Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

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Indication	First Choice	Alternative	Comments/Special Issues
Bacterial Infections Bacterial pneumonia; *S. pneumoniae;* occasionally *S. aureus, H. influenzae,* *P. aeruginosa*	• Amoxicillin 90 mg/kg/dose orally divided every 8 or 12 hours (max 1 g/dose) for outpatient management, *or* • Ampicillin 200–400 mg/kg/day divided every 6 hours (max 2 g/dose) (use higher dose if *S. pneumoniae* MIC ≥4 mcg/mL), *or* • Ceftriaxone 50–100 mg/kg body weight per dose once daily, or 25–50 mg/kg body weight per dose twice daily IV or IM (max 4 g/day)	• Ceftazidime 200–300 mg/kg/day divided every 8 hours IV or IM (max 12 g/day), *or* • Cefepime 50 mg/kg/dose every 8 hours IV or IM (max 2 g/dose)	Alternative treatment should be determined based on local antimicrobial susceptibility patterns or that of the bacterial isolate, if available. For children who are receiving combination ART, have mild or no immunosuppression, and have mild-to-moderate community-acquired pneumonia, oral therapy option would be amoxicillin 45 mg/kg/dose twice daily (maximum dose: 4 g per day). Add azithromycin for hospitalized patients to treat other common community-acquired pneumonia pathogens (*M. pneumoniae, C. pneumoniae*). Add clindamycin or vancomycin if methicillin-resistant *S. aureus* is suspected (base the choice on local susceptibility patterns). For patients with neutropenia, chronic lung disease other than asthma (e.g., LIP, bronchiectasis) or indwelling venous catheter, consider regimen that includes activity against *P. aeruginosa* (such as ceftazidime or cefepime instead of ceftriaxone). Consider PCP in patients with severe pneumonia or more advanced HIV disease. Evaluate for tuberculosis, cryptococcosis, and endemic fungi as epidemiology suggests.

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Candida Infections	Oropharyngeal *Uncomplicated Infection* • Clotrimazole troches, 10-mg troche PO four or five times daily • Nystatin suspension 4–6 mL PO four times daily, *or* one or two 200,000-unit flavored pastilles by mouth four or five times daily *Moderate to Severe OPC* • Fluconazole 3–6 mg/kg/dose PO once daily (maximum dose: 400 mg/day) *Treatment Duration* • 7 to 14 days	Oropharyngeal (Fluconazole-Refractory) • Itraconazole oral solution 2.5 mg/kg body weight/dose PO twice daily (maximum 200–400 mg/day) for 7–14 days • Posaconazole PowderMix for delayed-release oral suspension in children age ≥2 years and in the weight band for 7–14 days: o *10 kg to <12 kg*: 90 mg PO twice daily on Day 1, followed by 90 mg PO once daily o *12 kg to <17 kg:* 120 mg PO twice daily on Day 1, followed by 120 mg PO once daily o *17 kg to <21 kg:* 150 mg PO twice daily on Day 1, followed by 150 mg PO once daily o *21 kg to <26 kg:* 180 mg PO twice daily on Day 1, followed by 180 mg PO once daily o *26 kg to <36 kg:* 210 mg PO twice daily on Day 1, followed by 210 mg PO once daily o *36–40 kg:* 240 mg PO twice daily on Day 1, followed by 240 mg PO once daily • Posaconazole delayed-release *tablets* in children ≥2 years old and >40 kg body weight: 300 mg PO twice daily on	Itraconazole oral solution **should not** be used interchangeably with itraconazole capsules. Itraconazole capsules are generally ineffective for treatment of esophageal disease. Central venous catheters should be removed, when feasible, in children with HIV with fungemia. In uncomplicated catheter-associated *C. albicans* candidemia, an initial course of amphotericin B followed by fluconazole to complete treatment can be used (use invasive disease dosing). Voriconazole has been used to treat esophageal candidiasis in a small number of immunocompromised children without HIV. Voriconazole Dosing in Pediatric Patients • Voriconazole 9 mg/kg body weight/dose every 12 hours IV loading for Day 1, followed by voriconazole 8 mg/kg body weight/dose IV every 12 hours. • Conversion to oral voriconazole should be at 9 mg/kg body weight/dose orally every 12 hours. • Children aged ≥12 years and weighing ≥40 kg can use adult dosing (load voriconazole 6 mg/kg body weight/dose every 12 hours IV on Day 1, followed by 4 mg/kg body weight/dose every 12 hours IV. Conversion to oral therapy at 200 mg every 12 hours by mouth). Anidulafungin in Children Aged 2–17 Years

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		Day 1, followed by 300 mg PO once daily for 7–14 days • Posaconazole oral suspension: 6 mg/kg/dose three times daily for 7–14 days • Posaconazole IV: 6 mg/kg/dose (maximum 300 mg) IV twice daily on Day 1, followed by 6 mg/kg/dose (maximum 300 mg) IV once daily for 7–14 days • *Alternative:* Voriconazole: Dosing as per esophageal disease below • *Alternative:* Echinocandins: Dosing as per esophageal disease below • *Alternative:* Lipid formulation amphotericin B 3–4 mg/kg daily. Note: Low-dose lipid formulation amphotericin B dosing has not been established. • *Alternative:* Amphotericin B (deoxycholate) 0.3–0.5 mg/kg body weight IV once daily	• Loading dose of 3 mg/kg body weight/once daily followed by 1.5 mg/kg body weight/once daily (100 mg/day maximum). Fluconazole Dosing Considerations • If a neonate's creatinine level is >1.2 mg/dL for >3 consecutive doses, the dosing interval for fluconazole 12 mg/kg body weight may be prolonged to one dose every 48 hours until the serum creatinine level is <1.2 mg/dL • *Aged ≥18 Years*: 400 mg/dose once daily (6 mg/kg body weight once daily)
	Esophageal Disease • Fluconazole 6 mg/kg/day PO once on Day 1, then 3–6 mg/kg/dose PO once daily (maximum dose: 12 mg/kg/day, 400 mg/day) *Treatment Duration* • 14–21 days	Esophageal Disease (Intolerance of Oral Therapy) • Fluconazole 6 mg/kg/day IV once on Day 1, then 3–6 mg/kg/dose IV once daily (maximum dose: 12 mg/kg/day, 400 mg/day) for 14–21 days *Echinocandins* • Anidulafungin	N/A

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		○ *Aged 1 Month to 17 Years*: Loading dose of 3 mg/kg body weight/daily and then maintenance at 1.5 mg/kg body weight/dose daily IV (maximum 100 mg/day) • Caspofungin ○ Infants Aged *<3 Months*: 25 mg/m^2 BSA/dose daily IV ○ *Aged 3 Months to 17 Years*: 70 mg/m^2/day IV loading dose followed by 50 mg/m^2/day IV (maximum 70 mg). Note: Dosing of caspofungin for children should be based on BSA. • Micafungin ○ Note: In the United States, optimal dosing for infants younger than 4 months is not yet established. Studies indicate linear PK; age and clearance are inversely related (see recommended doses below). ○ *Neonates*: Up to 10–12 mg/kg body weight/dose daily IV may be required to achieve therapeutic concentrations. ○ *Ages ≥4 Months and Weight ≤30 kg:* 3 mg/kg body weight/dose IV daily ○ *Ages ≥4 Months and Weight >30 kg:* 2.5 mg/kg body weight/dose IV daily (maximum dose: 150 mg/day)	

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Indication	First Choice	Alternative	Comments/Special Issues
		• Lipid formulation amphotericin B 3–4 mg/kg daily. Note: Low-dose lipid formulation amphotericin B dosing has not been established. • Amphotericin B (deoxycholate) 0.3–0.5 mg/kg body weight IV once daily Esophageal Disease (Fluconazole-Refractory) • Itraconazole oral solution 2.5 mg/kg body weight/dose PO twice daily • Voriconazole o *Ages 2 Years to <12 Years:* 4 mg/kg body weight/dose IV every 12 hours. Consider switch to 9 mg/kg/dose (maximum 350 mg) PO every 12 hours only after significant clinical improvement. o *Ages 12–14 Years and Weight <50 kg:* 4 mg/kg body weight/dose IV every 12 hours. Consider switch to 9 mg/kg/dose (maximum 350 mg) PO every 12 hours only after significant clinical improvement. o *Ages 12–14 Years and Weight ≥50 kg:* 200 mg PO/IV every 12 hours o *Ages ≥15 Years and Weight <40 kg:* 100 mg PO/IV every 12 hours o *Ages ≥15 Years and Weight ≥40 kg:* 200 mg PO/IV every 12 hours • *Alternative:* Echinocandins: Dosing as above	

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		• *Alternative:* Lipid formulation amphotericin B: Dosing as above • *Alternative:* Amphotericin B (deoxycholate): Dosing as above • *Alternative:* Posaconazole: Dosing as above • *Alternative:* Isavuconazonium sulfate IV (372 mg/vial) o *Ages 1 Year to <3 Years and Weight <18 kg:* 15 mg/kg body weight/dose every 8 hours IV loading for six doses (48 hours), followed by 15 mg/kg once daily o *Ages 3 Years to <18 Years and Weight <37 kg:* 10 mg/kg every 8 hours IV loading for six doses (48 hours), followed by 10 mg/kg once daily IV o *Ages 3 Years to <18 Years and Weight ≥37 kg:* 372 mg (total dose) every 8 hours IV loading for six doses (48 hours), followed by 372 mg (total dose) once daily IV • *Alternative:* Isavuconazonium sulfate capsules (74.5 mg/capsule) o *Ages 6 Years to <18 Years and Weight 16 kg to <25 kg:* 149 mg (2 capsules) PO every 8 hours loading for six doses (48 hours), followed by 149 mg (2 capsules) PO once daily o *Ages 6 Years to <18 Years and Weight 18 kg to <25 kg:* 223.5 mg	

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		(3 capsules) PO every 8 hours loading for six doses (48 hours), followed by 223.5 mg (3 capsules) PO once daily o *Ages 6 Years to <18 Years and Weight 25 kg to <32 kg:* 298 mg (4 capsules) PO every 8 hours loading for six doses (48 hours), followed by 298 mg (4 capsules) PO once daily o *Ages 6 Years to <18 Years and Weight ≥32 kg:* 372 mg (5 capsules) PO every 8 hours loading for six doses (48 hours), followed by 372 mg (5 capsules) PO once daily *Treatment Duration* • 14–21 days	
	Invasive Disease: Moderately Severe to Severely Ill *Echinocandin Recommended* • Anidulafungin o *Aged 1 Month–17 Years*: Load with 3 mg/kg body weight/daily dose IV and then maintenance dose at 1.5 mg/kg body weight once daily (maximum 100 mg/day) • Caspofungin: o *Infants Aged <3 Months*: 25 mg/m^2 BSA/dose once daily IV	Invasive Disease • Fluconazole 25 mg/kg body weight/dose once IV/PO loading for Day 1, followed by 12 mg/kg body weight IV/PO once daily (maximum 600 mg/day) for minimum 2 weeks after last positive blood culture (if uncomplicated candidemia) o For infants aged ≤3 months and gestational age <30 weeks, maintenance dosing is 9 mg/kg/dose IV/PO daily • Lipid formulations of amphotericin B, 3–5 mg/kg body weight IV once daily	Central venous catheters should be removed, when feasible, in children with HIV with fungemia. The preferred treatment for invasive disease in children with HIV depends on severity of disease, previous azole exposure, and *Candida* isolate obtained (if known). If a child with uncomplicated invasive candidiasis is initiated on an intravenous antifungal agent, such as an echinocandin or an amphotericin B formulation, step-down therapy to an oral agent such as fluconazole can be considered when the patient is clinically improved, has isolates susceptible to the oral agent, and have negative repeat blood cultures following initiation of antifungal therapy.

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	○ *Aged 3 Months–17 Years:* 70 mg/m^2 BSA/day loading dose followed by 50 mg/m^2 once daily (maximum 70 mg). Note: Dosing of caspofungin in children should be based on BSA. • Micafungin: ○ Note: In the United States, optimal dosing for infants younger than 4 months is not yet established. Studies indicate linear PK; age and clearance are inversely related (see recommended doses below). ○ *Neonates*: Up to 10–12 mg/kg body weight/dose daily IV may be required to achieve therapeutic concentrations. ○ *Infants <15 kg Body Weight:* 5–7 mg/kg/day ○ *Children ≤40 kg Body Weight and Aged 2–8 Years*: 3–4 mg/kg body weight/dose daily IV ○ *Children ≤40 kg Body Weight and Aged 9–17 Years:* 2–3 mg/kg body weight/dose daily ○ *Children >40 kg Body Weight:* 100 mg/dose daily IV *Treatment Duration* • Based on presence of deep-tissue foci and clinical response; in those	• Amphotericin B deoxycholate, 1 mg/kg body weight IV once daily in the neonatal period • Voriconazole: ○ *Ages 2 Years to <12 Years:* 9 mg/kg body weight/dose every 12 hours IV loading for two doses, followed by voriconazole 8 mg/kg body weight/dose IV every 12 hours. Conversion to oral voriconazole should be at 9 mg/kg/dose (maximum 350 mg) PO every 12 hours. ○ *Ages 12–14 Years and Weight <50 kg:* 9 mg/kg body weight/dose every 12 hours IV loading for two doses, followed by voriconazole 8 mg/kg body weight/dose IV every 12 hours. Conversion to oral voriconazole should be at 9 mg/kg/dose (maximum 350 mg) PO every 12 hours. ○ *Ages 12–14 Years and Weight ≥50 kg:* Load voriconazole 6 mg/kg body weight/dose every 12 hours IV for two doses, followed by 3–4 mg/kg body weight/dose IV every 12 hours. Conversion to oral therapy should be at 200 mg PO every 12 hours. If response is inadequate, may increase to 300 mg PO every 12 hours. ○ *Ages ≥15 Years and Weight <40 kg:* Load voriconazole 6 mg/kg body	Voriconazole can be used in situations in which mold coverage is also warranted.

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	with candidemia, treat until 2 weeks after last positive blood culture. Invasive Candidiasis: Mildly to Moderately Ill *Fluconazole Recommended* • Fluconazole 25 mg/kg body weight/dose once IV/PO loading for Day 1, followed by 12 mg/kg body weight/dose IV/PO daily (maximum dose: 600 mg) • For infants aged ≤3 months and gestational age <30 weeks, fluconazole maintenance dosing is 9 mg/kg/dose IV daily. • Avoid fluconazole for *C. krusei* and *C. glabrata.* See dosing for echinocandins above. • Use caution with echinocandins for *C. parapsilosis*. *Treatment Duration* • Based on presence of deep-tissue foci and clinical response; in those with candidemia, treat until 2 weeks after last positive blood culture.	weight/dose every 12 hours IV for two doses, followed by 3–4 mg/kg body weight/dose IV every 12 hours. Conversion to oral therapy should be at 100 mg PO every 12 hours. If response is inadequate, may increase to 150 mg PO every 12 hours. o *Ages ≥15 Years and Weight ≥40 kg:* Load voriconazole 6 mg/kg body weight/dose every 12 hours IV for two doses, followed by 3–4 mg/kg body weight/dose IV every 12 hours. Conversion to oral therapy should be at 200 mg PO every 12 hours. If response is inadequate, may increase to 300 mg PO every 12 hours. *Treatment Duration* • Based on presence of deep-tissue foci and clinical response; in those with candidemia, treat until 2 weeks after last positive blood culture.	
	Invasive Disease: CNS *Neonates* • *Initial:* Amphotericin B deoxycholate 1 mg/kg body weight/dose IV daily,	Invasive Disease: CNS *Neonates* • Amphotericin B deoxycholate 1 mg/kg body weight/dose IV daily, *or* liposomal	Infected CNS devices should be removed if possible. For patients in whom a ventricular device cannot be removed, amphotericin B deoxycholate could be administered through the device into the ventricle. Intrathecal neonatal doses have ranged from 0.5 mg/day in 2 mL of D5W to 0.6 mg/day in 0.5 mL of

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	or liposomal amphotericin B 5 mg/kg body weight/dose IV daily • *Step-Down (If Fluconazole-Susceptible):* Fluconazole 25 mg/kg body weight/dose once IV/PO loading for Day 1, followed by 12 mg/kg body weight/dose IV/PO daily *Children* • *Initial:* Liposomal amphotericin B 5 mg/kg body weight/dose IV daily +/- flucytosine 25 mg/kg body weight/dose PO four times daily • *Step-Down (If Fluconazole-Susceptible):* Fluconazole 25 mg/kg body weight/dose once IV/PO loading for Day 1, followed by 12 mg/kg body weight/dose IV/PO daily (maximum dose: 800 mg) *Treatment Duration* • ≥1 month until all signs, symptoms, and CSF and radiographic abnormalities have resolved	amphotericin B 5 mg/kg body weight/dose IV daily, *and* • Flucytosine 25 mg/kg body weight/dose PO four times daily as salvage therapy *Children* • *Initial:* Amphotericin B deoxycholate 0.7–1 mg/kg body weight/dose IV daily IV daily (maximum 1.5 mg/kg/day) +/- flucytosine 25 mg/kg body weight/dose PO four times daily • *Step-Down (If Fluconazole-Susceptible):* Fluconazole 25 mg/kg body weight/dose once IV/PO loading for Day 1, followed by 12 mg/kg body weight/dose IV/PO daily (maximum dose: 800 mg)	D5W (total doses were 0.15 mg to 8.6 mg); doses of 0.125 to 0.25 mg have been administered to children via an Ommaya reservoir. Lipid formulations of amphotericin may not adequately penetrate the kidneys and should only be used with caution in neonates when urinary tract involvement is suspected or confirmed. Fluconazole dosing for CNS candidiasis is unknown but based on dosing for *Candida* invasive disease and maximums from cryptococcal meningitis. In neonates with CNS candidiasis, micafungin 10–15 mg/kg/dose IV daily may be considered as alternative therapy in special circumstances, such as salvage therapy or situations in which toxicity or drug resistance (e.g., *C. glabrata*) preclude the use of the preferred agents.
Coccidioidomycosis	Severe Illness With Respiratory Compromise Due to Diffuse Pulmonary or Disseminated Non-Meningitic Disease • Liposomal amphotericin B preparation at a dose of 5 mg/kg body weight IV once daily (dose can be increased to as much as	Severe Illness With Respiratory Compromise Due to Diffuse Pulmonary or Disseminated Non-Meningitic Disease *If Unable to Use Amphotericin B—* • Fluconazole 12 mg/kg body weight (maximum 800–1,200 mg) per dose IV or by mouth once daily	Surgical debridement of bone, joint, and/or excision of cavitary lung lesions may be helpful. Itraconazole is the preferred azole for treatment of bone infections. Fluconazole can be used as an alternative agent.

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	10 mg/kg body weight IV once daily for life-threatening infections) • Amphotericin B deoxycholate 0.5–1.0 mg/kg body weight IV once daily until clinical improvement. • Liposomal amphotericin B is the treatment of choice with similar efficacy and fewer adverse events. • After the patient is stabilized, therapy with an azole (fluconazole or itraconazole) can be substituted and continued to complete a 1-year course of antifungal therapy.	• Treatment is continued for a total of 1 year, followed by secondary prophylaxis.	Some experts initiate an azole during amphotericin B therapy. Others defer initiation of the azole until after amphotericin B is stopped. For treatment failure, can consider voriconazole, isavuconazole, caspofungin, or posaconazole (or combinations). However, experience is limited in children. Options should be discussed with an expert in the treatment of coccidioidomycosis. Chronic suppressive therapy (secondary prophylaxis) with fluconazole or itraconazole is routinely recommended following initial induction therapy for disseminated disease. Therapy with amphotericin B results in a more rapid clinical response in severe, non-meningeal disease.
	Mild-to-Moderate Non-Meningeal Coccidioidal Infection • Fluconazole 6–12 mg/kg body weight (maximum 400 mg) per dose IV or by mouth once daily for 6–12 months and clinical improvement	Mild-to-Moderate Non-Meningeal Coccidioidal Infection • Itraconazole 2–5 mg/kg body weight (maximum dose 200 mg) per dose IV or PO three times daily for 3 days, then 2–5 mg/kg body weight (maximum dose 200 mg) PO per dose twice daily thereafter for 6–12 months and clinical improvement • *Age ≥13 Years:* Posaconazole oral (delayed-release tablets), 300 mg twice daily for two doses, followed by 300 mg daily for 6–12 months and clinical improvement	Surgical debridement of bone, joint, and/or excision of cavitary lung lesions may be helpful. Itraconazole is the preferred azole for treatment of bone infections. Fluconazole can be used as an alternative agent. For treatment failure, can consider voriconazole, isavuconazole, caspofungin, or posaconazole (or combinations). However, experience is limited in children. Options should be discussed with an expert in the treatment of coccidioidomycosis. Secondary prophylaxis should be considered after treatment of milder disease if CD4 count remains <250 cells/mm^3 or CD4 percentage <15%.

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	Coccidioidal Meningitis • Lifelong fluconazole 12 mg/kg body weight (maximum 800–1,200 mg) per dose IV or PO once daily	Coccidioidal Meningitis • IV liposomal amphotericin B plus intrathecal amphotericin B deoxycholate followed by secondary prophylaxis	For treatment failure, can consider posaconazole, isavuconazole, or voriconazole. Chronic suppressive therapy (secondary prophylaxis) with fluconazole is continued lifelong for meningeal disease. Options for treatment and secondary prophylaxis should be discussed with an expert in the treatment of coccidioidomycosis in children.
COVID-19	Non-hospitalized Children at High Risk of Progression to Severe COVID-19 *Aged ≥28 Days to <12 Years* • Remdesivir (Veklury) o ≥3 to <40 kg: Lyophilized powder only; IV loading dose: 5 mg/kg/dose on Day 1, followed by 2.5 mg/kg/dose once daily on Days 2 and 3 o ≥40 kg: Injection solution or lyophilized powder; IV loading dose: 200 mg on Day 1, followed by 100 mg once daily on Days 2 and 3 *Aged ≥12 Years and ≥40 kg* • Nirmatrelvir 300 mg and ritonavir 100 mg, administered together (Paxlovid), twice daily for 5 days Hospitalized Children • Remdesivir (Veklury)	Non-hospitalized Children at High Risk of Progression to Severe COVID-19 *Aged ≥28 Days to <12 Years* • N/A *Aged ≥12 Years* • Remdesivir (Veklury) o ≥3 to <40 kg: Lyophilized powder only, IV: loading dose: 5 mg/kg/dose on Day 1, followed by 2.5 mg/kg/dose once daily on Days 2 and 3	Remdesivir is administered intravenously. When given to non-hospitalized patients, duration is for 3 days. When given to hospitalized patients, duration is generally 5 days or until hospital discharge, whichever is first, but may extend to up to 10 days based on clinical response. Remdesivir should be started within 7 days of symptom onset but could be considered if presenting with >7 days of symptoms in children with severe immunosuppression. Ritonavir-boosted nirmatrelvir is an oral PI that may be administered with other ARVs, including those that contain ritonavir or cobicistat, without any interruption or modification to the usual ART. However, there is potential for significant drug–drug interactions with other medications, requiring dose or frequency adjustment or avoidance. Consult a drug interactions database, such as the University of Liverpool COVID-19 Drug–Drug Interaction website, for further guidance. Ritonavir-boosted nirmatrelvir should be started within 5 days of symptom onset. Renal and hepatic function should be evaluated prior to initiating ritonavir-boosted nirmatrelvir, and doses should be adjusted if needed. Dexamethasone has potential for drug–drug interactions, including with NNRTIs. Providers should

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	○ ≥3 to <40 kg: Lyophilized powder only; IV loading dose: 5 mg/kg/dose on Day 1, followed by 2.5 mg/kg/dose once daily on Days 2 through 5 ○ ≥40 kg: Injection solution or lyophilized powder; IV loading dose: 200 mg on Day 1, followed by 100 mg once daily on Days 2 through 5 • Dexamethasone 0.15 mg/kg (with a maximum dose of 6 mg), oral or IV, once daily for up to 10 days		consult a drug interactions resource, such as the University of Liverpool COVID-19 Drug–Drug Interaction website, for further guidance. Alternative corticosteroids, such as hydrocortisone or methylprednisolone, may be considered if dexamethasone is not available or if alternative corticosteroids are being administered for another indication.
Cryptococcosis	CNS Disease *Acute Therapy (Minimum 2-Week Induction Followed by Consolidation Therapy)* • Amphotericin B deoxycholate 1.0 mg/kg body weight (or liposomal amphotericin B 6 mg/kg body weight) IV once daily ***plus*** flucytosine 25 mg/kg body weight per dose by mouth given 4 times daily *Consolidation Therapy (Followed by Secondary Prophylaxis)* • Fluconazole 12 mg/kg body weight on Day 1, then 10–12 mg/kg body weight (max 800 mg) once daily IV or by mouth for a minimum of 8 weeks	CNS Disease *Acute Therapy (Minimum 2-Week Induction Followed by Consolidation Therapy)* • If Flucytosine Not Tolerated or Unavailable— ○ A. Liposomal amphotericin B, 6 mg/kg body weight IV once daily, **or** Amphotericin B Lipid Complex, 5 mg/kg body weight IV once daily, **or** Amphotericin B deoxycholate, 1.0–1.5 mg/kg body weight IV once daily **alone or B. in combination** with high-dose fluconazole (12 mg/kg body weight on day 1 and then 10–12 mg/kg body weight [max 800 mg] IV). **Note:** Data-driven pediatric dosing guidelines are unavailable	In patients with meningitis, CSF culture should be negative prior to initiating consolidation therapy. Overall, *in vitro* resistance to antifungal agents used to treat cryptococcosis remains uncommon. Newer azoles (voriconazole, posaconazole, ravuconazole) are all very active *in vitro* against *C. neoformans* but published clinical experience on their use for cryptococcosis is limited. Liposomal amphotericin and amphotericin B lipid complex are especially useful for children with renal insufficiency or infusion-related toxicity to amphotericin B deoxycholate. Liposomal amphotericin and amphotericin B lipid complex are **significantly** more expensive than amphotericin B deoxycholate. Liquid preparation of itraconazole (if tolerated) is preferable to tablet formulation because of better

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		for fluconazole with use of such combination therapy. • If Amphotericin B-Based Therapy Not Tolerated— o Fluconazole, 12 mg/kg body weight on Day 1 and then 10–12 mg/kg body weight (maximum 800 mg) IV or by mouth once daily plus flucytosine, 25 mg/kg body weight per dose by mouth given 4 times daily • Consolidation Therapy (Followed by Secondary Prophylaxis) o Itraconazole 5–10 mg/kg body weight by mouth given once daily, or 2.5–5 mg/kg body weight given twice daily (maximum 200 mg/dose) for a minimum of 8 weeks. A loading dose (2.5–5 mg/kg body weight per dose 3 times daily) is given for the first 3 days (maximum 200 mg/dose; 600 mg/day). See comment on itraconazole under Other Options/Issues.	bioavailability, but it is more expensive. Bioavailability of the solution is better than the capsule, but there were no upfront differences in dosing range based on preparation used. Ultimate dosing adjustments should be guided by itraconazole levels. Serum itraconazole concentrations should be monitored to optimize drug dosing. Amphotericin B may increase toxicity of flucytosine by increasing cellular uptake, or impair its renal excretion, or both. Flucytosine dose should be adjusted to keep 2-hour post-dose drug levels at 40–60 µg/mL. Oral acetazolamide should not be used for reduction of ICP in cryptococcal meningitis. Corticosteroids and mannitol have been shown to be ineffective in managing ICP in adults with cryptococcal meningitis. Secondary prophylaxis is recommended following completion of initial therapy (induction plus consolidation)—drugs and dosing listed above. [a] Duration of therapy for non-CNS disease depends on site and severity of infection and clinical response
	Localized Disease, Including Isolated Pulmonary Disease (CNS Not Involved)[a] • Fluconazole 12 mg/kg body weight on Day 1 and then 6–12 mg/kg body weight (maximum 600 mg) IV or by mouth once daily	Localized Disease Including Isolated Pulmonary Disease (CNS Not Involved)[a] • Amphotericin B, 0.7–1.0 mg/kg body weight, *or* • Amphotericin liposomal 3–5 mg/kg body weight, *or*	

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		• Amphotericin lipid complex, 5 mg/kg body weight IV once daily	
	Disseminated Disease (CNS Not Involved) or Severe, Pulmonary Disease[a] • Amphotericin B 0.7–1.0 mg/kg body weight, *or* • Liposomal amphotericin, 3–5 mg/kg body weight, *or* • Amphotericin B lipid complex 5 mg/kg body weight IV once daily (± flucytosine)	Disseminated Disease (CNS Not Involved) or Severe, Pulmonary Disease[a] • Fluconazole, 12 mg/kg body weight on Day 1 and then 6–12 mg/kg body weight (maximum 600 mg) IV or by mouth once daily	
Cryptosporidiosis	Effective ART • Immune reconstitution might lead to parasitologic and clinical response	There is no consistently effective therapy for cryptosporidiosis in patients with HIV infection; optimized ART and a trial of nitazoxanide should be considered. Nitazoxanide • 1–3 years of age: Nitazoxanide (20 mg/mL oral solution) 100 mg orally twice daily with food • 4–11 years of age: Nitazoxanide (20 mg/mL oral solution) 200 mg orally twice daily with food • ≥12 years of age: Nitazoxanide tablet 500 mg orally twice daily with food *Treatment Duration* • 3–14 days	Supportive Care • Hydration, correct electrolyte abnormalities, nutritional support Antimotility agents (such as loperamide) should be used with caution in young children.

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Cytomegalovirus Infection (CMV)	Symptomatic Congenital Infection With Neurologic Involvement • Ganciclovir 6 mg/kg body weight per dose IV every 12 hours for 6 weeks, *or* • Valganciclovir 16 mg/kg body weight per dose orally twice daily for 6 months		Data on valganciclovir dosing in young children for treatment of retinitis are unavailable, but consideration can be given to transitioning from IV ganciclovir to oral valganciclovir after improvement of retinitis is noted. Intravitreal injections of ganciclovir, foscarnet, or cidofovir are used in adults for retinitis but are not practical for most children. Combination ganciclovir and foscarnet is associated with substantial rates of adverse effects, and optimal treatment for neurologic disease in children is unknown, particularly if receiving optimized ART. Chronic suppressive therapy (secondary prophylaxis) is recommended in adults and children following initial therapy of disseminated disease, retinitis, neurologic disease, or GI disease with relapse.
	Disseminated Disease and Retinitis *Induction Therapy* • Ganciclovir 5 mg/kg body weight per dose IV every 12 hours for 14–21 days (may be increased to 7.5 mg/kg body weight per dose IV twice daily) *Chronic Maintenance Therapy* • Ganciclovir 5 mg/kg body weight once daily for 5–7 days	Disseminated Disease and Retinitis *Induction Therapy* • Foscarnet, 60 mg/kg body weight per dose IV every 8 hours or 90 mg/kg body weight per dose IV every 12 hours for 14–21 days *Chronic Maintenance Therapy* • Foscarnet 90–120 mg/kg body weight IV once daily *Alternative Therapy for Retinitis (Followed by Chronic Maintenance Therapy; See Cytomegalovirus Row in Secondary Prophylaxis Table)* • Valganciclovir tablets 900 mg per dose orally twice daily for 14–21 days, followed by chronic suppressive therapy (see above). o Note: This is an option in older children who can receive the adult dose (based on their BSA) and in patients with mild disease.	

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
		• IV ganciclovir ***plus*** IV foscarnet (at above induction doses) may be considered as initial induction therapy in children with sight-threatening disease or for treatment following failure/relapse on monotherapy. • Cidofovir is also used to treat CMV retinitis in adults who are intolerant to other therapies. Induction dosing in adults is 5 mg/kg body weight IV once weekly for 2 weeks, followed by chronic suppressive therapy (see Cytomegalovirus row in Secondary Prophylaxis table); however, data on dosing in children are unavailable. Must be given with probenecid and IV hydration.	
	Central Nervous System Disease *Induction Therapy* • Ganciclovir 5 mg/kg body weight per dose IV every 12 hours ***plus*** foscarnet 60 mg/kg body weight per dose IV every 8 hours (or 90 mg/kg body weight per dose IV every 12 hours) continued until symptomatic improvement *Chronic Maintenance Therapy* • See Cytomegalovirus row in Secondary Prophylaxis table		

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
Giardiasis	• Tinidazole, 50 mg/kg by mouth, administered as 1 dose given with food (maximum 2 g). Note: Based on data from children who are HIV-negative • Nitazoxanide o *1–3 years*: 100 mg by mouth every 12 hours with food for 3 days o *4–11 years*: 200 mg by mouth every 12 hours with food for 3 days o ≥*12 years*: 500 mg by mouth every 12 hours with food for 3 days Note: Based on data from children who are HIV-negative	Metronidazole 5 mg/kg by mouth every 8 hours for 5–7 days. Note: Based on data from children who are HIV-negative	Tinidazole is FDA-approved in the United States for children aged ≥3 years. It is available in tablets that can be crushed. Metronidazole has a high frequency of gastrointestinal side effects. A pediatric suspension of metronidazole is not commercially available but can be compounded from tablets. Metronidazole is not FDA-approved for the treatment of giardiasis. Supportive Care • Hydration • Correction of electrolyte abnormalities • Nutritional support Antimotility agents (e.g., loperamide) should be used with caution in young children.
Hepatitis B Virus Infection (HBV)	Treatment of Both HIV and HBV Required *Child Not Already Receiving 3TC or FTC* • 3TC 4 mg/kg body weight (maximum 150 mg) per dose by mouth twice daily as part of a fully suppressive ART regimen • For children aged ≥2 years, TAF as part of ART regimen with 3TC or FTC	Alternative for 3TC: FTC 6 mg/kg bodyweight (maximum 200 mg) once daily	Indications for Treatment Include— • Detectable serum HBV DNA, irrespective of HBeAg status, for >6 months; *and* • Persistent (≥6 months) elevation of serum transaminases (≥ twice the upper limit of normal); *or* • Evidence of chronic hepatitis on liver biopsy Choice of HBV treatment options for children with HIV/HBV infection depends upon whether concurrent HIV treatment is warranted.

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• For children ≥14 kg to <25 kg, FTC 120 mg/TAF 15 mg FDC once daily • For children ≥25 kg, FTC 200 mg/TAF 25 mg FDC once daily, or 3TC 300 mg plus 25 mg TAF daily • Note: For children weighing <35 kg, FTC/TAF combination should not be used with protease inhibitors for HIV therapy *Child Already Receiving ART Containing 3TC or FTC, Suggesting 3TC/FTC Resistance* • For children aged ≥2 years, include TDF or TAF as part of ART regimen with 3TC or FTC o For children aged <12 years, TDF 8 mg/kg body weight per dose once daily (maximum dose 300mg) o For children aged ≥12 years, TAF 25 mg once daily • For children aged ≥12 years, add entecavir 0.5 mg by mouth once daily in addition to ART regimen		3TC and FTC have similar activity (and have cross-resistance) and should not be given together. FTC is not FDA-approved for treatment of HBV. TAF is approved for use in treatment of HIV infection in children aged ≥2 years but is not approved for treatment of HBV infection in children aged <12 years. It should only be used for HBV in children with HIV/HBV coinfection as part of an ART regimen. Entecavir is approved for use in children without HIV ≥2 years of age for treatment of chronic HBV. It should only be used for HBV in children with HIV/HBV coinfection who also receive an HIV-suppressive ART regimen but cannot use or access tenofovir. IRIS may be manifested by dramatic increase in transaminases as CD4 counts rise within the first 6-12 weeks of ART. It may be difficult to distinguish between drug-induced hepatotoxicity and other causes of hepatitis and IRIS. In children receiving TDF or TAF and 3TC or FTC, clinical and laboratory exacerbations of hepatitis (flare) may occur if the drug is discontinued; thus, once anti-HIV/HBV therapy has begun, it should be continued unless contraindicated or until the child has been treated for >12 months after HBeAg seroconversion and can be closely monitored on discontinuation. If anti-HBV therapy is discontinued and a flare occurs, reinstitution of therapy is recommended because a flare can be life threatening.
Hepatitis C Virus Infection (HCV)	For detailed dosing recommendations for HCV antiviral therapy in children	For detailed dosing recommendations for HCV antiviral therapy in children and	The American Association for the Study of Liver Diseases (AASLD) and the Infectious Diseases

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	and adolescents, refer to the section on HCV in Children.	adolescents, refer to the section on HCV in Children.	Society of America (IDSA) have developed a web-based process for the rapid formulation and dissemination of evidence-based, expert-developed recommendations for hepatitis C virus (HCV) management. See the AASLD/IDSA HCV Guidance: Recommendations for Testing, Managing, and Treating Hepatitis C for more details. For more information on other important considerations in the management of HCV in children and adolescents with HIV—such as drug–drug interactions, alternate therapies, dose adjustment, and extra monitoring—refer to the section on Patients With HIV/HCV Coinfection.
Herpes Simplex Virus Infection (HSV)	Neonatal CNS or Disseminated Disease • Acyclovir 20 mg/kg body weight IV/dose every 8 hours for ≥21 days Neonatal Skin, Eye, or Mouth Disease • Acyclovir 20 mg/kg body weight IV/dose every 8 hours for 14 days CNS or Disseminated Disease in Children Outside the Neonatal Period • Acyclovir 10 mg/kg body weight (up to 15 mg/kg body weight/dose in children <12 years) IV every 8 hours for 21 days		For Neonatal CNS Disease— • Repeat CSF HSV DNA PCR should be performed on days 19 to 21 of therapy. If the repeat CSF HSV DNA PCR is positive, continue IV acyclovir for an additional week, repeating the CSF HSV DNA PCR again near the end of extended treatment. Acyclovir should not be stopped until a repeat CSF HSV DNA PCR is negative.
	Moderate to Severe Symptomatic Gingivostomatitis	• Valacyclovir is approved for immunocompetent adults and adolescents with first-episode	

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Acyclovir 5–10 mg/kg body weight/dose IV every 8 hours. Patients can be switched to oral therapy after lesions have begun to regress and therapy continued until lesions have completely healed. Mild Symptomatic Gingivostomatitis • Acyclovir 20 mg/kg body weight (maximum 400 mg/dose) dose by mouth four times a day for 7–10 days Recurrent Herpes Labialis • Acyclovir 20 mg/kg body weight (maximum 400 mg/dose) dose by mouth four times a day for 5 days For First-Episode Genital Herpes (Adults and Adolescents)— • Acyclovir 20 mg/kg body weight (maximum 400 mg/dose) dose by mouth three times a day for 7–10 days	mucocutaneous HSV at a dose of 1 g/dose by mouth twice daily for 7–10 days; also approved for recurrent herpes labialis in children ≥12 years using two, 2 g doses by mouth separated by 12 hours as single-day therapy. • Recurrent genital HSV can be treated with valacyclovir 500 mg twice daily for 3 days or 1 g by mouth daily for 5 days. • Immunocompetent adults with recurrent herpes labialis can be treated with famciclovir, 1 g/dose by mouth twice daily for 1 day. • Famciclovir is approved to treat primary genital HSV in immunocompetent adults at a dose of 250 mg/dose by mouth three times daily for 7–10 days. • Recurrent genital HSV is treated with famciclovir 1 g/dose by mouth twice daily at a 12-hour interval for 2 doses. • Famciclovir is approved for use in HIV-infected adults and adolescents with recurrent mucocutaneous HSV infection at a dose of 500 mg/dose by mouth twice daily for 7 days.	
	Recurrent Genital Herpes (Adults and Adolescents)		Alternative and Short-Course Therapy in Immunocompromised Adults With Recurrent Genital Herpes

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Acyclovir 20 mg/kg body weight (maximum 400 mg/dose) dose by mouth three times daily for 5 days Children With HSV Keratoconjunctivitis • Often treated with topical trifluridine (1%) or ganciclovir (0.15%) applied as 1–2 drops 5 times daily. Many experts add oral acyclovir to the topical therapy. Children With ARN • For children old enough to receive adult dose, acyclovir 10–15 mg/kg body weight/dose IV every 8 hours for 10–14 days, followed by oral valacyclovir 1 g/dose three times daily for 4–6 weeks • As an alternative, oral acyclovir 20 mg/kg body weight/dose four times daily for 4–6 weeks after IV acyclovir for 10–14 days		• Acyclovir 800 mg per dose by mouth twice daily for 5 days • Acyclovir 800 mg per dose by mouth three times daily for 2 days Note: Consultation with an ophthalmologist experienced in managing herpes simplex infection involving the eye and its complications in children is strongly recommended when ocular disease is present.
		Acyclovir-Resistant HSV Infection • Foscarnet 40 mg/kg body weight/dose given IV every 8 hours or 60 mg/kg body weight/dose IV every 12 hours should be administered slowly over the course of 2 hours (i.e., no faster than 1 mg/kg/minute).	
Histoplasmosis	Acute Primary Pulmonary Histoplasmosis	Acute Primary Pulmonary Histoplasmosis	Use same initial itraconazole dosing for capsules as for solution. Itraconazole solution is preferred to the

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Itraconazole oral solution loading dose of 2–5 mg/kg body weight (maximum 200 mg) per dose by mouth 3 times daily for first 3 days of therapy, followed by 2–5 mg/kg body weight (max 200 mg) per dose by mouth twice daily for 12 months. Duration of 12 weeks is sufficient for HIV-infected children, with functional cellular immunity (CD4 percentage >20% or if aged ≥6, CD4 cell count >300 cells/mm^3, provided monitoring confirms clinical improvement and decreased urine antigen concentrations.	• Fluconazole 3–6 mg/kg body weight (maximum 200 mg) by mouth once daily	capsule formulation because it is better absorbed; solution can achieve serum concentrations 30% higher than those achieved with the capsules. Urine antigen concentration should be assessed at diagnosis. If >39 ng/mL, serum concentrations should be followed. When serum levels become undetectable, urine concentrations should be monitored monthly during treatment and followed thereafter to identify relapse. Serum concentrations of itraconazole should be monitored and achieve a level of 1 µg/mL at steady-state. Levels exceeding 10 µg/mL should be followed by dose reduction. High relapse rate with CNS infection occurs in adults and longer therapy may be required; treatment in children is anecdotal and expert consultation should be considered. Chronic suppressive therapy (secondary prophylaxis) with itraconazole is recommended in adults and children following initial therapy. Amphotericin B deoxycholate is better tolerated in children than in adults. Liposomal amphotericin B is preferred for treatment of parenchymal cerebral lesions.
	Mild Disseminated Disease • Itraconazole oral solution loading dose of 2–5 mg/kg body weight (maximum 200 mg) per dose by mouth 3 times daily for first 3 days of therapy, followed by 2–5 mg/kg body weight (maximum 200 mg) per dose by mouth twice daily for 12 months	Mild Disseminated Disease • Fluconazole 5–6 mg/kg body weight IV or by mouth (maximum 300 mg) per dose, twice daily (maximum 600 mg/day) for 12 months	
	Moderately Severe to Severe Disseminated Disease *Acute Therapy (Minimum 2-Week Induction, Longer if Clinical Improvement Is Delayed, Followed by Consolidation Therapy):* • Liposomal amphotericin B 3–5 mg/kg body weight, IV once daily (preferred)	Moderately Severe to Severe Disseminated Disease • If itraconazole not tolerated, amphotericin alone for 4–6 weeks can be used with monitoring that confirms decline in histoplasma urine and serum antigen levels.	

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Amphotericin B deoxycholate 0.7–1 mg/kg body weight IV once daily (alternative) *Consolidation Therapy (Followed by Chronic Suppressive Therapy):* • Itraconazole oral solution initial loading dose of 2–5 mg/kg body weight (maximum 200 mg) per dose by mouth 3 times daily for first 3 days of therapy, followed by 2–5 mg/kg body weight (max 200 mg) per dose by mouth given twice daily for 12 months	• Liposomal amphotericin B 3–5 mg/kg body weight IV once daily (preferred) for 4–6 weeks • Amphotericin B deoxycholate 0.7–1 mg/kg body weight IV once daily (alternative) for 4–6 weeks	
	Central Nervous System Infection *Acute Therapy (4–6 Weeks, Followed by Consolidation Therapy)* • Liposomal amphotericin B, 5 mg/kg body weight IV once daily (AII) *Consolidation Therapy (Followed by Chronic Suppressive Therapy)* • Itraconazole oral solution initial loading dose of 2–5 mg/kg body weight (maximum 200 mg) per dose by mouth 3 times daily for first 3 days of therapy, followed by 2–5 mg/kg body weight (max 200 mg) per dose by mouth given twice daily for ≥12 months and until histoplasma antigen is no longer detected in cerebrospinal fluid		

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
Human Papillomavirus Disease (HPV)	Monitoring for spontaneous resolution is a reasonable option; 30% resolve spontaneously within 6 months and 90% within several years. Patient- or Parent-Applied Treatment Options • Imiquimod (3.75% or 5%) cream applied topically at night and washed off in the morning for 3 nonconsecutive nights a week for up to 16 weeks (BII) • Podofilox (0.5%) solution/gel applied topically two times daily for 3 consecutive days a week. Withhold treatment for 4 days and repeat the cycle weekly up to four times (BIII). • Sinecatechins (15%) ointment applied three times daily for up to 16 weeks, until warts are cleared completely and not visible (BIII) Provider-Applied Treatment Options • TCA (80% to 90%) applied topically weekly for up to 3 to 6 weeks (BIII). • Cryotherapy with liquid nitrogen or cryoprobe applied every 1–2 weeks up to four times (BIII). • Surgical removal either by tangential excision, tangential shave excision, curettage, or electrosurgery (BIII)	Patient- or Parent-Applied Treatment Options • Cidofovir topical gel (1%) is an experimental therapy studied in adults with HIV that is commercially available through compounding pharmacies and has very limited use in children; systemic absorption can occur with potential for renal toxicity (CIII). Provider-Applied Treatment Options • Intralesional IFN-α and 5-FU/ epinephrine gel implant are generally not recommended because of high cost, difficult administration, potential for systemic side effects, and lack of testing in children (CIII). Note: These alternative therapies should include consultation with infectious disease and dermatological specialists.	When choosing treatment options, parent and child comfort in application should be considered. Children have a low pain threshold and, generally, sensitive skin. Adequate topical anesthetics to the genital area should be given before caustic modalities are applied. For young children, these approaches are poorly tolerated due treatment-related and postoperative pain, and as a result may require general anesthesia. Therefore, these should be mainly reserved for children with extensive lesions. Many of these agents are contraindicated in pregnancy and have potential teratogenic effect. When treatment options are considered, the potential for pregnancy should be discussed and proper precautions during pregnancy explained.

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
Isosporiasis (Cystoisosporiasis)	TMP-SMX 5 mg/kg body weight of the TMP component (maximum 160 mg TMP) twice daily by mouth for 10 days	Pyrimethamine 1 mg/kg body weight (maximum 25 mg) plus folinic acid 5–15 mg by mouth once daily for 14 days Second-Line Alternatives • Ciprofloxacin 10–20 mg/kg body weight (maximum 500 mg) by mouth twice daily for 7 days • Nitazoxanide (see doses below) for 3 consecutive days *Children Aged 1 Year–3 Years* • Nitazoxanide 100 mg by mouth every 12 hours *Children Aged 4 Years–11 Years* • Nitazoxanide 200 mg by mouth every 12 hours *Adolescents Aged ≥12 Years and Adults* • Nitazoxanide 500 mg by mouth every 12 hours	If symptoms worsen or persist, the TMP-SMX dose (5 mg/kg/dose of the TMP component) may be given more frequently (e.g., 3–4 times daily by mouth for 10 days) and/or the duration of treatment may be increased to 3–4 weeks. The optimal duration of treatment with pyrimethamine has not been established. Ciprofloxacin is not a drug of choice in children because of increased incidence of adverse events, including events related to joints and/or surrounding tissues.
Malaria	Uncomplicated *P. Falciparum* or Unknown Malaria Species, From Chloroquine-Resistant Areas (All Malaria Areas Except Those Listed as Chloroquine Sensitive) or Unknown Region • Atovaquone-proguanil (pediatric tablets 62.5 mg/25 mg; adult tablets 250 mg/100 mg), dosed once daily:	N/A	For quinine-based regimens, doxycycline or tetracycline should be used only in children aged ≥8 years. An alternative for children aged ≥8 years is clindamycin 7 mg/kg body weight per dose by mouth given every 8 hours. Clindamycin should be used for children aged <8 years. Before primaquine is given, G6PD status must be verified. Primaquine may be given in combination with chloroquine if the G6PD status is known and

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	o 5–8 kg; 2 pediatric tablets for 3 days; o 9–10 kg; 3 pediatric tablets for 3 days; o 11–20 kg; 4 pediatric tablets or 1 adult tablet for 3 days; o 21–30 kg; 2 adult tablets for 3 days; o 31–40 kg; 3 adult tablets for 3 days; o >40 kg; 4 adult tablets for 3 days Uncomplicated *P. Falciparum* OR Unknown Malaria Species from Chloroquine-Sensitive Region (See Comments for Link to Resistance Map) • Chloroquine phosphate: 16.6 mg/kg body weight (10 mg/kg body weight chloroquine base) (maximum 1,000 mg) by mouth once, then 8.3 mg/kg body weight (maximum 500 mg) by mouth at 6, 24, and 48 hours (total dose = 41.6 mg/kg body weight chloroquine phosphate [maximum 2,500 mg] = 25 mg/kg body weight chloroquine base) *P. vivax, P. ovale, P. malariae, P. knowlesi* (All Areas Except Papua New Guinea, Indonesia; See Comments)		negative, otherwise give after chloroquine (when G6PD status is available) For most updated prevention and treatment recommendations for specific region, refer to updated CDC treatment table available at http://www.cdc.gov/malaria/resources/pdf/treatmenttable.pdf For sensitive and resistant malaria map: https://www.cdc.gov/malaria/travelers/country_table/a.html High treatment failure rates due to chloroquine-resistant *P. vivax* have been documented in Papua New Guinea and Indonesia. Treatment should be selected from one of the three following options: • Atovaquone-proguanil plus primaquine phosphate • Quinine sulfate plus either doxycycline or tetracycline plus primaquine phosphate. This regimen cannot be used in children aged <8 years. • Mefloquine plus primaquine phosphate

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	Initial Therapy *(Followed by Anti-Relapse Therapy for* P. ovale *and* P. vivax*):* • Chloroquine phosphate 16.6 mg/kg body weight (10 mg/kg body weight chloroquine base) (maximum 1,000 mg) by mouth once, then 8.3 mg/kg body weight (maximum 500 mg) by mouth at 6, 24, and 48 hours (total dose = 41.6 mg/kg body weight chloroquine phosphate [maximum 2,500 mg] = 25 mg/kg body weight chloroquine base) *Anti-Relapse Therapy for* P. ovale *and* P. vivax*:* • Primaquine 0.5 mg base/kg body weight (max 30 mg base) by mouth once daily for 14 days Uncomplicated *P. falciparum* or Unknown Malaria Species from Chloroquine-Resistant Areas (All Malaria Areas Except Those Listed as Chloroquine Sensitive) or Unknown Region • Mefloquine (250-mg tablets only): 15 mg/kg body weight (maximum 750 mg) by mouth once, then 10 mg/kg body weight (maximum 500 mg) by mouth given 12 hours later • Quinine sulfate 10 mg/kg body weight (maximum 650 mg) per dose		

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	by mouth every 8 hours for 3 to 7 days, **plus** Clindamycin 7 mg/kg body weight per dose by mouth every 8 hours for 7 days, **or** doxycycline: 2.2 mg/kg body weight per dose (maximum 100 mg) given by mouth every 12 hours, **or** tetracycline 6–12.5 mg/kg body weight per dose by mouth given every 6 hours (maximum dose: 500 mg per dose given 4 times daily) for 7 days. • Artemether-lumefantrine: 1 tablet = 20 mg Artemether and 120 mg lumefantrine, a 3-day treatment schedule for a total of 6 doses. The second dose follows the initial dose 8 hours later, then 1 dose twice daily for the next 2 days. o 5 to <15 kg; 1 tablet per dose o 15 to <25 kg; 2 tablets per dose o 25 to <35 kg; 3 tablets per dose o >35 kg; 4 tablets per dose		
Severe Malaria	• Quinidine gluconate 10 mg/kg body weight IV loading dose over 1–2 hours, then 0.02 mg/kg body weight/minute infusion for ≥24 hours (Treatment duration: 7 days in Southeast Asia, Oceania, otherwise 3 days) *Plus One of the Following:*	N/A	Quinidine gluconate is a class 1a anti-arrhythmic agent not typically stocked in pediatric hospitals. When regional supplies are unavailable, the CDC Malaria Hotline may be of assistance (see below). **Do not** give quinidine gluconate as an IV bolus. Quinidine gluconate IV should be administered in a monitored setting. Cardiac monitoring required. Adverse events including severe hypoglycemia, prolongation of the QT interval, ventricular arrhythmia,

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Doxycycline 100 mg per dose by mouth every 12 hours for 7 days; for children <45 kg, use 2.2 mg/kg body weight per dose, *or* • Clindamycin 7 mg/kg body weight per dose by mouth given every 8 hours for 7 days, *or* • Tetracycline 6–12.5 mg/kg body weight per dose every 6 hours (maximum dose 500 mg per dose given 4 times daily) for 7 days • Artesunate 2.4 mg/kg body weight IV bolus at 0, 12, 24, and 48 hours *Plus One of the Following:* • Doxycycline (treatment dosing as above), or Atovaquone-proguanil (treatment dosing as above), *or* • Mefloquine 15 mg/kg body weight (maximum 750 mg) by mouth once, then 10 mg/kg body weight (maximum 500 mg) by mouth once given 12 hours later, *or* • Clindamycin (dosing as above)		and hypotension can result from the use of this drug at treatment doses. Investigational New Drug: IV artesunate is available from CDC. Contact the CDC Malaria Hotline at (770) 488-7788 from 8 a.m.–4:30 p.m. EST or (770) 488-7100 after hours, weekends, and holidays. Artesunate followed by one of the following: Atovaquone-proguanil (Malarone), clindamycin, mefloquine, or (for children aged >8 years) doxycycline. Quinidine gluconate: 10 mg = 6.25 mg quinidine base. Doxycycline (or tetracycline) should be used in children aged >8 years. For patients unable to take oral medication, may give IV. For children <45 kg, give 2.2 mg/kg IV every 12 hours and then switch to oral doxycycline. For children >45 kg, use the same dosing as per adults. For IV use, avoid rapid administration. For patients unable to take oral clindamycin, give 10 mg base/kg loading dose IV, followed by 5 mg base/kg IV every 8 hours. Switch to oral clindamycin (oral dose as above) as soon as a patient can take oral medication. For IV use, avoid rapid administration. *Drug Interactions* • Avoid co-administration of quinidine with ritonavir • Use quinidine with caution with other protease inhibitors.
Microsporidiosis	Effective ART	N/A	Supportive care (e.g., hydration, correction of electrolyte abnormalities, nutritional support)

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• Immune reconstitution may lead to microbiologic and clinical response. For Disseminated (Not Ocular) and Intestinal Infection Attributed to Microsporidia Other than *E. bieneusi* or *V. corneae*— • Albendazole 7.5 mg/kg body weight (maximum 400 mg/dose) by mouth twice daily (in addition to ART) *Treatment Duration* • Continue until sustained immune reconstitution (longer than 6 months at CDC immunologic category 1 or 2) after initiation of ART and resolution of signs and symptoms For *E. bieneusi* or *V. corneae* Infections— • Fumagillin (where available) adult dose 20 mg by mouth 3 times daily, *or* • TNP-470 (a synthetic analogue of fumagillin; where available) recommended for treatment of infections caused by *E. bieneusi* in HIV-infected adults (in addition to ART) For Ocular Infection— • Topical fumagillin bicyclohexylammonium (Fumidil B) 3 mg/mL in saline (fumagillin 70		Fumagillin for systemic use is unavailable in the United States and data on dosing in children are unavailable. Consultation with an expert is recommended.

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	μg/mL) eye drops: 2 drops every 2 hours for 4 days, then 2 drops four times daily (investigational use only in United States) **plus**, for microsporidial infection other than *E. bieneusi* and *V. corneae*, albendazole 7.5 mg/kg body weight (maximum 400 mg/dose) by mouth twice daily for management of systemic infection in systemic infection (in addition to ART) *Treatment Duration* • Continue until sustained immune reconstitution (longer than 6 months at CDC immunologic category 1 or 2) after initiation of ART and resolution of signs and symptoms.		
Mycobacterium avium Complex (MAC)	**Initial Treatment (≥2** Drugs): • Clarithromycin[a] 7.5–15 mg/kg (maximum 500 mg/dose) PO twice daily, *plus* • Ethambutol 15–25 mg/kg (maximum 2.5 g/day) PO once daily followed by chronic suppressive therapy *If Experiencing Severe Disease (Extensive End Organ Involvement, Prolonged Symptoms, Slow Response to Therapy)* • Add rifabutin[a] 10–20 mg/kg (maximum 300 mg/day) PO once daily	If Intolerant to Clarithromycin • Azithromycin 10–12 mg/kg (maximum 500 mg/day) PO once daily, plus ethambutol For Children With Severe Symptoms or Disseminated Disease Who Need a Rifabutin Alternative or a Fourth Drug to Supplement a Macrolide/ Ethambutol/Rifabutin Regimen • Amikacin[b] 15–30 mg/kg (maximum 1.5 g/day) IV in one or two divided doses. Therapeutic drug monitoring (peak and trough levels) is required, *or* • Linezolid 10 mg/kg/dose PO every 8 hours for age 1 month to <12 years	Susceptibility testing is recommended prior to treatment initiation. Combination therapy with a minimum of two drugs is recommended for ≥12 months. Careful monitoring for drug–drug interactions is advised. Clofazimine is associated with increased mortality in adults with HIV and should not be used. Children receiving ethambutol who are old enough to undergo routine eye testing should have monthly monitoring of visual acuity and color discrimination. Fluoroquinolones (e.g., ciprofloxacin and moxifloxacin) are used with caution in children aged

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
		(maximum 600 mg/dose) and 10 mg/kg/dose PO every 12 hours (maximum 600 mg) for age ≥12 years, *or* • Moxifloxacin 7.5–10 mg/kg (maximum dose 400 mg daily) PO once daily, *or* • Levofloxacin 15-20 mg/kg/dose PO once daily (maximum dose 750 mg), *or* • Ciprofloxacin 10–15 mg/kg (maximum 1.5 g/day) PO twice daily, *or* • Bedaquiline for children aged ≥5 years weighing ≥15 kg (based on MDR-TB regimens): o *Weeks 1–2:* 400 mg once daily o *Weeks 3–24:* 200 mg three times weekly • For therapy beyond 24 weeks, consider consultation with a pediatric infectious disease/HIV expert.	<18 years because of concerns regarding potential effects on cartilage; use in children aged <18 years requires an assessment of potential risks and benefits. Chronic suppressive therapy (secondary prophylaxis) is recommended in children and adults following initial therapy. Limited data for bedaquiline in adults with NTM.
Mycobacterium tuberculosis	Intrathoracic Disease *Drug-Susceptible TB* • Intensive Phase (2 Months) o Isoniazid 10–15 mg/kg body weight (maximum 300 mg/day) by mouth once daily, plus o Rifampin 15–20 mg/kg body weight[a] (maximum 600 mg/day) by mouth once daily, plus	Alternative for Rifampin • Rifabutin 10–20 mg/kg body weight (maximum 300 mg/day) by mouth once daily (same dose if three times a week) • Discuss with an expert. Alternative Continuation Phase With Three Times Weekly Dosing (4 Months) *If Good Adherence and Treatment Response*	Treatment for TB disease should always be provided by DOT. If ART-naive, start TB therapy immediately and initiate ART within 2–8 weeks. If already on ART, review regimen to minimize potential toxicities and drug interactions; start TB treatment immediately. Potential drug toxicity and interactions should be reviewed at every visit. Drug interactions with ART

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Indication	First Choice	Alternative	Comments/Special Issues
	○ Pyrazinamide 30–40 mg/kg body weight (maximum 2 g/day) by mouth once daily, plus ○ Ethambutol 15–25 mg/kg body weight (maximum 1 g/day) by mouth once daily ○ In children with minimal disease with fully drug-susceptible TB, some experts recommend a three-drug intensive phase regimen excluding ethambutol. • Continuation Phase (4 Months) ○ Isoniazid 10–15 mg/kg body weight (maximum 300 mg/day) by mouth once daily, plus ○ Rifampin 15–20 mg/kg body weight[a] (maximum 600 mg/day) by mouth once daily Extrathoracic Disease Note: Depends on disease entity • Lymph node TB—treat as minimal intrathoracic disease • Bone or joint disease—consider extending the continuation phase to 10 months (for total duration of therapy of 12 months). TB Meningitis • As an alternative to ethambutol, streptomycin 20–40 mg/kg body weight (maximum 1 g/day) IM once daily. During intensive phase,	• Isoniazid 20–30 mg/kg body weight (maximum 900 mg/day) by mouth three times per week, plus • Rifampin 15–20 mg/kg body weight (maximum 600 mg/day) three times per week • In children with minimal disease with fully drug-susceptible TB, some experts recommend a continuation phase of 4 months (total duration of therapy of 6 months)	should be considered for all rifamycin-containing alternatives. Adjunctive Treatment • Co-trimoxazole prophylaxis • Pyridoxine 1–2 mg/kg body weight/day (maximum 25–50 mg/day) with isoniazid or cycloserine/terizidone, if malnourished. Pyridoxine supplementation is recommended for exclusively breastfed infants and for children and adolescents on meat- and milk-deficient diets; children with nutritional deficiencies, including all children with HIV; and pregnant girls and women. • Corticosteroids (2 mg/kg body weight per day of prednisone [maximum 60 mg/day] or its equivalent for 4–6 weeks followed by tapering) with TB meningitis; may be considered with pleural effusions, pericarditis, severe airway compression, or severe IRIS. Second-Line Drug Doses • Consult with an expert as dosing guidelines continue to evolve with emerging data. [a] Some experts recommend using a daily rifampin dose of 20–30 mg/kg/day for infants and toddlers.

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	consider ethionamide, 15–20 mg/kg body weight by mouth (maximum 1 g/day), initially divided into two doses until well tolerated. • Many experts recommend rifampin doses of 20–30 mg/kg daily for treatment of TB meningitis. See the AAP Red Book and WHO Operational Handbook on Tuberculosis for more information. • Consider extending the continuation phase to 10 months (for a total duration of therapy of 12 months). • Discuss with an expert. Drug-Resistant TB • Therapy should be based on the resistance pattern of the child (or of the source case where the child's isolate is not available); consult an expert.		
Pneumocystis Pneumonia	TMP-SMX 15–20 mg/kg/day (TMP component) in divided doses every 6–8 hours IV or PO for 21 days (followed by secondary prophylaxis dosing)	If TMP-SMX-Intolerant or Clinical Treatment Failure After 5–7 Days of TMP-SMX Therapy *Pentamidine* • 4 mg/kg/dose IV/IM once daily is the first-choice alternative regimen for severe disease. • Note: Close electrolyte and glucose monitoring required. Pentamidine can be changed to atovaquone after 7–10 days IV therapy. Atovaquone can be	After acute pneumonitis resolved in mild-to-moderate PCP, IV TMP-SMX can be transitioned to oral formulations. For oral administration, total daily dose of TMP-SMX can also be administered in three divided doses (every 8 hours). The following regimens have been used in adults, but data in children are limited: • Dapsone 2 mg/kg/dose PO once daily (maximum 100 mg/day) plus trimethoprim 5 mg/kg/dose PO every 8 hours

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Indication	First Choice	Alternative	Comments/Special Issues
		considered for initial therapy in mild-to-moderate disease. *Atovaquone* • Daily Dosing o *Children Aged 1–3 Months and >24 Months to 12 Years:* 30–40 mg/kg/dose PO once daily with food o *Children Aged 4–24 Months:* 45 mg/kg/dose PO once daily with food • Twice-Daily Dosing o *Children Aged ≥13 Years:* 750 mg/dose PO twice daily o Some experts use twice-daily dosing of atovaquone as alternative treatment for PCP in children aged <12 years. ▪ *Children Aged 1–3 Months and >24 Months to 12 Years:* 15–20 mg/kg/dose PO twice daily with food ▪ *Children Aged 4–24 Months:* 22.5 mg/kg/dose PO twice daily with food	• Primaquine base 0.3 mg/kg/dose PO once daily (maximum 30 mg/day) plus clindamycin 10mg/kg/dose IV or PO (maximum 600 mg/dose given IV and 300–450 mg/dose given orally) every 6 hours Chronic suppressive therapy (secondary prophylaxis) with TMP-SMX is recommended in children and adults following initial therapy (see Secondary Prophylaxis). Corticosteroids Adjunctive Therapy *Indication* • PaO_2 <70 mmHg at room air or alveolar-arterial oxygen gradient ≥35 mmHg *Prednisone Dose* • Days 1–5: 1 mg/kg/dose PO twice daily, then • Days 6–10: 0.5–1 mg/kg/dose PO twice daily, then • Days 11–21: 0.5 mg/kg/dose PO once daily. *Alternative Corticosteroid Regimens* • Adult Dosage of Prednisone o Days 1–5: 40 mg/dose PO twice daily, then o Days 6–10: 40 mg/dose PO once daily, then o Days 11–21: 20 mg/dose PO once daily • Methylprednisolone IV o Days 1–7: 1 mg/kg/dose every 6 hours, then o Days 8–9: 1 mg/kg/dose twice daily, then

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Indication	First Choice	Alternative	Comments/Special Issues
			o Days 10–11: 0.5 mg/kg/dose twice daily, then o Days 12–16: 1 mg/kg/dose once daily
Syphilis	Congenital *Proven or Highly Probable Disease* • Aqueous crystalline penicillin G 100,000–150,000 units/kg body weight per day, administered as 50,000 units/kg body weight per dose IV every 12 hours for the first 7 days of life, and then every 8 hours for 10 days • If diagnosed after 1 month of age, aqueous penicillin G 200,000–300,000 unit/kg body weight per day, administered as 50,000 units/kg body weight per dose IV every 4–6 hours (maximum 18–24 million units per day) for 10 days *Possible Disease* • Treatment options are influenced by several factors, including maternal treatment, titer, and response to therapy; and infant physical exam, titer, and test results. Scenarios that include variations of these factors are described and treatment recommendations are provided in detail on pages 36–37 of the Centers for Disease Control STD Treatment Guidelines, 2010.	Congenital *Proven or Highly Probable Disease (Less Desirable if CNS Involvement)* • Procaine penicillin G 50,000 units/kg body weight IM once daily for 10 days *Possible Disease* • Treatment options are influenced by several factors, including maternal treatment, titer, and response to therapy; and infant physical exam, titer, and test results. Scenarios that include variations of these factors are described and treatment recommendations are provided in detail on pages 36–37 of the Centers for Disease Control STD Treatment Guidelines, 2010.	For treatment of congenital syphilis, repeat the entire course of treatment if >1 day of treatment is missed. Examinations and serologic testing for children with congenital syphilis should occur every 2–3 months until the test becomes non-reactive or there is a fourfold decrease in titer. Children with increasing titers or persistently positive titers (even if low levels) at ages 6–12 months should be evaluated and considered for re-treatment. In the setting of maternal and possible infant HIV infection, the more conservative choices among scenario-specific treatment options may be preferable. Children and adolescents with acquired syphilis should have clinical and serologic response monitored at 3, 6, 9, 12, and 24 months after therapy.

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Indication	First Choice	Alternative	Comments/Special Issues
	Acquired *Early Stage (Primary, Secondary, Early Latent)* • Benzathine penicillin 50,000 units/kg body weight (maximum 2.4 million units) IM for 1 dose *Late Latent* • Benzathine penicillin 50,000 units/kg body weight (maximum 2.4 million units) IM once weekly for 3 doses *Neurosyphilis (Including Ocular)* • Aqueous penicillin G 200,000–300,000 units/kg body weight per day administered as 50,000 units/kg body weight per dose IV every 4–6 hours (maximum 18–24 million units per day) for 10–14 days		

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
Toxoplasmosis	Congenital Toxoplasmosis • Pyrimethamine loading dose of 1 mg/kg body weight PO twice daily for 2 days, then 1 mg/kg body weight PO once daily for 2–6 months, then 1 mg/kg body weight PO three times weekly thereafter, *plus* • Leucovorin (folinic acid) 10 mg PO or IM three times weekly, *plus* • Sulfadiazine 50 mg/kg body weight PO twice daily *Treatment Duration* • 12 months Acquired Toxoplasmosis *Acute Induction Therapy (Followed by Chronic Suppressive Therapy)* • Pyrimethamine loading dose of 1 mg/kg body weight (maximum 50 mg) PO twice daily for 3 days, then 1 mg/kg body weight (maximum 25 mg) PO once daily, *plus* • Sulfadiazine 25–50 mg/kg body weight (maximum 1–1.5 g/dose) PO per dose four times daily, *plus* • Leucovorin 10–20 mg PO once daily, continued for one week after stopping pyrimethamine *Treatment Duration (Followed by Chronic Suppressive Therapy)*:	For Sulfonamide-Intolerant Patients: • Pyrimethamine loading dose of 1 mg/kg body weight PO twice daily for 2 days, then 1 mg/kg body weight PO once daily for 2–6 months, then 1 mg/kg body weight PO three times weekly thereafter, *plus* • Leucovorin (folinic acid) 10 PO or IM three times weekly, *plus* • Clindamycin 5–7.5 mg/kg body weight PO or IV (maximum 600 mg/dose) per dose four times daily	Congenital Toxoplasmosis • For infants born mothers with symptomatic *Toxoplasma* infection during pregnancy, empiric therapy of the newborn should be strongly considered irrespective of treatment during pregnancy. Acquired Toxoplasmosis • Pyrimethamine use requires CBC monitoring at least weekly while on daily dosing and at least monthly while on less-than-daily dosing. • The following regimens are used in adults but have not been studied in children: o TMP-SMX 5/25 mg/kg body weight per dose IV or PO given twice daily as an alternative to pyrimethamine-sulfadiazine o Atovaquone 1,500 PO twice daily administered— ▪ with pyrimethamine and leucovorin, *or* ▪ with sulfadiazine, *or* ▪ alone, for those with pyrimethamine and sulfadiazine intolerance o Azithromycin 900–1,200 mg daily (corresponding to 20 mg/kg daily, maximum 1,000 mg in children) administered with pyrimethamine-leucovorin • Corticosteroids (e.g., prednisone, dexamethasone) have been used in children with CNS disease when CSF protein is very elevated (>1,000 mg/dL) or when focal lesions with significant mass effects are

Table 3. Treatment of Opportunistic Infections in Children With and Exposed to HIV—Summary of Recommendations

Indication	First Choice	Alternative	Comments/Special Issues
	• ≥6 weeks (longer duration if clinical or radiologic disease is extensive or response in incomplete at 6 weeks)		present, with discontinuation as soon as clinically feasible. • Anticonvulsants should be administered to people with a history of seizures and continued through the acute treatment but should not be used prophylactically. • Sulfadiazine may be given as two to four equal doses per day as long as the total daily dose is 85–120 mg/kg body weight. • Consider screening for G6PD deficiency before starting sulfadiazine or TMP-SMX in people from regions with high prevalence of severe G6PD deficiency.
Varicella-Zoster Virus Disease (VZV)	Varicella *Children With Severe Immunosuppression (HIV Stage 3) or Severe Varicella Disease (see* Treating Disease *in text)* • Acyclovir 10 mg/kg/dose or 500 mg/m^2/dose IV every 8 hours for at least 7 days and until no new lesions appear for 48 hours *Children With No or Moderate Immunosuppression (HIV Stage 1 and 2) and Mild Varicella Disease* • If age ≥3 months: o Valacyclovir 20 mg/kg/dose (max: 1,000 mg/dose) PO three times daily for 7–14 days	*Children Unresponsive to Acyclovir When Resistance Is Suspected* • Foscarnet: 120–180 mg/kg/day IV divided every 8–12 hours for at least 7 days and until no new lesions appear for 48 hours *Children in Whom IV Acyclovir Is Indicated, in the Setting of a National Shortage of IV Acyclovir* • Foscarnet: 120–180 mg/kg/day IV divided every 8–12 hours for at least 7 days and until no new lesions appear for 48 hours, *or* • Ganciclovir 5 mg/kg/dose IV every 12 hours for at least 7 days and until no new lesions appear for 48 hours	For children aged <2 years, the dose of IV acyclovir is 10 mg/kg/dose every 8 hours. For children aged ≥2 years, some health care providers administer the same dose or base the dose on body surface area (500 mg/m^2/dose IV every 8 hours). When children treated with IV acyclovir show signs of clinical improvement with no new lesions for 48 hours, completion of antiviral therapy with an oral agent may be considered. Renal dose adjustments listed below are only applicable for IV acyclovir: • CrCl >50 mL/minute/1.73 m^2: No dose adjustment necessary • CrCl 25 to 50 mL/minute/1.73 m^2: Administer the usual recommended dose every 12 hours

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Indication	First Choice	Alternative	Comments/Special Issues
	• If age <3 months OR unable to obtain valacyclovir suspension: o Acyclovir 20 mg/kg/dose (max: 800 mg/dose) PO four times daily for 7–14 days		• CrCl 10 to <25 mL/minute/1.73 m^2: Administer the usual recommended dose every 24 hours • CrCl <10 mL/minute/1.73 m^2: Administer 50% of the usual recommended dose every 24 hours (e.g., if the usual recommended dose is 10 mg/kg/dose every 8 hours, then administer 5 mg/kg/dose every 24 hours) • Intermittent hemodialysis: 5 mg/kg/dose IV every 24 hours; administer after hemodialysis on dialysis days • Peritoneal dialysis: 5 mg/kg/dose IV every 24 hours; no supplemental dose needed • Continuous renal replacement therapy: 10 mg/kg/dose IV every 12 hours For patients with renal impairment on PO acyclovir, the Panel recommends consultation with a pediatric pharmacist and extrapolation of dose adjustments used for adults with renal impairment. In children receiving acyclovir, it is important to maintain adequate hydration to avoid crystallization of the drug in the renal tubules. Valacyclovir doses should be adjusted for renal impairment; however, no formal pediatric renal dosing guidelines exist for valacyclovir. The Panel recommends consultation with a pediatric pharmacist and extrapolation of dose adjustments used for adults with renal impairment (see package insert). There is no pediatric preparation of valacyclovir, although 500 mg caplets can be extemporaneously compounded to make a suspension.

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Indication	First Choice	Alternative	Comments/Special Issues
			For patients with renal impairment on IV foscarnet, the Panel recommends consultation with a pediatric pharmacist and extrapolation of dose adjustments used for management of cytomegalovirus.
	Herpes Zoster *Children With Severe Immunosuppression (HIV Stage 3), Trigeminal or Sacral Nerve Involvement, Visceral Involvement, Extensive Multidermatomal, or Disseminated HZ* • Acyclovir 10 mg/kg/dose or 500 mg/m^2/dose IV every 8 hours for 10–14 days *Children With No or Moderate Immunosuppression (HIV Stage 1 and 2) and Uncomplicated HZ* • If age ≥3 months: o Valacyclovir 20 mg/kg/dose (max: 1,000 mg/dose) PO three times daily for 7–14 days If age <3 months or unable to obtain valacyclovir suspension: • Acyclovir 20 mg/kg/dose (max: 800 mg/dose) PO four times daily for 7–14 days	*Children Unresponsive to Acyclovir When Resistance Is Suspected* • Foscarnet IV: 120–180 mg/kg/day divided every 8–12 hours for at least 7 days and until no new lesions appear for 48 hours Famciclovir is approved for use in adults (age ≥18 years) with HZ at a dose of 500 mg/dose PO three times daily for 7–14 days; however, data are insufficient to support the use of famciclovir for HZ in children with HIV.	For most cases, oral treatment (as opposed to IV) for HZ is considered safe because the risk of disseminated, life-threatening disease is lower with HZ than with varicella. For renal dose adjustment and other administration considerations with acyclovir, valacyclovir, and foscarnet, see Varicella above.

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Indication	First Choice	Alternative	Comments/Special Issues
	Children With Progressive Outer Retinal Necrosis • Acyclovir 10 mg/kg/dose or 500 mg/m^2/dose IV every 8 hours OR ganciclovir 5 mg/kg/dose IV every 12 hours, *plus* • Foscarnet 90 mg/kg/dose IV every 12 hours, *plus* • Ganciclovir 2 mg/0.05 mL intravitreal twice weekly AND/OR foscarnet 1.2 mg/0.05 mL intravitreal twice weekly *Children With Acute Retinal Necrosis* • Acyclovir 10 mg/kg/dose or 500 mg/m2/dose IV every 8 hours for 10–14 days, **followed by** valacyclovir 20 mg/kg/dose (max: 1,000 g/dose) PO three times daily for 4–6 weeks OR acyclovir 20 mg/kg/dose (max: 800 mg/dose) PO four times daily for 4–6 weeks		Involvement of an ophthalmologist with experience in managing HZ ophthalmicus and its complications in children **is strongly recommended** when ocular involvement is evident. Optimal management of progressive outer retinal necrosis has not been defined.

[a] Careful monitoring of drug–drug interactions is critical when using rifabutin or clarithromycin in children on ARVs.

[b] Amikacin levels for therapeutic drug monitoring: peak (C_{max}) 30–40 mg/L and trough (C_{min}) <5 mg/L for once daily dosing; C_{max} 65–80 mg/L for thrice weekly dosing

Key: 3TC = lamivudine; 5-FU = 5-fluorouracil; AAP = American Academy of Pediatrics; ARN = acute retinal necrosis; ART = antiretroviral therapy; ARV = antiretroviral; BSA = body surface area; CBC = complete blood count; CMV = cytomegalovirus; CNS = central nervous system; CSF = cerebrospinal fluid; D5W = 5% dextrose in water; DOT = directly observed therapy; FDA = U.S. Food and Drug Administration; FDC = fixed-dose combination; FTC = emtricitabine; G6PD = glucose-6-phosphate dehydrogenase; GI = gastrointestinal; HBeAg = hepatitis B e antigen; HBV = hepatitis B virus; HCV = hepatitis C virus; HSV = herpes simplex virus; HZ = herpes zoster; ICP = intracranial pressure; IFN-α = interferon-alfa; IGRA = interferon-gamma release assay; IM = intramuscular; IRIS = immune reconstitution inflammatory syndrome; IV = intravenous; LIP = lymphocytic interstitial pneumonia; MIC = minimum inhibitory concentration; NNRTI = non-nucleoside reverse transcriptase inhibitors; OPC = oropharyngeal; PCP = *Pneumocystis* pneumonia; PCR = polymerase chain reaction; PI = protease inhibitor; PK = pharmacokinetic; PO = orally; TAF = tenofovir alafenamide; TB = tuberculosis; TCA = trichloroacetic acid; TDF = tenofovir disproxil fumarate; TMP = trimethoprim; TMP-SMX = trimethoprim-sulfamethoxazole; WHO = World Health Organization