

Clinical Laboratory
Microbiology

Community Health Network

ANTIMICROBIAL
SUSCEPTIBILITY STUDIES

(excluding Laguna Honda Hospital)

January - December 2012

Report Prepared by:

Phong D. Pham, MLS (ASCP)^{cm}
Margaret K. Wong, MA, SM (ASCP)
Barbara L. Haller, M.D., Ph.D.
Daniel Deck, Pharm.D.
Lisa Winston, M.D.

For Questions Contact:
Microbiology Resident
415-443-1438 (Pager)

Barbara L. Haller, M.D., Ph.D.
Chief, Microbiology Division
415-206-3595

URINE ISOLATES
JANUARY - DECEMBER 2012

PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL *

Enteric Urine Isolates	# Tested	AMP^	PIPTZ^	CTAZ^	CTRX^	CFPM	GENT	TOB	TMSX	CIPR	LEVO	NITRO	ETP
Citrobacter freundii	27	R	93	85	85	100	93	93	78	85	85	96	100
Citrobacter koseri	25	R	100	100	100	100	100	100	100	96	96	84	100
Enterobacter aerogenes	34	R	97	94	88	100	97	97	100	100	100	29	97
Enterobacter cloacae	33	R	94	79	82	100	100	97	82	88	88	52	97
Escherichia coli	1591	50	98	97	95	96	93	93	67	85	85	99	100
- ESBL	85		92				64	54	22	17	17	98	99
- Non ESBL	1519	52	98	100	100	100	94	95	70	88	88	99	100
Klebsiella oxytoca	27	0	100	100	100	100	100	100	93	96	100	85	100
Klebsiella pneumoniae	136	R	99	99	99	99	99	99	91	98	99	50	100
Proteus mirabilis	166	90	99	99	99	99	93	93	86	92	96	R	100

Non-Enteric Urine Isolates	# Tested	PIPTZ^	CTAZ^	CFPM	GENT	TOB	TMSX	CIPR	LEVO	MERO
Acinetobacter baumannii	9		56	56	56	78	56	44	44	67
Pseudomonas aeruginosa	56	98	96	89	86	95		73	77	84
Stenotrophomonas maltophilia	3		100				100		67	

Gram Positive Urine Isolates	# Tested	AMP^	AMCL^	NAF	CZOL^	CTRX	TMSX	TET	LEVO
Staphylococcus aureus	90	18	64	64	64	64	94	90	64
Staphylococcus, Coagulase Negative	40	20	58	58	58	58	60	90	60
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	85
Pyrazinamide	100	100
Rifampin	1	100
Streptomycin	1	95

Twenty isolates were tested by
San Francisco Department
of Public Health

NOTES:

- Many strains of *Enterobacter* and *Citrobacter* produce inducible penicillinases and cephalosporinases. Cephalosporins 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). 5% of isolates tested in 2012 were confirmed ESBL producers [103 patients].
- Campylobacter jejuni/coli* group enteric infections are regularly 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), 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. Confirmatory PCN and other antimicrobial MIC's are done automatically on screen positive isolates. 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. Non-synergistic strains of 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	641	132 ^ (21%)	81 (18%)
Ampicillin	637	151 ^^ (24%)	91 (20%)

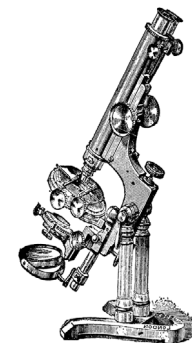
^ 98 urines, 5 bloods, 10 wounds, 18 (tissue, fluids), 1 respiratory
^^ 104 urines, 6 bloods, 16 wounds, 24 (tissue, fluids), 1 respiratory

- Meropenem and imipenem susceptibility data for particular isolates are available upon request through the Infectious Diseases Consult Service (pager: 443-2847).

**AEROBIC ISOLATES NON-URINE SOURCES
JANUARY THROUGH DECEMBER 2012**

PERCENT OF ISOLATES SUSCEPTIBLE TO ANTIMICROBIAL *

Enteric Isolates	# Tested	AMP	PIPTZ	CTAZ	CTRX	CFPM	GENT	TOB	TMSX	CIPR	LEVO	ETP
Citrobacter freundii	19	R	100	100	95	100	100	100	90	100	100	100
Enterobacter aerogenes	28	R	93	86	82	96	100	100	100	100	100	96
Enterobacter cloacae	54	R	93	85	82	98	100	98	93	98	98	96
Escherichia coli	191	38	100	93	91	92	87	85	58	74	75	100
- ESBL	16		100				69	56	38	19	19	100
- Non ESBL	176	42	99	99	99	100	89	87	59	78	80	98
Klebsiella oxytoca	25	0	100	96	96	100	100	100	96	100	100	100
Klebsiella pneumoniae	78	R	99	100	100	100	100	100	92	96	97	100
Proteus mirabilis	55	95	100	100	98	100	95	95	95	93	95	100
Salmonella sp.	7	71		R	100				100	100	100	
Serratia marcescens	22	R	96	77	96	100	100	96	100	91	100	100
Shigella flexneri	13	15		R					0	92	92	
Shigella sonnei	23	52		R					9	100	100	



Gram Positive Isolates & Miscellaneous	# Tested	PCN	AMP	AMCL	NAF	CZOL	CTRX	ERYT	CLIN	TET	VAN	GENT	TOB	TMSX	LEVO
Staphylococcus aureus	988	12	12	56	56	56	56	43	78^	89	100			96	69
- Methicillin Resistant	445	0	0	0	0	0	0	9	73^	92	100			97	45
- Methicillin Susceptible	560	22	22	100	100	100	100	69	82^	92	100			95	87
Staphylococcus, Coagulase Negative	396	19	19	53	53	53	53	39	60^	73	100			68	71
Staphylococci resistant to Nafcillin are resistant to PCN, AMP, AMCL, PIPTZ, Cephems (CZOL, CTAX, CTRX, CFPM), & Carbapenems.															
Streptococcus pyogenes, Group A	18	100			S		100	67	67^		100	R	R		
Streptococcus agalactiae, Group B	28	100					100	64	71^		100	R	R		
Streptococcus pneumoniae (See Note # 4)	85/60	97					97	78	80	77	100	R	R	63	
85 isolates tested against PCN, ERYT and TET. 60 isolates were tested against the other antimicrobials.															
Haemophilus influenzae (See Note # 3)	18		89	S		R	S	R				R	R	S	S
Moraxella catarrhalis (See Note # 3)	10	R	30	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	37		84	76	89	92	84	87	89	95
Acinetobacter lwoffii	15		87	93	100	100	93	93	100	100
Pseudomonas aeruginosa	85	94	98	89	89	95		82	82	92
Stenotrophomonas maltophilia	21		48				100		91	

Abbrev	Antimicrobial	Cost / Day	Std. Adult Regimen
AMCL	Amoxicillin / clavulanate	\$1.50	875 mg Q 12 hr PO
AMP	Ampicillin	\$24.00	2 gm Q 6 hr IV
AMSL	Ampicillin / sulbactam	\$18.00	3 gm Q 6 hr IV
AZTH	Azithromycin	\$4.00	500 mg Q 24 hr IV
AZTR	Aztreonam	\$150.00	2 gm Q 8 hr IV
CFPM	Cefepime	\$13.00	2 gm Q 12 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	\$36.00	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	\$0.70	1 gm Q 24 hr IV
CZOL	Cefazolin	\$2.00	1 gm Q 8 hr IV
ETP	Ertapenem	\$55.00	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	\$1.00	750 mg Q 24 hr PO
LEVO	Levofloxacin	\$4.50	750 mg Q 24 hr IV
MERO	Meropenem	\$45.00	1 gm Q 8 hr IV
METR	Metronidazole	\$1.50	500 mg Q 8 hr PO
NAF	Nafcillin	\$72.00	2 gm Q 6 hr IV
NITRO	Nitrofurantoin	\$1.00	100mg Q 12 hr PO
PCN	Penicillin	\$133.00	4 MU Q 4 hr IV
PIPTZ	Piperacillin / tazobactam	\$28.00	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	\$10.00	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. Although generally useful, the beta-lactamase test may not predict imipenem resistance.