Table 2. Treatment of AIDS-Associated Opportunistic Infections (Includes Recommendations for Acute Treatment and Secondary Prophylaxis/Chronic Suppressive/Maintenance Therapy)

Updated: April 12, 2022
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Opportunistic Infection		Preferred Therapy	Alternative Therapy	Other Comments
Bacterial Enteric Infections	Empiric therapy pending definitive diagnosis	Diagnostic fecal specimens should be obtained before the initiation of empiric antimicrobial therapy. If a pathogen is identified, antibiotic susceptibilities should be performed to confirm and inform antibiotic choices given increased reports of antibiotic resistance. Reflex culture for antibiotic susceptibilities should also be done if diagnosis is made using PCR-based methods. Empiric antibiotic therapy may be indicated for patients with CD4 count 200–500 cells/mm^3 where diarrhea is severe enough to compromise quality of life or the ability to work (CIII) and is indicated in patients with CD4 count <200 cells/mm^3 or concomitant AIDS-defining illness and with clinically severe diarrhea (≥6 stools per day or bloody stool) and/or accompanying fever or chills (AIII). Empiric Therapy • Ciprofloxacin 500–750 mg PO (or 400 mg IV) every 12 hours for 5 days (AIII) (particularly if diarrhea is not associated with international travel) Therapy should be adjusted based on the results of a diagnostic work-up. For patients with chronic diarrhea (>14 days) without severe clinical signs, empiric antibiotics therapy is not necessary. Treatment can be withheld until a diagnosis is made.	Empiric Therapy *In Patients with Marked Nausea, Vomiting, Diarrhea, Electrolyte Abnormalities, Acidosis, Blood Pressure Instability, and/or When Hospitalization Is Needed* • Ceftriaxone 1 g IV every 24 hours (BIII), *or* • Cefotaxime 1 g IV every 8 hours (BIII)	Oral or IV rehydration (if indicated) should be given to patients with diarrhea (AIII). Anti-motility agents should be avoided if there is concern about inflammatory diarrhea, including CDI (BIII). If no clinical response is observed after 3–4 days, consider a follow-up stool culture with antibiotic susceptibility testing or alternative diagnostic tests (e.g., toxin assays, molecular testing) to evaluate alternative diagnoses, antibiotic resistance, or drug–drug interactions.
	Campylobacteriosis	For Mild Disease and if CD4 Count >200 Cells/mm^3 • No therapy unless symptoms persist for more than several days (CIII).	For Mild-to-Moderate Disease (If Susceptible) • Levofloxacin 750 mg (PO or IV) every 24 hours (BIII), *or* • Moxifloxacin 400 mg (PO or IV) every 24 hours (BIII)	Oral or IV rehydration if indicated (AIII) Anti-motility agents should be avoided (BIII). If no clinical response is observed after 5–7 days, consider a follow-

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		For Mild-to-Moderate Disease (If Susceptible) • Ciprofloxacin 500–750 mg PO (or 400 mg IV) every 12 hours for 7–10 days (BIII), *or* • Azithromycin 500 mg PO daily for 5 days (BIII) (Note: Not for patients with bacteremia [AIII]) For *Campylobacter* Bacteremia • Ciprofloxacin 500–750 mg PO (or 400 mg IV) every 12 hours for ≥14 days if the isolate is sensitive (BIII) plus an aminoglycoside (BIII) For Recurrent infections • Duration of therapy may be extended to 2–6 weeks (BIII).	Add an aminoglycoside to fluoroquinolone in bacteremic patients (BIII).	up stool culture, alternative diagnosis, or antibiotic resistance. In the United States in 2018, 29% of *C. jejuni* isolates were resistant to ciprofloxacin and 2% were resistant to azithromycin; among *C. coli* isolates, 40.5% were resistant to fluoroquinolone and 13.3% are resistant to azithromycin. The rationale for addition of an aminoglycoside to a fluoroquinolone in bacteremic patients is to prevent emergence of quinolone resistance. Effective ART may reduce the frequency, severity, and recurrence of *campylobacter* infections.
	Clostridium difficile infection (CDI)	Fidaxomicin 200 mg PO two times daily for 10 days (AI) Vancomycin 125 mg PO four times daily for 10 days (AI) For severe, life-threatening CDI, see text and references for additional information.	For Nonsevere CDI *If Fidaxomicin or Vancomycin Access Is Limited* • Metronidazole 500 mg (PO) three times daily for 10 days (CII)	Recurrent CDI Treatment is the same as in patients without HIV infection. Bezlotoximab (CIII) or fecal microbiota therapy may be successful and safe to treat recurrent CDI (CIII). See text and references for additional information.
	Salmonellosis	All people with HIV and salmonellosis should receive antimicrobial treatment due to an increase of bacteremia (by 20-fold to 100-fold) and mortality (by up to 7-fold) compared to individuals without HIV (AIII).		Oral or IV rehydration if indicated (AIII) Anti-motility agents should be avoided (BIII). The role of long-term secondary prophylaxis in patients with recurrent *Salmonella* bacteremia is not well established. Must weigh benefit against risks of long-term antibiotic exposure (BIII). Effective ART may reduce the frequency, severity, and recurrence of salmonella infections.
		• Ciprofloxacin 500–750 mg PO (or 400 mg IV) every 12 hours, if susceptible (AIII) Duration of Therapy *For Gastroenteritis Without Bacteremia* • If CD4 count ≥200 cells/mm^3: 7–14 days (BIII) • If CD4 count <200 cells/mm^3: 2–6 weeks (BIII)	• Levofloxacin 750 mg (PO or IV) every 24 hours (BIII), *or* • Moxifloxacin 400 mg (PO or IV) every 24 hours (BIII), *or* • TMP 160 mg-SMX 800 mg (PO or IV) every 12 hours (BIII), *or* • Ceftriaxone 1 g IV every 24 hours (BIII), *or* • Cefotaxime 1 g IV every 8 hours (BIII)	

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		For Gastroenteritis with Bacteremia • If CD4 count ≥200/mm^3: 14 days or longer duration if bacteremia persists or if the infection is complicated (e.g., if metastatic foci of infection are present) (BIII) • If CD4 count <200 cells/mm^3: 2–6 weeks (BIII) Secondary Prophylaxis Should Be Considered • For patients with recurrent *Salmonella* bacteremia (BIII), *or* • For patients with recurrent gastroenteritis (with or without bacteremia) with CD4 count <200 cells/mm^3 with severe diarrhea (BIII)		
	Shigellosis	• Ciprofloxacin 500–750 mg PO (or 400 mg IV) every 12 hours (if MIC <0.12 μg/mL (AIII) Duration of Therapy • Gastroenteritis: 7–10 days (AIII) • Bacteremia: ≥14 days (BIII) • Recurrent infections: Up to 6 weeks (BIII) Note: Increased resistance of *Shigella* to fluoroquinolones is occurring in the United States. Avoid fluoroquinolones if ciprofloxacin MIC is ≥0.12 μg/mL, even if the laboratory identifies the isolate as sensitive. Many *Shigella* strains resistant to fluoroquinolones exhibit resistance to other commonly used antibiotics. Thus, antibiotic sensitivity testing of *Shigella* isolates from HIV-infected individuals should be performed routinely.	• Levofloxacin 750 mg (PO or IV) every 24 hours (BIII), *or* • Moxifloxacin 400 mg (PO or IV) every 24 hours (BIII), *or* • TMP 160 mg-SMX 800 mg (PO or IV) every 12 hours (BIII) (Note: *Shigella* infections acquired outside of the United States have high rates of TMP-SMX resistance), *or* • Azithromycin 500 mg PO daily for 5 days (BIII) (Note: not recommended for patients with bacteremia [AIII].) Note: Azithromycin-resistant *Shigella spp.* has been reported in HIV-infected MSM.	Therapy may slightly shorten duration of illness and/or prevent spread of infection (AIII). Given increasing antimicrobial resistance and limited data showing that antibiotic therapy limits transmission, antibiotic treatment may be withheld in patients with CD4 count >500 cells/mm^3 whose diarrhea resolves prior to culture confirmation of *Shigella* infection (CIII). Oral or IV rehydration if indicated (AIII). Anti-motility agents should be avoided (BIII). If no clinical response after 5–7 days, consider a follow-up stool culture, alternative diagnosis, or antibiotic resistance. Effective ART may decrease the risk of recurrence of *Shigella* infections.

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Bartonellosis	For Bacillary Angiomatosis, Peliosis Hepatis, Bacteremia, and Osteomyelitis • Doxycycline 100 mg PO or IV every 12 hours (AII), *or* • Erythromycin 500 mg PO or IV every 6 hours (AII) CNS Infections • (Doxycycline 100 mg +/- RIF 300 mg) PO or IV every 12 hours (AIII) Confirmed *Bartonella* Endocarditis • (Doxycycline 100 mg IV every 12 hours plus gentamicin 1 mg/kg IV every 8 hours) for 2 weeks, then continue with doxycycline 100 mg IV or PO every 12 hours (BII) Other Severe Infections • (Doxycycline 100 mg PO or IV +/- RIF 300 mg PO or IV) every 12 hours (BIII), *or* • (Erythromycin 500 mg PO or IV every 6 hours) +/- RIF 300 mg PO or IV every 12 hours (BIII) Duration of Therapy • At least 3 months (AII)	For Bacillary Angiomatosis, Peliosis Hepatis, Bacteremia, and Osteomyelitis • Azithromycin 500 mg PO daily (BIII) • Clarithromycin 500 mg PO twice a day (BIII) Confirmed *Bartonella* Endocarditis, but with Renal Insufficiency • (Doxycycline 100 mg IV plus RIF 300 mg PO or IV) every 12 hours for 2 weeks, then continue with doxycycline 100 mg IV or PI every 12 hours (BII)	When RIF is used, take into consideration the potential for significant interaction with ARV drugs and other medications (see Table 4 for dosing recommendations). If relapse occurs after initial (>3 month) course of therapy, long-term suppression with doxycycline or a macrolide is recommended as long as the CD4 count is <200 cells/mm^3 (AIII).
Candidiasis (Mucocutaneous)	For Oropharyngeal Candidiasis; Initial Episodes (for 7–14 Days) *Oral Therapy* • Fluconazole 100 mg PO daily (AI) For Esophageal Candidiasis (for 14–21 Days) • Fluconazole 100 mg (up to 400 mg) PO or IV daily (AI), *or* • Itraconazole oral solution 200 mg PO daily (AI) For Uncomplicated Vulvo-Vaginal Candidiasis • Oral fluconazole 150 mg for one dose (AII), *or*	For Oropharyngeal Candidiasis; Initial Episodes (for 7–14 Days) *Oral Therapy* • Itraconazole oral solution 200 mg PO daily (BI), *or* • Posaconazole oral suspension 400 mg PO twice a day for 1 day, then 400 mg daily (BI) *Topical Therapy* • Clotrimazole troches, 10 mg PO five times daily (BI), *or* • Miconazole mucoadhesive buccal 50-mg tablet; apply to mucosal surface over the	Chronic or prolonged use of azoles may promote development of resistance. Higher relapse rate for esophageal candidiasis seen with echinocandins than with fluconazole use. Suppressive therapy usually not recommended (BIII) unless patients have frequent or severe recurrences. If Decision Is to Use Suppressive Therapy *Oropharyngeal Candidiasis* • Fluconazole 100 mg PO daily or three times weekly (BI), or

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	• Topical azoles (clotrimazole, butoconazole, miconazole, tioconazole, or terconazole) for 3–7 days (AII) For Severe or Recurrent Vulvo-Vaginal Candidiasis • Fluconazole 100–200 mg PO daily for ≥7 days (AII), *or* • Topical antifungal ≥7 days (AII)	canine fossa once daily (do not swallow, chew, or crush tablet) (BI), *or* • Nystatin suspension 4–6 mL four times a day or 1–2 flavored pastilles four to five times daily (BII) • Gentian violet (0.00165%) topical application twice daily (BI) For Esophageal Candidiasis (for 14–21 Days) • Voriconazole 200 mg PO or IV twice a day (BI), *or* • Isavuconazole 200 mg PO as a loading dose, followed by 50 mg PO daily (BI), *or* • Isavuconazole 400 mg PO as a loading dose, followed by 100 mg PO daily (BI), *or* • Isavuconazole 400 mg PO once weekly (BI), *or* • Anidulafungin 100 mg IV 1 time, then 50 mg IV daily (BI), *or* • Caspofungin 50 mg IV daily (BI), *or* • Micafungin 150 mg IV daily (BI), *or* • Amphotericin B deoxycholate 0.6 mg/kg IV daily (BI), *or* • Lipid formulation of amphotericin B 3–4 mg/kg IV daily (BIII) For Uncomplicated Vulvo-Vaginal Candidiasis • Itraconazole oral solution 200 mg PO daily for 3–7 days (BII)	• Itraconazole oral solution 200 mg PO daily (CI) *Esophageal Candidiasis* • Fluconazole 100–200 mg PO daily (BI); or • Posaconazole 400 mg PO twice a day (BII) *Vulvo-Vaginal Candidiasis* • Fluconazole 150 mg PO once weekly (CII)

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		For Azole-Refractory *Candida glabrata* Vaginitis • Boric acid vaginal suppository 600 mg once daily for 14 days	
Chagas Disease (American Trypanosomiasis)	For Acute, Early Chronic, and Re-Activated Disease • Benznidazole 5–8 mg/kg/day PO in 2 divided doses for 30–60 days (BIII) (not commercially available in the United States; contact the CDC Drug Service at drugservice@cdc.gov or 404-639-3670, or the CDC emergency operations center at 770-488-7100).	For Acute, Early Chronic, And Reactivated Disease: • Nifurtimox 8–10 mg/kg/day PO for 90–120 days (CIII) (not commercially available in the United States, contact the CDC Drug Service at drugservice@cdc.gov or 404-639-3670, or the CDC emergency operations center at 770-488-7100).	Treatment is effective in reducing parasitemia and preventing clinical symptoms or slowing disease progression. It is ineffective in achieving parasitological cure. Duration of therapy has not been studied in HIV-infected patients. Initiate or optimize ART in patients undergoing treatment for Chagas disease, once they are clinically stable (AIII).
Coccidioidomycosis	Clinically Mild Infections (e.g., Focal Pneumonia) • Fluconazole 400 mg PO daily (BII), *or* • Itraconazole 200 mg PO twice a day (BII) Severe, Non-Meningeal Infection (Diffuse Pulmonary Infection or Severely Ill Patients with Extrathoracic, Disseminated Disease) • Amphotericin B deoxycholate 0.7–1.0 mg/kg IV daily (AII) • Lipid formulation amphotericin B 4–6 mg/kg IV daily (AIII) • Duration of therapy: continue until clinical improvement, then switch to an azole (BIII). Meningeal Infections • Fluconazole 400–800 mg IV or PO daily (AII) Chronic Suppressive Therapy • Fluconazole 400 mg PO daily (AII), *or*	Mild Infections (Focal Pneumonia) *For Patients Who Failed to Respond to Fluconazole or Itraconazole* • Posaconazole 200 mg PO twice a day (BII), *or* • Voriconazole 200 mg PO twice a day (BIII) Severe, Non-Meningeal Infection (Diffuse Pulmonary Infection or Severely Ill Patients with Extrathoracic, Disseminated Disease) • Some specialists will add a triazole (fluconazole or itraconazole, with itraconazole preferred for bone disease) 400 mg per day to amphotericin B therapy and continue triazole once amphotericin B is stopped (BIII). Meningeal Infections • Itraconazole 200 mg PO three times a day for 3 days,	Some patients with meningitis may develop hydrocephalus and require CSF shunting. Therapy should be continued indefinitely in patients with diffuse pulmonary or disseminated diseases because relapse can occur in 25%–33% of HIV-negative patients. It can also occur in HIV-infected patients with CD4 counts >250 cells/mm^3 (BIII). Therapy should be lifelong in patients with meningeal infections because relapse occurs in 80% of HIV-infected patients after discontinuation of triazole therapy (AII). Itraconazole, posaconazole, and voriconazole may have significant interactions with certain ARV agents. These interactions are complex and can be bi-directional. Refer to Table 4 for dosage recommendations. Therapeutic drug monitoring and dosage adjustment may be necessary to ensure triazole antifungal and antiretroviral efficacy and reduce concentration-related toxicities.

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	• Itraconazole 200 mg PO twice a day (AII)	then 200 mg PO twice a day (BII), *or* • Posaconazole 200 mg PO twice a day (BIII), *or* • Voriconazole 200–400 mg PO twice a day (BIII), *or* • Intrathecal amphotericin B deoxycholate, when triazole antifungals are ineffective (AIII) Chronic Suppressive Therapy • Posaconazole 200 mg PO twice a day (BII), *or* • Voriconazole 200 mg PO twice a day (BIII)	Intrathecal amphotericin B should only be given in consultation with a specialist and administered by an individual with experience with the technique.
Community-Acquired Pneumonia (CAP)	Empiric antibiotic therapy should be initiated promptly for patients presenting with clinical and radiographic evidence consistent with bacterial pneumonia. The recommendations listed are suggested empiric therapy. The regimen should be modified as needed once microbiologic results are available (BIII). Providers must also consider the risk of opportunistic lung infections (e.g., PCP, TB), which may alter the empiric therapy. Empiric Outpatient Therapy • A PO beta-lactam plus a PO macrolide (azithromycin or clarithromycin) (AII) *Preferred Beta-Lactams* • High-dose amoxicillin or amoxicillin/clavulanate *Alternative Beta-Lactams* • Cefpodoxime or cefuroxime*, or* • Levofloxacin 750 mg PO once daily (AII), *or* moxifloxacin 400 mg PO once daily (AII), especially for patients with penicillin allergies	Empiric antibiotic therapy should be initiated promptly for patients presenting with clinical and radiographic evidence consistent with bacterial pneumonia. The recommendations listed are suggested empiric therapy. The regimen should be modified as needed once microbiologic results are available (BIII). Providers must also consider the risk of opportunistic lung infections (e.g., PCP, TB), which may alter the empiric therapy. Empiric Outpatient Therapy • A PO beta-lactam plus PO doxycycline (CIII) *Preferred Beta-Lactams* • High-dose amoxicillin or amoxicillin/clavulanate *Alternative Beta-Lactams*: • Cefpodoxime or cefuroxime	Duration For most patients, 5–7 days Patients should be afebrile for 48–72 hours and clinically stable before stopping antibiotics. Longer duration is often required if severe CAP or bacteremia is present, and particularly if due to *S. pneumoniae* or complicated *S. aureus* pneumonia. Fluoroquinolones should be used with caution in patients in whom TB is suspected but is not being treated. Empiric therapy with a macrolide alone is not routinely recommended, because of increasing pneumococcal resistance (up to 30%) (BIII). Patients receiving a macrolide for MAC prophylaxis may have bacterial resistance to macrolide due to chronic exposure. For patients begun on IV antibiotic therapy, switching to PO should be considered when they are clinically improved and able to tolerate oral medications.

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	Empiric Therapy for Hospitalized Patients with Non-Severe CAP • An IV beta-lactam plus a macrolide (azithromycin or clarithromycin) (AI) *Preferred Beta-Lactams* • Ceftriaxone, cefotaxime, or ampicillin-sulbactam • Levofloxacin 750 mg IV once daily (AI), *or* moxifloxacin, 400 mg IV once daily (AI), especially for patients with penicillin allergies. Empiric Therapy for Hospitalized Patients with Severe CAP • An IV beta-lactam plus IV azithromycin (AI), *or* • An IV beta-lactam plus (levofloxacin 750 mg IV once daily or moxifloxacin 400 mg IV once daily) (AI) *Preferred Beta-Lactams* • Ceftriaxone, cefotaxime, or ampicillin-sulbactam Empiric Therapy for Patients at Risk of *Pseudomonas* Pneumonia • An IV antipneumococcal, antipseudomonal beta-lactam plus (ciprofloxacin 400 mg IV every 8–12 hours or levofloxacin 750 mg IV once daily) (AI) *Preferred Beta-Lactams* • Piperacillin-tazobactam, cefepime, imipenem, or meropenem Empiric Therapy for Patients at Risk for Methicillin-Resistant *Staphylococcus aureus* Pneumonia • Add vancomycin IV or linezolid (IV or PO) to the baseline regimen (AII). • Addition of clindamycin to vancomycin (but not to linezolid) can be considered for severe necrotizing pneumonia to minimize bacterial toxin production (CII).	Empiric Therapy for Hospitalized Patients with Non-Severe CAP • An IV beta-lactam plus doxycycline (CIII) Empiric Therapy for Hospitalized Patients with Severe CAP *For Penicillin-Allergic Patients* • Aztreonam IV plus (levofloxacin 750 mg IV once daily or moxifloxacin 400 mg IV once daily) (BIII) Empiric Therapy for Patients at Risk of *Pseudomonas* Pneumonia • An IV antipneumococcal, antipseudomonal beta-lactam plus an IV aminoglycoside plus azithromycin (BII), *or* • An IV antipneumococcal, antipseudomonal beta-lactam plus an aminoglycoside plus (levofloxacin 750 mg IV once daily or moxifloxacin 400 mg IV once daily) (BIII) *For Penicillin-Allergic Patients* • Replace the beta-lactam with aztreonam (BIII).	Antibiotic chemoprophylaxis is generally not recommended because of the potential for developing drug resistance and drug toxicities (AI).

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Cryptococcosis	Cryptococcal Meningitis *Induction Therapy (2 weeks, followed by consolidation therapy)* • Liposomal amphotericin B 3–4 mg/kg IV daily plus flucytosine 25 mg/kg PO four times a day (AI) (Note: Flucytosine dose should be adjusted in patients with renal dysfunction.) • Amphotericin B deoxycholate 0.7–1.0 mg/kg IV daily plus flucytosine 25 mg/kg PO four times a day (AI) (if cost is an issue and the risk of renal dysfunction is low), *or* • If not improved clinically or remain clinically unstable, continue induction therapy until the CSF culture is confirmed to be negative (BIII). *Consolidation Therapy (for at least 8 weeks (AI), followed by maintenance therapy)* • Fluconazole 800 mg PO (or IV) daily (AI) • For clinically stable patients with negative CSF cultures, dose can be reduced to 400 mg PO once daily (AII) • If CSF remains positive (but clinically stable) after 2 weeks of induction therapy, increase fluconazole dose to 1,200 mg and perform LP 2 weeks later (BIII); duration of consolidation therapy should be 8 weeks from the time of negative CSF culture (AI). *Maintenance Therapy* • Fluconazole 200 mg PO daily for ≥1 year from initiation of antifungal therapy (AI) For Non-CNS, Extrapulmonary Cryptococcosis and Diffuse Pulmonary Disease or Patients with Isolated Asymptomatic	Cryptococcal Meningitis *Induction Therapy (for at least 2 weeks, followed by consolidation therapy)* • Amphotericin B lipid complex 5 mg/kg IV daily plus flucytosine 25 mg/kg PO four times a day (BII), *or* • Liposomal amphotericin B 3–4 mg/kg IV daily plus fluconazole 800–1,200 mg PO or IV daily (BIII), *or* • Fluconazole 1,200 mg PO or IV daily plus flucytosine 25 mg/kg PO four times a day (BII), *or* • Fluconazole 800 mg PO or IV daily plus flucytosine 25 mg/kg PO four times a day (BIII), *or* • Amphotericin B deoxycholate 0.7–1.0 mg/kg IV daily plus fluconazole 800–1,200 mg PO or IV daily (BI), *or* • Liposomal amphotericin B 3–4 mg/kg IV daily (BI), *or* • Amphotericin B deoxycholate 0.7–1.0 mg/kg IV once daily alone (BI), *or* • Liposomal amphotericin B 3–4 mg/kg IV once daily plus flucytosine 25 mg/kg PO four times a day for 1 week followed by fluconazole 1,200 mg PO once daily (BIII), *or* • Fluconazole 1,200 mg PO or IV daily (CI) *Consolidation Therapy (for at least 8 weeks (AI), followed by maintenance therapy)* • If patient's CSF culture remains positive at the end of 2 weeks, but the patient is not ill enough to be	Addition of flucytosine to amphotericin B has been associated with more rapid sterilization of CSF and decreased risk for subsequent relapse. Patients receiving flucytosine should have either blood levels monitored (peak level 2 hours after dose should be 25–100 mcg/mL) or at least twice weekly monitoring of complete blood counts for cytopenia. Dosage should be adjusted in patients with renal insufficiency (BII). In resource limited settings, induction of 1 week of amphotericin B deoxycholate with flucytosine followed by high dose fluconazole is preferred (BIII). Opening pressure should always be measured when an LP is performed. Repeated LPs or CSF shunting are essential to effectively manage increased intracranial pressure. Corticosteroids and mannitol are ineffective in reducing ICP and are not recommended (AIII). Some specialists recommend a brief course of tapering dose of corticosteroid for management of severe IRIS symptoms (BIII).

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	Antigenemia Without Meningitis and Serum **CrAg. ≥1:640 by LFA** • Treatment same as for cryptococcal meningitis (BIII) Non-CNS Cryptococcosis with Mild-to-Moderate Symptoms and Focal Pulmonary Infiltrates, or Patients with Isolated Asymptomatic Antigenemia Without Meningitis **and Serum CrAg ≤1:320 by L**FA) • Fluconazole, 400 to 800 mg PO daily for 10 weeks, followed by 200 mg daily for a total of 6 months (BIII)	hospitalized, continue flucytosine for an additional 2 weeks with fluconazole 1,200 mg daily, before starting a single-drug consolidation regimen. • Itraconazole 200 mg PO twice a day for 8 weeks—less effective than fluconazole (CI) *Maintenance Therapy* • No alternative therapy recommendation	
Cryptosporidiosis	• Initiate or optimize ART for immune restoration to CD4 count >100 cells/mm^3 (AII), *and* • Aggressive oral or IV rehydration and replacement of electrolyte loss (AIII), *and* • Symptomatic treatment of diarrhea with anti-motility agents (AIII).	No therapy has been shown to be effective without ART. Trial of these agents may be used in conjunction with, but not instead of, ART: • Nitazoxanide 500–1,000 mg PO twice a day for 14 days (CIII), *or* • Paromomycin 500 mg PO four times daily for 14–21 days (CIII) • With optimized ART, symptomatic treatment and rehydration and electrolyte replacement	Tincture of opium may be more effective than loperamide in management of diarrhea (CIII).
Cytomegalovirus (CMV) Disease	CMV Retinitis Induction Therapy (followed by Chronic Maintenance Therapy) *For Immediate Sight-Threatening Lesions (within 1,500 microns of the fovea)* • Ganciclovir 5 mg/kg every 12 hours IV or valganciclovir 900 mg PO twice a day or for 14–21 days (AI) (some prefer IV ganciclovir initially and transition to PO valganciclovir when there is evidence of clinical response) with or without • Intravitreal injections of ganciclovir (2 mg) or foscarnet (2.4 mg) to	CMV Retinitis *For Immediate Sight-Threatening Lesions (within 1,500 microns of the fovea): Intravitreal therapy as listed in the Preferred section, plus one of the following:* *Alternative Systemic Induction Therapy (followed by Chronic Maintenance Therapy)* • Foscarnet 90 mg/kg IV every 12 hours or 60 mg/kg every 8 hours for 14–21 days (BI), *or*	The choice of therapy for CMV retinitis should be individualized, based on tolerance of systemic medications, prior exposure to anti-CMV drugs, and location of the lesion (AIII). Given the evident benefits of systemic therapy in preventing contralateral eye involvement, reduce CMV visceral disease and improve survival. Whenever feasible, treatment should include systemic therapy. The ganciclovir ocular implant, which is effective for treatment of

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	rapidly achieve high intraocular concentration, continue weekly until lesion inactivity is achieved (AIII); plus *For Peripheral Lesions* • Valganciclovir 900 mg PO twice a day for 14–21 days, then 900 mg once daily (AI) *Maintenance Therapy* • Valganciclovir 900 mg PO daily (AI) for 3–6 months until ART induced immune recovery CMV Esophagitis or Colitis • Ganciclovir 5 mg/kg IV every 12 hours; may switch to valganciclovir 900 mg PO every 12 hours once the patient can tolerate oral therapy (BI) • Valganciclovir 900 mg PO every 12 hours may be considered as initial therapy in mild diseases (CIII) • Duration: 21–42 days or until symptoms have resolved (CII) • Maintenance therapy is usually not necessary, but should be considered after relapses (BII). Well-Documented, Histologically Confirmed CMV Pneumonia • Experience for treating CMV pneumonitis in HIV patients is limited. Use of IV ganciclovir or IV foscarnet is reasonable (doses same as for CMV retinitis) (CIII). • The optimal duration of therapy and the role of oral valganciclovir have not been established. CMV Neurological Disease *Note: Treatment should be initiated promptly.* • Ganciclovir 5 mg/kg IV every 12 hours plus (foscarnet 90 mg/kg IV every 12 hours or 60 mg/kg IV every 8 hours) to stabilize disease	• Cidofovir 5 mg/kg/week IV for 2 weeks; saline hydration before and after therapy and probenecid, 2 g PO 3 hours before dose, followed by 1 g PO 2 hours and 8 hours after the dose (total of 4 g) (CI) (Note: This regimen should be avoided in patients with sulfa allergy because of cross hypersensitivity with probenecid.) *Chronic Maintenance (for 3–6 months until ART-induced immune recovery)* • Foscarnet 90–120 mg/kg IV once daily (AI), *or* • Cidofovir 5 mg/kg IV every other week with saline hydration and probenecid as above (BI) CMV Esophagitis or Colitis • Foscarnet 90 mg/kg IV every 12 hours or 60 mg/kg every 8 hours (BI) for patients with treatment-limiting toxicities to ganciclovir or with ganciclovir resistance, *or* • Valganciclovir 900 mg PO every 12 hours in milder disease and if able to tolerate PO therapy (BII), *or* • Duration: 21–42 days or until symptoms have resolved (CII) • For mild disease, if ART can be initiated without delay, consider withholding CMV therapy (CIII).	CMV retinitis, is no longer available. Routine (i.e., every 3 months) ophthalmologic follow-up is recommended after stopping chronic maintenance therapy for early detection of relapse or IRU, and then periodically after sustained immune reconstitution (AIII). IRU may develop in the setting of immune reconstitution. Treatment of IRU Periocular, intravitreal, or short courses of systemic steroid (BIII) Initial therapy in patients with CMV retinitis, esophagitis, colitis, and pneumonitis should include initiation or optimization of ART (BIII).

Table 2. Treatment of AIDS-Associated Opportunistic Infections (Includes Recommendations for Acute Treatment and Secondary Prophylaxis/Chronic Suppressive/Maintenance Therapy)

Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	and maximize response, continue until symptomatic improvement and resolution of neurologic symptoms (CIII) • The optimal duration of therapy and the role of oral valganciclovir have not been established.		
Hepatitis B Virus (HBV) Disease	ART is recommended for all HIV/HBV co-infected patients regardless of CD4 cell count (AII). The ART regimen should include two drugs that are active against both HBV and HIV, such as [tenofovir 300 mg plus emtricitabine 200 mg (or lamivudine 300 mg)] PO once daily (plus additional drug(s) for HIV) (AIII). Duration Continue treatment indefinitely (CIII)	For Patients Who Refuse or Are Unable to Take ART or Who Are **HIV Long**-Term Non-Progressors • HBV treatment is indicated for patients with elevated ALT and HBV DNA >2,000 IU/mL significant liver fibrosis, advanced liver disease or cirrhosis (AI). • Peginterferon alfa-2a 180 mg SQ once weekly for 48 weeks (CIII), *or* • Peginterferon alfa-2b 1.5 mg/kg SQ once weekly for 48 weeks (CIII) If Tenofovir Cannot Be Used as Part of HIV/HBV Therapy (Because of Current or High Risk of Renal Dysfunction) • Use a fully suppressive ART regimen without tenofovir, and with the addition of entecavir (dose adjustment according to renal function) (BIII).	Directly acting HBV drugs—such as adefovir, emtricitabine, entecavir, lamivudine, telbivudine, or tenofovir—must not be given in the absence of a fully suppressive ART regimen to avoid selection of drug resistance HIV (AI). Cross-resistance to emtricitabine or telbivudine should be assumed in patients with suspected or proven lamivudine resistance. When changing ART regimens, continue agents with anti-HBV activity (BIII). If anti-HBV therapy is discontinued and a flare occurs, therapy should be re-instituted because it can be potentially lifesaving (AIII).
Hepatitis C Virus (HCV) Disease	The field of HCV drug development is evolving rapidly, with a number of investigational drugs currently at late-stage clinical trials, and some will soon be approved for use. Clinicians should refer to the most recent HCV treatment guidelines (http://www.hcvguidelines.org) for the most up-to-date recommendations.		
Herpes Simplex Virus (HSV) Disease	**Orolabial Lesions (for 5**–10 Days) • Valacyclovir 1 g PO twice a day (AIII), *or* • Famciclovir 500 mg PO twice a day (AIII), *or* • Acyclovir 400 mg PO three times a day (AIII)	For Acyclovir-Resistant HSV *Preferred Therapy* • Foscarnet 80–120 mg/kg/day IV in two to three divided doses until clinical response (AI)	Patients with HSV infection can be treated with episodic therapy when symptomatic lesions occur, or with daily suppressive therapy to prevent recurrences. Extemporaneous compounding of topical products can be prepared using trifluridine ophthalmic

Table 2. Treatment of AIDS-Associated Opportunistic Infections (Includes Recommendations for Acute Treatment and Secondary Prophylaxis/Chronic Suppressive/Maintenance Therapy)

Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	Initial or Recurrent Genital HSV (for 5–14 days) • Valacyclovir 1 g PO twice a day (AI), *or* • Famciclovir 500 mg PO twice a day (AI), *or* • Acyclovir 400 mg PO three times a day (AI) Severe Mucocutaneous HSV • Initial therapy acyclovir 5 mg/kg IV every 8 hours (AIII) • After lesions begin to regress, change to PO therapy as above. Continue until lesions are completely healed. Chronic Suppressive Therapy *For Patients with Severe Recurrences of Genital Herpes (AI) or Patients Who Want to Minimize Frequency of Recurrences (AI)* • Valacyclovir 500 mg PO twice a day (AI), *or* • Famciclovir 500 mg PO twice a day (AI), *or* • Acyclovir 400 mg PO twice a day (AI) • Continue indefinitely, regardless of CD4 count.	*Alternative Therapy (CIII)* • IV cidofovir (dosage as in CMV retinitis), *or* • Topical trifluridine 1% three times a day, *or* • Topical cidofovir 1% once daily, *or* • Topical imiquimod 5% three times weekly, *or* • Topical foscarnet 1% five times daily Duration of Therapy • 21–28 days or longer	solution and the IV formulation of cidofovir and foscarnet. An expanded access program of oral pritelivir is now available for immunocompromised patients with acyclovir-resistant HSV infection. For more information, see the AiCuris Pritelivir website.
Histoplasmosis	Moderately Severe to Severe Disseminated Disease *Induction Therapy* • For at least 2 weeks or until clinically improved • Liposomal amphotericin B 3 mg/kg IV daily (AI) *Maintenance Therapy* • Itraconazole 200 mg PO three times a day for 3 days, then 200 mg PO twice a day (AII)	Moderately Severe to Severe Disseminated Disease *Induction Therapy (for at least 2 weeks or until clinically improved)* • Amphotericin B lipid complex 5 mg/kg IV daily (AIII), *or* Alternatives to Itraconazole for Maintenance Therapy or **Treatment of Less Severe** Disease • Posaconazole extended release 300 mg PO twice a	Itraconazole, posaconazole, and voriconazole may have significant interactions with certain ARV agents. These interactions are complex and can be bi-directional. Refer to Drug–Drug Interactions in the Adult and Adolescent Antiretroviral Guidelines for dosage recommendations. Therapeutic drug monitoring and dosage adjustment may be necessary to ensure triazole antifungal and ARV efficacy and reduce concentration-related toxicities.

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	Less Severe Disseminated Disease *Induction and Maintenance Therapy* • Itraconazole 200 mg PO three times a day for 3 days, then 200 mg PO twice a day (AII) *Duration of Therapy* • At least 12 months Meningitis *Induction Therapy (4–6 weeks)* • Liposomal amphotericin B 5 mg/kg/day (AIII) *Maintenance Therapy* • Itraconazole 200 mg PO twice a day to three times a day for ≥12 months and until resolution of abnormal CSF findings (AII) **Long**-Term Suppression Therapy *For patients with severe disseminated or CNS infection (AIII) after completion of at least 12 months of therapy and who relapse despite appropriate therapy (BIII)* • Itraconazole 200 mg PO daily (AIII)	day for 1 day, then 300 mg PO once daily (BIII) • Voriconazole 400 mg PO twice a day for 1 day, then 200 mg twice a day (BIII), *or* • Fluconazole 800 mg PO daily (CII) Meningitis (These Recommendations Are Based on Limited Clinical Data for Patients with Intolerance to Itraconazole) • Posaconazole extended release 300 mg PO twice a day for 1 day, then 300 mg PO once daily (BIII) • Voriconazole 400 mg PO twice a day for 1 day, then 200 mg twice a day (BIII), *or* • Fluconazole 800 mg PO daily (CII) **Long**-Term Suppression Therapy • Posaconazole 300 mg extended release tablet PO once daily (BIII) • Voriconazole 200 mg PO twice daily (BIII) • Fluconazole 400 mg PO once daily (CII)	Random serum concentration of itraconazole between 1–2 mcg/mL is recommended. Frequency and severity of toxicities increase when concentration is >4 mcg/mL. Acute pulmonary histoplasmosis in HIV-infected patients with CD4 counts >300 cells/mm^3 should be managed as non-immunocompromised host (AIII).
Human Herpesvirus-8 Diseases (*Kaposi Sarcoma [KS], Primary Effusion Lymphoma [PEL], Multicentric Castleman's Disease [MCD]*)	Mild to Moderate KS (Localized Involvement of Skin and/or Lymph Nodes) • Initiate or optimize ART (AII) Advanced KS (Visceral [AI] or Disseminated Cutaneous KS [BIII]) • Chemotherapy (per oncology consult) plus ART • Liposomal doxorubicin first-line chemotherapy (AI) **Primary Effusion Lymphoma** • Chemotherapy (per oncology consult) plus ART (AIII)	MCD • Rituximab (375 mg/m^2 given weekly for 4–8 weeks) may be an alternative to or used adjunctively with antiviral therapy (CII).	Corticosteroids should be avoided in patients with KS, including those with KS-IRIS (AIII). Corticosteroids are potentially effective as adjunctive therapy for MCD, but should be used with caution, especially in patients with concurrent KS. Patients who received rituximab for MCD may experience subsequent exacerbation or emergence of KS.

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	• PO valganciclovir or IV ganciclovir can be used as adjunctive therapy (CIII) MCD Therapy Options (in Consultation with Specialist, Depending on HIV/HHV-8 Status, Presence of Organ Failure, and Refractory Nature of Disease) ART (AIII) along with one of the following: • Valganciclovir 900 mg PO twice a day for 3 weeks (CII), *or* • Ganciclovir 5 mg/kg IV every 12 hours for 3 weeks (CII), *or* • Valganciclovir PO or Ganciclovir IV plus zidovudine 600 mg PO every 6 hours for 7–21 days (CII) • Rituximab +/- Prednisone (CII) • Monoclonal antibody targeting IL-6 or IL-6 receptor (BII) Concurrent KS and MCD Rituximab plus liposomal doxorubicin (BII)		
Human Papillomavirus (HPV) Disease	Treatment of Condyloma Acuminata (Genital Warts)		HIV-infected patients may have larger or more numerous warts and may not respond as well to therapy for genital warts when compared to HIV-uninfected individuals. Topical cidofovir has activity against genital warts, but the product is not commercially available (CIII). Intralesional interferon-alpha is usually not recommended because of high cost, difficult administration, and potential for systemic side effects (CIII). The rate of recurrence of genital warts is high despite treatment in HIV-infected patients. There is no consensus on the treatment of oral warts. Many treatments for anogenital warts cannot be used in the oral
	Patient-Applied Therapy for Uncomplicated External Warts That Can Be Easily Identified by Patients • Podophyllotoxin (e.g., podofilox 0.5% solution or 0.5% gel): Apply to all lesions twice a day for 3 consecutive days, followed by 4 days of no therapy, repeat weekly for up to 4 cycles, until lesions are no longer visible (BIII), *or* • Imiquimod 5% cream: Apply to lesion at bedtime and remove in the morning on 3 non-consecutive nights weekly for up to 16 weeks, until lesions are no longer visible. Each treatment should be washed with soap and water 6–10 hours after application (BII), *or*	Provider-Applied Therapy for Complex or Multicentric **Lesions, or Lesions** Inaccessible to Patient *Applied Therapy* • Cryotherapy (liquid nitrogen or cryoprobe): Apply until each lesion is thoroughly frozen. Repeat every 1–2 weeks for up to 4 weeks, until lesions are no longer visible (BIII). Some providers allow the lesion to thaw, then freeze a second time in each session (BIII), *or* • Trichloroacetic acid or bichloroacetic acid cauterization: 80%–90% aqueous solution, apply to	

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Opportunistic Infection		Preferred Therapy	Alternative Therapy	Other Comments
		• Sinecatechins 15% ointment: Apply to affected areas three times a day for up to 16 weeks, until warts are completely cleared and not visible (BIII).	wart only, allow to dry until a white frost develops. Repeat weekly for up to 6 weeks, until lesions are no longer visible (BIII), *or* • Surgical excision (BIII) or laser surgery (CIII) to external or anal warts, *or* • Podophyllin resin 10%–25% in tincture of benzoin: Apply to all lesions (up to 10 cm^2), then wash off a few hours later, repeat weekly for up to 6 weeks until lesions are no longer visible (CIII).	mucosa. Surgery is the most common treatment for oral warts that interfere with function or for aesthetic reasons.
Isosporiasis (Cystoisosporiasis)		For Acute Infection • TMP-SMX (160 mg/800 mg) PO (or IV) four times a day for 10 days (AII), *or* • TMP-SMX (160 mg/800 mg) PO (or IV) twice a day for 7–10 days (BI) • Can start with twice a day dosing first and increase daily dose and/or duration (up to 3–4 weeks) if symptoms worsen or persist (BIII) • IV therapy may be used for patients with potential or documented malabsorption. Chronic Maintenance Therapy (Secondary Prophylaxis) • In patients with CD4 count <200/mm^3, TMP-SMX (160 mg/800 mg) PO three times weekly (AI)	For Acute Infection • Pyrimethamine[a] 50–75 mg PO daily plus leucovorin 10–25 mg PO daily (BIII), *or* • Ciprofloxacin 500 mg PO twice a day for 7 days (CI) as a second line alternative Chronic Maintenance Therapy (Secondary Prophylaxis) • TMP-SMX (160 mg/800 mg) PO daily or (320 mg/1,600 mg) three times weekly (BIII) • Pyrimethamine[a] 25 mg PO daily plus leucovorin 5–10 mg PO daily (BIII) • Ciprofloxacin 500 mg three times weekly (CI) as a second-line alternative	Fluid and electrolyte management in patients with dehydration (AIII). Nutritional supplementation for malnourished patients (AIII). Immune reconstitution with ART may result in fewer relapses (AIII).
Leishmaniasis	Visceral	For Initial Infection • Liposomal amphotericin B 2–4 mg/kg IV daily (AII), *or* • Liposomal amphotericin B interrupted schedule (e.g., 4 mg/kg on days 1–5, 10, 17, 24, 31, 38) (AII)	For Initial Infection • Other lipid formulation of amphotericin B, dose and schedule as in Preferred Therapy, *or* • Amphotericin B deoxycholate 0.5–1.0 mg/kg IV daily for total dose of 1.5–2.0 g (BII), *or*	ART should be initiated or optimized (AIII). For sodium stibogluconate, contact the CDC Drug Service at 404-639-3670 or drugservice@cdc.gov. For miltefosine, visit https://www.impavido.com.

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Opportunistic Infection		Preferred Therapy	Alternative Therapy	Other Comments
		• To achieve total dose of 20–60 mg/kg (AII) Chronic Maintenance Therapy (Secondary Prophylaxis); Especially in Patients with CD4 Count <200 cells/mm^3 • Liposomal amphotericin B 4 mg/kg every 2–4 weeks (AII), *or* • Amphotericin B lipid complex (AII) 3 mg/kg every 21 days (AII)	• Sodium stibogluconate (pentavalent antimony) (BII) 20 mg/kg IV or IM daily for 28 days. • Miltefosine—if 30–44 kg: 50 mg two times daily; if ≥45 kg, 50 mg three times a day—for 28 days (CIII) Chronic Maintenance Therapy (Secondary Prophylaxis) • Sodium stibogluconate 20 mg/kg IV or IM every 4 weeks (BII)	
	Cutaneous	• Liposomal amphotericin B 2–4 mg/kg IV daily for 10 days (BIII), *or* • Liposomal amphotericin B interrupted schedule (e.g., 4 mg/kg on days 1–5, 10, 17, 24, 31, 38) to achieve total dose of 20–60 mg/kg (BIII), *or* • Sodium stibogluconate 20 mg/kg IV or IM daily for 3–4 weeks (BIII) Chronic Maintenance Therapy May be indicated in immunocompromised patients with multiple relapses (CIII)	Possible Options • Oral miltefosine (can be obtained via a treatment IND), *or* • Topical paromomycin, *or* • Intralesional sodium stibogluconate, *or* • Local heat therapy No data exist for any of these agents in HIV-infected patients; choice and efficacy dependent on species of *Leishmania.*	None
Malaria		Because *Plasmodium falciparum* malaria can progress within hours from mild symptoms or low-grade fever to severe disease or death, all HIV-infected patients with confirmed or suspected *P. falciparum* infection should be hospitalized for evaluation, initiation of treatment, and observation (AIII). Treatment recommendations for HIV-infected patients are the same as for HIV-uninfected patients (AIII). Choice of therapy is guided by the degree of parasitemia, the species of *Plasmodium*, the patient's clinical status, region of infection, and the likely drug susceptibility of the infected	When suspicion for malaria is low, antimalarial treatment should not be initiated until the diagnosis is confirmed.	For treatment recommendations for specific regions, clinicians should refer to the following web link: http://www.cdc.gov/malaria. or call the CDC Malaria Hotline: 770-488-7788, Monday–Friday, 8 a.m.–4:30 p.m. ET; or 770-488-7100 after hours.

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	species, and can be found at https://www.cdc.gov/malaria.		
Microsporidiosis	For GI Infections Caused by *Enterocytozoon bienuesi* • Initiate or optimize ART with immune restoration to CD4 count >100 cells/mm^3 (AII); *plus* • Manage dehydration and diarrhea with fluid support (AII); and malnutrition and wasting with nutritional supplement (AIII). For Intestinal and Disseminated (Not Ocular) Infections Caused by Microsporidia Other Than *E. bienuesi* and *Vittaforma corneae* • Albendazole 400 mg PO twice daily (AII), continue until CD4 count >200 cells/mm^3 for >6 months after initiation of ART (BIII) For Disseminated Disease Caused by *Trachipleistophora* or *Anncaliia* • Itraconazole 400 mg PO daily plus albendazole 400 mg PO twice daily (CIII) For Ocular Infection • Topical fumagillin bicylohexylammonium (Fumidil B) eyedrops 3 mg/mL in saline (fumagillin 70 μg/mL): two eyedrops every 2 hours for 4 days, then two eyedrops four times daily (investigational use only in United States) (BII) plus albendazole 400 mg PO twice daily, for management of systemic infection (BIII) *If CD4 Count >200 Cells/mm^3* • Continue until symptoms resolved (CIII). *If CD4 Count ≤200 Cells/mm^3* • Continue until resolution of ocular symptoms and CD4 count increases to >200 cells/mm^3 for	For GI Infections Caused by *E. bienuesi* • Fumagillin 60 mg/day (BII) and TNP-470 (a synthetic analog of fumagillin) (BIII) may be effective, but neither is available in the United States. • Nitazoxanide (1,000 mg twice daily) may have some effect, but response may be minimal in patients with low CD4 cell counts (CIII).	Anti-motility agents can be used for diarrhea control if required (BIII).

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	>6 months in response to ART (BIII).		
Mycobacterium avium Complex (MAC) Disease	**At Least 2 Drugs as Initial Therapy** to Prevent or Delay Emergence of Resistance • Clarithromycin 500 mg PO two times daily (AI) plus ethambutol 15 mg/kg PO daily (AI), *or* • If drug interaction or intolerance precludes the use of clarithromycin, (azithromycin 500–600 mg plus ethambutol 15 mg/kg) PO daily (AII) Duration • At least 12 months of therapy, can discontinue if no signs and symptoms of MAC disease and sustained (>6 months) CD4 count >100 cells/mm^3 in response to ART	Some experts recommend addition of a third or fourth drug for patients with high mycobacterial loads (>2 log CFU/mL of blood), or in the absence of effective ART (CIII). Third or Fourth Drug Options May Include • Rifabutin 300 mg PO daily (dose adjustment may be necessary based on drug interactions) (CI), *or* • A fluoroquinolone, such as moxifloxacin 400 mg PO daily (CIII) or levofloxacin 500 mg PO daily (CIII), *or* • An injectable aminoglycoside such as amikacin 10–15 mg/kg IV daily (CIII) or streptomycin 1 g IV or IM daily (CIII)	Testing of susceptibility to clarithromycin and azithromycin is recommended (BIII). NSAIDs can be used for moderate to severe symptoms attributed to IRIS (CIII). If IRIS symptoms persist, short course (i.e., 4 weeks–8 weeks) systemic corticosteroid (equivalent to 20–40 mg prednisone) can be used (CII).
Mycobacterium tuberculosis (TB) Disease	After collecting a specimen for culture and molecular diagnostic tests, empiric TB treatment should be started in individuals with clinical and radiographic presentation suggestive of TB (AIII). Refer to the Dosing Recommendations for Anti-TB Drugs Recommendations table in the *Mycobacterium tuberculosis* section for dosing recommendations. Initial Phase (8 weeks or 2 months, given daily by DOT) (AI) • INH (plus pyridoxine) plus (RIF or RFB) plus PZA plus EMB (AI) • If drug susceptibility report shows sensitivity to INH and RFP, then EMB can be discontinued before the end of 2 months (AI).	Treatment for Drug-Resistant TB *Empiric therapy for resistance to rifamycin +/- other drugs:* • INH plus PZA plus EMB plus (moxifloxacin or levofloxacin) plus (linezolid or amikacin) (BII) • Therapy should be modified once rifamycin resistance is confirmed, and based on drug susceptibility results to provide ≥5 drugs (BII). *Resistant to INH* • (Moxifloxacin or levofloxacin) plus (RIF or RFB) plus EMB plus PZA for 6 months (BII) *Resistance to Rifamycin +/- Other Drugs* • Therapy should be individualized based on drug	DOT is recommended for all patients (AII). All rifamycins may have significant pharmacokinetic interactions with ARV drugs; please refer to the Dosing Recommendations for Anti-TB Drugs table in the *Mycobacterium tuberculosis* section and the Drug–Drug Interactions section in the Adult and Adolescent Antiretroviral Guidelines for dosing recommendations. Therapeutic drug monitoring should be considered in patients receiving rifamycin and interacting ART. Adjunctive corticosteroids for TB meningitis (AII): dexamethasone 0.3–0.4mg/kg/day for 2–4 weeks, then taper by 0.1 mg/kg per week until 01mg/kg, then 4 mg per day,

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	Continuation Phase (Duration depends on site and severity of infection [as noted below].) • INH (plus pyridoxine) plus (RIF or RFB) daily (AI) Total Duration of Therapy (For Drug-Susceptible TB) *Pulmonary, Drug-Susceptible, Uncomplicated TB* • 6 months (AI) *Pulmonary TB with Positive Culture After 2 Months of TB Treatment, or Severe Cavitary or Disseminated Extrapulmonary TB* • 9 months (BII) *TB Meningitis*: • 9–12 months (BII) *Extra-Pulmonary TB in Other Sites* • 6 months (BII)	susceptibility results and clinical and microbiologic responses, to include ≥5 active drugs, and with close consultation with experienced specialists (AIII).	and taper by 1 mg/week for total of 12 weeks. Adjunctive corticosteroid is not recommended for patients with TB pericarditis. Paradoxical IRIS that is not severe can be treated with NSAIDs without a change in TB or HIV therapy (BIII). See text for prednisone dosing recommendations for preemptive treatment or management of IRIS.
Pneumocystis Pneumonia (PCP)	Patients who develop PCP despite TMP-SMX prophylaxis can usually be treated with standard doses of TMP-SMX (BIII). Duration of PCP treatment: 21 days (AII) For Moderate-to-Severe PCP • TMP-SMX: (TMP 15–20 mg and SMX 75–100 mg)/kg/day IV given every 6 hours or every 8 hours (AI); may switch to PO formulations after clinical improvement (AI). For Mild-to-Moderate PCP • TMP-SMX: (TMP 15–20 mg and SMX 75–100 mg)/kg/day, given PO in 3 divided doses (AI), *or* • TMP-SMX: (160 mg/800 mg or DS) two tablets PO three times daily (AI)	For Moderate-to-Severe PCP • Pentamidine 4 mg/kg IV daily infused over ≥60 minutes (AI); can reduce dose to 3 mg/kg IV daily in the event of toxicities (BI), *or* • Primaquine 30 mg (base) PO daily plus (clindamycin 600 mg IV every 6 hours or 900 mg IV every 8 hours) or (clindamycin 450 mg PO every 6 hours or 600 mg PO every 8 hours) (AI) For Mild-to-Moderate PCP • Dapsone 100 mg PO daily plus TMP 5 mg/kg PO three times a day (BI), *or* • Primaquine 30 mg (base) PO daily plus (clindamycin 450 mg PO every 6 hours or 600 mg PO every 8 hours) (BI), *or*	Indications for Adjunctive Corticosteroids (AI) PaO_2 <70 mmHg at room air, *or* Alveolar-arterial DO_2 gradient >35 mmHg Prednisone Doses (Beginning as Early as Possible and Within 72 Hours of PCP Therapy) (AI) • Days 1–5: 40 mg PO twice daily • Days 6–10: 40 mg PO daily • Days 11–21: 20 mg PO daily IV methylprednisolone can be administered as 75% of prednisone dose. Benefit of corticosteroid if started after 72 hours of treatment is unknown, but some clinicians will use it for moderate-to-severe PCP (BIII). Whenever possible, patients should be tested for G6PD before

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	Secondary Prophylaxis, After Completion of PCP Treatment • TMP-SMX DS: 1 tablet PO daily (AI), *or* • TMP-SMX (80 mg/400 mg or SS): 1 tablet PO daily (AI)	• Atovaquone 750 mg PO twice daily with food (BI) Secondary Prophylaxis, After Completion of PCP Treatment • TMP-SMX DS: 1 tablet PO three times weekly (BI), *or* • Dapsone 100 mg PO daily (BI), *or* • Dapsone 50 mg PO daily with (pyrimethamine[a] 50 mg plus leucovorin 25 mg) PO weekly (BI), *or* • (Dapsone 200 mg plus pyrimethamine[a] 75 mg plus leucovorin 25 mg) PO weekly (BI), *or* • Aerosolized pentamidine 300 mg monthly via Respirgard II™ nebulizer (BI), *or* • Atovaquone 1,500 mg PO daily (BI), *or* • (Atovaquone 1,500 mg plus pyrimethamine[a] 25 mg plus leucovorin 10 mg) PO daily (CIII)	use of dapsone or primaquine. Alternative therapy should be used in patients found to have G6PD deficiency. Patients who are receiving pyrimethamine[a]/sulfadiazine for treatment or suppression of toxoplasmosis do not require additional PCP prophylaxis (AII). If TMP-SMX is discontinued because of a mild adverse reaction, re-institution should be considered after the reaction resolves (AII). The dose can be increased gradually (desensitization) (BI), reduced, or the frequency modified (CIII). TMP-SMX should be permanently discontinued in patients with possible or definite Stevens-Johnson Syndrome or toxic epidermal necrosis (AII).
Progressive Multifocal **Leukoencephalopathy (PML)**/JC Virus Infections	There is no specific antiviral therapy for JC virus infection. The main treatment approach is to reverse the immunosuppression caused by HIV. Initiate ART immediately in ART-naive patients (AII). Optimize ART in patients who develop PML in phase of HIV viremia on ART (AIII).	None	Corticosteroids may be used for PML-IRIS characterized by contrast enhancement, edema or mass effect, and with clinical deterioration (BIII) (see text for further discussion).
Syphilis (*Treponema pallidum* Infection)	Early-Stage (Primary, Secondary, and Early-**Latent Syphilis)** • Benzathine penicillin G 2.4 million units IM for 1 dose (AII) **Late-Latent Disease (>1 year or of** Unknown Duration, and No Signs of Neurosyphilis)	Early-Stage (Primary, Secondary, and Early-**Latent** Syphilis) *For penicillin-allergic patients* • Doxycycline 100 mg PO twice a day for 14 days (BII), *or*	The efficacy of non-penicillin alternatives has not been evaluated in HIV-infected patients and they should be used only with close clinical and serologic monitoring. Combination of procaine penicillin and probenecid is not recommended for patients who

Table 2. Treatment of AIDS-Associated Opportunistic Infections (Includes Recommendations for Acute Treatment and Secondary Prophylaxis/Chronic Suppressive/Maintenance Therapy)

Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	• Benzathine penicillin G 2.4 million units IM weekly for 3 doses (AII) **Late**-Stage (Tertiary–Cardiovascular or Gummatous Disease) • Benzathine penicillin G 2.4 million units IM weekly for 3 doses (AII) (Note: Rule out neurosyphilis before initiation of benzathine penicillin, and obtain infectious diseases consultation to guide management.) Neurosyphilis (Including Otic or Ocular Disease) • Aqueous crystalline penicillin G 18–24 million units per day (administered as 3–4 million units IV q4h or by continuous IV infusion) for 10–14 days (AII) +/- benzathine penicillin G 2.4 million units IM weekly for 3 doses after completion of IV therapy (CIII)	• Ceftriaxone 1 g IM or IV daily for 10–14 days (BII), *or* • Azithromycin 2 g PO for 1 dose (BII) (Note: Azithromycin is not recommended for men who have sex with men or pregnant women [AII].) **Late-Latent Disease (>1 year or of Unknown Duration, and No Signs of Neurosyphilis)** *For penicillin-allergic patients* • Doxycycline 100 mg PO twice a day for 28 days (BIII) Neurosyphilis • Procaine penicillin 2.4 million units IM daily plus probenecid 500 mg PO four times a day for 10–14 days (BII) +/- benzathine penicillin G 2.4 million units IM weekly for 3 doses after completion of above (CIII), *or* • For penicillin-allergic patients: Desensitization to penicillin is the preferred approach (BIII); if not feasible, ceftriaxone, 2 g IV daily for 10–14 days (BII)	are allergic to sulfa-containing medications (AIII). The Jarisch-Herxheimer reaction is an acute febrile reaction accompanied by headache and myalgia that can occur within the first 24 hours after therapy for syphilis. This reaction occurs most frequently in patients with early syphilis, high non-treponemal titers, and prior penicillin treatment.
Talaromycosis (Penicilliosis)	Induction Therapy • Liposomal amphotericin B 3–5 mg/kg/day IV (AI) *Duration* • 2 weeks (AI), followed by consolidation therapy Consolidation Therapy • Itraconazole 200 mg PO twice daily for 10 weeks (AI), followed by chronic maintenance therapy Chronic Maintenance Therapy • Itraconazole 200 mg PO once daily, until CD4 count >100 cells/mm^3 for ≥6 months (AII)	Induction Therapy • Amphotericin B deoxycholate 0.7 mg/kg/day IV for 2 weeks (if liposomal amphotericin B is not available) (AI) *If Amphotericin B is Not Available* • Voriconazole 6 mg/kg IV every 12 hours for 1 day (loading dose), then 4 mg/kg IV every 12 hours (BII), *or* • Voriconazole 600 mg PO twice daily for 1 day (loading dose), then 400 mg PO twice daily (BII)	Itraconazole is not recommended as induction therapy for talaromycosis (AI). ART can be initiated as early as 1 week after initiation of treatment for talaromycosis (BIII). Itraconazole and voriconazole may have significant interactions with certain ARV agents. These interactions are complex and can be bi-directional. Refer to Drug–Drug Interactions in the Adult and Adolescent Antiretroviral Guidelines for dosage recommendations. TDM and dosage adjustment may be necessary to ensure triazole

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		Duration • 2 weeks (BII) followed by consolidation therapy with itraconazole (preferred) or voriconazole Consolidation Therapy • Voriconazole 200 mg PO twice daily for 10 weeks (BII), followed by chronic maintenance therapy Chronic Maintenance Therapy • Itraconazole should be used (AII). Chronic maintenance therapy with voriconazole has not been studied.	antifungal and ARV efficacy and reduce concentration-related toxicities. The goals of itraconazole and voriconazole trough concentrations are >0.5 mcg/mL and >1.0 mcg/mL, respectively.
Toxoplasma gondii Encephalitis	Treatment of Acute Infection (AI) • Pyrimethamine[a] 200 mg PO one time, followed by weight-based therapy: o If <60 kg: pyrimethamine[a] 50 mg PO once daily plus sulfadiazine 1,000 mg PO every 6 hours plus leucovorin 10–25 mg PO once daily o If ≥60 kg: pyrimethamine[a] 75 mg PO once daily plus sulfadiazine 1,500 mg PO every 6 hours plus leucovorin 10–25 mg PO once daily • Leucovorin dose can be increased to 50 mg daily or twice a day. Duration for Acute Therapy • At least 6 weeks (BII); longer duration if clinical or radiologic disease is extensive or response is incomplete at 6 weeks • After completion of acute therapy, all patients should be initiated on chronic maintenance therapy. Chronic Maintenance Therapy • Pyrimethamine[a] 25–50 mg PO daily plus sulfadiazine 2,000–4,000 mg PO daily (in 2–4 divided doses)	Treatment of Acute Infection • Pyrimethamine[a] (leucovorin)* plus clindamycin 600 mg IV or PO every 6 hours (AI), *or* • TMP-SMX (TMP 5 mg/kg and SMX 25 mg/kg) IV or PO twice a day (BI), *or* • Atovaquone 1,500 mg PO twice a day with food plus pyrimethamine[a] (leucovorin)* (BII), *or* • Atovaquone 1,500 mg PO twice a day with food plus sulfadiazine 1,000–1,500 mg PO every 6 hours (weight-based dosing, as in preferred therapy) (BII), *or* • Atovaquone 1,500 mg PO twice a day with food (BII), *or* Chronic Maintenance Therapy • Clindamycin 600 mg PO every 8 hours plus (pyrimethamine[a] 25–50 mg plus leucovorin 10–25 mg) PO daily (BI), *or*	If pyrimethamine is unavailable or there is a delay in obtaining it, TMP-SMX should be utilized in place of pyrimethamine-sulfadiazine (BI). For patients with a history of sulfa allergy, sulfa desensitization should be attempted using one of several published strategies (BI). Atovaquone should be administered until therapeutic doses of TMP-SMX are achieved (CIII). Adjunctive corticosteroids (e.g., dexamethasone) should only be administered when clinically indicated to treat mass effect associated with focal lesions or associated edema (BIII); discontinue as soon as clinically feasible. Anticonvulsants should be administered to patients with a history of seizures (AIII) and continued through acute treatment, but should not be used as seizure prophylaxis (AIII). If clindamycin is used in place of sulfadiazine, additional therapy

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	plus leucovorin 10–25 mg PO daily (AI)	• TMP-SMX DS 1 tablet twice a day (BII), *or* • TMP-SMX DS 1 tablet once daily (BII); *or* • Atovaquone 750–1,500 mg PO twice a day plus (pyrimethamine[a] 25 mg plus leucovorin 10 mg) PO daily (BII), *or* • Atovaquone 750–1,500 mg PO twice a day plus sulfadiazine 2,000–4,000 mg PO daily (in 2–4 divided doses (BII), *or* • Atovaquone 750–1,500 mg PO twice a day with food (BII) * Pyrimethamine[a] and leucovorin doses are the same as for preferred therapy.	must be added to prevent PCP (AII).
Varicella Zoster Virus (VZV) Disease	Primary Varicella Infection (Chickenpox) *Uncomplicated Cases* • Initiate as soon as possible after symptom onset and continue for 5–7 days: o Valacyclovir 1 g PO three times a day (AII), *or* o Famciclovir 500 mg PO three times a day (AII) *Severe or Complicated Cases* • Acyclovir 10 mg/kg IV every 8 hours for 7–10 days (AIII) • May switch to oral valacyclovir, famciclovir, or acyclovir after defervescence if no evidence of visceral involvement (BIII). Herpes Zoster (Shingles) *Acute Localized Dermatomal* • For 7–10 days; consider longer duration if lesions are slow to resolve	Primary Varicella Infection (Chickenpox) *Uncomplicated Cases (for 5–7 Days)* • Acyclovir 800 mg PO five times a day (BII) Herpes Zoster (Shingles) *Acute Localized Dermatomal* • For 7–10 days; consider longer duration if lesions are slow to resolve • Acyclovir 800 mg PO five times a day (BII)	In managing VZV of the eyes, consultation with an ophthalmologist experienced in management of VZV retinitis is strongly recommended (AIII). Duration of therapy for VZV retinitis is not well defined, and should be determined based on clinical, virologic, and immunologic responses and ophthalmologic responses. Optimization of ART is recommended for serious and difficult-to-treat VZV infections (e.g., retinitis, encephalitis) (AIII). In patients with herpes zoster ophthalmicus who have stromal keratitis and anterior uveitis, topical corticosteroids to reduce inflammation may be necessary. The role of ART has not been established in these cases.

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Opportunistic Infection	Preferred Therapy	Alternative Therapy	Other Comments
	• Valacyclovir 1 g PO three times a day (AII), *or* • Famciclovir 500 mg three times a day (AII) **Extensive Cutaneous Lesion or** Visceral Involvement • Acyclovir 10 mg/kg IV every 8 hours until clinical improvement is evident (AII) • May switch to PO therapy (valacyclovir, famciclovir, or acyclovir) after clinical improvement (i.e., when no new vesicle formation or improvement of signs and symptoms of visceral VZV), to complete a 10- to 14-day course (BIII). ARN • Acyclovir 10 mg/kg IV every 8 hours for 10–14 days, followed by valacyclovir 1g PO three times a day for >14 weeks (AIII), *plus* • Intravitreal ganciclovir 2 mg/0.05 mL twice weekly for 1–2 doses (BIII) PORN • Acyclovir 10 mg/kg IV every 8 hours or ganciclovir 5 mg/kg IV every 12 hours (AIII), *plus* • ≥1 intravitreal antiviral injection: ganciclovir 2 mg/0.05 mL or foscarnet 1.2 mg/0.05 mL twice weekly (AIII) • Initiate or optimize ART (AIII)		

[a] Refer to Daraprim Direct for information on accessing pyrimethamine.

For information regarding the evidence ratings, refer to the Rating System for Prevention and Treatment Recommendations in the Introduction section of the Adult and Adolescent Opportunistic Infection Guidelines.

Key: ARN = acute retinal necrosis; ART = antiretroviral therapy; ARV = antiretroviral; CD4 = CD4 T lymphocyte cell; CDC = Centers for Disease Control and Prevention; CDI = *Clostridium* difficile infection; CFU = colony-forming unit; CNS = central nervous system; CSF = cerebrospinal fluid; CYP3A4 = Cytochrome P450 3A4; DOT = directly observed therapy; DS = double strength; EMB = ethambutol; g = gram; G6PD = Glucose-6-phosphate dehydrogenase; GI = gastrointestinal; ICP = intracranial pressure; IM = intramuscular; IND = investigational new drug; INH = isoniazid; IRIS = immune reconstitution inflammatory syndrome; IRU = immune reconstitution uveitis; IV = intravenous; LP = lumbar puncture; MIC = minimum inhibitory concentrations; mg = milligram; mmHg = millimeters of mercury; MSM = men who have sex with men; NSAID = non-steroidal anti-inflammatory drugs; PCR = polymerase chain reaction; PI = protease inhibitor; PO = oral; PORN = progressive outer retinal necrosis; PZA = pyrazinamide; RFB = rifabutin; RIF = rifampin; SQ = subcutaneous; TVR = telaprevir; TMP-SMX = trimethoprim-sulfamethoxazole