

**Clinical Laboratory  
Microbiology**

**Community Health Network**

**ANTIMICROBIAL  
SUSCEPTIBILITY STUDIES**  
(excluding Laguna Honda Hospital)

January - December 2013

Report Prepared by:

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**URINE ISOLATES  
JANUARY - DECEMBER 2013**

**PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL \***

Enteric Urine Isolates	# Tested	AMP^	PIPTZ^	CTAZ^	CTRX^	CFPM	GENT	TOB	TMSX	CIPR	LEVO	NITRO	ETP
Citrobacter freundii	19	R	90	84	84	100	95	100	68	95	95	90	100
Citrobacter koseri	14	R	100	100	100	100	100	100	93	100	100	86	100
Enterobacter aerogenes	29	R	90	86	79	93	100	100	100	93	97	14	97
Enterobacter cloacae	28	R	89	86	86	96	96	96	79	93	93	29	96
Escherichia coli	1544	50	97	95	94	95	90	90	68	82	82	98	100
- ESBL	87		92				48	33	38	15	18	97	100
- Non ESBL	1469	53	98	99	99	100	93	93	69	86	86	98	100
Klebsiella oxytoca	16	6	81	94	81	100	100	88	88	88	100	63	94
Klebsiella pneumoniae	150	R	97	98	96	98	97	97	90	97	99	48	100
Proteus mirabilis	145	83	99	99	98	99	89	89	81	85	93	R	100

Non-Enteric Urine Isolates	# Tested	PIPTZ^	CTAZ^	CFPM	GENT	TOB	TMSX	CIPR	LEVO	MERO
Acinetobacter baumannii	8		88	75	100	100	75	75	75	88
Pseudomonas aeruginosa	34	85	88	88	77	97		79	74	77
Stenotrophomonas maltophilia	3		33				67		67	

Gram Positive Urine Isolates	# Tested	AMP^	AMCL^	NAF	CZOL^	CTRX	TMSX	TET	LEVO
Staphylococcus aureus	79	22	56	56	56	56	92	90	51
Staphylococcus, Coagulase Negative	24	46	50	50	50	50	75	75	58
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.**  
^ **Many antimicrobials used to treat urinary tract infections are highly concentrated in the urine. While serum levels may not be effective to treat pyelonephritis, levels achievable in urine (assuming normal renal function) may be effective for cystitis.**

Mycobacterium Tuberculosis Complex	
Antimicrobial (mcg/ml)	% Susceptible
Ethambutol	5 100
Isoniazid	0.1 89
Pyrazinamide	100 94
Rifampin	1 94
Streptomycin	1 94

**Eighteen isolates were tested by  
San Francisco Department  
of Public Health**

**NOTES:**

- Many strains of *Enterobacter*, *Citrobacter* and *Serratia* produce inducible cephalosporinases. Cephalosporins other than cefepime should be used with caution when treating infections caused by these bacteria.
- Escherichia coli*, *Klebsiella pneumoniae*, *K. oxytoca* and *Proteus mirabilis* are routinely screened for extended spectrum beta-lactamases (ESBL). 6% of isolates tested are confirmed ESBL producers [107 patients].
- Campylobacter jejuni/coli* group enteric infections are usually treated with fluoroquinolones or macrolides. Strains resistant to these antimicrobials have been isolated at SFGH.
- 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), 3<sup>rd</sup> 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. Enterococci that demonstrate high level aminoglycoside resistance are not killed by the usually synergistic combination of a penicillin or vancomycin plus an aminoglycoside

**Incidence of Vancomycin and Ampicillin Resistance**

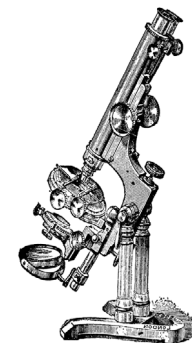
Antimicrobial	No. isolates tested	No. resistant isolates	No. of patients with resistant Enterococci (Total No. Patients: 460)
Vancomycin	564	103 ^ (18%)	65 (14%)
Ampicillin	564	106 ^^ (19%)	72 (15%)

^ 70 urines, 6 bloods, 15 wounds, 12 (tissue, fluids)  
^^ 78 urines, 4 bloods, 9 wounds, 15 (tissue, fluids)

**AEROBIC ISOLATES NON-URINE SOURCES  
JANUARY THROUGH DECEMBER 2013**

**PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL \***

Enteric Isolates	# Tested	AMP	PIPTZ	CTAZ	CTRX	CFPM	GENT	TOB	TMSX	CIPR	LEVO	ETP
Citrobacter freundii	13	R	100	92	100	100	100	100	92	100	100	100
Enterobacter aerogenes	34	R	91	88	88	100	100	100	100	91	97	94
Enterobacter cloacae	37	R	92	84	73	92	100	92	81	92	92	97
Escherichia coli	177	40	97	92	87	90	83	84	58	71	72	100
- ESBL	21		95				48	33	24	19	24	100
- Non ESBL	157	45	97	98	98	100	88	90	62	78	78	100
Klebsiella oxytoca	16	0	100	100	100	100	100	100	100	100	100	100
Klebsiella pneumoniae	77	R	99	97	96	97	99	99	90	97	99	100
Proteus mirabilis	57	93	98	100	100	100	98	98	91	93	98	100
Salmonella sp.	13	92		R	92				92	100	100	
Serratia marcescens	25	R	76	80	88	96	100	100	100	96	100	96
Shigella flexneri	12	25		R					33	100	100	
Shigella sonnei	4	100		R					0	75	75	



Gram Positive Isolates & Miscellaneous	# Tested	PCN	AMP	AMCL	NAF	CZOL	CTRX	ERYT	CLIN	TET	VAN	GENT	TOB	TMSX	LEVO
Staphylococcus aureus	952	14	17	56	56	56	56	40	75^	91	100			97	68
- Methicillin Resistant	433	0	0	0	0	0	0	7	67^	92	100			97	40
- Methicillin Susceptible	536	24	30	100	100	100	100	67	81^	90	100			98	89
Staphylococcus, Coagulase Negative	382	19	48	55	55	55	55	41	61^	76	100			70	74
	Staphylococci resistant to Nafcillin are resistant to PCN, AMP, AMCL, PIPTZ, Cephems (CZOL, CTAZ, CTRX, CFPM), & Carbapenems.														
Streptococcus pyogenes, Group A	26	100			S			100	62	62^		100	R	R	
Streptococcus agalactiae, Group B	28	100						100	46	57^		100	R	R	
Streptococcus pneumoniae (See Note # 5)	103/72	97						97	78	88	76	100	R	R	64
	103 isolates tested against PCN, ERYT and TET. 72 isolates were tested against the other antimicrobials.														
Haemophilus influenzae (See Note # 4)	92		77	S		R	S	R					R	R	S S
Moraxella catarrhalis (See Note # 4)	13	R	0	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	20		90	70	90	100	95	95	100	100
Acinetobacter lwoffii	3		100	100	100	100	67	100	100	100
Pseudomonas aeruginosa	90	89	89	87	86	98		81	80	80
Stenotrophomonas maltophilia	14		50				100		100	

Abbrev	Antimicrobial	Cost / Day	Std. Adult Regimen
AMCL	Amoxicillin / clavulanate	\$0.80	875 mg Q 12 hr PO
AMP	Ampicillin	\$13.00	2 gm Q 6 hr IV
AMSL	Ampicillin / sulbactam	\$11.00	3 gm Q 6 hr IV
AZTH	Azithromycin	\$5.60	500 mg Q 24 hr IV
AZTR	Aztreonam	\$165.00	2 gm Q 8 hr IV
CFPM	Cefepime	\$20.00	2 gm Q 8 hr IV
CIPR	Ciprofloxacin (UTI)	\$0.40	500 mg Q 12 hr PO
CIPR	Ciprofloxacin	\$4.00	400 mg Q 12 hr IV
CLIN	Clindamycin	\$25.00	600 mg Q 8 hr IV
CLIN	Clindamycin	\$2.70	300 mg Q 8 hr PO
CTAZ	Ceftazidime	nonformulary	1 gm Q 8 hr IV
CTRX	Ceftriaxone	\$1.20	1 gm Q 24 hr IV
CZOL	Cefazolin	\$2.00	1 gm Q 8 hr IV
ETP	Ertapenem	\$70.00	1 gm Q 24 hr IV
ERYT	Erythromycin	\$36.00	500 mg Q 6 hr IV
GENT	Gentamicin	\$4.00	80 mg Q 8 hr IV
LEVO	Levofloxacin	\$0.50	750 mg Q 24 hr PO
LEVO	Levofloxacin	\$5.60	750 mg Q 24 hr IV
MERO	Meropenem	\$60.00	2 gm Q 8 hr IV
METR	Metronidazole	\$2.00	500 mg Q 8 hr PO
NAF	Nafcillin	\$100.00	2 gm Q 4 hr IV
NITRO	Nitrofurantoin	\$1.00	100mg Q 12 hr PO
PCN	Penicillin	\$230.00	4 MU Q 4 hr IV
PIPTZ	Piperacillin / tazobactam	\$26.00	4.5 gm Q 6 hr IV
TET	Tetracycline	\$0.40	500 mg Q 6 hr PO
TMSX	Trimeth/sulfa (UTI)	\$0.50	160 mg TMP Q 12 hr PO
TMSX	Trimethoprim/sulfa	\$11.00	320 mg TMP Q 12 hr IV
TOB	Tobramycin	\$4.00	80mg Q 8 hr IV
VAN	Vancomycin	\$12.00	1 gm Q 12 hr IV

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: 415 433-1438).

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