2009 / 2010 ANTIBIOGRAM

Central Zone – Former DTHR Sites

Department of Pathology and Laboratory Medicine

Medically Relevant Pathogens Based on Gram Morphology

Gram-negative bacilli		
Escherichia coli	*Serratia marcescens*	*Pseudomonas aeruginosa*
Klebsiella pneumoniae	*Proteus mirabilis*	*Pseudomonas* species
Klebsiella oxytoca	*Morganella morganii*	*Stenotrophomonas maltophilia*
Enterobacter cloacae	*Aeromonas* species	*Acinetobacter baumanii*
Enterobacter aerogenes	*Providencia* species	*Achromobacter* species
Citrobacter freundii	*Salmonella* species	*Burkholderia cepacia*
Citrobacter koseri	*Shigella* species	

Gram-positive Cocci	
Gram-positive Cocci in Chains	**Gram-positive Cocci in Clumps**
Enterococcus species	*Staphylococcus aureus*
Streptococcus species, including:	*Staphylococcus* species, coagulase-negative
Streptococcus pyogenes (Group A)	*Staphylococcus lugdunensis*
Streptococcus agalactiae (Group B)	*Aerococcus* species
Streptococcus pneumoniae	*Rothia mucilaginosus*
Viridans group streptococci	
Streptococcus anginosus group	

Abbreviation Glossary for Antimicrobials

Antimicrobial	Abbreviation	Antimicrobial	Abbreviation
Amikacin	AMK	Gentamicin	GEN
Ampicillin	AMP	Imipenem	IMI
Amoxicillin/clavulanate	A/C	Meropenem	MERO
Cefazolin	FAZ	Nitrofurantoin	NIT
Ceftriaxone	CRO	Piperacillin	PIP
Ceftazidime	CAZ	Piperacillin-tazobactam	P/T
Cefuroxime	CXM	Rifampin	RIF
Ciprofloxacin	CIP	Tetracycline	TET
Clindamycin	CLIN	Tobramycin	TOB
Cloxacillin	CLOX	Trimethoprim-sulfamethoxazole	SXT
Erythromycin	ERY	Vancomycin	VAN

2009 ANTIBIOGRAM TABLES

Gram Positive Organisms – Percent Isolates Susceptible

Pathogen	No. Tested	AMP	CLOX	CRO	ERY	CLIN	SXT	NIT	TET	CIP	GEN	RIF	VAN
Staphylococcus aureus (MSSA)	1643	-	100	-	71	78	100	100	96	86	98	100	100
Coagulase negative staphylococci	205	-	42	-	48	70	68	99	86	42	79	100	100
Enterococcus spp.	1463	97	-	-	-	-	-	98	-	59	65*	-	100
Enterococcus faecalis	50	100	-	-	-	-	-	100	-	66	52*	-	96
Enterococcus faecium	15	33	-	-	-	-	-	-	-	27	73*	-	60
Streptococcus pneumoniae	49	86	-	96	79	-	86	-	-	-	-	-	100

Gram Negative Enterobacteriaceae – Percent Isolates Susceptible

Pathogen	No. Tested	AMP	A/C	P/T	FAZ	CXM	CRO	IMI	CIP	GEN	NIT	TET	SXT
Escherichia coli	9530	62	87	97	91	95	99	100	85	95	98	79	79
Escherichia coli ESBL	253	0	0	84	0	0	0	100	17	76	94	42	57
Klebsiella pneumoniae	994	0	98	99	97	93	100	100	97	100	45	89	95
Klebsiella oxytoca	269	0	95	97	44	92	97	100	96	99	88	92	94
Citrobacter freundii	206	0	0	97	0	0	86	100	89	96	92	82	83
Enterobacter aerogenes	80	0	0	93	0	0	84	100	91	99	18	94	98
Enterobacter cloacae	239	0	0	86	0	0	82	100	88	99	23	82	90
Morganella morganii	59	0	0	100	0	0	98	100	88	83	0	59	95
Proteus mirabilis	320	84	95	100	89	98	100	100	87	96	0	2	86
Serratia marcesens	34	0	0	71	0	0	88	100	91	100	0	10	91

Gram Negative Non-Enterobacteriaceae – Percent Isolates Susceptible

Pathogen	No. Tested	PIP	CAZ	IMI	MERO	CIP	GEN	TOB	AMK	SXT
Pseudomonas aeruginosa	655	98	92	90	93	77	89	96	97	-
Stenotrophomonas maltophilia	36	0	42	0	0	31	-	-	-	100

-, not available; this susceptibility data is not reported either because testing is not indicated or therapy is not appropriate
*, reflects aminoglycoside synergistic activity when used in combination with a beta-lactam or glycopeptide antibiotic.

2010 ANTIBIOGRAM TABLES

Gram Positive Organisms – Percent Isolates Susceptible

Pathogen	No. Tested	AMP	CLOX	CRO	ERY	CLIN	SXT	NIT	TET	CIP	GEN	RIF	VAN
Staphylococcus aureus (MSSA)	1658	-	100	-	72	78	100	100	96	84	98	100	100
Coagulase negative staphylococci	208	-	47	-	36	69	62	100	84	33	82	100	100
Enterococcus spp.	1583	96	-	-	-	-	-	99	-	60	68*	-	100
Enterococcus faecalis	67	100	-	-	-	-	-	100	-	67	67*	-	100
Enterococcus faecium	40	20	-	-	-	-	-	-	-	18	75*	-	100
Streptococcus pneumoniae	79	81	-	93	70	-	83	-	-	-	-	-	100

Gram Negative Enterobacteriaceae – Percent Isolates Susceptible

Pathogen	No. Tested	AMP	A/C	P/T	FAZ	CXM	CRO	IMI	CIP	GEN	NIT	TET	SXT
Escherichia coli	9966	62	89	98	92	95	99	100	83	95	97	79	80
Escherichia coli ESBL	296	0	0	89	0	0	0	100	13	68	87	34	46
Klebsiella pneumoniae	1080	0	98	99	97	91	100	100	97	100	52	89	94
Klebsiella oxytoca	277	0	96	97	44	91	97	100	97	100	95	92	97
Citrobacter freundii	236	0	0	97	0	0	81	100	87	96	93	78	78
Enterobacter aerogenes	91	0	0	89	0	0	89	100	93	100	25	83	91
Enterobacter cloacae	206	0	0	84	0	0	80	100	96	99	29	87	92
Morganella morganii	65	0	0	97	0	0	100	100	80	94	5	55	74
Proteus mirabilis	303	86	99	99	94	100	100	100	87	96	0	1	83
Serratia marcesens	48	0	0	81	0	0	92	100	77	100	0	8	94

Gram Negative Non-Enterobacteriaceae – Percent Isolates Susceptible

Pathogen	No. Tested	PIP	CAZ	IMI	MERO	CIP	GEN	TOB	AMK	SXT
Pseudomonas aeruginosa	711	98	94	91	97	80	89	97	95	-
Stenotrophomonas maltophilia	36	0	56	0	0	44	-	-	-	95

-, not available; this susceptibility data is not reported either because testing is not indicated or therapy is not appropriate
*, reflects aminoglycoside synergistic activity when used in combination with a beta-lactam or glycopeptides antibiotic.

HIGHLIGHTS OF THE ANTIBIOGRAM

1. *S. aureus* (MSSA) susceptibility rates have not changed from 2007. Cloxacillin and first generation cephalosporins (cefazolin) remain the drugs of choice for the treatment of non-life-threatening *S. aureus* infections. MRSA strains may be referred to as 'community-associated' (CA) or 'hospital-associated' (HA). CA-MRSA tend to be more predictably susceptible to clindamycin and SXT than HA-MRSA. Although DTHR data are not available, 2009 data from the UAH reports CA-MRSA susceptibility to clindamycin and SXT as 71% and 97%, respectively.

2. Vancomycin remains highly active against *S. aureus* and coagulase-negative staphylococci.

3. *S. pneumoniae* resistance to the macrolides is a global problem; Canadian rates have been steadily increasing for the past decade and reached ~25% in 2007. Penicillin G is the treatment of choice for susceptible non-CSF infections. No vancomycin resistance has been detected to date in *S. pneumoniae* and quinolone resistance is rare.

4. Resistance rates in clinically relevant enterococci have not changed significantly since 2005. Ampicillin +/- gentamicin is the treatment of choice for systemic infections of *E. faecalis* (for UTI's, nitrofurantoin is effective). Substitution of one aminoglycoside for another cannot be assumed and synergy testing must be completed. Periodic hospital outbreaks of vancomycin resistant enterococcus (VRE) increase the risk of serious infections with resistant enterococci. Identification of enterococci to the species level is only performed for sterile site isolates.

5. *E. coli* susceptibility rates to ciprofloxacin and SXT have decreased since the last antibiogram. For patients with *E.coli* urinary tract infections and creatinine clearance more than 60 mL/min, consider using nitrofurantoin. The extended-spectrum β-lactamase (ESBL) resistance phenotype confers resistance to all third-generation cephalosporins and, in many cases, piperacillin-tazobactam. A significant proportion of ESBL-positive *E. coli* are also resistant to the quinolones (87%), aminoglycosides (32%), and SXT (54%).

6. Ceftriaxone/cefotaxime, fluoroquinolones and aminoglycosides are drugs of choice for *Klebsiella* infections. A significant proportion of ESBL-positive *K. pneumoniae* isolates are also resistant to the quinolones, aminoglycosides, and SXT.

7. *Enterobacter*, *Citrobacter*, and *Serratia* species may develop resistance to all β-lactams except for imipenem and meropenem during prolonged β-lactam therapy. These pathogens are also intrinsically resistant to ampicillin, cefazolin, and cefuroxime.

8. For non-urinary tract pseudomonal infections combination therapy is recommended. Ceftazidime or piperacillin/tazobactam PLUS ciprofloxacin or aminoglycoside are drugs of choice. Tobramycin has documented higher activity than gentamicin against *Pseudomonas*.