

Gram Negative Bacilli

2022 Isolates

Values expressed are % susceptible R = intrinsic resistance "-" = data not available"

	No. of Isolates (a)	Penicillins		Cephalosporins and Lactams					Carbapenems		Aminoglyc's			Others		Urines Only	
		Ampicillin (\$)	Piper/Tazobactam (\$\$)	Cefuroxime (IV) (\$)	Ceftriaxone (\$)	Ceftazidime (\$)	Cefepime (b) (\$)	Aztreonam (\$\$\$)	Ertapenem (\$\$\$)	Meropenem (\$\$)	Amikacin (\$\$\$)	Gentamicin (\$\$\$)	Tobramycin (\$\$\$)	Ciprofloxacin (\$)	Co-trimoxazole (\$\$)	Cefazolin (\$) Predicts 1st gen cephem	Nitrofurantoin (\$\$\$)
Achromobacter xylosoxidans	15(c,d)	R	93	R	R	73	7	7	R	87	13	13	7	20	73	R	-
Acinetobacter baumannii complex	23(c,d)	R	A/S 100	R	R	100	100	R	R	100	96	96	96	96	91	R	-
Citrobacter freundii complex	19(c)	R	90	R	84	84	100/0	-	100	95	100	100	95	90	84	R	94
Enterobacter cloacae complex	42	R	69	R	62	69	82/18	85	86	100	100	100	100	98	95	R	74
Escherichia coli	517	47	97	84	87	93	90/3	92	100	100	100	89	87	79	68	83	97
Klebsiella aerogenes (Enterobacter aerogenes)	31	R	68	R	55	58	88/12	62	87	94	100	97	97	97	97	R	33
Klebsiella oxytoca	41	R	95	100	90	98	100/0	93	100	100	100	98	98	98	95	63	96
Klebsiella pneumoniae	87	R	95	88	90	93	94/0	100	99	99	99	93	93	87	83	87	23
Morganella morganii	14(c,d)	R	93	R	79	79	-	-	100	100	100	100	100	93	100	R	R
Proteus mirabilis	53	89	100	83	100	100	100/0	-	100	100	100	100	100	98	87	96	R
Pseudomonas aeruginosa	155	R	99	C/T 100	99	97	87		R	92	98	90	98	87	R	R	R
Pseudomonas aeruginosa (CF-mucoid) (e)	18(c)	R	94	C/T 89	94	94	78		Imp 78	89	89	-	94	94	R	R	R
Pseudomonas aeruginosa (CF-non-mucoid) (e)	43	R	98	C/T 100	95	98	86		Imp 86	86	95	-	95	81	R	R	R
Salmonella spp.	17(c)	94	-	R	94	-	-	-	-	-	R	R	R	82	88	R	-
Serratia marcescens	32	R	100	R	94	100	100/0	100	100	100	97	97	94	94	100	R	R
Stenotrophomonas maltophilia	46	R	R	R	R	-	-	R	R	R	R	R	Levo 91	100	R	-	-

- (a) First isolate from each patient was included.
- (b) Shows susceptible / susceptible dose dependent. Not routinely tested on urine and blood Enterobacteriales isolates.
- (c) Data from isolate totals <30 may be statistically unreliable.
- (d) Includes isolates from 2021.
- (e) Cystic fibrosis patient isolates tested by disk diffusion.

A/S= Ampicillin/ Sulbactam; C/T= Ceftolozane/ Tazobactam; Imp= Imipenem; Levo= Levofloxacin



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# Antimicrobial Stewardship Program

2023

## Antimicrobial Susceptibility and Dosing Information

### Take an Antibiotic Time Out!

Discuss **BUG, DRUG, and DURATION** 48—72 hours after starting an antibiotic

- What are the culture results?
- Can the antibiotic be stopped or narrowed?
- What is the planned duration for diagnosis?

Gram Positive Cocci

Values expressed are % susceptible R = intrinsic resistance "-" = data not available"

	Number of Isolates (a)	Beta-Lactams						Others										
		Oxacillin/Nafcillin (\$\$)		Penicillin or Ampicillin (\$)		1st Generation cephem (\$)	Cefuroxime (\$)	Ceftriaxone (\$)	Meropenem (\$\$\$)	Levofloxacin (\$\$)	Ciprofloxacin - urine (\$)	Clindamycin (b) (\$)	Erythromycin (\$\$\$\$)	Nitrofurantoin - urine (\$\$\$)	Co-trimoxazole (\$)	Vancomycin (\$\$\$)	Tetracycline (\$\$)	Linezolid (\$\$\$\$)
		%S	%R	%S	%R													
Staphylococcus aureus	490	84	(c)	-	-	84	-	-	-	-	77	65	-	100	100	-	-	-
MRSA only	76	0	0	-	-	0	-	-	-	-	61	28	-	100	100	96	100	-
Staphylococcus lugdunensis	6(d,e)	83	(c)	-	-	83	-	-	-	-	50	50	-	100	100	-	-	-
Staphylococcus sp., Coagulase-negative	36	39	(c)	-	-	39	-	-	-	-	47	22	-	69	100	-	-	-
Enterococcus faecium	22(d)	-	41	-	59	R	R	R	-	23	R	-	54	R	86	-	91	-
Enterococcus faecalis	22(d)	-	96	-	4	R	R	R	-	-	R	-	-	R	100	-	-	-
Streptococcus group B	65	-	100	0	0	-	-	-	-	-	50	-	-	-	-	-	-	-
Viridans group Streptococci	37	-	73	16	11	-	-	92	-	87	-	92	64	-	-	100	-	-
Streptococcus pneumoniae	24(d)	-	62(f)	-	38	-	77	92(g)	77	-	85	71	-	83	100	Doxycycline 80	-	-

**Drug cost:** Please choose the appropriate antibiotic based on best spectrum of coverage and lowest cost. Costs are reflective of 1 day of therapy based on adult dosing and include drug levels and reformulations.

\$ = \$0-20  
 \$\$ = \$20-50  
 \$\$\$ = \$50-100  
 \$\$\$\$ = >\$100

Candida

Percent Susceptible By Broth Microdilution (YeastOne, Trek Diagnostics)	No. Tested	Amphotericin B (a) (\$\$\$\$)	Fluconazole (b) (\$)	Voriconazole (\$\$\$\$)	Caspofungin (c) (\$\$\$)
Candida albicans	18(d,e)	100	94/0	94	94
Candida glabrata	9(d,e)	100	0/89	-	89
Candida parapsilosis	8(d,e)	100	100/0	100	100
Other Candida species	5(d,e)	100	(f)	60	80

Haemophilus influenzae

For infections with beta-lactamase producing H. influenzae: cefuroxime, ceftriaxone, trimethoprim/sulfamethoxazole, amoxicillin/clavulanate, or azithromycin is recommended.  
 Ceftriaxone is drug of choice for CNS infections.  
 At LPCH, 79% (23/29) of H. influenzae are ampicillin susceptible.

- (a) Suggested Ampho Resistant breakpoint MIC > or = 2 mcg/ml. (b) Shows susceptible / susceptible dose dependent.
- (c) Consult Peds ID if Caspofungin being considered for treatment. (d) Data from isolate totals <30 may be statistically unreliable.
- (e) Includes isolates from 2021. (f) Species other than C. krusei are 100% susceptible; C. krusei is intrinsically resistant to fluconazole.

### Questions?

Focused questions about antimicrobial choice, dose, route, and duration

Antimicrobial Stewardship Program (ASP)

Voalte 650-724-8835 (M-F, 8-4) or E-mail (below)

For cases requiring in-depth review and physician consultation

Pediatric Infectious Disease Consult Service

Page Peds ID On Call

E-mail: [pediatricasp@stanford.edu](mailto:pediatricasp@stanford.edu)

Antibiogram and dosing compiled by the Antimicrobial Stewardship Program, P&T Committee, Stanford Health Care Clinical Microbiology Laboratory, and Department of Pharmacy. Released 3/2023.

## LPCHS Formulary Antimicrobials

### GENERAL INFORMATION

- The doses provided are general recommendations and do **NOT** include **neonatal dosing, cystic fibrosis dosing, or renal dose adjustment**.
- Please refer to the **Housestaff Manual** or **Neofax** for additional recommendations and **indication-specific dosing**.
- Maximum individual doses in parentheses.
- Renal dose adjustment** parameters indicated by **superscript**:  
<sup>1</sup> Adjustment needed if CrCl < 70 mL/min  
<sup>2</sup> Adjustment needed if CrCl < 50 mL/min  
<sup>3</sup> Adjustment needed if CrCl < 30 mL/min
- All inpatient restricted antimicrobial use, including continuation of home medications, requires Pediatric Infectious Disease (ID) approval. Contact the Pediatric ID fellow on-call for approval.
- For assistance, consult ASP or ID.

### ABBREVIATIONS

(ID) = Requires ID approval for use (please note process in HSM for details and exclusions):  
 Amphotericin B products    Ceftazidime-avibactam  
 Cidofovir    Foscarnet    Isavuconazonium    Letemovir  
 Linezolid    Posaconazole    Remdesivir  
 All non-formulary antimicrobials, e.g., daptomycin  
 (PI) = Prolonged infusion (i.e., extended infusion, continuous infusion) may be considered; use Epic order panel  
 (Px) = Prophylaxis; (Tx) = Treatment  
 (TDM) = Therapeutic drug monitoring recommended  
 (TMP/SMX) = Trimethoprim/sulfamethoxazole

### THERAPEUTIC DRUG MONITORING

DRUG	DOSING INTERVAL	TROUGH (mcg/mL)	PEAK* (mcg/mL)
Amikacin	Q8h	< 8	20—30
	Q24h		Indication specific
Gentamicin or Tobramycin	Q8h	< 1	3—10
	Q24h		15—35
Isavuconazonium (ID)	Q24h	1—7	N/A
Posaconazole (ID)	Variable	Px >0.7 Tx >1 (salvage >1.25)	N/A
Vancomycin	Per Pharmacy	AUC 400—600	N/A
Voriconazole	Q12h	1—5.5	N/A

\*30 min post end of 30 min infusion or 60 min post end of 60 min infusion

PARENTERAL (IV) ANTIBIOTICS	
DRUG	DOSAGE
Amikacin <sup>2</sup> (TDM)	7.5 mg/kg/dose q8h (500mg) 15—20 mg/kg/dose q24h (1.5g)
Ampicillin <sup>3</sup>	50—100 mg/kg/dose q6h (2g)
Ampicillin-sulbactam <sup>3</sup>	50 mg/kg/dose q6h (2g) (dose based on ampicillin)
Aztreonam <sup>3</sup>	30 mg/kg/dose q6h (2g)
Cefazolin <sup>3</sup>	16.5—50 mg/kg/dose q8h (2g)
Cefepime <sup>2</sup> (PI)	50 mg/kg/dose q8h (2g)
Cefoxitin	40 mg/kg/dose q6-8h (2g)
Ceftazidime <sup>2</sup> (PI)	50 mg/kg/dose q8h (2g)
Ceftazidime-avibactam <sup>2</sup> (ID)	≥ 3 months: 50 mg/kg/dose q8h (2g)
Ceftriaxone	50—75 mg/kg/dose q24h (2g) Meningitis: 50 mg/kg/dose q12h (2g)
Ciprofloxacin <sup>3</sup>	15 mg/kg/dose q12h (400mg)
Clindamycin	7—13 mg/kg/dose q8h (900mg)
Doxycycline	2 mg/kg/dose q12h (100mg)
Gentamicin <sup>2</sup> (TDM)	2—2.5 mg/kg/dose q8h 5—7.5 mg/kg/dose q24h Synergy: 1 mg/kg/dose q8h or 3 mg/kg/dose q24h
Levofloxacin <sup>2</sup>	<5yr: 8—10 mg/kg/dose q12h ≥5yr: 10 mg/kg/dose q24h (750mg)
Linezolid (ID)	<12yr: 10 mg/kg/dose q8h (600mg) ≥12 yr: 10 mg/kg/dose q12h (600mg)
Meropenem <sup>2</sup> (PI)	20 mg/kg/dose q8h (1g) Meningitis/CF: 40 mg/kg/dose q8h (2g)
Metronidazole <sup>3</sup>	10 mg/kg/dose q8h (500mg) Appendicitis: 30 mg/kg/dose q24h (1g, unless >80kg, then 1.5g)
Nafcillin <sup>3</sup> (PI)	33-50 mg/kg/dose q4-6h (2g)
Penicillin G <sup>3</sup>	25,000—100,000 units/kg/dose q4-6h (4million units)
Piperacillin-tazobactam <sup>2</sup> (PI)	<i>See age-specific HSM recommendations</i> 80—130 mg/kg/dose q6-8h (4g)
Tobramycin <sup>2</sup>	1—2.5 mg/kg/dose q8h 5—7.5 mg/kg/dose q24h

TMP-SMX <sup>3</sup> (dose based on trimethoprim)	Treatment: 3-6 mg/kg/dose q12h (160mg) <i>Stenotrophomonas/PJP</i> : 5 mg/kg/dose q8h (320mg)
Vancomycin <sup>3</sup> (TDM)	15—20 mg/kg/dose q6-8h (per Pharmacy)
ENTERAL (PO) ANTIBIOTICS	
Amoxicillin <sup>3</sup>	12.5—30 mg/kg/dose TID (1g) <i>S. pneumoniae</i> : 40—45 mg/kg/dose BID (2g)
Amoxicillin-clavulanate <sup>3</sup> [dose based on amoxicillin; note ratio of amoxicillin to clavulanate (e.g., 7:1)]	<i>See age-specific HSM recommendations</i> General dosing (7:1): 22.5 mg/kg/dose BID (875 mg) <i>S. pneumoniae</i> coverage (14:1 or 16:1): 40—45 mg/kg/dose BID (2g) Urinary tract infection (4:1): 13 mg/kg/dose TID (500 mg)
Azithromycin	10 mg/kg on day 1 (500mg), then 5 mg/kg (250mg) q24h on days 2-5
Cefdinir <sup>3</sup>	7 mg/kg/dose BID or 14 mg/kg/dose daily (600mg)
Cephalexin <sup>3</sup>	12.5—50 mg/kg/dose TID-QID (1g)
Ciprofloxacin <sup>3</sup>	10—20 mg/kg/dose BID (750mg)
Clindamycin <sup>3</sup>	7—10 mg/kg/dose TID (600mg)
Doxycycline	2 mg/kg/dose q12h (100mg)
Levofloxacin <sup>2</sup>	<5yr: 8—10 mg/kg/dose q12h ≥5yr: 10 mg/kg/dose q24h (750mg)
Linezolid (ID)	<12yr: 10 mg/kg/dose q8h (600mg) ≥12yr: 10 mg/kg/dose q12h (600mg)
Metronidazole	10 mg/kg/dose q8h (500mg)
Nitrofurantoin <sup>1</sup> (MacroBID®) Oral capsule	Treatment: 3.5 mg/kg/dose (50-mg increments) BID (100mg) Prophylaxis: 1—2 mg/kg/dose daily—BID (100mg)
Nitrofurantoin <sup>1</sup> (MacroDantin®) Oral suspension	Treatment: 1.25—2.5 mg/kg/dose QID (100mg) Prophylaxis: 1—2 mg/kg/dose daily—BID (100mg)
Penicillin <sup>3</sup>	12.5 mg/kg/dose QID (500mg)
Rifampin	5-10 mg/kg/dose daily-TID (600mg)
TMP-SMX <sup>3</sup> (dose based on trimethoprim)	Tx: 3-6 mg/kg/dose q12h (320mg) Px: 2-5mg/kg/dose daily (160mg)
Vancomycin	10 mg/kg/dose PO QID (125 mg; unless severe <i>C. difficile</i> , 500 mg)

### ANTIFUNGALS

Liposomal amphotericin (ID)	IV: 3—5 mg/kg/dose q24h
Caspofungin	Tx/Px: IV: Load 70 mg/m <sup>2</sup> once (70mg), then 50 mg/m <sup>2</sup> daily (50mg)
Fluconazole <sup>2</sup>	IV/PO: Loading dose 6—12 mg/kg/dose once, followed by 3—12 mg/kg/dose daily (800mg)
Isavuconazonium (ID) (TDM)	IV/PO: 10 mg/kg q8h x 6 doses, then 10 mg/kg daily (372 mg)
Posaconazole (ID) (TDM)	<i>See age-specific HSM recommendation</i> Tx/Px (tablet): 5-7 mg/kg/dose BID x 1 day, then 5-7 mg/kg/dose (50-mg increments) once daily (300 mg)
Voriconazole (TDM)	<i>See age-specific HSM recommendation</i> Tx/Px: IV/PO: 6—9 mg/kg/dose q12h x 2 doses, then by 3—9 mg/kg/dose q12h

### ANTIVIRALS

Acyclovir <sup>2</sup>	>70kg: <i>Use ideal body weight</i> Tx: IV: 10—15 mg/kg/dose q8h (800mg); PO: 15—20 mg/kg/dose 3-5x/day (800mg); hydration required Px: IV: 5 mg/kg/dose or 250 mg/m <sup>2</sup> q8h (300mg); PO: 10—15 mg/kg/dose TID (300mg)
Cidofovir (ID) <sup>2</sup>	1 mg/kg/dose IV 3 x/week or 5 mg/kg/dose once weekly (hydration required; +/- probenecid)
Foscarnet <sup>1</sup> (ID)	<i>Induction</i> Tx: 60—90 mg/kg/dose IV q12h
Ganciclovir <sup>1</sup>	<i>Induction</i> Tx: 5 mg/kg/dose IV q12h Px: 5 mg/kg/dose IV q24h
Letemovir (ID)	≥ 30 kg or ≥ 12 years old: 480 mg daily
Oseltamivir <sup>3</sup>	Tx: 3—3.5 mg/kg/dose PO BID (75mg) Px: 3 mg/kg/dose daily (75mg)
Remdesivir <sup>3</sup> (ID)	5 mg/kg IV (200 mg) x 1, then 2.5 mg/kg (100 mg) IV q24h
Valacyclovir <sup>2</sup>	Tx: 20 mg/kg/dose PO BID (1g) Px: 250—500 mg PO BID
Valganciclovir <sup>1</sup>	Tx: 12—20 mg/kg/dose PO q12h (900mg) Px: 10—15 mg/kg/dose PO daily (900mg)