Table 4. Common Drugs Used for Treatment of Opportunistic Infections in Children With HIV: Preparations and Major Toxicities

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Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Acyclovir	Oral Suspension • 40 mg/mL Capsules • 200 mg Tablets • 400 mg • 800 mg IV • 500 mg	More Frequent • Phlebitis (at injection site when given IV) Less Frequent • Acute renal failure (parenteral use, more common with rapid infusion) Rare *Parenteral Form Only* • Encephalopathy • Hematologic toxicity (leukopenia, neutropenia, thrombocytopenia, anemia, hemolysis) • Crystalluria, hematuria • Disseminated intravascular coagulation • Hypotension • Neuropsychiatric toxicity (with high doses)	More Frequent • GI disturbances (anorexia, diarrhea, nausea, vomiting) • Headache, lightheadedness • Malaise Less Frequent (More Common in Adults Than Children) • Agitation • Alopecia • Dizziness • Myalgia, paresthesia • Somnolence	Requires dose adjustment in children with renal impairment. Avoid other nephrotoxic drugs. To avoid renal tubular damage related to crystalluria, administer IV preparation by slow IV infusion over at least 1 hour at a final concentration not to exceed 7 mg/mL. This must be accompanied by adequate hydration. Use caution with IV preparation in children with underlying neurological conditions, serious hepatic or electrolyte abnormalities, or substantial hypoxia.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		Parenteral and Oral Forms • Rash (urticarial, exfoliative skin disorders including SJS) • Anaphylaxis • Seizures • Elevated ALTs and ASTs • Fever • Hallucinations • Leukopenia • Lymphadenopathy • Peripheral edema • Visual abnormalities		
Albendazole	Tablet • 200 mg	More Frequent • Abnormal ALTs and ASTs Less Frequent • Hypersensitivity (rash, pruritus) • Neutropenia (with high doses) Rare • Pancytopenia	Less Frequent • CNS effects (dizziness, headache) • GI disturbances (abdominal pain, diarrhea, nausea, vomiting) Rare • Alopecia	Should be given with food. Recommend giving with a high-fat meal to increase absorption. May crush or chew tablets and give with water. Monitor CBC and LFTs prior to each cycle and every 2 weeks during therapy. Pregnancy tests may be administered.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Amikacin	IV • 500 mg • 1,000 mg	More Frequent • Nephrotoxicity • Neurotoxicity (including muscle twitching, seizures) • Ototoxicity, both auditory and vestibular Less Frequent • Hypersensitivity (skin rash, redness, or swelling) Rare • Neuromuscular blockade	N/A	Must be infused over 30 to 60 minutes to avoid neuromuscular blockade. Requires dose adjustment in children with impaired renal function. Should monitor renal function and hearing periodically (e.g., monthly) in children on prolonged therapy. TDM indicated. Use with caution in children on ECMO; PK may be altered. Dose adjustment with close monitoring necessary.
Amphotericin B Deoxycholate	IV • 50 mg	More Frequent • Infusion-related reactions (fever/chills, hypotension, anaphylaxis) • Anemia • Hypokalemia • Renal function impairment • Thrombophlebitis (at injection site) Less Frequent or Rare • Blurred or double vision • Cardiac arrhythmias, usually with rapid infusions	• GI disturbance (nausea, vomiting, diarrhea, abdominal pain) • Headache	Monitor BUN, Cr, CBC, electrolytes, LFTs, fluid status and input/output, signs of hypokalemia. Infuse over 1 to 2 hours; in children with azotemia, hyperkalemia, or getting doses >1 mg/kg, infuse over 3 to 6 hours. Requires dose reduction in children with impaired renal function.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		• Hypersensitivity (rash) • Leukopenia • Polyneuropathy • Seizures • Thrombocytopenia		Avoid other nephrotoxic drugs, when possible, because nephrotoxicity is exacerbated with concomitant use of other nephrotoxic drugs; permanent nephrotoxicity is related to cumulative dose. Nephrotoxicity may be ameliorated by hydration with 0.9% saline IV over 30 minutes prior to the amphotericin B infusion. Infusion-related reactions are less frequent in children than adults; the onset is usually 1 to 3 hours after infusion, duration <1 hour; frequency decreases over time. Addition of heparin to infusion solution may reduce phlebitis. Flush line with dextrose; NS may cause precipitate. Pre-treatment with acetaminophen and/or diphenhydramine may alleviate febrile reactions.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Amphotericin B Lipid Complex	IV • 100 mg	More Frequent: • Infusion-related reactions (fever/chills, and headache) Less Frequent • Anemia • Leukopenia • Respiratory distress • Thrombocytopenia • Renal function impairment	• GI disturbance (loss of appetite, nausea, vomiting, diarrhea, abdominal pain)	Monitor BUN, Cr, CBC, electrolytes, and LFTs. Infuse diluted solution at a rate of 2.5 mg/kg/hour. To minimize immediate infusion-related reactions, premedicate with the following 30 to 60 minutes prior to administration: acetaminophen, diphenhydramine, and/or hydrocortisone. Adequate hydration and pre-infusion administration of NS may decrease risk of nephrotoxicity. In-line filters should not be used. Do not dilute with saline solutions or mix with other drugs or electrolytes (compatibility has not been established). Use with caution with bone marrow suppressants or other nephrotoxic drugs; renal toxicity is dose-dependent, but less renal toxicity than seen with conventional amphotericin B. Consider dose reduction in children with impaired renal function.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Amphotericin B Liposome	IV • 50 mg	More Frequent • Fever, chills • Hypokalemia Less Frequent • Back pain • Chest pain • Dark urine • Dyspnea • Infusion-related reaction (headache) • Jaundice • Renal function impairment Rare • Anaphylactic reaction	• GI disturbance (nausea, vomiting, diarrhea, abdominal pain) • Headache • Rash	Monitor BUN, Cr, CBC, electrolytes, and LFTs. Infuse over 2 hours. Do not use in-line filter less than 1 micron to administer. Consider dose reduction in children with impaired renal function. Flush line with D5W before and after infusion.
Artesunate	IV • Please refer to the AMIVAS website.	Rare • Anaphylactic reaction • Neutropenia • Bradycardia	• GI disturbance (nausea, vomiting) • Headache • Rash	Monitor CBC, LFTs, and electrolytes. Artesunate is preferred over quinidine for severe malaria because of decreased mortality. Monitor signs and symptoms of hemolytic anemia, Hb, and renal function for 4 weeks after therapy.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Atovaquone	Oral Suspension • 150 mg/mL	Frequent • Fever • Rash	Frequent • GI disturbances (nausea, vomiting, diarrhea) • Headache • Cough • Insomnia	Should be administered with a meal to enhance absorption; bioavailability increases threefold when administered with a high-fat meal. Avoid suspension in neonates due to benzyl alcohol. Monitor CBC with differential, liver enzymes, bilirubin, serum electrolytes, and serum amylase.
Atovaquone/ Proguanil	Tablets • Pediatric tablets; 62.5 mg/25 mg • Adult tablets; 250 mg/100 mg	Less Frequent • Vomiting • Pruritus	N/A	Pediatric tablets are available to make dosing easier. Atovaquone taken with a high-fat meal significantly increases the rate and extent of absorption. Side effects requiring discontinuation in ~1% to 2% of people.[b] Not recommended for prophylaxis in children with CrCl <30 mL/min.
Azithromycin	Oral Suspension • 20 mg/mL • 40 mg/mL Tablets • 250 mg	More Frequent • Thrombophlebitis (IV form) Rare • Acute interstitial nephritis	• GI disturbances (abdominal discomfort or pain, diarrhea, nausea, vomiting) • Dizziness, headache	Administer 1 hour before or 2 hours after a meal; do not administer with aluminum- and magnesium-containing antacids.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	• 500 mg • 600 mg Oral Powder Packet • 1,000 mg IV • 500 mg	• Allergic reactions/anaphylaxis (dyspnea, hives, rash) • Pseudomembranous colitis • Prolonged QT interval • Syncope • Torsades de pointes • Ventricular tachycardia		IV should be infused at a concentration of 1 mg/mL over a 3-hour period, or 2 mg/mL over a 1-hour period; IV should not be administered as a bolus. Use with caution in children with hepatic function impairment; biliary excretion is the main route of elimination. Potential drug interactions. See Table 5. Significant Drug Interactions for Drugs Used to Treat or Prevent Opportunistic Infections and the Drug–Drug Interactions section of the Adult and Adolescent Antiretroviral Guidelines for more information.
Bedaquiline	Tablets • 20 mg • 100 mg	Less Frequent • Chest pain • Hemoptysis Rare • Prolonged QT interval on ECG • Hepatotoxicity	More Frequent • Arthralgia • Nausea Less Frequent • Anorexia • Rash Rare • Increased serum amylase	Monitor serum potassium, calcium, and magnesium at baseline. Monitor ALT, AST, alkaline phosphatase, and bilirubin at baseline and monthly during treatment. Monitor EKG at baseline and monthly during treatment. Give with food (standard meal approximately 22 g of fat and 558 calories) to increase bioavailability twofold.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Capreomycin	IV/IM • 1,000 mg	More Frequent • Nephrotoxicity Less Frequent • Hypersensitivity (rash, fever) • Hypokalemia • Neuromuscular blockade • Ototoxicity, both auditory and vestibular • Injection site pain, sterile abscess	N/A	Rarely used in the United States because of efficacy concerns. Administer only by deep IM injection into large muscle mass (superficial injections may result in sterile abscess). Requires dose adjustment in children with impaired renal function. Monitor renal function and hearing periodically (e.g., monthly) in children on prolonged therapy. Monitor LFTs and electrolytes.
Caspofungin	IV • 50 mg • 70 mg	More Frequent • Histamine-mediated symptoms (fever, facial swelling, pruritus, bronchospasm) Rare • Hypokalemia • Anaphylactic reaction	• GI disturbances (nausea, vomiting, diarrhea) • Headache • Rash, facial flushing • Elevated ALTs and ASTs • Thrombophlebitis	Requires dose adjustment in moderate-to-severe hepatic insufficiency. Administer IV infusion over 1 hour in normal saline (do not use diluents containing dextrose). Higher doses (150 mg or greater) should be infused over at least 2 hours.
Chloroquine Phosphate	Tablets • 500 mg • 250 mg	More Frequent • Pruritus: Common in individuals of Black race	• Psoriasis exacerbations • GI disturbances (nausea, vomiting, diarrhea)	Store in child-proof containers and protect from light. Overdose can be toxic.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		Less Frequent, but More Severe • Auditory toxicity • Ocular toxicity • Neuropsychiatric disorders • QT prolongation • Hepatitis • Bone marrow suppression • Peripheral neuropathy	• Visual disturbances including photosensitivity • Muscle weakness	Chloroquine phosphate is bitter tasting, so consider administering with foods such as chocolate syrup that can mask the taste. Use with caution in children with G6PD deficiency or seizure disorder. Genetic testing is recommended. Monitor CBC; periodic neurologic and ophthalmologic exams are recommended in children on prolonged therapy. Monitor EKG at baseline and as clinically indicated in children with elevated risk of QT prolongation.
Cidofovir	IV • 370 mg	More Frequent • Nephrotoxicity • Neutropenia Less Frequent • Fever and allergic reactions Rare • Vision changes due to ocular hypotony • Metabolic acidosis	• GI disturbances (anorexia, diarrhea, nausea, vomiting) • Headache • Asthenia • Proteinuria	Infuse over 1 hour. Should not be used in children with severe renal impairment. Nephrotoxicity risk is decreased with prehydration with IV NS and probenecid with each infusion; probenecid is administered prior to each dose and repeated for two additional doses after infusion. Additional hydration after infusion is recommended if tolerated.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				Concurrent use of other nephrotoxic drugs should be avoided. Perform ophthalmologic exams and monitor renal function, urinalysis, electrolytes, and CBC.
Ciprofloxacin	Oral Suspension • 50 mg/mL • 100 mg/mL Tablets • 100 mg • 250 mg • 500 mg • 750 mg XR Tablets • 500 mg • 1,000 mg IV • 200 mg • 400 mg	Less Frequent • Phototoxicity Rare • CNS stimulation • Hepatotoxicity • Hypersensitivity reactions (rash, pruritus, and exfoliative skin disorders including SJS, dyspnea, and vasculitis) • Interstitial nephritis • Phlebitis (at injection sites) • Pseudomembranous colitis • Tendonitis or tendon rupture • QT interval prolongation	More Frequent • GI disturbances (abdominal discomfort or pain, diarrhea, nausea, vomiting) • CNS toxicity (dizziness, headache, insomnia, drowsiness) Less Frequent • Change in taste • Photosensitivity	Administer oral formulations at least 2 hours before or 6 hours after taking sucralfate, antacids, or other products containing calcium, zinc, or iron (including daily products or calcium-fortified juices). Take with full glass of water to avoid crystalluria. Possible phototoxicity reactions with sun exposure. IV infusions should be over 1 hour. Do not split, crush, or chew XR tablets. QT prolongation is concentration-dependent and occurs with use of two or more medications that prolong QT interval.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Clarithromycin	Oral Suspension • 25 mg/mL • 50 mg/mL Tablets • 250 mg • 500 mg	Rare • Hepatotoxicity • Hypersensitivity reaction (rash, pruritus, dyspnea) • Pseudomembranous colitis • Thrombocytopenia • QT interval prolongation	More Frequent • GI disturbances (abdominal discomfort or pain, diarrhea, nausea, vomiting) Less Frequent • Abnormal taste sensation • Headache • Rash	Requires dose adjustment in children with impaired renal function. Can be administered without regard to meals. Reconstituted suspension should not be refrigerated. Potential drug interactions exist. See Table 5. Significant Drug Interactions for Drugs Used to Treat or Prevent Opportunistic Infections and Drug-Drug Interactions section of the Adult and Adolescent Antiretroviral Guidelines for more information.
Clindamycin	Oral Solution • 15 mg/mL Capsules • 75 mg • 150 mg • 300 mg	More Frequent • Pseudomembranous colitis Less Frequent • Hypersensitivity (rash, redness, pruritus) • Neutropenia • Thrombocytopenia	More Frequent • GI disturbances (abdominal pain, nausea, vomiting, diarrhea) Less Frequent • Fungal overgrowth in rectal and genital areas	IV preparation not recommended for use in neonates because of benzyl alcohol. IV preparation must be diluted prior to administration. Do not exceed 600 mg in a single IM injection.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	IV/IM • 300 mg • 600 mg • 900 mg			Capsule formulation should be taken with food or a full glass of water to avoid esophageal irritation. Reconstituted oral solution should not be refrigerated. Some products may contain tartrazine and can cause allergic reactions. Allergic reactions are frequently observed in people who also have aspirin hypersensitivity.
Cycloserine	Capsule • 250 mg	More Frequent • CNS toxicity (including confusion, anxiety) Less Frequent • Hypersensitivity (skin rash) • Peripheral neuropathy • Seizures • Psychosis Rare • Cardiac arrhythmias	More Frequent • Headache, dizziness, drowsiness Rare • Photosensitivity	Take with food to minimize gastric irritation. Neurotoxicity is related to excessive serum concentrations; serum concentrations should be maintained at 25–30 mcg/mL. Monitor serum levels if possible. Requires dose adjustment in children with impaired renal function. Do not administer to children with severe renal impairment (because of increased risk of neurotoxicity). Should coadminister pyridoxine at the same time.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				May increase Vitamin B12 and folic acid requirements. Monitor renal function, LFTs, and CBC.
Dapsone	Oral Suspension (extemporaneously prepared from 25 mg tablets) • 2 mg/mL Tablets • 25 mg • 100 mg	More Frequent • Hemolytic anemia (especially with G6PD deficiency) • Methemoglobinemia • Skin rash Rare • Blood dyscrasias • Exfoliative skin disorders (including SJS) • Hepatic toxicity • Mood or other mental changes • Peripheral neuritis • Hypersensitivity reaction (fever, rash, jaundice, anemia)	• CNS toxicity (headache, insomnia, nervousness) • GI disturbances (anorexia, nausea, vomiting) • Photosensitivity reactions	Protect from light; dispense syrup in amber glass bottles. Monitor CBC and LFTs. Use with caution in children with G6PD deficiency, Hb M deficiency, and methemoglobin reductase deficiency.
Doxycycline	Tablets and Capsules • 20 mg • 50 mg • 75 mg • 100 mg	More Frequent • GI irritation, pill esophagitis • Photosensitivity Less Frequent • Increased intracranial pressure	• Staining of teeth possible for individuals aged <8 years • Photo-onycholysis • GI disturbances (nausea, vomiting, abdominal cramps)	Swallow with adequate amounts of fluids. Avoid antacids, milk, dairy products, and iron for 1 hour before and 2 hours after administration of doxycycline.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	Oral Suspension and Syrup • 5 mg/mL oral suspension • 10 mg/mL oral syrup IV • 100 mg	• Photosensitivity • Hemolytic anemia • Rash and hypersensitivity reactions • *Clostridium difficile*-associated diarrhea • Pseudotumor cerebri		Avoid high-fat meals that can reduce doxycycline serum levels. Use with caution in hepatic and renal disease. IV doses should be infused over 1 to 4 hours. Children should avoid prolonged exposure to direct sunlight (skin sensitivity). Monitor renal function, CBC, and LFTs if therapy is prolonged.
Erythromycin	Erythromycin-Base Tablet • 250 mg • 333 mg • 500 mg DR Tablet • 250 mg • 333 mg • 500 mg DR Capsule • 250 mg	Less Frequent • Estolate may cause cholestatic jaundice, although hepatotoxicity is uncommon (2% of reported cases). Rare • QT prolongation • Hypersensitivity reactions (rash, exfoliative skin disorders including SJS/TEN)	• GI disturbances (nausea, vomiting, abdominal cramps) • Rash, urticaria • Increased LFTs	Use with caution in liver disease. Oral therapy should replace IV therapy as soon as possible. Give oral doses after meals. Parenteral administration should consist of a continuous drip or slow infusion over 1 hour or longer. Adjust dose in renal failure. Erythromycin should be used with caution in neonates; hypertrophic pyloric stenosis and life-threatening episodes of ventricular tachycardia associated with prolonged QTc interval have been reported.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	Erythromycin Ethyl Succinate *Suspension* • 200 mg/5 mL • 400 mg/5 mL *Oral Drops* • 100 mg/2.5 mL *Chewable Tablet* • 200 mg *Tablet* • 400 mg Erythromycin Estolate *Suspension* • 125 mg/5 mL • 200 mg/5 mL Erythromycin Stearate *Tablet* • 250 mg • 500 mg			IV formulations contain benzyl alcohol derivatives and are not recommended in neonates.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	Erythromycin Gluceptate *IV* • 200 mg Erythromycin Lactobionate *IV* • 500 mg • 1,000 mg			
Ethambutol	Tablets • 100 mg • 400 mg	Less Frequent • Acute gouty arthritis (secondary to hyperuricemia) Rare • Hypersensitivity (rash, fever, joint pain) • Peripheral neuropathy • Retrobulbar optic neuritis, decreased visual acuity, loss of red-green color discrimination • Bone marrow suppression • Abnormal LFTs, hepatotoxicity	• GI disturbances (abdominal pain, anorexia, nausea, vomiting) • Confusion • Disorientation • Headache	Requires dose adjustment in children with impaired renal function. Take with food (e.g., gelatin, chocolate pudding) to minimize gastric irritation. Tablets may be crushed. Monitor visual acuity and red-green color discrimination. Document normal vision at baseline. Monitor renal function, LFTs, and CBC. Avoid concomitant use of neurotoxic drugs. Evaluate pregnancy status prior to treatment.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Ethionamide	Tablet • 250 mg	Less Frequent • Hepatitis, jaundice • Peripheral neuritis • Psychiatric disturbances Rare • Goiter or hypothyroidism • Hypoglycemia • Optic neuritis • Rash	More Frequent • GI disturbances (anorexia, metallic taste, nausea, vomiting, stomatitis) • Orthostatic hypotension Rare • Gynecomastia	Avoid use of other neurotoxic drugs that could increase potential for peripheral neuropathy and optic neuritis. Administration of pyridoxine may alleviate peripheral neuritis. Avoid alcohol. Take with food to minimize gastric irritation. Monitor LFTs, glucose, and thyroid function. Perform periodic ophthalmologic exams. Monitor for signs and symptoms of SCARs.
Fluconazole	Oral Suspension • 10 mg/mL • 40 mg/mL Tablets • 50 mg • 100 mg • 150 mg • 200 mg IV • 200 mg	Less Frequent • Hypersensitivity (fever, chills, rash) Rare • Agranulocytosis, eosinophilia, leucopenia, thrombocytopenia • Exfoliative skin disorders (including SJS) • Hepatotoxicity • QT prolongation • Thrombocytopenia	More Frequent • GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) Less Frequent • CNS effects (dizziness, drowsiness, headache) • Alopecia	Can be given orally without regard to meals. Shake suspension well before dosing. Requires dose adjustment in children with impaired renal function. IV administration should be administered over 1–2 hours at a rate of ≤200 mg/hour. Daily dose is the same for oral and IV administration.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	• 400 mg			Multiple potential drug interactions exist. See Table 5. Significant Drug Interactions for Drugs Used to Treat or Prevent Opportunistic Infections and Drug-Drug Interactions section of the Adult and Adolescent Antiretroviral Guidelines for more information. Monitor periodic LFTs, renal function, and CBC.
Flucytosine	Capsules • 250 mg • 500 mg Oral Liquid • Extemporaneous preparation	More Frequent • Bone marrow suppression (especially leukopenia and thrombocytopenia) Less Frequent • Hepatotoxicity • Renal toxicity (including crystalluria) Rare • Cardiac toxicity (ventricular dysfunction, myocardial toxicity, cardiac arrest) • CNS symptoms (hallucinations, seizures, peripheral neuropathy) • Anaphylaxis • Hearing loss	• GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) • Elevated ALTs and ASTs • Rash Rare • CNS symptoms (headache, drowsiness, confusion, vertigo)	Monitor serum concentrations and adjust dose to maintain therapeutic levels and minimize risk of bone marrow suppression. Requires dose adjustment in children with impaired renal function; use with extreme caution. Fatal aplastic anemia and agranulocytosis rarely have been reported. Consider determination of dihydropyridine dehydrogenase (DPD) enzyme deficiency in children who develop drug toxicity.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				Oral preparations should be administered with food over a 15-minute period to minimize GI side effects. QT prolongation may occur. Monitor CBC, LFTs, renal function, and electrolytes.
Foscarnet	IV • 6,000 mg	More Frequent • Nephrotoxicity • Serum electrolyte abnormalities (hypocalcemia, hypophosphatemia, hypomagnesemia, hypokalemia) Less Frequent • Hematologic toxicity (anemia, granulocytopenia) • Neurotoxicity (muscle twitching, tremor, seizures, tingling around mouth) • Cardiac abnormalities secondary to electrolyte changes • Phlebitis (at site of injection) Rare • Sores or ulcers in mouth or throat	Frequent • GI disturbances (abdominal pain, anorexia, nausea, vomiting) • Anxiety, confusion, dizziness, headache • Fever	Requires dose adjustment in children with impaired renal function. Use adequate hydration to decrease nephrotoxicity. Avoid concomitant use of other drugs with nephrotoxicity. Monitor serum electrolytes, ECG, renal function, and CBC. IV solution of 24 mg/mL can be administered via central line; must be diluted to a final concentration ≤12 mg/mL if given via peripheral line. Must be administered at a constant rate by infusion pump over ≥2 hours (or no faster than 1 mg/kg/minute).

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Ganciclovir	Capsules • 250 mg • 500 mg IV • 500 mg	More Frequent • Granulocytopenia • Thrombocytopenia Less Frequent • Anemia • CNS effects (confusion, headache) • Hypersensitivity (fever, rash) • Elevated transaminase enzymes • Increase in creatinine, BUN • Phlebitis (at injection sites) Rare • Retinal detachment • Seizures • Psychosis • Cardiovascular effects (hypertension, chest pain)	• GI disturbances (abdominal pain, anorexia, nausea, vomiting) • Rash	Requires dose adjustment in children with renal impairment. Avoid other nephrotoxic drugs. IV infusion over at least 1 hour; in-line filter required. Flush line well with NS before and after administration. Maintain good hydration. Undiluted IV solution is alkaline (pH 11); use caution when handling and preparing solutions, and avoid contact with skin and mucus membranes. Administer oral doses with a high-fat meal to increase absorption. Do not open or crush capsules. Perform ophthalmologic examinations and monitor CBC, LFTs, and renal function.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Imipenem/Cilastatin	IV • 250 mg • 500 mg	More Frequent • Hematologic toxicity (decreased hematocrit, decreased hemoglobin) • Hepatotoxicity (increased ALT and AST) Less Frequent • Hematologic toxicity (eosinophilia, thrombocythemia) • Renal toxicity (proteinuria) Rare • Seizures • Cardiovascular toxicity • Neutropenia • Phlebitis near injection site	Rare • Rash • GI disturbances (nausea and vomiting) • Oral candidiasis	Administer by IV intermittent infusion. Doses ≤500 mg may be infused over 20 to 30 minutes. Doses >500 mg should be infused over 40 to 60 minutes. If nausea and vomiting occur during infusion, decrease rate of IV infusion.
Isavuconazole	Oral Capsules • 74.5 mg • 186 mg IV • 372 mg	More Frequent • Peripheral edema • Hypokalemia Less Frequent • Increase in liver enzymes	More Frequent • Back pain • GI disturbances (abdominal pain and constipation) Less Frequent • Anxiety	Administer IV over a minimum of 1 hour via infusion, set with in-line filter. Give capsules with or without food. Swallow capsules whole. Do not chew, crush, dissolve, or open capsules.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		Rare • Atrial fibrillation • Cholelithiasis • Acute respiratory failure	Rare • Dermatologic (alopecia, urticaria) • Tinnitus	Some dosage forms contain propylene glycol. Large amounts administered have been associated with potentially fatal toxicities in neonates, including metabolic acidosis, seizures, renal failure, and CNS depression.
Isoniazid	Oral Syrup • 10 mg/mL Tablets • 100 mg • 300 mg IV/IM • 100 mg	More Frequent • Hepatitis prodromal syndrome (anorexia, weakness, vomiting) • Hepatitis • Peripheral neuritis Rare • Blood dyscrasias • Hypersensitivity (fever, rash, joint pain) • Neurotoxicity (including seizure) • Optic neuritis	• GI disturbances (abdominal pain, nausea, vomiting, diarrhea) • Elevated liver transaminases • Pyridoxine deficiency	Take with food to minimize gastric irritation. Take ≥1 hour before aluminum-containing antacids. Avoid taking isoniazid with histamine and tyramine-containing foods. Increase dietary intake of folate, niacin, and magnesium. Use with caution in children with hepatic function impairment, severe renal failure, or history of seizures. Pyridoxine supplementation should be provided for all children with HIV. Monitor LFTs and perform periodic ophthalmologic examinations.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Itraconazole	Oral Solution • 10 mg/mL Capsule • 100 mg IV • 250 mg	Less Frequent • Hypersensitivity (fever, chills, rash) • Hypokalemia (can be associated with cardiac arrhythmias) Rare • Hepatotoxicity • Hematologic abnormalities (thrombocytopenia, leukopenia)	More Frequent • GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) Less Frequent • CNS effects (dizziness, drowsiness, headache) • Rash	Oral Solution • Give on an empty stomach because gastric acid increases absorption. Capsule • Administer after a full meal to increase absorption. • Grapefruit juice may alter itraconazole levels. Itraconazole oral solution has 60% greater bioavailability compared with capsules, and the oral solution and capsules should not be used interchangeably. Administer IV infusion over at least 1 hour. Multiple potential drug interactions. See Table 5. Significant Drug Interactions for Drugs Used to Treat or Prevent Opportunistic Infections and Drug-Drug Interactions section of the Adult and Adolescent Antiretroviral Guidelines for more information. Monitor LFTs and potassium levels.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				Monitor serum concentrations (TDM) in severe infections after 2 weeks of therapy. Levels may be drawn any time during the dosing interval. Box warning: May cause or exacerbate HF. Discontinue to reassess risk-benefit if signs or symptoms of HF occur.
Kanamycin	IV/IM • 75 mg • 500 mg • 1,000 mg	More Frequent • Nephrotoxicity • Neurotoxicity (including muscle twitching, seizures) • Ototoxicity (both auditory and vestibular) Less Frequent • Hypersensitivity (rash, redness, or swelling) Rare • Neuromuscular blockade	N/A	Must be infused over 30 to 60 minutes to avoid neuromuscular blockade. Requires dose adjustment in children with impaired renal function. Monitor renal function and auditory function periodically (e.g., monthly) in children on prolonged therapy. Monitor serum concentrations (TDM).

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Ketoconazole	Tablet • 200 mg Topical • Shampoo • Cream • Gel • Foam Oral Suspension • Extemporaneous preparation	Less Frequent • Hypersensitivity (fever, chills, rash) Rare • Hepatotoxicity (including hepatic failure)	More Frequent • GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) Less Frequent • CNS effects (dizziness, drowsiness, headache) Rare • Gynecomastia • Impotence • Menstrual irregularities • Photophobia	Adverse GI effects occur less often when administered with food. Drugs that decrease gastric acidity or sucralfate should be administered ≥2 hours after ketoconazole. Administer with acidic liquid (non-diet cola or orange juice) in children with achlorhydria. Disulfiram-like reactions have occurred in pediatric patients accidentally ingesting alcohol. Hepatotoxicity is an idiosyncratic reaction, usually reversible when stopping the drug, but rare fatalities can occur any time during therapy; more common in females and adults >40 years, but cases have been reported in children. High-dose ketoconazole suppresses corticosteroid secretion and lowers serum testosterone concentration (reversible). Multiple potential drug interactions exist. Monitor LFTs.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Mefloquine	Tablet • 250 mg	More Frequent • CNS effects (psychosis, depression, hallucinations, paranoia, seizures) Rare • Blood dyscrasias • Cholestasis, elevated bilirubin	• Rash • GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) • Minor CNS effects (dizziness, vivid dreams, insomnia) • Tinnitus, blurred vision	Side effects are less prominent in children. Administer with food and plenty of water. Tablets can be crushed and added to food; administer with foods such as chocolate syrup or gelatin to mask the bitter taste of crushed tablets. Monitor LFTs.
Nitazoxanide	Oral Suspension • 20 mg/mL Tablet • 500 mg	N/A	More Frequent • GI disturbances (abdominal pain, nausea, vomiting) • Headache Rare • Scleral icterus • Rash	Should be given with food. Shake suspension well prior to dosing. Use with caution in neonates. Nitazoxanide products may contain benzyl alcohol derivatives that can be associated with gasping syndrome.
p-Aminosalicylic Acid	DR Granules • 4,000 mg per packet	Rare • Hypersensitivity o Fever o Rash o Exfoliative dermatitis o GI symptoms	• GI disturbances (abdominal pain, nausea, vomiting, diarrhea)	Should not be administered to children with severe renal disease. Drug should be discontinued at first sign of hypersensitivity reaction (rash, fever, and GI symptoms typically precede jaundice).

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		o Jaundice o Hepatitis o Pericarditis o Vasculitis o Hematologic abnormalities including hemolytic anemia o Hypoglycemia o Optic neuritis o Encephalopathy o Reduction in Prothrombin • Crystalluria • Hemolytic anemia		Vitamin B12 therapy should be considered in children receiving for >1 month. Administer granules by sprinkling on acidic foods (e.g., applesauce, yogurt) or a fruit drink (e.g., tomato juice, orange juice). Maintain urine at neutral or alkaline pH to avoid crystalluria. The granule's soft "skeleton" may be seen in the stool. Monitor CBC and LFTs.
Pentamidine	IV/IM/Aerosol • 300 mg	For IV Administration *More Frequent* • Nephrotoxicity • Hypoglycemia • Hyperglycemia or diabetes mellitus • Elevated liver transaminases • Hypotension • Leukopenia or neutropenia • Thrombocytopenia	For IV Administration *More Frequent* • GI disturbances (anorexia, nausea, vomiting, diarrhea) *Less Frequent* • Unpleasant metallic taste For Aerosol Administration *More Frequent* • Bronchospasm	Rapid infusion may result in precipitous hypotension; IV infusion should be administered over ≥1 hour (preferably 2 hours). Cytolytic effect on pancreatic beta islet cells, leading to insulin release, can result in prolonged severe hypoglycemia (usually occurs after 5–7 days of therapy, but can also occur after the drug is discontinued); risk increased with higher dose, longer duration of therapy, and retreatment within 3 months of prior treatment.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		Less Frequent • Anemia • Cardiac arrhythmias • Hypersensitivity (skin rash, fever) • Pancreatitis • Phlebitis • Sterile abscess (at site injection) For Aerosol Administration *More Frequent* • Sneezing • Cough		Hyperglycemia and diabetes mellitus can occur up to several months after drug is discontinued. Monitor LFTs, renal function, glucose, electrolytes, and BP. Inhalation • A special nebulizer is required for aerosol administration. Medical personnel should be trained in the proper administration of aerosolized pentamidine. • An inhaled bronchodilator may be administered prior to each dose in children who experience bronchospasm or cough.
Posaconazole	IR Oral Suspension • 40 mg/mL Oral Powder Packet • 300 mg DR Tablet • 100 mg DR Oral Suspension • Extemporaneous preparation	Less Frequent • Hypersensitivity (fever, chills, skin rash) • Anaphylactoid reaction with IV infusion Rare • Hepatotoxicity (including hepatic failure) • Exfoliative skin disorders (including SJS)	• Bone marrow suppression • Muscular pain • CNS effects (headache, dizziness, fatigue) • Elevated serum ALTs and ASTs	Must be given with meals to ensure adequate absorption. Monitor LFTs, renal function, and electrolytes. Monitor serum drug concentrations (TDM). Shake suspension prior to dosing. Various oral formulations are not interchangeable.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
	IV • 300 mg	• Renal dysfunction • Cardiac arrhythmias (QT interval prolongation, Torsades de pointes, hypertension) • Hemolytic uremic syndrome • Pulmonary embolism • Neutropenia		Administer reconstituted DR suspension within 1 hour of prep and administer with food. Administer IR suspension during or within 20 minutes following a full meal. Infuse IV over 90 minutes via central line only.
Primaquine	Tablet • 15 mg (base) = 26.3 mg primaquine phosphate	More Frequent • Hemolytic anemia (with G6PD deficiency) Less Frequent • Methemoglobinemia Rare • Leukopenia	• GI disturbances (nausea, vomiting)	Take with meals or antacids to minimize gastric irritation. Store in a light-resistant container. Combat bitter taste with chocolate syrup, applesauce, or jelly. Monitor CBC. Recommend G6PD testing.
Pyrazinamide	Tablet • 500 mg Oral Suspension • Extemporaneous preparation	More Frequent • Arthralgia Less Frequent • Hepatotoxicity (dose-related) Rare • Acute gouty arthritis secondary to hyperuricemia • Thrombocytopenia, anemia	• Skin rash, pruritus • Photosensitivity • Malaise • GI disturbances (nausea, vomiting) • Arthralgia • Hyperuricemia	Avoid in children with severe hepatic impairment. Reduce dose in children with renal or hepatic impairment. Monitor LFTs and uric acid.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
		• Interstitial nephritis • Porphyria		
Pyrimethamine	Tablet • 25 mg Oral Suspension • Extemporaneous preparation	Less Frequent • Neutropenia • Thrombocytopenia • Megaloblastic anemia Rare • SJS • Seizure	• Skin rash • Photosensitivity • Dry mouth • GI disturbances (nausea, vomiting) • CNS effects (depression, insomnia)	To prevent hematologic toxicity, administer with leucovorin. Monitor CBC. Administer with meals to avoid GI side effects. Recommend G6PD testing.
Quinidine	Tablet (XR) • 324 mg Tablet • 200 mg • 300 mg	Serious • Cardiac arrhythmias • QT interval prolongation • Hypoglycemia • Hemolytic anemia (with G6PD deficiency) • Hepatotoxicity	Very Frequent • Cinchonism (dose-dependent)—syndrome of tinnitus, reversible high-frequency hearing loss, deafness, vertigo, blurred vision, diplopia, photophobia, headache, confusion, and delirium.	Monitor CBC and LFTs. Hemolysis may occur in children with G6PD.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Ribavirin	Powder for Solution for Nebulization • Reconstituted product contains 20 mg/mL. Oral Solution • 40 mg/mL Capsule • 200 mg Tablets • 200 mg • 400 mg • 600 mg	More Frequent • Hemolytic anemia (with associated potential for increase in unconjugated bilirubin and uric acid) Less Frequent • Neutropenia, thrombocytopenia, anemia • Pancreatitis	• CNS effects (fatigue, headache, insomnia, depression) • GI disturbances (abdominal pain, nausea, vomiting) • Skin rash • Myalgia, arthralgia, weakness	Should not be used in children with severe renal impairment. Should not be used as monotherapy for treatment of hepatitis C but rather, used in combination with IFN-α. Intracellular phosphorylation of pyrimidine nucleoside analogues (zidovudine, stavudine, zalcitabine) decreased by ribavirin, may have antagonism; use with caution. Enhances phosphorylation of didanosine; use with caution due to increased risk of pancreatitis/ mitochondrial toxicity. Oral solution contains propylene glycol. This drug is teratogenic/embryocidal and contraindicated in pregnant women and their partners. Avoid pregnancy for an additional 6 months after treatment. In combination therapy with IFN-α, ribavirin may cause a reduction in growth velocity in children and adolescents 5–17 years of age.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				Monitor CBC, renal function, LFTs, and thyroid function. Perform pregnancy tests regularly while on therapy. High-fat meals increase AUC and Cmax. Be consistent with fat content of meals.
Rifabutin	Capsule • 150 mg Oral Suspension • Extemporaneous preparation	More Frequent • Allergic reaction (rash, pruritus) • Neutropenia Less Frequent • Asthenia Rare • Arthralgia, myalgia • Change in taste • Pseudojaundice • Thrombocytopenia • Uveitis	• Headache • Insomnia • Rash, staining of skin • GI disturbances (abdominal pain, diarrhea, nausea, vomiting, anorexia)	Preferably take on an empty stomach, but may be administered with food in children with GI intolerance. The contents of capsules may be mixed with applesauce for children who are unable to swallow capsules. May cause reddish to brown-orange color urine, feces, saliva, sweat, skin, or tears (can discolor soft contact lenses). Uveitis seen with high-dose rifabutin (i.e., >300 mg/day in adults), especially when combined with clarithromycin. Multiple potential drug interactions exist. Use with caution in children with renal or hepatic impairment.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				Monitor CBC and LFTs; conduct ophthalmologic examinations. Reduce dose in children with renal impairment.
Rifampin	Oral Suspension • Extemporaneous preparation Capsules • 150 mg • 300 mg IV • 600 mg	Less Frequent • Flu-like syndrome Rare • Blood dyscrasias • Hepatitis prodromal syndrome (anorexia, nausea, vomiting, weakness) • Hepatitis • Interstitial nephritis • Exfoliative skin disorders (including SJS)	• GI disturbances (abdominal pain, diarrhea) • CNS effects (fatigue, headache, insomnia, depression) • Rash • Discoloration of body fluids • Elevated serum transaminases • Visual changes	Preferably taken on an empty stomach, but can be administered with food in children with GI intolerance; take with full glass of water. Suspension formulation stable for 30 days. Shake well prior to dosing. May mix contents of capsule with applesauce or jelly. May cause reddish to brown-orange color urine, feces, saliva, sweat, skin, or tears (can discolor soft contact lenses). Multiple potential drug interactions Use with caution in children with hepatic impairment. Administer IV by slow infusion. Extravasation may cause local irritation and inflammation. Monitor CBC and LFTs.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Streptomycin	IV/IM • 1,000 mg	More Frequent • Nephrotoxicity • Neurotoxicity (including muscle twitching, seizures) • Peripheral neuritis • Ototoxicity (both auditory and vestibular) Less Frequent • Hypersensitivity (skin rash, redness, or swelling) • Optic neuritis • Bone marrow suppression Rare • Neuromuscular blockade	• CNS effects (headache, ataxia, dizziness)	Usual route of administration is deep IM injection into large muscle mass. For children who cannot tolerate IM injections, dilute to 12–15 mg in 100 mL of 0.9% sodium chloride; must be infused over 30–60 minutes to avoid neuromuscular blockade. Requires dose adjustment in children with impaired renal function. Monitor renal function and hearing periodically (e.g., monthly) in children on prolonged therapy. Monitor serum concentrations (TDM).
Sulfadiazine	Tablet • 500 mg Oral Suspension • Extemporaneous preparation	Rare • Crystalluria, renal failure • Bone marrow suppression/blood dyscrasias • Severe hypersensitivity syndrome • Hemolytic anemia (with G6PD deficiency)	• GI disturbances (abdominal pain, diarrhea, nausea) • CNS effects (headache, dizziness) • Rash • Photosensitivity	Ensure adequate fluid intake to avoid crystalluria. Monitor CBC, renal function, and urinalysis. Monitor serum concentrations (TDM) if serious infection.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
				May potentially lead to hyperbilirubinemia and kernicterus in neonates and young infants. Avoid use in infants <2 months unless other options are not available.
Trimethoprim-Sulfamethoxazole (TMP-SMX)	Oral Suspension • TMP 8 mg/mL and SMX 40 mg/mL Tablets *Single Strength* • TMP 80 mg and SMX 400 mg *Double Strength* • TMP 160 mg and SMX 800 mg IV • TMP 16 mg/ mL and SMX 80 mg/mL	More Frequent • Skin rash Less Frequent • Hypersensitivity reactions (skin rash, fever) • Hematologic toxicity (leukopenia, neutropenia, thrombocytopenia, anemia) Rare • Exfoliative skin disorders (including SJS) • Hemolytic anemia (with G6PD deficiency) • Methemoglobinemia • Renal toxicity (crystalluria, nephritis, tubular necrosis) • CNS toxicity (aseptic meningitis) • Pseudomembranous colitis • Cholestatic hepatitis • Thyroid function disturbance	• GI disturbances (anorexia, nausea, vomiting, diarrhea) • Photosensitivity • Rash	Requires dose adjustment in children with impaired renal function. Maintain adequate fluid intake to prevent crystalluria and stone formation; take with full glass of water. Potential for photosensitivity skin reaction with sun exposure. May displace bilirubin from protein binding sites which may lead to hyperbilirubinemia in neonates and young infants. Oral suspension may contain propylene glycol that can lead to fatal toxicities, such as metabolic acidosis, renal failure, or respiratory depression in neonates. Administer IV infusion over 60–90 minutes. Monitor CBC and renal function.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Valacyclovir	Tablets • 500 mg • 1,000 mg Note: An oral suspension formulation of 50 mg/mL can be prepared in Ora-Sweet or SyrPalta syrups)	Rare • Renal failure • Bone marrow suppression • Thrombotic microangiopathy/ hemolytic uremic syndrome • CNS effects (psychosis, seizures, delirium)	More Frequent • Headache, nausea Less Frequent • Arthralgia • Dizziness, fatigue • GI disturbances (diarrhea or constipation, anorexia, abdominal pain, vomiting) • Dysmenorrhea	Thrombotic thrombocytopenic purpura/hemolytic uremic syndrome has been reported in adults with HIV with advanced disease receiving high (i.e., 8 g/day) but not low doses. Monitor CBC and renal function. Avoid other nephrotoxic drugs. Maintain adequate hydration.
Valganciclovir	Tablet • 450 mg Oral Solution • 50 mg/mL	More Frequent • Granulocytopenia • Thrombocytopenia Less Frequent • Anemia • CNS effects (seizures, psychosis, hallucinations) • Hypersensitivity (fever, rash) • Elevated transaminase enzymes • Increase in creatinine or BUN • Retinal detachment	• GI disturbances (abdominal pain, anorexia, nausea, vomiting) • CNS effects (headache, insomnia)	Requires dose adjustment in children with renal impairment. Avoid other nephrotoxic drugs. Tablets should not be broken or crushed. Monitor CBC and renal function. Potentially teratogenic and carcinogenic.

Drug	Preparations	Major Toxicities[a]		Special Instructions
		Indicating Need for Medical Attention	Indicating Need for Medical Attention If Persistent or Bothersome	
Voriconazole	Tablets • 50 mg • 200 mg Oral Suspension • 40 mg/mL IV • 200 mg	Less Frequent • Hypersensitivity (fever, chills, skin rash) • Anaphylactoid reaction with IV infusion Rare • Hepatotoxicity (including hepatic failure) • Exfoliative skin disorders (including SJS) • Renal dysfunction • Cardiac arrhythmias • Pancreatitis • QT prolongation • Electrolyte abnormalities • Optic neuritis, papilledema	More Frequent • Visual changes, dose-related (photophobia, blurry vision) • CNS effects (dizziness, drowsiness, headache) • GI disturbances (abdominal pain, constipation, diarrhea, anorexia, nausea, vomiting) • Photosensitivity Rare • Gynecomastia • Elevated serum transaminases	Oral tablets should be taken 1 hour before or after a meal. Shake oral suspension well prior to dosing. Maximum IV infusion rate should be 3 mg/kg/hour over 1–2 hours. Use oral administration for children with impaired renal function, if possible, because of accumulation of IV vehicle in children with renal insufficiency. Dose adjustment is needed if hepatic insufficiency exists. Visual disturbances are common (>30%) but are transient and reversible when drug is discontinued. Multiple potential drug interactions exist. Monitor renal function, electrolytes, and LFTs. Consider monitoring serum concentrations (TDM).

[a] The toxicities listed in the table have been selected based on their potential clinical significance and are not inclusive of all side effects reported for a particular drug.

[b] Source: Atovacquone/Proguanil. ScienceDirect. https://www.sciencedirect.com/topics/medicine-and-dentistry/atovaquone-proguanil.

Key: ALT = alanine transaminase; AST= aspartate transaminase; AUC = area under the curve; BP = blood pressure; BUN = blood urea nitrogen; CBC = complete blood count; C_{max} = maximum plasma concentration; CNS = central nervous system; Cr = creatinine; CrCl = creatinine clearance; D5W = dextrose 5% in water; DR = delayed-release; ECMO = extracorporeal membrane oxygenation; EKG = electrocardiogram; G6PD = glucose-6-phosphate dehydrogenase; GI = gastrointestinal; Hb = hemoglobin; HF = heart failure; IFN-α = interferon alfa; IM = intramuscular; IR = immediate-release; IV = intravenous; LFT = liver function test; NS = normal saline; PK = pharmacokinetics; QT = interval between Q and T waves; QTc = QT interval corrected for heart rate; SCAR = severe cutaneous adverse reactions; SJS = Stevens-Johnson Syndrome; SMX = sulfamethoxazole; TDM = therapeutic drug monitoring; TMP = trimethoprim; XR = extended-release.