Northwestern Medicine West Region

SUGGESTED EMPIRIC ANTIMICROBIAL THERAPY BY SITE OF INFECTION

Empiric antimicrobial guidelines are based on the most likely organisms responsible for infection, West Region susceptibilities, and prevalence of resistant organisms. Therapy may need to be adjusted once identification and susceptibility are determined.

Previous antimicrobial therapy may affect the susceptibility of organisms that subsequently cause infection. Close attention should be given to courses of antimicrobial therapy administered to patients in the recent past. In many cases, obtaining the appropriate specimen(s) before antibiotics are started is critical to successful outcomes of an infectious disease. Alterations in empiric antimicrobial therapy may be required.

Anatomic site	Common Pathogens	Preferred therapy	Alternative**	Comments
BONE				
Acute osteomyelitis	*Staphylococcus aureus* (MSSA and MRSA)	vancomycin		Bone biopsy and/or tissue biopsy is strongly recommended prior to starting antibiotics.
Acute osteomyelitis in patient with hemoglobinopathy (Sickle cell disease or Thalassemia)	Salmonella species, other Gram-negatives, *S. aureus*	ceftriaxone +/- vancomycin	ciprofloxacin +/- vancomycin	Bone biopsy and/or tissue biopsy is strongly recommended. Fluoroquinolone resistance is increasingly reported among Salmonella spp.
Long bone status post internal fixation of fracture	*S. aureus, Staphylococcus epidermidis*, Gram-negatives	vancomycin + piperacillin-tazobactam	vancomycin + cefepime	Bone biopsy and/or tissue biopsy is strongly recommended.
Sternum, post-operative	*S. aureus, S. epidermidis*	vancomycin		Bone biopsy and/or tissue biopsy is strongly recommended.
Vertebral osteomyelitis +/- epidural abscess	*S. aureus* most common (including MRSA), other Gram-positives and Gram-negatives also possible	vancomycin + ceftriaxone, OR vancomycin + cefepime if risk factors for *Pseudomonas aeruginosa*	vancomycin + fluoroquinolone OR daptomycin +/- fluoroquinolone	Obtain blood cultures in non-surgery-associated cases. Bone biopsy and/or tissue biopsy is strongly recommended. In patient with acute neurologic compromise, sepsis, or hemodynamic instability, ok to start empiric treatment prior to collecting bone or tissue cultures. Native Vertebral OM Guidelines
Contiguous osteomyelitis with vascular insufficiency	polymicrobial			Empiric antibiotic therapy is not recommended; recommend bone biopsy for directed therapy

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CENTRAL NERVOUS SYSTEM				
Meningitis—acute bacterial	*Streptococcus pneumoniae, Neisseria meningitides, Listeria monocytogenes*	vancomycin + ceftriaxone +/- ampicillin†	vancomycin + aztreonam +/- trimethoprim- sulfamethoxazole†	Empiric antibiotics are indicated prior to LP if acute bacterial meningitis is suspected. Penicillin testing necessary with beta-lactam allergy; contact infectious diseases service. If pneumococcal meningitis suspected, administer dexamethasone before or with first dose of antibiotics: Dexamethasone 10mg IV q 6 hours x 2-4 days. If *S. pneumoniae* is ruled out as cause, discontinue dexamethasone. Bacterial Meningitis Guidelines † Ampicillin or trimethoprim-sulfamethoxazole is given to cover *Listeria monocytogenes* (more common in patients over age 50, alcoholics, pregnant women, and patients with impaired cellular immunity).
Brain abscess--primary	*S. pneumoniae, Streptococcus* spp., *Bacteroides* spp., Enterobacteriaceae, *S. aureus*	vancomycin +ceftriaxone + metronidazole +/- ampicillin†		Biopsy for microbiology and pathology is necessary for diagnosis.
Meningitis--post-surgical or post traumatic	*S. aureus, S. epidermidis,* Gram-negatives	vancomycin + cefepime (preferred)	For severe PCN allergy (anaphylaxis/ hives): vancomycin + aztreonam + tobramycin	IDSA Healthcare-Associated Ventriculitis and Meningitis Guideline
Encephalitis	HSV, arboviruses, enteroviruses, VZV, non-infectious causes.	IV acyclovir		Obtain blood cultures. See IDSA guidelines for an extensive list of epidemiologic risk factors, diagnostic work-up, and individualized empiric therapy for encephalitis: Encephalitis Guidelines

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CENTRAL NERVOUS SYSTEM				
Prophylaxis for *Neisseria meningitidis* contacts		Ciprofloxacin or rifampin	Ceftriaxone 250 mg IM x 1 is preferred agent in pregnancy.	Contact infection control for guidance. Dose: ciprofloxacin 500 mg po x 1 OR rifampin 600 mg po q 12 hours x 4 doses
INTRAABDOMINAL				
Cholecystitis (community-acquired) - Mild-moderate severity	Enterobacteriaceae	cefazolin	aztreonam	Community-acquired: symptoms prior to admit or within 48h of admit AND no hospitalization within prior 90 days. Intra-abdominal Infection Guidelines
Cholangitis following biliary anastomosis – any severity	Enterobacteriaceae, anaerobes	piperacillin-tazobactam	cefepime + metronidazole For severe PCN allergy (anaphylaxis/ hives): aztreonam + metronidazole + vancomycin	May add vancomycin for risk of MRSA or healthcare-associated infection. Empiric antifungal coverage not indicated unless culture directed. Intra-abdominal Infection Guidelines
Cholecystitis (community-acquired) – Severe physiologic disturbance or high-risk patient (advanced age or immunocompromised)	Enterobacteriaceae, anaerobes	piperacillin-tazobactam	cefepime + metronidazole For severe PCN allergy (anaphylaxis/ hives): aztreonam + metronidazole + vancomycin	May add vancomycin for risk of MRSA or healthcare-associated infection Intra-abdominal Infection Guidelines
Cholecystitis (healthcare-associated), biliary sepsis or common duct obstruction	Enterobacteriaceae, anaerobes and the possibility of Gram-negative resistance; *Enterococcus* spp. in select immunocompromised patients	piperacillin-tazobactam +/- vancomycin	cefepime + metronidazole +/- vancomycin For severe PCN allergy (anaphylaxis/ hives): aztreonam + metronidazole + vancomycin	Healthcare-associated: prior gallbladder instrumentation, admitted longer than 48 hours, hospitalized previously in the past 90 days. See IDSA guidelines for intra-abdominal infections: Intra-abdominal Infection Guidelines

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INTRAABDOMINAL				
C. difficile colitis		Oral vancomycin OR Oral fidaxomicin (for mild/mod infection only and if patient can afford treatment upon discharge)		Vancomycin 125mg PO QID x 10 days or Fidaxomicin 200mg BID x 10 days Rectal administration of vancomycin and IV metronidazole, and/or high dose vancomycin 500 mg PO may be considered in severe, complicated cases of *C. difficile* infection (above findings plus hypotension, shock, ileus or toxic megacolon) C. diff Guidelines
Diverticulitis, perirectal abscess, peritonitis	Community-acquired: Enterobacteriaceae, Bacteroides spp.	cefazolin + metronidazole	aztreonam + metronidazole	Community-acquired: < 48h of admission, no hospitalization in past 90d. High-risk: severe physiologic disturbance, advanced age, or immunocompromised state. See IDSA guidelines for intra-abdominal infections: Intra-abdominal Infection Guidelines
	Community-acquired, high-risk: Enterobacteriaceae, *Bacteroides* spp., *Enterococcus* spp., and the possibility of Gram-negative resistance	piperacillin-tazobactam	cefepime + metronidazole For severe PCN allergy (anaphylaxis/ hives): aztreonam + metronidazole + vancomycin	
	Healthcare-associated or severely ill: same as high-risk community-acquired	piperacillin-tazobactam +/- vancomycin*	cefepime + metronidazole +/- vancomycin* For severe PCN allergy (anaphylaxis/ hives): aztreonam + metronidazole + vancomycin	*Empiric *Enterococcus* coverage (directed at *E. faecalis*) is recommended, especially for those with post-op infection, those who have previously received cephalosporins, immunocompromised patients, and those with prosthetic intravascular material, port, or PD catheter.
Following appendectomy, no perforation		none	none	Surgical prophylaxis only
Following appendectomy, with perforation	Enterobacteriaceae, *Bacteroides* spp.	cefazolin + metronidazole	aztreonam + metronidazole	

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GASTROINTESTINAL				
Pancreatitis--acute/non-necrotizing	noninfectious	No antibiotics		No antibiotic therapy necessary
Pancreatitis—acute/necrotizing or infected pseudocyst, abscess	Enterobacteriaceae, *Enterococcus* spp., *S. aureus, S. epidermidis* , anaerobes, Candida spp.	piperacillin-tazobactam	cefepime + metronidazole For severe PCN allergy (anaphylaxis/ hives): meropenem plus ID consult	Strongly recommend attempting aspiration for microbiologic diagnosis and therapy. Pip/tazo has adequate penetration into pancreatic necrosis, thus carbapenem therapy is not indicated unless patient has history of MDR organisms
Peritonitis--spontaneous bacterial peritonitis (SBP)	S. pneumoniae, K. pneumoniae, E. coli	ceftriaxone	aztreonam + vancomycin	
Peritonitis--Peritoneal Dialysis related	*S. aureus, S. epidermidis* , Gram-negatives, Candida spp.	vancomycin + gentamicin	ceftriaxone + vancomycin OR ceftazidime + vancomycin (if concern for Pseudomonas)	Contact clinical pharmacist for dosing recommendations. Obtain PD fluid for microbiologic diagnosis. Often intraperitoneal therapy is ideal to treat these infections. PD Infection Guidelines
GENITAL				
Endometritis-Acute postpartum	Group B *Streptococc*al spp., anaerobes, Enterobacteriaceae	clindamycin + gentamicin OR piperacillin-tazobactam for critically ill pts	If severe renal dysfunction: ampicillin/sulbactam	
Salpingitis/PID	*Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Bacteroides* spp., Enterobacteriaceae, Group B *Streptococcus* spp.	ceftriaxone + metronidazole + doxycycline		Testing for GC and Chlamydia are strongly recommended. Discharge patient on oral doxycycline to complete a 14-day course. Sexual partners within prior 60 days need evaluation and treatment. STI Guidelines

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HEART				
Endocarditis		Refer to guidelines		ID consult recommended. Refer to AHA guidelines: Endocarditis guidelines
JOINT				
Septic joint/ at risk for STI	At risk for sexually transmitted infection (STI): *Neisseria gonorrhoeae, S. aureus*, *Streptococcal* spp., rarely enteric Gram-negative bacilli	ceftriaxone +/- vancomycin	aztreonam + vancomycin	Send blood cultures before antibiotics are started. Early joint aspiration is strongly recommended for cell count, differential, gram stain, crystals, and culture to guide diagnosis. For type-1 penicillin allergy, consult Infectious Diseases and Allergy. If gonorrhea is suspected, cultures from the joint may or may not be positive.
Septic Joint- not at risk for STI	*S. aureus* (MSSA and MRSA), *Streptococcal* spp., Gram-negative bacilli	vancomycin + ceftriaxone	vancomycin + aztreonam	
Prosthetic joint infection	*S. aureus* (MSSA and MRSA), *S. epidermidis* , *Streptococcal* spp., rarely Gram-negative bacilli	vancomycin		Withholding antibiotics pending cultures is recommended in clinically stable patients. Consider addition of piperacillin-tazobactam if the patient has a history of revisions and antibiotic treatment. See 2013 IDSA Guideline for Prosthetic Joint Infections: Prosthetic Joint Guidelines
KIDNEY, BLADDER AND PROSTATE				
Asymptomatic bacteriuria	*E. coli*, Enterobacteriaceae, *Enterococcus* spp.	No antibiotics recommended unless criteria are met (see comments)		Should only be treated in pregnant women or patients undergoing urologic procedures with anticipated mucosal bleeding --other patients should be evaluated on a case-by-case basis. See IDSA guidelines for asymptomatic bacteriuria: Asymptomatic Bacteriuria Guidelines

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KIDNEY, BLADDER AND PROSTATE				
Cystitis	*E. coli* , Enterobacteriaceae, *S. saprophyticus*	nitrofurantoin PO x 5 days (if estimated creatinine clearance >30 mL/min) OR cephalexin PO x 5 days OR cefazolin IV x 3 days	trimethoprim-sulfamethoxazole x 3 days OR aztreonam IV x 3 days	Consider testing urethritis for gonorrhea, chlamydia, and trichomonas. See IDSA guidelines for uncomplicated UTIs/pyelonephritis, Cystitis\Pyelo Guidelines
Complicated UTI/catheters	*E. coli*, Enterobacteriaceae, Enterococcus	cefazolin	Recent history of organism resistant to cefazolin: ceftriaxone Severe PCN allergy: aztreonam piperacillin-tazobactam if at risk for Enterococcus or resistant organisms	See IDSA guidelines for catheter-related UTIs (recommended to d/c or change catheter) CAUTI Guideline
Asymptomatic Candiduria	*Candida* spp.	Remove catheter Neutropenic patients and very low–birth-weight infants should be treated as recommended for candidemia (see below) Patients undergoing urologic procedures should be treated with oral fluconazole, 400 mg (6 mg/kg) daily before and after the procedure		See IDSA guidelines for candidiasis, Candidiasis Guidelines

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KIDNEY, BLADDER AND PROSTATE				
Symptomatic Candiduria	*C. albicans* (and other fluconazole susceptible spp)	Remove catheter, fluconazole		See IDSA guidelines for candidiasis, Candidiasis Guidelines Micafungin, liposomal Ampho and voriconazole have poor renal excretion and are NOT considered effective against fungal UTI
	Fluconazole-resistant *Candida* spp	ID c/s recommended		
Pyelonephritis—acute, uncomplicated	*E. coli* , Enterobacteriaceae	cefazolin	Recent history of organism resistant to cefazolin: Ceftriaxone or ampicillin if h/o Enterococcus Severe PCN allergy: aztreonam	See IDSA guidelines for uncomplicated UTIs/pyelonephritis, Cystitis\Pyelo Guidelines For oral stepdown treatment of uncomplicated pyelonephritis, sulfamethoxazole/trimethoprim or ciprofloxacin are first-line due to good renal tissue penetration. Cefpodoxime is a second-line oral option.
Pyelonephritis—complicated (obstruction, post-instrumentation, male)	Enterobacteriaceae, *Enterococcus*	piperacillin-tazobactam	aztreonam +\- vancomycin	Patients at increased risk of enterococcal infections: elderly, urinary obstruction and post instrumentation **If septic, use sepsis order set
Perinephric abscess	Enterobacteriaceae	piperacillin-tazobactam	cefepime + metronidazole	Recommend drainage of larger abscesses, may need aspiration for microbiologic diagnosis.
Prostatitis	Enterobacteriaceae	ceftriaxone	trimethoprim-sulfamethoxazole OR doxycycline OR ciprofloxacin (recommended in that order based on susceptibilities)	Review antibiogram and susceptibilities as increasing rates of ciprofloxacin resistance among Enterobacteriaceae have been noted

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LUNG				
Pneumonia—community acquired (CAP) **For patients previously categorized as HCAP**, use CAP guideline recommendations unless patient meets criteria for MDR infection including IV antibiotics in past 90 days or high mortality risk (in septic shock or requiring ventilator support)	*S. pneumoniae, H. influenzae*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Legionella pneumophila*, viruses	ceftriaxone + azithromycin PO or IV x 5 days	ceftriaxone + doxycycline PO or IV x 5 days levofloxacin 750mg PO or IV x 5 days	See ATS/IDSA guidelines for CAP, CAP Guidelines If patient is critically ill, draw 2 sets of blood cultures. If diffuse pneumonia, empyema, or cavitary pneumonia in critically ill patient, add empiric MRSA coverage with vancomycin or linezolid. Potsma DF et al. NEJM 2015;372:1312-1323.
Pneumonia--community acquired in ICU	as above	ceftriaxone x 7 days + azithromycin x 5 days	ceftriaxone + levofloxacin x 7 days Severe PCN allergy: levofloxacin x 7 days	
Pneumonia—hospital acquired (HAP) "HCAP" has been removed from the hospital-acquired/ ventilator-associated guidelines due to "increasing evidence …that many patients defined as having HCAP are not at high risk for MDR pathogens."	as above plus *S. aureus, Pseudomonas aeruginosa,* other Gram-negative bacilli	piperacillin-tazobactam ADD tobramycin^ if candidate for double coverage (see to right)* ADD vancomycin if risk for MRSA** ^May use ciprofloxacin as an alternative if patient with chronic renal dysfunction Treat x 7 days	cefepime Severe PCN allergy: aztreonam plus vancomycin ADD tobramycin^ if candidate for double coverage (see to right)* ADD vancomycin if risk for MRSA** ^May use ciprofloxacin as an alternative if patient with chronic renal dysfunction Treat x 7 days	"Hospital-acquired pneumonia" refers to pneumonia that develops > 48 hours after admission. *Double cover if: 1) IV antibiotic use in past 90 days 2) High mortality risk: in septic shock or requires ventilator support Risk of MDR Pseudomonas: (1) above or structural lung disease (bronchiectasis, CF)—ID consult recommended if patient at risk **MRSA coverage recommended if VAP, IV antibiotics within past 90 days, on mechanical ventilation, septic shock, or positive MRSA screen. If MRSA is not isolated within 72 hours, MRSA coverage should be stopped IDSA/ATS HAP/VAP 2016 Guideline

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LUNG				
Pneumonia—ventilator-Associated (VAP)	as above plus *S. aureus, Pseudomonas aeruginosa,* other Gram-negative bacilli	piperacillin-tazobactam + vancomycin ADD tobramycin^ if MDR risk factors (to right) Treat x 7 days	Cefepime + vancomycin Severe PCN allergy: Aztreonam + tobramycin^ + vancomycin ADD tobramycin^ if MDR risk factors (to right) Treat x 7 days	MDR Risk Factors: Any of the following: IV abx in past 90 days, septic shock at time of VAP, ARDS, >5 days hospitalization prior to onset of VAP, or CRRT prior to VAP If MRSA is not isolated within 72 hours, MRSA coverage should be stopped. ^May use ciprofloxacin as an alternative if patient with chronic renal dysfunction IDSA/ATS HAP/VAP 2016 Guideline
Pneumonia—aspiration, community acquired	Bacteroides spp., *Peptostreptococci*, *Fusobacterium* spp., viridians group *Streptococcal* spp.	ampicillin/sulbactam x 5 days	Ceftriaxone x 5 days OR Clindamycin x 5 days	Important to distinguish between aspiration pneumonitis and pneumonia; if patient is symptomatic for aspiration pneumonitis >48hr after initial event, consider addition of antibiotics Anaerobic infection risk factors: severe periodontal dz, h/o EtOH, or putrid sputum
SEPSIS or ACUTE FEBRILE SYNDROME				
Toxic shock syndrome	S. aureus (MSSA and MRSA), group A streptococci	vancomycin + clindamycin + penicillin G		Strongly recommend prompt surgical evaluation for possible debridement and infectious diseases consultation.
Not neutropenic, no hypotension, source unclear	*S. aureus* (MSSA and MRSA), *Streptococcal* spp., *E. coli*	ceftriaxone + vancomycin		Consider adding empiric doxycycline, particularly if recent exposure to woodlands, ticks, or recent travel to developing countries.

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SEPSIS or ACUTE FEBRILE SYNDROME				
Not neutropenic, no hypotension, suspect intra-abdominal source	Enterobacteriaceae	piperacillin-tazobactam	cefepime + metronidazole For severe PCN allergy: aztreonam + metronidazole + vancomycin	
Not neutropenic, no hypotension, petechial rash	*S. pneumoniae, N. meningitidis*	ceftriaxone + vancomycin		Consider adding empiric doxycycline, particularly if recent exposure to woodlands, ticks, or developing countries.
Fever & neutropenia (no hypotension, no apparent source) in a cancer patient receiving chemotherapy	Enterobacteriaceae, Pseudomonas spp.	cefepime ADD vancomycin if hemodynamically unstable, pneumonia, or evidence of catheter-related infection	If severe PCN allergy: meropenem ADD vancomycin if hemodynamically unstable, pneumonia, or evidence of catheter-related infection	Empiric vancomycin is unnecessary unless patient is hemodynamically unstable or has pneumonia or PCN allergy or there is evidence of catheter-related infection on exam. Discontinue vancomycin after 72 hours if started for suspected or confirmed gram-positive bacteremia that was later identified to be a single isolate of coagulase negative staphylococci. See IDSA guidelines for neutropenic fever: Neutropenic Fever Guidelines
Fever & neutropenia -- febrile longer than 96 hours	as above (fever & neutropenia) + fungal infection	add micafungin		Micafungin is not the preferred antifungal agent for all cancer patients. High risk cancer patients are considered at increased risk of mold infections: Neutropenic Fever Guidelines
Sepsis/Septic shock	*S. aureus* (MSSA and MRSA), *E. coli,* Enterobacteriaceae	piperacillin-tazobactam +/- tobramycin^ (see infection order set for double-coverage details) ADD vancomycin if MRSA risk (see infection order set for details) ADD azithromycin if suspect CAP*	cefepime +/- tobramycin^ ADD vancomycin if suspect MRSA ADD azithromycin if suspect CAP* For severe pcn allergy: aztreonam + metronidazole +/- tobramycin^ + vancomycin	See guidelines from Surviving Sepsis Campaign ^Ciprofloxacin can be used as an alternative to tobramycin in patients with underlying severe renal dysfunction. *No need to add azithromycin for CAP if ciprofloxacin used.

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SKIN				
Bite—animal or human	Animal bite: *Pasteurella multocida,* Fusobacterium, Capnocytophaga (dog bite) Human bite: viridans group *Streptococcal* spp., *S.epidermidis* , *Corynebacterium spp.*, *S. aureus* , *Eikenella* spp., *Bacteroides* spp., *Peptostreptococci* spp. *Fusobacterium* spp., *Prevotella* spp.	amoxicillin-clavulanate OR ampicillin-sulbactam	doxycycline + metronidazole OR trimethoprim-sulfamethoxazole + metronidazole	More specific therapy depends upon animal involved Evaluate the need for tetanus and/or rabies vaccination
Boils (furunculosis) or cutaneous abscesses	*S. aureus* (MSSA and MRSA)	trimethoprim-sulfamethoxazole	doxycycline OR clindamycin	Hot packs, incision and drainage serves as primary therapy. Note: clindamycin resistance is present in ~ 50% of MRSA isolates. See IDSA SSTI Guidelines
Cellulitis: NON-PURULENT/ NON-SUPPURATIVE (no open wound, no infected ulcer)	Group A *Streptococcal* spp., Group B, C, G *Streptococcal* spp.. (*S. aureus* is uncommon in absence of abscess, necrosis, or purulence)	cefazolin	Severe PCN allergy: clindamycin	See IDSA guidelines for cellulitis, erysipelas, abscesses, SSTIs: SSTI Guidelines.
Cellulitis: PURULENT/ SUPPURATIVE (purulent drainage or exudates)	*S. aureus, MRSA* Cellulitis with purulent exudates or at risk for MRSA (Cellulitis associated with penetrating trauma, evidence of MRSA infection elsewhere, nasal colonization with MRSA, injection drug use, purulent drainage, or SIRS)	Mild-Moderate: incision and drainage + trimethoprim-sulfamethoxazole OR doxycycline Severe: incision and drainage + cefazolin (if MSSA) OR vancomycin if MRSA suspected	Clindamycin is an alternative once susceptibilities known, but empiric coverage for MRSA is only ~50%	Culture and sensitivities are indicated for de-escalation See IDSA guidelines for MRSA infections, MRSA Guidelines

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SKIN				
Cellulitis--IV catheter-related	Coagulase-negative *Staphylococcal* spp., *S. aureus* (MSSA and MRSA),	Remove catheter + vancomycin		
Chronic ulcer with acute cellulitis	*S. aureus*	cefazolin	clindamycin OR trimethoprim-sulfamethoxazole	
Chronic ulcer with abscess (including diabetic foot ulcers)	*Streptococcal* spp., *Enterococcus*, Enterobacteriaceae, *Pseudomonas* spp., *Bacteroides* spp., *S. aureus* (MSSA and MRSA), polymicrobial	Wound care; piperacillin-tazobactam OR ampicillin/sulbactam +/- trimethoprim-sulfamethoxazole or vancomycin for suspected MRSA	clindamycin + aztreonam +/- trimethoprim-sulfamethoxazole or vancomycin for suspected MRSA	Consider wound care alone (no antibiotic therapy) with no signs of systemic illness, soft tissue abscess, or local cellulitis. With exposed bone, obtain bone biopsy prior to administering antimicrobials to guide therapy.
Diabetic foot ulcer without evidence of infection or exposed bone	skin flora	No antibiotics recommended		No antibiotic therapy necessary
Necrotizing fasciitis	Streptococci (group A, C, G), Clostridial spp., polymicrobial, including *S. aureus*	piperacillin-tazobactam + clindamycin + vancomycin	meropenem + clindamycin + vancomycin	Prompt surgical debridement required. If streptococcal necrotizing fasciitis, consider management for toxic shock syndrome. Recommend infectious diseases consult. See IDSA guidelines for SSTIs, SSTI Guidelines.

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VASCULAR				
Catheter-associated infection	Coagulase-negative staphylococci, *S. aureus* (MSSA and MRSA)	Remove line vancomycin ADD piperacillin-tazobactam if high suspicion for gram-negative		May be able to salvage a long-term line if infection is due to *S. epidermidis* AND no evidence of tunnel infection or complicated blood stream infection. See IDSA guidelines for catheter-related infections, Cath Related Bloodstream Infection Guidelines
Impaired host line infection	*S. epidermidis* , other coagulase-negative staphylococci, *S. aureus* (MSSA and MRSA), Candida species, Enterobacteriaceae, Pseudomonas	piperacillin-tazobactam + vancomycin +/- tobramycin		Consider short course of tobramycin in addition to other antibiotics if patient is clinically unstable. Consider coverage for vancomycin-resistant Enterococcus (VRE) if patient is colonized with this organism. If hemodynamically unstable, consider adding fungal coverage (micafungin or fluconazole).
Hyperalimentation-associated line infection	As with impaired host line infection, candida is more common	fluconazole in addition to above recommendations based on anatomic site/diagnosis		Consider micafungin rather than fluconazole if patient has been receiving fluconazole in the month prior to fungemia.
Documented candidemia		micafungin if neutropenic, critically ill, or prior exposure to fluconazole in past month	fluconazole	Consider micafungin rather than fluconazole if patient has been receiving fluconazole in the month prior to fungemia or if the patient is critically ill. See IDSA guidelines for candidiasis, IDSA Candidiasis Guidelines

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