

Anti-infective Agents on Formulary

IV PENICILLINS		Cost/day
Penicillin G	2 million unit q4h	\$66.50
Ampicillin	1 gm q6h	\$19.40
Nafcillin	2 gm q4h	\$45.00
Unasyn	1.5 gm q6h	\$5.90
	3 gm q6h	\$14.40
Zosyn	2.25 gm q8h	\$41.25
	3.375 gm q8h	\$54.45
	4.5 gm q8h	\$67.65
IV CEPHALOSPORINS		
Cefazolin	1 gm q8h	\$10.50
	2 gm q8h	\$19.00
Cefuroxime	1.5 gm q8h	\$10.00
Cefoxitin	1 gm q8h	\$7.70
	2 gm q8h	\$16.20
Ceftriaxone	1 gm q24h	\$1.40
	2 gm q12h	\$4.40
Ceftazidime	1 gm q8h	\$9.10
	2 gm q8h	\$16.70
Cefepime	1 gm q8h	\$8.70
	2 gm q8h	\$21.40
Ceftaroline	600 mg q12h	\$350.00
CARBAPENEMS		
Meropenem	1 gm q8h	\$29.90
Ertapenem	1 gm q24h	\$74.40
IV QUINOLONONES		
Levofloxacin	250 mg q24h	\$7.00
	500 mg q24h	\$2.50
	750 mg q24h	\$3.10
Ciprofloxacin	200 mg q12h	\$4.20
	400 mg q12h	\$4.25
IV ANTIFUNGALS		
Amphotericin-B	50 mg q24h	\$32.10
Ambisome	300 mg q24h	\$461.10
Fluconazole	200 mg q24h	\$2.60
	400 mg q24h	\$3.60
Micafungin	100 mg q24h	\$173.90
Voriconazole	400 mg q12h	\$111.60
IV MISCELLANEOUS ANTIMICROBIALS		
Acyclovir	400 mg q8h	\$9.05
Azithromycin	500 mg q24h	\$2.30
Aztreonam	1 gm q8h	\$75.50
Clindamycin	600 mg q8h	\$12.40
Daptomycin	6 mg/kg q24h	\$130.20
Doxycycline	100 mg q12h	\$34.45
Erythromycin	500 mg q6h	\$263.60
Linezolid	600 mg q12h	\$40.90
Metronidazole	500 mg q8h	\$2.90
SMX/TMP	5 mg/kg q6h	\$67.40
Tigecycline	50 mg q12h	\$145.10
Vancomycin	1 gm q12h	\$20.60

ORAL PENICILLINS		Cost/day
Penicillin VK	500 mg QID	\$0.92
Ampicillin	500 mg QID	\$1.40
Amoxicillin	500 mg TID	\$0.30
Dicloxacillin	500 mg QID	\$3.70
Augmentin	500 mg TID	\$0.92
	875 mg BID	\$1.60
ORAL CEPHALOSPORINS		
Cephalexin	500 mg QID	\$1.65
Cefuroxime	250 mg BID	\$2.30
	500 mg BID	\$4.60
Cefaclor	250 mg TID	\$3.40
	500 mg TID	\$3.80
ORAL QUINOLONONES		
Levofloxacin	250 mg daily	\$0.15
	500 mg daily	\$0.50
	750 mg daily	\$0.35
Ciprofloxacin	250 mg BID	\$0.40
	500 mg BID	\$0.30
ORAL ANTIFUNGALS		
Fluconazole	100 mg daily	\$1.50
	200 mg daily	\$1.60
Itraconazole	200 mg BID	\$17.30
Ketoconazole	200 mg daily	\$0.50
Voriconazole	200 mg BID	\$33.75
ORAL MISC. ANTIMICROBIALS		
Acyclovir	200 mg 5x/d	\$0.65
Azithromycin	250 mg daily	\$1.35
Clindamycin	300 mg QID	\$1.70
Doxycycline	100 mg BID	\$2.40
Linezolid	600 mg BID	\$6.90
Rifaximin	200 mg TID	\$57.80
	550 mg BID	\$73.40
Vancomycin	125 mg QID	\$19.70
Fidaxomicin	200 mg BID	\$359.60
Metronidazole	500 mg q8h	\$2.30
SMZ/TMP	DS BID	\$0.25
Nitrofurantoin	100 mg BID	\$4.75
Erythromycin	500 mg QID	\$60.40
Clarithromycin	500 mg BID (for H. pylori)	\$0.90
IV AMINOGLYCOSIDES		
Gentamicin	350 mg 24h	\$16.80
Tobramycin	350 mg 24h	\$13.70

*cost is based on 70 kg person

Pre-Op Antimicrobial Prophylaxis Recommendations

Surgery Type	First Choice	Alternative
Cardiac, Noncardiac Thoracic, Vascular	Cefazolin* + Vancomycin 15mg/kg (if known MRSA colonization)	Vancomycin 15mg/kg
Neurosurgical	Cefazolin* + Vancomycin 15mg/kg (if known MRSA colonization)	Vancomycin 15mg/kg
Orthopedic	Cefazolin* + Vancomycin 15mg/kg (if known MRSA colonization)	Vancomycin 15mg/kg
Head and Neck	Cefazolin + Metronidazole	Clindamycin
Gastrointestinal, Esophageal, Hernia repair, PEG placement	Cefazolin* + Vancomycin 15mg/kg (if known MRSA colonization)	Vancomycin 15mg/kg + Gentamicin
Colon and Abdominal	Cefazolin* + Metronidazole OR Ertapenem	Levofloxacin + Metronidazole
Gynecological	Cefazolin*	Clindamycin + Gentamicin
Urological	Cefazolin* Cefazolin + Metronidazole Cefazolin + Gentamicin	Levofloxacin OR Vancomycin 15mg/kg +/- Gentamicin

*Recommended dose is 2 grams in adult patients (3 grams ≥ 120 kg)

Ertapenem (Invanz): USAGE RESTRICTED

1. Peri-operative one time dose
2. Diabetic foot infections
3. Orders by infectious disease physicians
4. Pediatric patients
5. Systemic infections secondary to ESBL producing organisms
6. Single dose administration to facilitate discharge to home or ECF

Meropenem (Merrem): USAGE RESTRICTED

1. Multidrug-resistant (MDR) organisms that remain susceptible to carbapenems
2. Pediatric/NICU patients
3. Meningitis caused by Pseudomonas aeruginosa
4. Empiric treatment in patients with suspected resistant gram negative infection and recent documented history of MDR organism
5. Failure of broad spectrum gram negative antibiotic therapy after 48 hours

Daptomycin (Cubicin): USAGE RESTRICTED

1. Skin and skin structure infections
 - Vancomycin (MRSA) and nafcillin (MSSA) are considered first line therapy
2. S. aureus bacteremia, including right-side endocarditis
3. VRE bacteremia or methicillin resistant coagulase negative staph bacteremia not clearing with vancomycin and removal of infected lines
4. CANNOT be used to treat pneumonia

Linezolid (Zyvox): USAGE RESTRICTED

1. MRSA pneumonia in patients not responding to or are intolerant of vancomycin
2. Serious documented VRE infections such as bacteremia, pyelonephritis, pneumonia, wound infection or other skin and soft tissue infection (for uncomplicated UTI or cystitis with VRE, consider the use of nitrofurantoin or tetracycline)
3. Use oral route when possible – 100% bioavailable

Ceftaroline (Teflaro): USAGE RESTRICTED

1. Gram positive infections resistant to beta-lactams and vancomycin allergy
2. Failed vancomycin therapy defined as: clinical decompensation or failure after 7 days of vancomycin despite adequate source control

Fluoroquinolone: USAGE RESTRICTED

1. Use in patients with documented beta-lactam allergy
2. Restricted to infectious disease physicians and intensivists
3. If criteria not met, pharmacists will interchange to alternative based on indication



Antimicrobial Guideline

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Approved by the Infection Control and Antibiotic Stewardship Committees

2019 Recommended Empiric Antibiotic Therapy of Selected Infections in Adults Requiring Hospitalization

Infection	1st Line	Alternative / Allergy
Community Acquired Pneumonia	Ceftriaxone + Azithromycin	Levofloxacin
Aspiration Pneumonia	Ceftriaxone ± Metronidazole	Levofloxacin + Clindamycin
Hospital Acquired Pneumonia	Cefepime ± Vancomycin	Zosyn ± Vancomycin
Suspected Pseudomonas Infection	Cefepime ± Tobramycin	Ciprofloxacin ± Tobramycin
UTI, Uncomplicated	TMP/SMX	Levofloxacin OR Nitrofurantoin
UTI, Complicated	Ceftriaxone ± Gentamicin	Levofloxacin
Sepsis of Unknown Etiology	Ceftriaxone ± Vancomycin	Zosyn ± Vancomycin
Intra-Abdominal Sepsis	Ceftriaxone + Metronidazole	Levofloxacin + Metronidazole
Bacterial Meningitis	Ceftriaxone + Vancomycin ± Ampicillin	Vancomycin + Aztreonam
Pelvic Inflammatory Disease	Cefoxitin + Doxycycline	Clindamycin + Gentamicin
Cellulitis, Uncomplicated	Cefazolin OR Nafcillin	Vancomycin OR Clindamycin
Cellulitis, Complicated OR Diabetic Foot Ulcer	Unasyn ± Vancomycin	Levofloxacin OR Ertapenem ± Vancomycin
Febrile Neutropenia (ANC less than 500)	Cefepime OR Zosyn OR	Aztreonam + Metronidazole + Vancomycin

Implementation of an antimicrobial stewardship program will help ensure that hospitalized patients receive the right antibiotic, at the right dose, at the right time, and for the right duration. As a result, there is reduced mortality, reduced risks of Clostridium difficile-associated diarrhea, shorter hospital stays, reduced overall antimicrobial resistance within the facility, and cost savings


St. Joseph's Medical Center - Stockton

Antibiogram 01/01/2018- 12/31/2018

Percent (%) susceptible	# Tested (n)	Penicillins							Cephalosporins					Carbapenems			Aminoglycosides			Fluoroquinolones		Other												
		Ampicillin	Amoxicillin	Oxacillin	Penicillin	Piperacillin/Tazo	Piperacillin	Ticarcillin	Ticar/Clav Acid	Amp/Subactam	Cefazolin	Cefepime	Cefotaxime	Ceftazidime	Ceftriaxone	Ertapenem	Imipenem	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Chloramphenico	Clindamycin	Erythromycin	Linezolid	Rifampin	Trimeth/Sulfa	Daptomycin	Tetracycline	Tigecycline	Vancomycin	Nitrofurantoin*
Gram negative rods:																																		
<i>Acinetobacter baumannii</i>	57	0			37			52	47		19	0	12	0		35	34	79	58	56	18	19								26	42			
<i>Citrobacter freundii</i>	68	0			88			0	0	97		87	87	100	99		100	93	91	93	94							100					99	
<i>Citrobacter koseri</i>	39	0			97			0	97	97		97	97	100	97		100	100	100	100	100	100						100					85	
<i>Klebsiella aerogenes</i> (former <i>Enterobacter aerogenes</i>)	73	0			85			0	0	97		88	89	100	97		100	100	100	100	100	100						100					7	
<i>Enterobacter cloacae</i>	166	0			81			0	0	92		78	80	100	98		98	93	91	91	91	91						88					26	
<i>Escherichia coli</i>	3120	45			95			54	76	84		82	82	100	100		99	87	86	71	71							72					95	
<i>Klebsiella oxytoca</i>	92	0			98			71	60	92		92	92	100	100		100	96	96	96	96							88					74	
<i>Klebsiella pneumoniae</i>	784	0			92			78	88	91		90	90	100	99		98	94	92	91	92							87					27	
<i>Morganella morganii</i>	57	0			95			12	0	95		77	93	100	86		100	86	100	63	68						56						0	
<i>Proteus mirabilis</i>	449	68			99			78	80	89		89	87	100			100	85	88	65	71						69						0	
<i>Providencia stuartii</i>	57	0			100			19	0	100		93	95		98		96	0	0	32	25												0	
<i>Pseudomonas aeruginosa</i>	475				54	71				85		85			78	87	97	89	97	79	71													
<i>Serratia marcescens</i>	102	0			54			0	0	96		96	93	100			99	99	97	90	92												0	
<i>Stenotrophomonas maltophilia</i>	42							55				32									95						100							
Gram positive cocci:																																		
<i>Enterococcus faecalis</i>	726	100																		*67	*69					100		100		100	92	98		
<i>Enterococcus faecium</i>	129	33																		*27	*26					99					44	27		
<i>Staphylococcus aureus</i>	1106			51														86		50	51		62	39	100	99	96	100	94	100	100	99		
<i>Staphylococcus epidermidis</i>	191			31															76		53	53		52	26	100	97			82		99	100	
<i>Streptococcus pneumoniae</i>	69		98	88						100		100	100		91						100	96				100	84		91		100			

* Urinary Tract isolates only

Non urine

 >= 5% more resistant 2018 than

 >= 5% more sensitive 2018 than 2017

NOTES:

A. Some strains of *Escherichia coli*, *Klebsiella sp.*, and *Proteus mirabilis* can produce Extended Spectrum Beta Lactamases (ESBLs). These strains should be considered resistant to all penicillins, cephalosporins, and monobactams. Treatment with a carbapenem is recommended.

B. Emerging resistance in Gram negative rods due to Carbapenemase and Metallo Beta Lactamase production is increasing world wide. These strains should be considered resistant to all penicillins, cephalosporins, carbapenems, and aztreonam. Resistance may also be demonstrated to the aminoglycosides and fluoroquinolones. Infectious Disease consult is recommended.

C. Per SJMC Infection Control Dept. policy for Multi-Drug Resistant Organisms: In addition to appropriate antibiotic therapy, patients must be placed in CONTACT ISOLATION PRECAUTIONS.

D. 49% of the *Staphylococcus aureus* isolates are MRSA (methicillin resistant) Susceptibility results for both hospital-acquired and community acquired MRSA isolates are combined on this antibiogram. Community acquired isolates tend to be susceptible to a greater number of antibiotics than hospital acquired MRSA strains, but they can be associated with more virulent infections.

E. 3% of the *Streptococcus pneumoniae* isolates were intermediate for penicillin. High doses of IV penicillins or ampicillin can be used to treat pneumococcal pneumonia caused by strains in the intermediate category, however patients with pneumococcal meningitis require therapy with maximum doses of ceftriaxone or cefotaxime.

F. 26% of *Haemophilus influenzae* are β -lactamase positive.

G. When considering high level aminoglycoside synergy for *Enterococcus faecalis* and *Enterococcus faecium*: 35% of *E. faecalis* isolates are resistant to Gentamicin, while 24% are resistant to Streptomycin. 19% of *E. faecium* isolates are resistant to Gentamicin, and 37% are resistant to Streptomycin.