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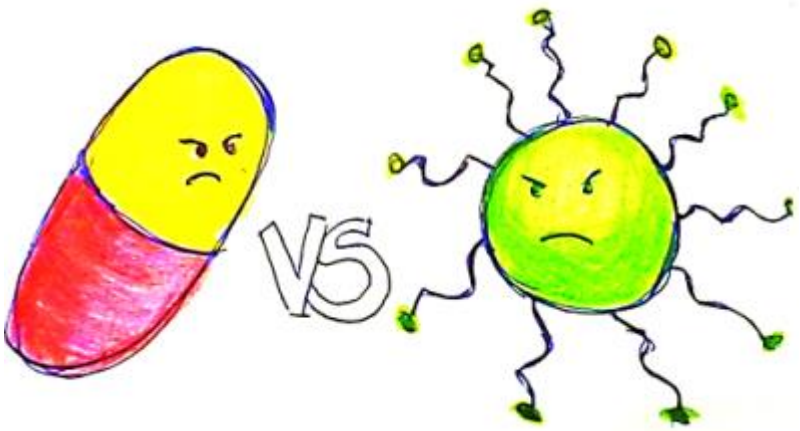
EMPIRIC ADULT ANTIBIOTIC GUIDE 2018



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PURPOSE

To optimize empiric antibiotic use at LifeBridge Health (LBH) hospitals, this guide was developed to assist clinicians on prescribing appropriate empiric antibiotic regimens. This guide was developed by the Antimicrobial Stewardship Committee and approved by the LBH Medical Executive Committee. These regimens are based on national standard guidelines for the specified indications, with adaptation to the LifeBridge formulary and antibiotic susceptibility patterns.

DISCLAIMER

The recommendations given in this guide are meant to serve as treatment guidelines. They should not supersede clinical judgment and/or infectious diseases consultation when indicated. These recommendations were developed for use at LBH hospitals only, and may not be appropriate for other settings. We have attempted to verify that all information is correct but information may change with continuing research. If there are questions or concerns, please email the Antimicrobial Stewardship Committee Chair.

NOTE: DOSING RECOMMENDATIONS ARE BASED ON NORMAL RENAL/HEPATIC FUNCTION

KEY

RX = Consider Pharmacy Dosing Service (must meet criteria) or refer to nomogram for dosing
= Restricted antibiotic that must meet restriction criteria or requires Antimicrobial Stewardship or ID approval
ID = Recommend ID consult
GI = Recommend GI consult
SURG = Recommend Surgery consult
Red print indicates preferred antibiotic regimen and should be considered first when possible.

Non-restricted Antibiotics			
Amikacin IV ($$)	Cefepime IV ($$)	Doxycycline IV/PO ($)	Penicillin VK PO ($)
Amoxicillin PO ($)	Ceftriaxone IV ($)	Gentamicin IV ($)	Rifampin PO ($)
Amox/clav PO ($)	Cefuroxime IV/PO ($)	Levofloxacin IV/PO ($)	Tobramycin IV ($$)
Ampicillin IV ($$)	Cephalexin PO ($)	Metronidazole IV/PO ($)	TMX/SMZ IV ($$$)
Amp/sulbactam IV ($$$)	Ciprofloxacin IV/PO ($)	Nafcillin IV ($$$)	TMX/SMZ PO ($)
Azithromycin IV/PO ($)	Clarithromycin PO ($)	Nitrofurantoin PO ($)	Vancomycin IV ($$)
Cefazolin IV ($)	Clindamycin IV/PO ($)	Penicillin G IV ($$)	Vancomycin PO ($$)
Cefotetan IV ($$$)	Dicloxacillin PO ($)	Piperacillin/tazobactam IV ($$)	
Restricted Antibiotics			
Aztreonam IV ($$$$)	Daptomycin IV ($$$$)	Fosfomycin ($$)	Meropenem IV ($$)
Ceftaroline IV ($$$$$)	Ertapenem IV ($$$$$)	Linezolid IV($$)	Tigecycline ($$$$$)
Dalbavancin IV ($$$$$)	Fidaxomicin PO ($$$$$)	Linezolid PO ($)	

Cost Key				
$: < $10/day	$$: $10-50/day	$$$: $50-100/day	$$$$: $100-200/day	$$$$$: >$200/day

Community-Acquired Pneumonia (CAP)[1]		
Type/Severity	Empiric Antibiotic Regimen	Duration
Inpatient (No concern for Pseudomonas)	Ampicillin/sulbactam IV 1.5g-3g Q6H **OR** Amoxicillin/clavulanate PO 875 mg BID **OR** Ceftriaxone IV 1g QDay	**Minimum of 5 days** *Re-assess after 5 days if longer duration is needed*
	PLUS	
	Azithromycin PO 500 mg QDay	
Inpatient ICU	*Any of the above regimen*	
	Levofloxacin IV/PO 750 mg QDay **PLUS** Ceftriaxone IV 1g QDay	
Outpatient	Azithromycin PO 500 mg QDay **OR** Doxycycline PO 100 mg BID	
Step-down	Amoxicillin/clavulanate PO 875 mg BID **OR** Cefuroxime PO 500 mg BID	

Hospital-Acquired Pneumonia (HAP)[2] [with or without sepsis – NOT on ventilator]		
Type/Severity	Empiric Antibiotic Regimen	Duration
Not at high-risk for mortality	**Cefepime IV 2g Q8H*** **OR** Levofloxacin IV 750 mg QDay	**7 days or shorter**
Increased MRSA risk	*Above regimen* **PLUS** Vancomycin IV[RX] (*may use MRSA nasal screening to guide therapy)*	
Need for ventilator support **OR** **Septic shock** **OR** **History of MDROs**	Cefepime IV 2g Q8H* **OR** Piperacillin/tazobactam IV 3.375g Q8H (4-hr infusion) **PLUS** Vancomycin IV[RX] **PLUS** **Aminoglycoside**** Sinai/Northwest: Tobramycin IV[RX] Carroll Hospital: Gentamicin IV[RX] **OR** Ciprofloxacin IV 400 mg Q8H	
Step-down	1. If MRSA screen negative: **consider stop vancomycin** 2. *Pseudomonas* not recovered: **consider stop anti-pseudomonal coverage**	

NOTE:
***Cefepime recommended given higher incidence of nephrotoxicity with piperacillin/tazobactam + vancomycin relative to cefepime+vancomycin[29]**
****Aminoglycoside should be used with caution; recommend consulting with ID before initiation**

Ventilator-Acquired Pneumonia (VAP)[2] [with or without sepsis]		
Type/Severity	Empiric Antibiotic Regimen	Duration
	Cefepime IV 2g Q8H* **OR** Piperacillin/tazobactam IV 3.375g Q8H (4-hr infusion) **PLUS** Vancomycin IV[RX] **PLUS** **Aminoglycoside**** Sinai/Northwest: Tobramycin IV[RX] Carroll Hospital: Gentamicin IV[RX] **OR** Ciprofloxacin IV 400 mg Q8H	7 days
Step-down	1. **Do not use aminoglycoside monotherapy** 2. Consider stopping antibiotics if patient's respiratory status is improving within 48 hours (i.e. if patient is coming off ventilator)	

Aspiration Pneumonia vs. Aspiration Pneumonitis[3,4]

1. Antibiotics may NOT be necessary in those who develop fever, leukocytosis, and infiltrates within 48 hours after aspiration as this likely reflects chemical pneumonitis. **Treatment is only recommended in patients who have symptoms for >48 hours or who are severely ill; recommended duration is 5-7 days.**

2. **Anaerobic coverage needed only if history of chronic/recurrent aspiration.**

3. If treatment is needed, refer to appropriate pneumonia guideline in previous section.

COPD Exacerbations[5]

Empiric use of levofloxacin is discouraged[6]

Type/Severity	Empiric Antibiotic Regimen	Duration
Consider antibiotics if increased sputum purulence AND any of the following: increased dyspnea, increased sputum volume **OR** mechanically ventilated	**Azithromycin PO 500 mg**	**3 days**
	Doxycycline PO 100 mg BID **OR** Amoxicillin/clavulanate PO 875 mg BID	**5 days**

Skin and Soft Tissue Infections[7,8]		
NOTE: Clindamycin has reliable GAS coverage but unreliable S. aureus coverage. Nearly 35% of MSSA and 50% of MRSA isolates at SHB, NWH, and CHC are resistant. See antibiogram.		
Type/Severity	Empiric Antibiotic Regimen	Duration
Mild Infections	**Purulence → I&D** **Antibiotics are optional (i.e. recurrent cases or abscesses > 5 cm)** Doxycycline PO 100 mg BID **OR** TMP/SMX (DS) PO 160/800 mg BID **Non-purulence → no I&D** Amoxicillin PO 500 mg TID **OR** Penicillin VK PO 500 mg QID **OR** Cephalexin PO 500 mg QID **OR** Dicloxacillin PO 250 mg QID	**5 days**
Moderate Infections SSTI with ANY of the signs of systemic infection listed below: T >38°C, HR >90 bpm, RR >24 or WBC >12,000	**Purulence → I&D** Doxycycline PO 100 mg BID **OR** TMP/SMX (DS) PO 160/800 mg BID **Non-purulence** **Cefazolin IV 1-2 g Q8H** **OR** Penicillin G IV 2–4 million units Q4–6H	**5-7 days**
Moderate-Severe Infections that meet following criteria: 1. Requiring IV Vancomycin therapy for 7-14 days 2. Clinically stable	**While in ED/Observation:** Vancomycin IV then Dalbavancin** IV 1000 mg x 1 dose on discharge	
Dalbavancin is restricted to ED or Observation patients with acute cellulitis who would otherwise need IV antibiotic therapy for 7-14 days beyond discharge (i.e. recurrent failure with oral antibiotics, IVDA to avoid PICC, history of PICC thrombosis, leaving AMA, etc.)		
Severe Infections / Sepsis / Chronic wound infection Chronic wound infection secondary to diabetes or chronic vascular issues; T >38°C, HR >90 bpm, RR >24, WBC >12,000 or <400 cells/µL or immunocompromised	Vancomycin IV[RX] **PLUS** Piperacillin/tazobactam IV 3.375 g Q8H (4-hr infusion) **OR** Cefepime IV 2 g Q12H **+** Metronidazole IV/PO 500 mg Q8-12H	**7-10 days** 7-10 days

Intra-abdominal Infections (IAI)[9]			
Type	Severity	Empiric Antibiotic Regimen	Duration
Appendicitis	Ruptured	Cefazolin IV 2gm Q8H + Metronidazole IV 500 mg Q8H	**Uncomplicated, post-surgery: 24 hours** **Complicated, post-surgery: 4 days** **No surgery: 10 days**[18] **Secondary bacteremia: 7 days**[9,21]
		Ciprofloxacin IV 400 mg Q12H + Metronidazole IV 500 mg Q8H *Note: e.coli resistance is >20% to ciprofloxacin, therefore, ciprofloxacin is only recommended for life-threatening beta-lactam allergic patients*	
Cholangitis[11,12]	Mild – Moderate	Cefazolin IV 2g Q8H *Note: anaerobic coverage not needed unless biliary-enteric anastomosis present*	**Source control: 3 days** **Source control with Bacteremia: 7 days**[9,21]
Cholecystitis[13]	Mild – Moderate	Cefazolin IV 2g Q8H *Note: anaerobic coverage not needed unless biliary-enteric anastomosis present*	**Source control: Stop antibiotic after procedure** **No surgery: 5-7 days**[9]
Cholangitis/ Cholecystitis	Severe	Piperacillin/tazobactam IV 3.375g Q8H (4-hour infusion)	**Source control: 4 days**[14]
		Ciprofloxacin IV 400 mg Q12H + Metronidazole IV 500 mg Q8H *Note: e.coli resistance is >20% to ciprofloxacin, therefore, ciprofloxacin is only recommended for life-threatening beta-lactam allergic patients*	
Diverticulitis	Acute, Uncomplicated	Consider deferral of antibiotic[9]	
	Complicated	Ceftriaxone IV 1g Q24H + Metronidazole IV 500 mg Q8H	**Source control: 4 days after surgery**[7] **Incomplete source control: 7-14 days**[16]
	Severely ill	**Cefepime IV 2g Q12H** **+** **Metronidazole IV 500 mg Q8H**	
		Piperacillin/tazobactam IV 3.375g Q8H (4-hour infusion)	
SBP or primary peritonitis[17]	Treatment	Ceftriaxone IV 2g QDay	**5 days**
	Prophylaxis	Ciprofloxacin PO 500 mg QDay	**Indefinite**
		TMP/SMX PO 160/800 mg QDay	

Intra-abdominal Infections (IAI)[9]			
Type	Severity	Empiric Antibiotic Regimen	Duration
Peritonitis in PD patients[18]	**Diagnostic criteria** PD fluid with >100 cells/mm^3 with >50% neutrophil predominance AND Positive PD fluid culture	**INTRA-PERITONEAL DOSING** Cefazolin IP 15-20 mg/kg Q24H **OR** Vancomycin IP 15-30 mg/kg Q5-7 days **PLUS** Gentamicin IP 0.6 mg/kg Q24H Vancomycin IP 15-30 mg/kg Q5-7 days + Cefepime IP 1g Q24H	**Coag-neg staph/strep spp: 14 days** **S. aureus, enterococcus, P. aeruginosa, Enterobacteriaceae: 21 days**
Acute Pancreatitis[19]	No treatment	**NOTE: Do not use antibiotics to prevent infection in severe or necrotizing pancreatitis. Antibiotic are not recommended in most cases**[1]	
	Treatment	Criteria for antibiotics 1. Pancreatic necrosis confirmed by CT and the necrosis is suspected to be infected 2. Deteriorates after 7-10 days of hospitalization. Fine needle aspiration for culture recommended 3. Suspicion for systemic (extrapancreatic) infection regardless of association with acute pancreatitis Ciprofloxacin IV 400 mg Q12H + Metronidazole IV/PO 500 mg Q8H Piperacillin/tazobactam IV 3.375g Q8H (4-hr infusion)	**10-14 days**
General IAI	Mild-Moderate	**Cefazolin IV 2g Q8H** **+** **Metronidazole IV/PO 500 mg Q8-12H** Ciprofloxacin IV 400 mg Q12H + Metronidazole IV/PO 500 mg Q8H *Note: e.coli resistance is >20% to ciprofloxacin, therefore, ciprofloxacin is only recommended for life-threatening beta-lactam allergic patients*	**Source control: 4 days after surgery**[9] **Medical management: 5-7 days, then reassess for the need for surgery**[9] **Secondary bacteremia: 7 days**[9,21]
	Severe or Health-Care associated	Cefepime IV 2g Q12H + Metronidazole IV/PO 500 mg Q8H **Piperacillin/tazobactam IV 3.375g Q8H (4-hr infusion)**	

***Clostridium difficile* Infections (CDI)[22]**			
Metronidazole has higher failure rates relative to vancomycin and fidaxomicin and ***is no longer a first-line agent***			
Episode	Severity	Definitive Therapy	Duration
Initial Metronidazole should only be used for outpatient therapy when oral vancomycin is not an option or unavailable	**Mild-Moderate** WBC < 15 AND SCr < 1.5	Vancomycin PO 125 mg QID	**10 days**
	Severe[ID] WBC ≥ 15 OR SCr ≥ 1.5	Vancomycin PO 125 mg QID	
	Fulminant[ID/SURG] Hypotension/shock, megacolon, ileus	Vancomycin PO 500 mg QID **+** Metronidazole IV 500 mg TID *Add vancomycin enema if ileus present*	**Based on clinical response**
Recurrence/ relapse	**First recurrence**	Follow initial episode regimen **OR** Fidaxomicin PO 200 mg BID	**10 days**
	Second or more recurrence	**Fecal microbiota transplant (FMT)[GI]**	
		Vancomycin Taper + Pulse Vancomycin PO 125 mg QID for 10 days then Vancomycin PO 125 mg BID for 7 days then Vancomycin PO 125 mg QOD for 6 weeks	**8+ weeks**
Avoid: antimotility medications (loperamide, diphenoxylate), proton pump inhibitors (PPIs) No data for probiotic use			

Urinary Tract Infection (UTI)[23,24,25]

- For catheter-associated UTIs (CAUTI), remove (preferred) or replace catheter before treatment
- Consider signs/symptoms, the presence of urinary catheter, and quality of specimen collection before initiation of treatment
- Avoid the use of fluoroquinolones for lower tract infection per FDA warning
- Collection of cultures in the absence of signs/symptoms should be avoided

Type/Location	Empiric Antibiotic Regimen	Duration	
	Determine best drug choice <u>based</u> on allergies and history of UTI / MDROs	**Uncomplicated** cystitis in a female without urologic abnormality or catheter	**Complicated** UTI in male or if urologic abnormality, pregnancy, or catheter
Asymptomatic Bacteriuria UA positive ± urine culture > 50-100,000 <u>AND</u> **NO signs and symptoms**	**DO NOT TREAT** **EXCEPTIONS:** 1. Pregnant 2. Undergoing urologic procedure with expected mucosal bleeding		
Lower Tract Infection UA positive ± urine culture > 50-100,000 <u>AND</u> **LOCAL signs and symptoms**	Cephalexin PO 500 mg BID	**3-5 days**	**5-7 days**
	Nitrofurantoin PO 100 mg BID	**5 days**	
	TMP/SMX PO 160/800 mg BID	**3 days**	**5 days**
	<u>Prostatitis</u> Ciprofloxacin IV 400 mg Q12H		**7 days**
Upper Tract Infection **LOCAL AND SYSTEMIC signs and symptoms**	<u>No history of *Pseudomonas*</u> Ceftriaxone IV 1g Q24H	**Minimum of 7 days**	
	<u>History of *Pseudomonas*</u> Cefepime IV 1g Q12H		
	<u>Life-threatening reaction to beta-lactam</u> Gentamicin IV[RX]		
Septic Shock secondary to UTI	Meropenem IV 2g Q8H (3-hr infusion)	**7 days**	

<table>
<tr><th colspan="3">Febrile Neutropenia[26,27,28]</th></tr>
<tr><td colspan="3">Fever: single oral temp ≥ 38.3ºC or temp ≥ 38ºC sustained for 1 hour

Neutropenia: ANC < 500 cells/mm^3 or ANC predicted to decrease to < 500 cells/mm^3 in 48 hours</td></tr>
<tr><td>Risk Level</td><td>Empiric Therapy</td><td>Duration</td></tr>
<tr><td rowspan="3">LOW

If anticipate short neutropenic period of ≤ 7 days
+
no/few co-morbid conditions (hypotension, pneumonia, new-onset abdominal pain, or neurologic changes)</td><td>Ciprofloxacin PO 500-750 mg BID</td><td rowspan="7"><u>Fever of Unknown Origin (FUO)</u>

Stop antibiotic once afebrile x 24 hours
AND
ANC ≥ 500 cells/mm^3

<u>Identified infection</u>

Treat until ANC ≥ 500 cells/mm^3
AND for recommended duration</td></tr>
<tr><td>PLUS</td></tr>
<tr><td>Amoxicillin/clavulanate PO 875 mg BID
OR
Clindamycin PO 300-450 mg Q6H</td></tr>
<tr><td rowspan="6">HIGH

If anticipate prolonged neutropenic period > 7 days</td><td>Cefepime IV 2g Q8H
OR
Piperacillin/tazobactam IV 3.375g Q8H
(4-hr infusion)</td></tr>
<tr><td>Consider adding vancomycin IV <u>ONLY IF</u> suspected vascular catheter-related infections, SSTI, pneumonia or hemodynamic instability. Vancomycin should be discontinued if target Gram-positive organism is not recovered in culture</td></tr>
<tr><td>Life-threatening reaction to beta-lactam</td></tr>
<tr><td>Aztreonam IV 2g Q8H
+
Vancomycin IV^{RX}</td></tr>
<tr><td>IF PERSISTENT FEVER after 4-7 DAYS</td></tr>
<tr><td>Consider antifungal therapy

ID Consult is recommended</td></tr>
</table>

CNS Infections			
For **BACTERIAL** meningitis, administer **dexamethasone IV 0.15 mg/kg Q6H (10 mg max)** 10-20 min before (or concomitantly with) the first dose of antibiotics, **up to 4 days max.** **Dexamethasone may be stopped if no strep. pneumoniae identified.**			
Type/Severity		Empiric Antibiotic Regimen	Duration
Meningitis	**Community-acquired** (Age 18-50 years)	Ceftriaxone IV 2g Q12H + Vancomycin IV[RX]	**N. meningitides / H. influenza: 7 days** **S. pneumoniae, GNR or L. monocytogenes: 10-14 days** **Staph aureus: minimum of 21 days** **Note:** CSF should be negative for at least 10 days before VP shunt placement
	Community-acquired Age >50 years or with immunosuppression or alcoholism	Ceftriaxone IV 2g Q12H + Vancomycin IV[RX] + Ampicillin IV 2g Q4H	
	Post-neurosurgery, penetrating trauma or CSF shunt	Cefepime IV 2g Q8H + Vancomycin IV[RX]	
Encephalitis	**HSV Encephalitis**	*Empirical therapy for HSV encephalitis may be started if neurologic symptoms (altered MS, hallucination, seizures, etc.) +/- edema / hemorrhage is noted in brain MRI or CT* Acyclovir IV 10 mg/kg Q8H **(Use IBW only. If actual body weight is less than IBW, use actual body weight)**	**14- 21 days** **ID Consult is recommended**

Sepsis/Septic Shock of Unknown Source

SEPSIS: A life-threatening organ dysfunction caused by a dysregulated **host response to an infection**[30]

- qSOFA (>=2 of below) may be used for bedside assessment for sepsis
  - Respiratory rate ≥ 22 breaths/min
  - altered mentation (Galsgow Coma Scale score <15)
  - systolic blood pressure ≤ 100 mmHg

SEPTIC SHOCK: Subset of sepsis with circulatory and cellular/metabolic abnormalities profound enough to substantially increase mortality[18]. In addition to sepsis, these patients have:

- Persisting hypotension requiring vasopressors to maintain MAP ≥ 65 mmHg AND
- Serum lactate level > 2 mmol/L despite adequate volume resuscitation

Type/Severity	Empiric Antibiotic Regimen	Duration
Sepsis	Initiate appropriate antibiotics based on the suspected primary site of infection	**Empiric: 3 days** **Step-down based on culture result**
Septic shock	**May consider 2 active agents against GNR (or MDRO based on patient's history)**	
	Cefepime IV 2g Q8H **OR** Piperacillin/tazobactam IV 3.375g Q8H (4-hr infusion) **OR** Meropenem IV 2g Q8H (3 hour infusion) (primarily for septic shock due to urosepsis or history of ESBL)	
	WITH OR WITHOUT	
	Aminoglycoside[RX]** **OR** Ciprofloxacin 400mg IV q8h	
	IF MRSA COVERAGE IS WARRANTED	
	Vancomycin IV[RX]	

****Aminoglycoside should be used with caution; recommend consulting with ID before initiation**

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