

Anti-infective Agents on Formulary

IV PENICILLINS	Cost/day	ORAL PENICILLINS	Cost/day
Penicillin G	2 million unit q4h	Penicillin VK	500 mg QID \$0.90
Ampicillin	1 gm q6h	Ampicillin	500 mg QID \$0.40
Nafcillin	2 gm q4h	Amoxicillin	500 mg TID \$0.30
Unasyn	1.5 gm q6h	Dicloxacillin	500 mg QID \$3.70
	3 gm q6h	Augmentin	500 mg TID \$3.15
Zosyn	2.25 gm q8h		875 mg BID \$1.70
	3.375 gm q8h		
	4.5 gm q8h		
		ORAL CEPHALOSPORINS	
		Cephalexin	500 mg QID \$0.90
		Cefuroxime	250 mg BID \$2.30
		500 mg BID	\$4.60
		Cefaclor	250 mg TID \$3.40
		500 mg TID	\$4.40
		ORAL QUINOLONES	
		Levofloxacin	250 mg daily \$0.30
		500 mg daily	\$0.30
		750 mg daily	\$0.45
		Ciprofloxacin	250 mg BID \$0.45
		500 mg BID	\$0.60
		CARBAPENEMS	
		Imipenem	250 mg q6h \$22.10
		500 mg q6h	\$39.70
		Ertapenem	1 gm q24h \$101.00
		ORAL ANTIFUNGALS	
		Fluconazole	100 mg daily \$1.50
		200 mg daily	\$2.15
		Itraconazole	200 mg BID \$17.30
		Ketoconazole	200 mg daily \$1.05
		ORAL MISC. ANTIMICROBIALS	
		Acyclovir	200 mg 5x/d \$0.70
		Azithromycin	250 mg daily \$1.40
		Clindamycin	300 mg QID \$1.75
		Doxycycline	100 mg BID \$1.40
		Linezolid	600 mg BID \$7.00
		Rifaximin	200 mg TID \$48.85
		550 mg BID	\$60.20
		Vancomycin	125 mg QID \$23.50
		250 mg QID	\$41.60
		Metronidazole	500 mg q8h \$2.25
		SMZ/TMP	DS BID \$0.30
		Nitrofurantoin	100 mg BID \$7.30
		Erythromycin	500 mg QID \$59.25
		Clarithromycin	500 mg BID \$7.25
		(for H. pylori)	
		IV AMINOGLYCOSIDES	
		Gentamicin	350 mg 24h \$8.40
		Tobramycin	350 mg 24h \$16.30
		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 \$17.90
		Daptomycin	6 mg/kg q24h \$414.55
		Doxycycline	100 mg q12h \$34.45
		Erythromycin	500 mg q6h \$238.35
		Linezolid	600 mg q12h \$71.65
		Metronidazole	500 mg q8h \$5.45
		SMX/TMP	5 mg/kg q6h \$101.50
		Tigecycline	50 mg q12h \$276.70
		Vancomycin	1 gm q12h \$6.20

*cost is based on 70 kg person

References available on Dignity Health Online
http://employee.dignityhealth.org

Antimicrobial Prophylaxis Recommendations

Surgery Type	First Choice	Alternative
Cardiac, Non-cardiac Thoracic, Vascular, Neurosurgery, Orthopedic, Spine	Cefazolin	Vancomycin OR Clindamycin
Head and Neck	Cefazolin + Metronidazole	Gentamicin + Clindamycin
Colon and Abdominal	Cefoxitin OR Unasyn OR Cefazolin + Metronidazole OR Ertapenem	Levofloxacin + Metronidazole OR Clindamycin + Levofloxacin OR Clindamycin + Aztreonam
OB/GYN (hysterectomy)	Cefazolin OR Cefoxitin	Clindamycin + Gentamicin

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.

Imipenem/cilastatin (Primaxin):

1. ESBL producing enterobacteriaceae
2. Complicated severe intra-abdominal infections
3. Complicated urinary tract infections
4. Pulmonary infection in cystic fibrosis patients colonized with P. aeruginosa or Burkholderia cepacia
5. Nosocomial pneumonia, including ventilator-associated pneumonia (VAP)
6. Febrile neutropenia

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 not responding to linezolid, 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 a. Patients not responding to or are intolerant of vancomycin b. Patients with renal failure or on concurrent nephrotoxic agents
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

Ertapenem (Invanz): USAGE RESTRICTED

1. Peri-operative one time dose
2. Diabetic foot infections
3. Orders by infectious disease physicians
4. NOT active against Pseudomonas, Acinetobacter, or Enterococcus

Tigecycline (Tygacil):

1. **BLACK BOX WARNING:** increased mortality compared with other antibiotics; reserve for situations when alternative treatments are not suitable
2. NOT active against Pseudomonas aeruginosa

Antimicrobial Guideline

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2017 Recommended Empiric Antibiotic Therapy of Selected Infections in Adults Requiring Hospitalization

Infection	1st Line	Alternative / Allergy
Community Acquired Pneumonia	Ceftriaxone + Azithromycin	Levofloxacin
Aspiration Pneumonia	Levofloxacin + Clindamycin	Unasyn OR Zosyn
Hospital Acquired Pneumonia	Zosyn + Tobramycin ± Vancomycin	Cefepime + Levofloxacin OR Gentamicin ± Vancomycin
Suspected Pseudomonas Infection	Zosyn + Tobramycin	Cefepime OR Ciprofloxacin + Tobramycin
UTI, Uncomplicated	TMP/SMX	Levofloxacin OR Nitrofurantoin
UTI, Complicated	Ceftriaxone ± Gentamicin	Levofloxacin
Sepsis of Unknown Etiology	Imipenem + Vancomycin	Zosyn + Vancomycin
Intra-Abdominal Sepsis	Ceftriaxone + Metronidazole	Levofloxacin + Metronidazole
Endocarditis	Ceftriaxone ± Vancomycin	Vancomycin ± Gentamicin
Bacterial Meningitis	Ceftriaxone + Vancomycin ± Ampicillin	None
Pelvic Inflammatory Disease	Cefoxitin + Doxycycline	Clindamycin + Gentamicin
Cellulitis, Uncomplicated	Cefazolin OR Nafcillin	Vancomycin OR Clindamycin
Cellulitis, Complicated OR Diabetic Foot Ulcer	Vancomycin + Zosyn	Levofloxacin + Clindamycin OR Ertapenem
Febrile Neutropenia (ANC less than 500)	Cefepime OR Zosyn OR Imipenem	Ciprofloxacin + Vancomycin

St. Joseph's Medical Center - Stockton

Antibiogram 01/01/2016- 12/31/2016

Percent (%) susceptible	# Tested (n)	Penicillins							Cephalosporins					Carbapenems			Aminoglycosides			Fluoroquinolones		Other													
		Ampicillin	Amoxicillin	Oxacillin	Penicillin	Piperacillin/Tazo	Piperacillin	Ticarcillin	Ticar/Clav Acid	Unasyn	Cefazolin	Cefepime	Cefotaxime	Ceftazidime	Ceftriaxone	Ertapenem	Imipenem	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Chloramphenicol	Clindamycin	Erythromycin	Linezolid	Rifampin	Sulfatrimeth	Daptomycin	Tetracycline	Tigecycline	Vancomycin	Nitrofurantoin*	
Gram negative rods:																																			
<i>Acinetobacter baumannii</i>	62					50		82		67	41	55	16		82	83	83	76	77		55	56							75		81				
<i>Citrobacter freundii</i>	91				90				0	98		88	89		100	98		100	92	88	75	76												97	
<i>Enterobacter aerogenes</i>	52	0			79				0	100		83	83		100	100		100	98	98	96	96												19	
<i>Enterobacter cloacae</i>	177	0			81				0	91		80	79		92			99	96	94	89	89												38	
<i>Escherichia coli</i>	3896	44			95			53	77	85		85	85		100	100		100	88	87	69	69												96	
<i>Klebsiella oxytoca</i>	132	0			95			48	49	96		96	96		100	98		100	96	95	95	95												80	
<i>Klebsiella pneumoniae</i>	780	0			92			81	89	92		92	92		100	99		99	95	94	92	94												29	
<i>Morganella morganii</i>	75	7			95			13	5	99		87	95		100			100	79	95	57	64						56					0		
<i>Proteus mirabilis</i>	517	71			100			78	81	91		91	91		100			100	80	85	60	66												0	
<i>Pseudomonas aeruginosa</i>	564				85		71			90		86			77	88		97	92	98	73	66													
<i>Serratia marcescens</i>	85	0							0	99		95	96		100			100	100	85	92	94												0	
<i>Stenotrophomonas maltophilia</i>	54							44				43										81													
Gram positive cocci:																																			
<i>Enterococcus faecalis</i>	929	99			100																*64	*66				100				100	100	93	99		
<i>Enterococcus faecium</i>	170	21																			*15	*15			100				100			38	28		
<i>Staphylococcus aureus</i>	1225			47															89		46	46		58	34	100	99	98	100	97	100	99			
<i>Staphylococcus epidermidis</i>	294			38															82		51	51		58	34	100	96	55		83		97			
<i>Staphylococcus lugdunensis</i>	37			89															97		95	95		69	70		97	100		92		100			
<i>Streptococcus pneumoniae</i>	68		100		84									100									98	95			100		83		83		100		

* Urinary Tract isolates only

Non urine

■ >= 5% more resistant 2016 than 2015

■ >= 5% more sensitive 2016 than 2015

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. 53% 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. 13% 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. 27% of *Haemophilus influenzae* are β -lactamase positive.