

Zuckerberg San Francisco General Hospital and Trauma Center

Clinical Laboratory Microbiology

Community Health Network

ANTIMICROBIAL SUSCEPTIBILITY STUDIES
(excluding Laguna Honda Hospital)

January - December 2017

also available online

<https://idmp.ucsf.edu/antimicrobial-susceptibility-san-francisco-general-hospital>

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URINE ISOLATES

JANUARY - DECEMBER 2017

PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL *

Enteric Urine Isolates	# Tested	AMP	PIPTZ	CZOL	CTAZ	CTRX	CFPM	GENT	TOB	TMSX	CIPR	LEVO	NITRO	ETP
Citrobacter freundii	13	R	100	R	85	77	100	92	92	77	92	92	89	100
Citrobacter koseri	12	R	100	100	100	100	100	100	100	100	100	100	100	100
Enterobacter aerogenes	30	R	93	R	93	93	100	100	100	100	100	100	55	97
Enterobacter cloacae	39	R	82	R	68	71	92	100	95	74	85	85	87	90
Escherichia coli	1495	46	98	87 ^	91	89	90	91	90	65	80	81	99	99
- ESBL	173		94					65	54	34	22	25	94	98
- Non ESBL	1345	51	99	97 ^	99	99	100	94	94	68	87	87	99	100
Klebsiella oxytoca	17	R	94	24	100	94	100	100	100	94	100	100	94	100
Klebsiella pneumoniae	192	R	98	92 ^	95	93	95	96	95	89	94	97	60	100
Morganella morganii	18	R	100	R	72	83	100	78	94	72	78	89	R	100
Proteus mirabilis	173	80	100	95 ^	99	94	97	91	92	83	87	89	R	100

Non-Enteric Urine Isolates	# Tested	PIPTZ	CTAZ	CFPM	GENT	TOB	TMSX	CIPR	LEVO	MERO
Acinetobacter baumannii	5		100	80	80	80	60	80	80	100
Pseudomonas aeruginosa	43	95	98	93	91	98		86	84	86
Stenotrophomonas maltophilia	8		63				100		88	

Gram Positive Urine Isolates	# Tested	AMP	AMCL	NAF	CZOL	CTRX	TMSX	TET	LEVO
Staphylococcus aureus	68	22	62	62	62	62	97	91	62
Staphylococcus, Coagulase Negative	25	12	56	56	56	56	64	72	68
Staphylococcus saprophyticus	Uncomplicated UTIs respond to achievable urine levels of 1st generation Cephalosporins, Nitrofurantoin, Trimeth/ Sulfa, or Fluoroquinolones								

* First isolate per patient for the organism. Statistical validity of % susceptible is decreased if fewer than 30 isolates are tested.

^ Percent susceptible if UTI is uncomplicated.

Mycobacterium Tuberculosis Complex	
Antimicrobial (mcg/ml)	% Susceptible
Ethambutol 5	100
Isoniazid 0.1	80
Pyrazinamide 100	95
Rifampin 1	85
Streptomycin 1	80

Twenty isolates (thirteen respiratory specimens, seven non respiratory) were tested by San Francisco Department of Public Health

NOTES:

- Many strains of *Enterobacter* and *Citrobacter* produce inducible penicillinases and cephalosporinases. Cephalosporins on the ZSFG formulary other than cefepime should be used with caution when treating infections by these bacteria.
- Escherichia coli*, *Klebsiella pneumoniae*, *K. oxytoca* and *Proteus mirabilis* are routinely screened for extended spectrum beta-lactamases (ESBL). 12% of isolates tested in 2017 were confirmed ESBL producers [216 patients].
- Campylobacter jejuni/coli* group enteric infections are usually treated with fluoroquinolones or macrolides. Strains resistant to these antimicrobials have been isolated at ZFGH. *Shigella sonnei* strains resistant to ciprofloxacin have been recovered at ZSFG.
- Rapid beta-lactamase (penicillinase) tests, which indicate PCN and AMP resistance when positive, are performed on *Haemophilus influenzae*, *Moraxella catarrhalis* and *Neisseria gonorrhoeae*. PCN and/or AMP results in table are based upon this beta-lactamase test. Other resistance mechanisms may exist.
- Streptococcus pneumoniae* isolates recovered from Blood and CSF are tested by MIC method for Penicillin (PCN), 3rd generation cephalosporin and vancomycin susceptibility. All other isolates are screened for PCN, erythromycin and tetracycline susceptibility by a disk test. This PCN screening test cannot distinguish between intermediate resistance and full resistance. A statement is added to the report noting that the isolate may be resistant. PCN susceptible strains are also susceptible to cephalosporins active against *S. pneumoniae*. Confirmatory PCN and other antimicrobial MIC's are done automatically on isolates that screen positive for resistance by disk test. For non-meningeal infections, a PCN MIC of 4 mcg/mL is intermediate and ≥ 8 mcg/mL is interpreted as resistant.

Penicillin (parenteral)	MIC Interpretation (mcg/mL)		
	Susceptible	Intermediate	Resistant
Nonmeningitis	≤ 2	4	≥ 8
Meningitis	≤ 0.06	--	≥ 0.12

- Enterococci isolated from all sites are screened for vancomycin and ampicillin resistance.

Incidence of Vancomycin and Ampicillin Resistance

Antimicrobial	No. isolates tested	No. resistant isolates	No. of patients with resistant Enterococci (Total No. Patients: 393)
Vancomycin	555	38 ^ (7%)	26 (7%)
Ampicillin	555	53 ^^ (10%)	40 (10%)

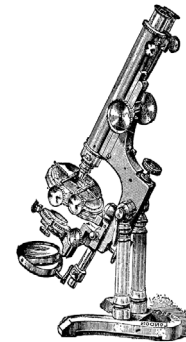
^ 17 urines, 6 bloods, 6 wounds/drainages, 7 tissues/bones, 2 fluids

^^ 26 urines, 6 bloods, 9 wounds/abscesses/drainages, 9 tissue/bones, 3 fluids

**AEROBIC ISOLATES NON-URINE SOURCES
JANUARY THROUGH DECEMBER 2017**

PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL *

Enteric Isolates	# Tested	AMP	PIPTZ	CZOL	CTAZ	CTRX	CFPM	GENT	TOB	TMSX	CIPR	LEVO	ETP
Citrobacter freundii	10	R	100	R	90	90	100	100	100	90	100	100	100
Enterobacter aerogenes	19	R	100	R	95	100	100	100	100	100	100	100	100
Enterobacter cloacae	45	R	87	R	76	60	96	96	93	80	96	98	91
Escherichia coli	193	38	97	59	87	83	84	90	88	62	79	79	98
- ESBL	33		91					73	58	36	15	15	94
- Non ESBL	161	46	99	70	99	99	99	93	94	68	92	92	99
Klebsiella oxytoca	38	R	100	8	100	100	100	100	100	92	100	100	100
Klebsiella pneumoniae	115	R	98	92	97	96	96	97	97	96	97	97	99
Proteus mirabilis	71	92	100	80	99	99	100	96	96	79	92	92	100
Salmonella sp.	12	75		R		83				100	100	100	
Serratia marcescens	36	R	97	R	86	72	100	100	97	100	100	100	100
Shigella flexneri	20	20		R						15	95	94	
Shigella sonnei	14	71		R						0	86	100	



Gram Positive Isolates & Miscellaneous	# Tested	PCN	AMP	AMCL	NAF	CZOL	CTRX	ERYT	CLIN	TET	VAN	GENT	TOB	TMSX	LEVO	
Staphylococcus aureus	858	17	17	63	63	63	63	48	80^	92	100			97	75	
- Methicillin Resistant	326	0	0	0	0	0	0	12	73^	91	100			97	48	
- Methicillin Susceptible	545	28	28	100	100	100	100	68	84^	93	100			98	90	
Staphylococcus lugdunensis	27	56	56	93	93	93	93	78	85^	85	100			100	96	
Staphylococcus, Coagulase Negative	305	24	24	61	61	61	61	39	60^	75	100			78	77	
Staphylococci resistant to Nafcillin (Oxacillin) are resistant to PCN, AMP, AMCL, PIPTZ, Cepheims (CZOL, CTAZ, CTRX, CFPM), & Carbapenems.																
Streptococcus pyogenes, Group A	47	100			S			100	96	96^		100	R	R		
Streptococcus agalactiae, Group B	35	100						100	57	77^		100	R	R		
Streptococcus pneumoniae (See Note # 5)	75/56	100						100	82	91	88	100	R	R	66	
75 isolates tested against PCN, ERYT and TET. 56 isolates were tested against the other antimicrobials.																
Haemophilus influenzae (See Note # 4)	70		83	S		R	S	R					R	R	S	S
Moraxella catarrhalis (See Note # 4)	6	R	17	S		R	S						S	S	S	S

* First isolate per patient for the organism. Statistical validity of % susceptible is decreased if fewer than 30 isolates are tested.

^ Clindamycin results determined by two tests (MIC and inducible Clindamycin resistance test).

Non Enteric Isolates	# Tested	PIPTZ	CTAZ	CFPM	GENT	TOB	TMSX	CIPR	LEVO	MERO
Acinetobacter baumannii	18		89	89	94	94	89	94	94	94
Acinetobacter lwoffii	5		100	100	100	100	80	100	100	100
Pseudomonas aeruginosa	66	88	91	88	86	99		92	89	92
Stenotrophomonas maltophilia	16		56				100		100	

Abbrev	Antimicrobial	Cost / Day	Std. Adult Regimen
AMCL	Amoxicillin / clavulanate	\$0.90	875 mg Q 12 hr PO
AMOX	Amoxicillin	\$0.24	500 mg Q 8 hr PO
AMP	Ampicillin	\$9.44	2 gm Q 6 hr IV
AMSL	Ampicillin / sulbactam	\$11.68	3 gm Q 6 hr IV
AZTH	Azithromycin	\$3.04	500 mg Q 24 hr IV
AZTR	Aztreonam	\$163.71	2 gm Q 8 hr IV
CZOL	Cefazolin	\$32.28	2 gm Q 8 hr IV
CFPM	Cefepime	\$16.32	2 gm Q 8 hr IV
CFTAR	Ceftaroline	\$361.54	600 mg Q 12 hr IV
CTRX	Ceftriaxone	\$1.37	1 gm Q 24 hr IV
CIPR	Ciprofloxacin	\$0.34	500 mg Q 12 hr PO
CIPR	Ciprofloxacin	\$5.54	400 mg Q 12 hr IV
CLIN	Clindamycin	\$34.20	600 mg Q 8 hr IV
CLIN	Clindamycin	\$4.12	300 mg Q 6 hr PO
DAPTO	Daptomycin	\$79.98	500 mg Q 24 hr IV
DOXY	Doxycycline	\$3.66	100 mg Q 12 hr PO
ETP	Ertapenem	\$89.29	1 gm Q 24 hr IV
GENT	Gentamicin	\$3.06	80 mg Q 8 hr IV
LEVO	Levofloxacin	\$0.39	750 mg Q 24 hr PO
LEVO	Levofloxacin	\$3.81	750 mg Q 24 hr IV
LZLD	Linezolid	\$6.72	600 mg Q 12 hr PO
LZLD	Linezolid	\$33.50	600 mg Q12 hr IV
MERO	Meropenem	\$17.82	1 gm Q 8 hr IV
METR	Metronidazole	\$2.04	500 mg Q 8 hr PO
NAF	Nafcillin	\$41.76	2 gm Q 4 hr IV
NITRO	Nitrofurantoin	\$5.54	100mg Q 12 hr PO
PCN	Penicillin	\$47.64	3 MU Q 4 hr IV
PIPTZ	Piperacillin / tazobactam	\$19.48	4.5 gm Q 6 hr IV
TMSX	Trimethoprim/sulfa	\$0.32	160 mg TMP Q 12 hr PO
TMSX	Trimethoprim/sulfa	\$224.18	320 mg TMP Q 12 hr IV
TOB	Tobramycin	\$2.34	80mg Q 8 hr IV
VAN	Vancomycin	\$3.96	1 gm Q 12 hr IV

Note: This table is intended to compare inpatient cost of commonly used antimicrobials. Many dosing regimens vary by indication.

Abbrev	Interpretation
S	Susceptible
I	Intermediate
R	Resistant

ANAEROBIC BACTERIA

Routine antimicrobial susceptibility testing is not performed because empirical therapy and appropriate surgical treatment are usually sufficient, and because infections are frequently due to multiple bacteria, not all of which may be cultured. In special circumstances, e.g., brain abscess, endocarditis, joint infection, recurrent bacteremia, testing is available upon approval by the Microbiology Resident (pager: 415 443-1438).

Beta-lactamase tests are performed on Gram-negative anaerobic bacteria, e.g., Bacteroides and Fusobacteria..