TABLE 170-5 DRUG INDICATIONS FOR SPECIFIC INFECTIONS, ASSOCIATED PATHOGENS, AND SAMPLE SUSCEPTIBILITY RATES (*CONTINUED*)

Antimicrobial(s)	Infections	Common Pathogens (% Susceptible); Resistance as Noted[a]
TMP-SMX	Community-acquired UTI; CA-MRSA skin and soft tissue infections	*E. coli* (73%); *S. aureus* (96%)
Sulfonamides	Nocardial infections; leprosy (dapsone); toxoplasmosis (sulfadiazine)	Unknown
Ciprofloxacin, levofloxacin, moxifloxacin	CAP (levofloxacin and moxifloxacin); UTI; bacterial gastroenteritis; hospital-acquired gram-negative enteric infections; *Pseudomonas* infections (ciprofloxacin and levofloxacin)	*S. pneumoniae* (99%); *E. coli* (80%); *P. aeruginosa* (ciprofloxacin, 72%; levofloxacin, 69%); *Salmonella* spp. (ciprofloxacin, 98%; levofloxacin, 100%)
Rifampin	Staphylococcal foreign body infections in combination with other antistaphylococcal agents; *Legionella* pneumonia; *Mycobacterium tuberculosis*; atypical nontuberculous mycobacterial infection; pneumococcal meningitis when organisms are susceptible or response is delayed	*S. aureus* (99%), although staphylococci rapidly develop resistance with monotherapy
Metronidazole	Obligate anaerobic gram-negative bacteria (e.g., *Bacteroides* spp); abscess in lung, brain, or abdomen; bacterial vaginosis; CDAD	Mostly susceptible; resistance very rare
Linezolid, tedizolid	VRE; uncomplicated and complicated skin and soft tissue infections caused by MSSA and MRSA; CAP with concurrent bacteremia; hospital-acquired pneumonia	Mostly susceptible; resistance occasionally seen in VRE
Chloramphenicol	HAI due to gram-positive and gram-negative organisms resistant to standard alternatives (e.g., *Burkholderia*)	Unknown
Colistin	HAI due to gram-negative bacilli resistant to all other chemotherapy (e.g., *P. aeruginosa, Acinetobacter* spp., and *Stenotrophomonas maltophilia*)	*P. aeruginosa* (case reports, outbreaks)
Quinupristin-dalfopristin	VRE; complicated skin and skin-structure infections due to MSSA and *S. pyogenes*	*E. faecalis* (<20%);[h] *E. faecium* (>90%)[h]
Mupirocin	Topical application to nares for *S. aureus* decolonization	*S. aureus* (74–100%)[i]
Nitrofurantoin	UTI caused by most gram-negative bacilli and some gram-positive organisms; prophylaxis in recurrent cystitis	*E. coli* (92%); *E. faecalis* (99%)
Fosfomycin	UTI caused by most gram-negative bacilli and some gram-positive organisms; prophylaxis in recurrent cystitis	Unknown

[a]Unless otherwise noted, susceptibility rates are based on isolates from the Massachusetts General Hospital Clinical Microbiology Laboratory collected between January and December 2012. Local rates will vary. [b]The Center for Disease Dynamics, Economics and Policy Resistance Map, Washington, DC. [c]S Sepehri et al: Prevalence of antimicrobial resistance among clinical isolates of *Bacteroides fragilis* group in Canada in 2010–2011: CANWARD Surveillance Study. Abstract C2-1814, presented at the 51st Interscience Conference on Antimicrobial Agents and Chemotherapy, 2011. Available at *www.can-r.com/posters/ICAAC2011/Sepehri%20Prevalence%20Bfragilis%20ICAAC2011.pdf*. [d]GV Doern et al: Clin Infect Dis 41:139, 2005. [e]RE Mendes et al: J Antimicrob Chemother 67:1321, 2012. [f]HS Sader et al: J Chemother 23:200, 2011. [g]J Torres et al: J Clin Microbiol 39:2677, 2001. [h]WS Oh et al: Antimicrob Agents Chemother 49:5176, 2005. [i]AE Simor et al: Antimicrob Agents Chemother 51:3880, 2007.

Abbreviations: CA-MRSA, community-acquired MRSA; CAP, community-acquired pneumonia; CA-UTI, community-acquired UTI; CDAD, *Clostridium difficile*–associated diarrhea; ESBL, extended-spectrum β-lactamase; GAS, group A streptococcal; HAI, hospital-acquired infection; MAI, *Mycobacterium avium-intracellulare*; MIC, minimal inhibitory concentration; MRSA, methicillin-resistant *Staphylococcus aureus*; MSSA, methicillin-susceptible *S. aureus*; TMP-SMX, trimethoprim-sulfamethoxazole; UTI, urinary tract infection; VRE, vancomycin-resistant *Enterococcus*.

against gram-positive bacteria, with some additional activity against *E. coli*, *P. mirabilis*, and *K. pneumoniae*. First-generation cephalosporins are commonly used for infections caused by MSSA and streptococci (e.g., skin and soft tissue infections). Cefazolin is a popular choice for surgical prophylaxis against skin organisms. The second generation (cefamandole, cefuroxime, cefaclor, cefprozil, cefuroxime axetil, cefoxitin, cefotetan) has additional activity against *H. influenzae* and *Moraxella catarrhalis*. Cefoxitin and cefotetan have potent activity against anaerobes as well. Second-generation cephalosporins are used to treat community-acquired pneumonia because of their activity against *S. pneumoniae*, *H. influenzae*, and *M. catarrhalis*. They are also used for other mild or moderate infections, such as acute otitis media and sinusitis. The third-generation cephalosporins are characterized by greater potency against gram-negative bacilli and reduced potency against gram-positive cocci. These cephalosporins, which include cefoperazone, cefotaxime, ceftazidime, ceftriaxone, cefdinir, cefixime, and cefpodoxime, are used for infections caused by Enterobacteriaceae, although resistance is an increasing concern. It is noteworthy that ceftazidime is the only third-generation cephalosporin with activity against *P. aeruginosa* but lacks activity against gram-positive bacteria. This drug is frequently used for pulmonary infections in cystic fibrosis and febrile neutropenia. Ceftriaxone penetrates the CSF and can be used to treat meningitis caused by *H. influenzae*, *N. meningitidis*, and susceptible strains of *S. pneumoniae*. It is also used for the treatment of later-stage Lyme disease. The fourth generation includes cefepime and cefpirome, broad-coverage agents that provide potent activity against both gram-negative bacilli, including *P. aeruginosa*, and gram-positive cocci. The fourth generation has clinical applications similar to those of the third generation and can be used in bacteremia, pneumonia, skin and soft tissue infections, and urinary tract infections caused by susceptible bacteria. Cefepime is also commonly used in febrile neutropenia. Ceftaroline, a fifth-generation cephalosporin, differs from the other cephalosporins in its added activity against MRSA, which is resistant to all other β-lactams. Ceftaroline's gram-negative activity is similar to that of the third-generation cephalosporins but does not include *P. aeruginosa*. Ceftaroline is efficacious in community-acquired pneumonia and skin infections, but few data are available on its use for more serious infections, such as bacteremia.

Carbapenems With a few exceptions for cefepime, all penicillins and cephalosporins are ineffective in the presence of ESBLs. Carbapenems, including doripenem, imipenem, meropenem, and ertapenem, offer the most reliable coverage for strains containing ESBLs. All carbapenems have broad activity against gram-positive cocci, gram-negative bacilli, and anaerobes. None is active against MRSA, but all are active against MSSA, *Streptococcus* species, and Enterobacteriaceae. Ertapenem is the only carbapenem that has poor activity against *P. aeruginosa* and *Acinetobacter*. Imipenem is active against penicillin-susceptible *Enterococcus faecalis* but not *Enterococcus faecium*. Carbapenems are not active against Enterobacteriaceae containing carbapenemases. *Stenotrophomonas maltophilia* and some *Bacillus* species are intrinsically resistant to carbapenems because of a zinc-dependent carbapenemase.

Monobactams Aztreonam is the sole monobactam. Its activity is limited to gram-negative bacteria and includes *P. aeruginosa* and most other Enterobacteriaceae. This drug is inactivated by ESBLs and carbapenemases. The principal use for aztreonam is as an alternative to penicillins, cephalosporins, or carbapenems in patients with serious β-lactam allergy. Aztreonam is structurally related to ceftazidime and should be used cautiously in individuals with a serious ceftazidime allergy. It is commonly used in febrile neutropenia and intraabdominal