examination is consistent with CNS involvement and cannot be attributable to other ongoing illness, re-treatment for neurosyphilis is recommended (AIII);
- Re-treatment of neurosyphilis should be considered if the CSF white blood cell count has not decreased 6 months after completion of treatment or if the CSF white blood cell count or protein is not normal 2 years after treatment (BIII).

For All Syphilis

- For penicillin-allergic patients or for a discussion of alternative therapies such as doxycycline, ceftriaxone, or azithromycin, please see pages 30, 34, and 38 of [the Centers for Disease Control and Prevention STD Treatment Guidelines, 2010](#).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion

[†]Studies that include children or children/adolescents, but not studies limited to post-pubertal adolescents

Toxoplasmosis

Updated: December 22, 2025

Reviewed: December 22, 2025

Panel's Recommendations
Preventing Exposure - Children with HIV should avoid ingesting undercooked meals that could contain tissue cysts and contact with cat feces that could contain sporulated oocysts (AIII). Primary Prophylaxis - Prophylaxis against <i>Toxoplasma</i> encephalitis (TE) should be administered to children with HIV who are <i>Toxoplasma</i>-seropositive and aged <1 year with CD4 T lymphocyte (CD4) cell percentage $\leq 26\%$ (CD4 count ≤ 750 cells/mm³), aged 1–5 years with CD4 percentage $\leq 22\%$ (CD4 count ≤ 500 cells/mm³), or ≥ 6 years with CD4 count ≤ 100 cells/mm³ (AIII). - The preferred agent for TE prophylaxis is trimethoprim-sulfamethoxazole (TMP-SMX) which is administered by weight-equivalent dosing for children (AII*). One double-strength tablet of TMP-SMX, three times weekly (or 3 consecutive days a week), is an alternative (AII*). Alternative therapies, such as dapsone/pyrimethamine plus leucovorin (BI*) or atovaquone with or without pyrimethamine (CIII), exist for those who do not tolerate TMP-SMX. - Preventive therapy can be discontinued once a child responds to antiretroviral therapy (ART) with a sustained rise (>3 months) in children aged 1–5 years with CD4 percentage $>22\%$ (CD4 count >500 cells/mm³) or children aged ≥ 6 years with CD4 count >200 cells/mm³ (see Introduction, Table 2) (AIII). Prophylaxis should not be discontinued in patients less than 1 year of age. Primary prophylaxis should be reintroduced if these parameters are not met (BIII). Treatment - Most experts recommend treatment with acute toxoplasmosis during pregnancy in an attempt to prevent fetal infection. For more extensive information on diagnosis, prevention, and treatment during pregnancy with toxoplasmosis, please see the Toxoplasmosis section of the Adult and Adolescent Opportunistic Infection Guidelines. - Empiric therapy should be strongly considered for newborns of mothers with HIV who had symptomatic or asymptomatic primary <i>Toxoplasma</i> infection during pregnancy, regardless of whether treatment was administered during pregnancy (BIII). - The preferred treatment for congenital toxoplasmosis is pyrimethamine plus sulfadiazine, with supplementary leucovorin (folinic acid) (AII). - The primary alternative for sulfadiazine in patients who develop sulfonamide hypersensitivity is clindamycin, administered with pyrimethamine and leucovorin (AI*). - The recommended treatment duration for congenital toxoplasmosis in infants with HIV is 12 months (AIII). - Therapy for acquired toxoplasmosis in children with HIV is pyrimethamine plus sulfadiazine and leucovorin (AII). Older children with HIV and acquired central nervous system, ocular, or systemic toxoplasmosis should be treated with pyrimethamine and leucovorin plus sulfadiazine (AI*). - Acute therapy should be continued for 6 weeks, assuming clinical and radiologic improvement (BII*). Longer courses of treatment may be required for extensive disease or poor response after 6 weeks. - Anticonvulsants should be given to children with TE who have a history of seizures but should not be administered prophylactically to children without a history of seizures (AIII). - Corticosteroids are recommended for children with HIV and central nervous system toxoplasmosis when cerebrospinal fluid protein is highly elevated (i.e., $>1,000$ mg/dL) or when focal lesions with substantial mass effect are present (BIII).

Panel's Recommendations
Secondary Prophylaxis - Children who have completed initial therapy for TE should be given suppressive therapy (i.e., secondary prophylaxis or chronic maintenance therapy) unless ART results in immune reconstitution (AI*). The preferred suppressive therapy for TE is sulfadiazine plus pyrimethamine and leucovorin (AI*). - Secondary prophylaxis can be discontinued in children on ART aged >1 year who are asymptomatic after completing TE therapy, with a concomitant and sustained rise (>3 months) to CD4 percentage >22% (CD4 count >500 cells/mm³) in children aged 1–5 years or CD4 >200 cells/mm³ in children ≥6 years of age (AIII). Secondary prophylaxis should be reinstituted if these parameters are not met (BIII).
<i>Rating of Recommendations: A = Strong; B = Moderate; C = Optional</i> <i>Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion</i> [†]Studies that include children or children/adolescents, but not studies limited to postpubertal adolescents

Varicella-Zoster Virus Disease

Updated: April 23, 2026

Reviewed: April 23, 2026

Panel's Recommendations
Vaccination and Post-exposure Prophylaxis - Children aged ≥ 12 months and adolescents with HIV stage 1 or 2 without evidence of immunity to varicella should receive two doses of single-antigen varicella vaccine (VAR; Varivax) according to routine or catch-up vaccination schedules (AI). VAR is not recommended for children with HIV stage 3 (AIII). - Children and adolescents with HIV who are susceptible to varicella or who have severe (stage 3) immunosuppression and have had a significant exposure to varicella or herpes zoster (HZ) should receive varicella-zoster immune globulin (available as intramuscular VariZig) as soon as possible (ideally within 96 hours but up to 10 days) after exposure (AI). Varicella vaccine should be administered 5 months after receipt of VariZig in eligible children (AIII). - Refer to the Varicella Vaccine section of Figure 1. Recommended Immunization Schedule for detailed recommendations. Treatment of Varicella and Herpes Zoster - Intravenous (IV) acyclovir is the preferred drug for the initial treatment of varicella infection in children with HIV, especially those with severe immunosuppression (stage 3) or those who have high fever, abdominal pain, respiratory symptoms, or numerous or deep, necrotic, or hemorrhagic skin lesions (AI). IV acyclovir should be initiated as soon as possible after varicella lesions appear and shows the most benefit when initiated within 24 hours of rash onset. For children with HIV stage 1 or 2 who have mild varicella disease, varicella can be initially treated with oral valacyclovir (if ≥ 3 months of age) or oral acyclovir (BII). - For children ≥ 3 months of age with HIV and uncomplicated HZ, oral valacyclovir is the treatment of choice (AI*). Initial IV acyclovir administration is recommended for children with HIV with severe immunosuppression (stage 3) and HZ, extensive multidermatomal HZ, trigeminal or sacral nerve involvement, disseminated infection, visceral involvement, or otherwise complicated HZ (AI*). - Children in whom lesions continue to develop, fail to heal, or progress after 7 days of treatment may have acyclovir-resistant varicella-zoster virus. Resistance is rare and primarily occurs in immunocompromised individuals. Because resistance testing may be difficult to arrange and delays treatment, the decision to change therapy should be based on current clinical status, and foscarnet should be administered immediately if clinical status is deteriorating (AII*). Rating of Recommendations: A = Strong; B = Moderate; C = Optional Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term clinical outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = Expert opinion [†]Studies that include children or children/adolescents, but not studies limited to postpubertal adolescents.