2013 UAH ANTIBIOGRAM

www.antibiogram.ca

University of Alberta Hospital and the Stollery Children's Hospital

Department of Laboratory Medicine and Pathology

Alberta Health Services

PROVLAB ALBERTA

Introduction

The antibiogram is an annual cumulative report of the antimicrobial susceptibility rates of common microbial pathogens to antimicrobials available on the hospital formulary. This report represents the local microbial epidemiology at the University of Alberta Hospital (UAH), Stollery Children's Hospital, and the Cross Cancer Institute (CCI), and is to be used as a resource to direct empiric antimicrobial therapy.

Antibiograms are generated by the compilation of susceptibility results from all 'first' clinical isolates of a specific pathogen recovered from an individual patient per calendar year. That is, only the first isolate within a 14-day period, regardless of specimen type or body site, is selected for analysis. The rationale for this referral period is based on the need to represent 'wild-type' susceptibility profiles and avoid over-representing antimicrobial resistance that may develop *de novo* during a patient's prolonged hospital stay. Susceptibility rates for patient groups (ie. age or ward location) represented by less than 30 isolates of a pathogen are not calculated due to the limited statistical significance and interpretive value.

This antibiogram contains summary data for 2013 and notable resistance trends over several years.

Web app available at www.antibiogram.ca

PDF version is available at http://www.albertahealthservices.ca/3294.asp.

A tremendous amount of effort goes into the creation of this document each year and the effort of the entire medical microbiology technologist staff is truly appreciated. We would also like to acknowledge Dr. Darren Hudson, UAH, for his assistance with the antibiogram data synthesis.

Inquiries may be directed to Dr. Jeff Fuller, Provlab, at jeff.fuller@albertahealthservices.ca.

Antibiogram Resistance Trends

Enterobacteriaceae:

Enterobacter, Citrobacter, and *Serratia* species are intrinsically resistant to ampicillin, cefazolin, and cefuroxime and may develop resistance to broader-spectrum β-lactams during prolonged β-lactam therapy. Carbapenems are effective empiric options but a small proportion of these species (<10%) exhibit *in vitro* resistance to ertapenem, albeit susceptible to imipenem and meropenem.

The extended-spectrum β-lactamase (ESBL) resistance phenotype confers resistance to all third-generation cephalosporins and, in many cases, piperacillin-tazobactam. The proportion of *E. coli* culture isolates that are ESBL-positive has increased steadily from 5% in 2010 to 8.4% in 2013. In 2013, the cross-resistance rates for ESBL-positive *E. coli* to the quinolones, aminoglycosides, and trimethoprim-sulfamethoxazole were 85%, 21%, and 61%, respectively.

The proportion of *K. pneumoniae* culture isolates that are ESBL-positive has remained at ~4% since 2007. Similar to *E. coli* ESBLs, resistance rates to other antibiotic classes are characteristically high but the overall annual recovery is low.

Enterococcus species:

Resistance rates in clinically relevant enterococci have not changed significantly over the last eight years. Identification of enterococci to the species level is only performed for sterile site isolates but vancomycin susceptibility is confirmed for ALL enterococcus isolates, regardless of specimen site. Although enterococcal bacteraemia is not common, the rate of vancomycin resistance in infections caused by *E. faecium* is significant.

***Pseudomonas aeruginosa*:**

Resistance rates in *P. aeruginosa* have remained relatively unchanged over eight years of surveillance of patients with and without cystic fibrosis (adult and paediatric). Overall resistance in 2013 was 15% to ceftazidime, 25% to ciprofloxacin, and 25% to gentamicin. Imipenem and meropenem resistance rates have increased 5% and 4%, respectively, from 2012.

***Staphylococcus aureus*:**

Resistance and isolation rates of *S. aureus* (ie. MSSA) and methicillin-resistant *S.aureus* (MRSA) have remained relatively unchanged over the last several years. The rate of MRSA detection relative to all *S. aureus* has remained ~20% since 2009.

***Streptococcus pneumoniae*:**

The susceptibility of *S. pneumoniae* to certain β-lactams is pharmacodynamically interpreted to direct appropriate therapy for meningeal (M) and non-meningeal (NM) infections, and for infections treated with oral penicillin V (PO). In 2013, resistance rates using meningeal and non-meningeal interpretations were 15% and 6% for penicillin, and 22% and 13% for ceftriaxone, respectively. Note, these rates do not reflect actual cases of pneumococcal meningitis.

Medically Relevant Pathogens Based on Gram Morphology

Gram-negative Bacilli		
Lactose Fermenters	**Non-lactose Fermenters**	**Glucose Non-fermenters**
Escherichia coli	*Serratia marcescens*	*Pseudomonas aeruginosa*
Klebsiella pneumoniae	*Salmonella* spp.	*Pseudomonas* spp.
Klebsiella oxytoca	*Proteus* spp.	*Stenotrophomonas maltophilia*
Enterobacter cloacae	*Morganella morganii*	*Acinetobacter baumanii* complex
Citrobacter freundii complex	*Aeromonas* spp.	*Achromobacter* species
Enterobacter aerogenes	*Providencia* spp.	*Burkholderia cepacia*
Citrobacter koseri	*Yersinia* spp.	*Chryseobacterium* species

Gram-positive Cocci	
Gram-positive Cocci in Chains	**Gram-positive Cocci in Clumps**
Enterococcus faecium, Enterococcus faecalis	*Staphylococcus aureus*
Streptococcus pyogenes (Group A)	*Staphylococcus* spp., coagulase-negative
Streptococcus agalactiae (Group B)	*Staphylococcus lugdunensis*
Streptococcus pneumoniae	*Micrococcus* spp.
Viridans group streptococci	*Aerococcus* spp.
Streptococcus anginosus group	*Rothia mucilaginosus*

Abbreviation Glossary for Antimicrobials

Antimicrobial	Abbreviation	Antimicrobial	Abbreviation
Amikacin	AMK	Gentamicin Synergy	GM500
Amoxicillin/clavulanate	A/C	Imipenem	IMI
Ampicillin	AMP	Levofloxacin	LEV
Amphotericin B	AMB	Linezolid	LNZ
Cefazolin	FAZ	Meropenem	MERO
Ceftriaxone	CRO	Metronidazole	MET
Ceftazidime	CAZ	Micafungin	MICA
Cefuroxime	CXM	Nitrofurantoin	NIT
Ciprofloxacin	CIP	Penicillin	PEN
Clindamycin	CLIN	Piperacillin	PIP
Cloxacillin	CLOX	Tetracycline	TET
Doxycycline	DOXY	Tobramycin	TOB
Erythromycin	ERY	Trimethoprim-sulfamethoxazole	SXT
Fluconazole	FLUC	Vancomycin	VAN
Gentamicin	GEN	Voriconazole	VORI

Antibiogram Tables

***Acinetobacter baumanni* complex**							
All Specimen Sources		**CAZ**	**CIP**	**GEN**	**MERO**	**TOB**	**SXT**
ALL Ages	**% SUSC**	**74**	**97**	**90**	**100**	**93**	**95**
	# SUSC	32	43	39	43	40	41
	# TESTED	43	43	43	43	43	43

***Bacteroides fragilis* group**					
All Specimen Sources		**A/C**	**CLIN**	**IMI**	**MET**
ALL Ages	**% SUSC**	**82**	**60**	**89**	**100**
	# SUSC	46	35	52	58
	# TESTED	56	58	58	58

***Citrobacter freundii* complex**									
All Specimen Sources		**AMP**	**FAZ**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
ALL Ages	**% SUSC**	**0**	**0**	**74**	**93**	**92**	**100**	**80**	**84**
	# SUSC	0	0	77	97	96	104	84	88
	# TESTED	104	104	104	104	104	104	104	104
≥ 17 years	**% SUSC**	**0**	**0**	**72**	**91**	**92**	**100**	**78**	**86**
	# SUSC	0	0	58	73	74	80	63	69
	# TESTED	80	80	80	80	80	80	80	80

Enterobacter, Citrobacter, and *Serratia* species are intrinsically resistant to ampicillin, cefazolin, and cefuroxime and may develop resistance to broader-spectrum β-lactams during prolonged β-lactam therapy. Carbapenems are effective empiric options but a small proportion of these species (<10%) exhibit *in vitro* resistance to ertapenem, albeit susceptible to imipenem and meropenem.

Enterobacter aerogenes									
All Specimen Sources		**AMP**	**FAZ**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
ALL Ages	**% SUSC**	**0**	**0**	**84**	**94**	**98**	**100**	**7**	**98**
	# SUSC	0	0	45	50	52	53	4	52
	# TESTED	53	53	53	53	53	53	53	53
≥ 17 years	**% SUSC**	**0**	**0**	**83**	**93**	**97**	**100**	**6**	**97**
	# SUSC	0	0	40	45	47	48	3	47
	# TESTED	48	48	48	48	48	48	48	48

Enterobacter cloacae									
All Specimen Sources		**AMP**	**FAZ**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
All Patients	**% SUSC**	**0**	**0**	**77**	**97**	**96**	**99**	**23**	**89**
ALL Ages	# SUSC	0	0	270	338	335	345	83	312
	# TESTED	348	348	348	348	348	348	348	348
≥ 17 years	**% SUSC**	**0**	**0**	**78**	**97**	**98**	**98**	**23**	**91**
	# SUSC	0	0	221	274	277	279	66	257
	# TESTED	282	282	282	282	282	282	282	282
< 17 years	**% SUSC**	**0**	**0**	**74**	**96**	**87**	**100**	**25**	**83**
	# SUSC	0	0	49	64	58	66	17	55
	# TESTED	66	66	66	66	66	66	66	66

Enterobacter, Citrobacter, and *Serratia* species are intrinsically resistant to ampicillin, cefazolin, and cefuroxime and may develop resistance to broader-spectrum β-lactams during prolonged β-lactam therapy. Carbapenems are effective empiric options but a small proportion of these species (<10%) exhibit *in vitro* resistance to ertapenem, albeit susceptible to imipenem and meropenem.

***Escherichia coli* (including ESBLs)**								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
All Patients	**% SUSC**	**49**	**89**	**72**	**91**	**99**	**94**	**73**
ALL Ages	# SUSC	1391	2485	2024	2549	2787	2604	2059
	# TESTED	2787	2787	2787	2787	2789	2787	2787
	% SUSC	**49**	**87**	**67**	**90**	**99**	**92**	**73**
≥ 17 years	# SUSC	1061	1880	1444	1941	2149	1992	1558
	# TESTED	2148	2148	2148	2148	2151	2148	2148
	% SUSC	**51**	**94**	**90**	**95**	**100**	**96**	**73**
< 17 years	# SUSC	333	605	580	608	638	612	471
	# TESTED	638	638	638	638	638	638	638
	% SUSC	**37**	**78**	**71**	**90**	**100**	**90**	**72**
UAH 3C3/3C4	# SUSC	31	65	59	75	83	75	60
	# TESTED	83	83	83	83	83	83	83
	% SUSC	**60**	**93**	**75**	**93**	**100**	**92**	**73**
CCI	# SUSC	55	86	69	86	92	85	67
	# TESTED	92	92	92	92	92	92	92

***Escherichia coli* - ESBL Producers Only**								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
	% SUSC	**0**	**0**	**15**	**79**	**99**	**84**	**39**
ALL Ages	# SUSC	0	0	35	186	232	196	91
	# TESTED	233	233	233	233	233	233	233
	% SUSC	**0**	**0**	**11**	**79**	**99**	**84**	**39**
≥ 17 years	# SUSC	0	0	24	166	207	176	83
	# TESTED	208	208	208	208	208	208	208

The extended-spectrum β-lactamase (ESBL) resistance phenotype confers resistance to all third-generation cephalosporins and, in many cases, piperacillin-tazobactam. The proportion of *E. coli* culture isolates that are ESBL-positive has increased steadily from 5% in 2010 to 8.4% in 2013. In 2013, the cross-resistance rates for ESBL-positive *E. coli* to the quinolones, aminoglycosides, and trimethoprim-sulfamethoxazole were 85%, 21%, and 61%, respectively.

***Klebsiella* species (Including ESBLs)**								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
All Patients	**% SUSC**	**0**	**94**	**96**	**98**	**99**	**37**	**90**
ALL Ages	# SUSC	0	812	825	842	855	324	774
	# TESTED	857	857	857	857	857	857	857
	% SUSC	**0**	**94**	**95**	**98**	**99**	**35**	**90**
≥ 17 years	# SUSC	0	687	695	711	722	254	654
	# TESTED	724	724	724	724	724	724	724
	% SUSC	**0**	**93**	**97**	**98**	**100**	**52**	**90**
< 17 years	# SUSC	0	125	130	131	133	70	120
	# TESTED	133	133	133	133	133	133	133
	% SUSC	**0**	**84**	**92**	**96**	**100**	**38**	**81**
UAH 3C3/3C4	# SUSC	0	48	53	55	57	22	46
	# TESTED	57	57	57	57	57	57	57
	% SUSC	**0**	**100**	**92**	**97**	**100**	**26**	**92**
CCI	# SUSC	0	38	35	37	38	10	35
	# TESTED	38	38	38	38	38	38	38

***Klebsiella* species - ESBL Producers Only**								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
	% SUSC	**0**	**0**	**62**	**77**	**97**	**14**	**31**
ALL Ages	# SUSC	0	0	22	27	34	5	11
	# TESTED	35	35	35	35	35	35	35

The extended-spectrum β-lactamase (ESBL) resistance phenotype confers resistance to all third-generation cephalosporins and, in many cases, piperacillin-tazobactam. The proportion of *K. pneumoniae* culture isolates that are ESBL-positive has remained at ~4% since 2007. Similar to *E. coli* ESBL, resistance rates to other antibiotic classes are characteristically high but the overall annual recovery is low.

Haemophilus influenzae				
All Specimen Sources		**AMP**	**CXM**	**SXT**
ALL Ages	**% SUSC**	**74**	**87**	**75**
	# SUSC	162	58	48
	# TESTED	217	66	64
≥ 17 years	**% SUSC**	**72**	**87**	**76**
	# SUSC	118	47	38
	# TESTED	163	54	50

Morganella morganii								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
ALL Ages	**% SUSC**	**0**	**87**	**78**	**78**	**100**	**0**	**70**
	# SUSC	0	50	45	45	57	0	45
	# TESTED	57	57	57	57	57	57	57
≥ 17 years	**% SUSC**	**0**	**87**	**78**	**78**	**100**	**0**	**69**
	# SUSC	0	48	43	43	53	0	38
	# TESTED	55	55	55	55	55	55	55

Proteus mirabilis								
All Specimen Sources		**AMP**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
ALL Ages	**% SUSC**	**76**	**96**	**78**	**92**	**100**	**0**	**73**
	# SUSC	163	205	167	197	213	0	156
	# TESTED	213	213	213	213	213	213	213
≥ 17 years	**% SUSC**	**74**	**97**	**74**	**92**	**100**	**0**	**70**
	# SUSC	134	175	134	166	180	0	127
	# TESTED	180	180	180	180	180	180	180

Pseudomonas aeruginosa									
All Specimen Sources		**AMK**	**CAZ**	**CIP**	**GEN**	**IMI**	**MERO**	**PIP**	**TOB**
All Patients	**% SUSC**	**81**	**86**	**77**	**77**	**74**	**80**	**78**	**89**
ALL Ages	# SUSC	949	1005	895	901	865	929	910	1043
	# TESTED	1167	1168	1168	1168	1166	1168	1168	1168
≥ 17 years	**% SUSC**	**80**	**84**	**73**	**76**	**73**	**78**	**78**	**89**
	# SUSC	760	805	700	722	693	746	747	850
	# TESTED	953	954	954	954	953	954	954	954
< 17 years	**% SUSC**	**88**	**93**	**91**	**83**	**80**	**85**	**76**	**90**
	# SUSC	189	200	195	179	172	183	163	193
	# TESTED	214	214	214	214	213	214	214	214
Non-CF Patients	**% SUSC**	**92**	**86**	**76**	**83**	**75**	**77**	**75**	**93**
ALL Ages	# SUSC	726	679	602	658	589	608	594	734
	# TESTED	792	792	792	792	790	792	792	792
≥ 17 years	**% SUSC**	**94**	**84**	**73**	**82**	**73**	**75**	**76**	**92**
	# SUSC	621	554	480	541	481	499	503	611
	# TESTED	661	661	661	661	660	661	661	661
< 17 years	**% SUSC**	**94**	**95**	**93**	**88**	**83**	**83**	**69**	**93**
	# SUSC	124	125	122	116	108	109	91	123
	# TESTED	131	131	131	131	131	131	131	131
CF Patients	**% SUSC**	**59**	**86**	**77**	**64**	**73**	**85**	**84**	**82**
ALL Ages	# SUSC	223	326	293	243	276	321	316	309
	# TESTED	375	376	376	376	376	376	376	376
≥ 17 years	**% SUSC**	**54**	**85**	**75**	**61**	**72**	**84**	**83**	**81**
	# SUSC	158	251	220	181	212	247	244	239
	# TESTED	292	293	293	293	293	293	293	293
< 17 years	**% SUSC**	**78**	**90**	**87**	**74**	**77**	**89**	**86**	**84**
	# SUSC	65	75	73	62	64	74	72	70
	# TESTED	83	83	83	83	83	83	83	83
UAH 3C3/3C4	**% SUSC**	**86**	**77**	**71**	**79**	**64**	**66**	**63**	**87**
	# SUSC	46	41	38	42	34	35	34	46
	# TESTED	53	53	53	53	53	53	53	53

Resistance rates in *P. aeruginosa* have remained relatively unchanged over eight years of surveillance of patients with and without cystic fibrosis (adult and paediatric). Overall resistance in 2013 was 15% to ceftazidime, 25% to ciprofloxacin, and 25% to gentamicin. Imipenem and meropenem resistance rates have increased 5% and 4%, respectively, from 2012.

Serratia marcescens									
All Specimen Sources		**AMP**	**FAZ**	**CRO**	**CIP**	**GEN**	**MERO**	**NIT**	**SXT**
All Patients	**% SUSC**	**0**	**0**	**95**	**95**	**98**	**96**	**0**	**98**
ALL Ages	# SUSC	0	0	95	95	98	96	0	98
	# TESTED	99	99	99	99	99	99	99	99
	% SUSC	**0**	**0**	**95**	**95**	**98**	**96**	**0**	**98**
≥ 17 years	# SUSC	0	0	76	76	79	77	0	79
	# TESTED	80	80	80	80	80	80	80	80

Enterobacter, Citrobacter, and *Serratia* species are intrinsically resistant to ampicillin, cefazolin, and cefuroxime and may develop resistance to broader-spectrum β-lactams during prolonged β-lactam therapy. Carbapenems are effective empiric options but a small proportion of these species (<10%) exhibit *in vitro* resistance to ertapenem, albeit susceptible to imipenem and meropenem.

Stenotrophomonas maltophilia				
All Specimen Sources		**CAZ**	**DOXY**	**SXT**
All Patients	**% SUSC**	**30**	**77**	**94**
ALL Ages	# SUSC	110	281	340
	# TESTED	361	361	361
	% SUSC	**44**	**76**	**91**
≥ 17 years	# SUSC	76	170	205
	# TESTED	223	223	223
	% SUSC	**24**	**80**	**97**
< 17 years	# SUSC	34	111	135
	# TESTED	138	138	138

***Enterococcus* species (Including VRE)**						
All Specimen Sources		**AMP**	**GM500**	**LNZ**	**NIT**	**VAN**
All Patients	**% SUSC**	**82**	**71**	**99**	**81**	**96**
ALL Ages	# SUSC	1102	957	1312	1094	1299
	# TESTED	1339	1339	1324	1336	1344
	% SUSC	**79**	**69**	**99**	**79**	**96**
≥ 17 years	# SUSC	852	744	1051	847	1033
	# TESTED	1072	1072	1060	1069	1076
	% SUSC	**93**	**79**	**98**	**92**	**99**
< 17 years	# SUSC	250	213	261	247	266
	# TESTED	267	267	264	267	268
	% SUSC	**55**	**84**	**100**	**53**	**91**
UAH 3C3/3C4	# SUSC	29	45	53	28	48
	# TESTED	53	53	53	53	53
	% SUSC	**70**	**65**	**100**	**78**	**93**
CCI	# SUSC	33	31	47	36	44
	# TESTED	47	47	47	47	47

Enterococcus faecalis						
Blood specimens		**AMP**	**GM500**	**LNZ**	**NIT**	**VAN**
	% SUSC	**97**	**65**	**100**	**97**	**100**
ALL Ages	# SUSC	37	25	38	37	38
	# TESTED	38	38	38	38	38

Enterococcus faecium						
Blood specimens		**AMP**	**GM500**	**LNZ**	**NIT**	**VAN**
	% SUSC	**--**	**--**	**--**	**--**	**--**
ALL Ages	# SUSC	1	20	28	6	24
	# TESTED	28	28	28	28	28

Resistance rates in clinically relevant enterococci have not changed significantly over the last seven years. Identification of enterococci to the species level is only performed for sterile site isolates but vancomycin susceptibility is confirmed for ALL enterococcus isolates, regardless of specimen site. --, denotes insufficient isolates, susceptibility rates not calculated.

***Staphylococcus aureus* (Including MRSA)**									
All Specimen Sources		**CLIN**	**CLOX**	**ERY**	**LNZ**	**NIT**	**TET**	**SXT**	**VAN**
All Patients	**% SUSC**	**76**	**78**	**67**	**99**	**98**	**96**	**95**	**100**
ALL Ages	# SUSC	1696	1749	1485	2210	2169	2125	2114	2215
	# TESTED	2216	2215	2216	2212	2211	2211	2215	2215
	% SUSC	**74**	**78**	**64**	**99**	**98**	**95**	**95**	**100**
≥ 17 years	# SUSC	1273	1341	1108	1704	1675	1634	1632	1709
	# TESTED	1710	1709	1710	1706	1705	1705	1709	1709
	% SUSC	**83**	**80**	**74**	**100**	**97**	**97**	**95**	**100**
< 17 years	# SUSC	423	408	377	506	494	491	482	506
	# TESTED	506	506	506	506	506	506	506	506
	% SUSC	**76**	**79**	**66**	**100**	**100**	**95**	**94**	**100**
UAH 3C3/3C4	# SUSC	101	106	88	134	134	127	126	134
	# TESTED	134	134	134	134	134	134	134	134
	% SUSC	**71**	**90**	**61**	**100**	**98**	**95**	**95**	**100**
CCI	# SUSC	45	57	38	63	62	60	60	63
	# TESTED	63	63	63	63	63	63	63	63

Resistance and isolation rates of *S. aureus* (ie. MSSA) and methicillin-resistant *S.aureus* (MRSA) have remained relatively unchanged over the last several years. The rate of MRSA detection relative to all *S. aureus* has remained at ~20% since 2009.

Staphylococcus lugdunensis							
All Specimen Sources		**CLIN**	**CLOX**	**ERY**	**NIT**	**SXT**	**VAN**
	% SUSC	**80**	**100**	**80**	**100**	**100**	**100**
ALL Ages	# SUSC	89	110	89	110	110	110
	# TESTED	110	110	110	110	110	110

***Staphylococcus* species, coagulase-negative**							
All Specimen Sources		**CLIN**	**CLOX**	**ERY**	**NIT**	**SXT**	**VAN**
All Patients	**% SUSC**	**46**	**35**	**31**	**98**	**57**	**100**
ALL Ages	# SUSC	155	116	107	329	192	335
	# TESTED	336	329	336	333	334	335
≥ 17 years old	**% SUSC**	**47**	**35**	**33**	**98**	**56**	**100**
	# SUSC	135	101	96	280	160	286
	# TESTED	287	282	287	284	285	286
< 17 years old	**% SUSC**	**40**	**31**	**22**	**100**	**65**	**100**
	# SUSC	20	15	11	49	32	49
	# TESTED	49	47	49	49	49	49

Viridans Group Streptococci				
All Specimen Sources		**CRO**	**PEN**	**VAN**
ALL Ages	**% SUSC**	**97**	**65**	**100**
	# SUSC	97	64	100
	# TESTED	99	98	100

***Streptococcus anginosus* group**				
All Specimen Sources		**CRO**	**PEN**	**VAN**
ALL Ages	**% SUSC**	**100**	**100**	**100**
	# SUSC	37	37	37
	# TESTED	37	37	37

Streptococcus pyogenes				
All Specimen Sources		**CLIN**	**ERY**	**PEN**
ALL Ages	**% SUSC**	**90**	**90**	**100**
	# SUSC	57	57	63
	# TESTED	63	63	63

Streptococcus pneumoniae		M	NM				M, PO	NM		
All Specimen Sources		**CRO**	**CRO**	**DOXY**	**ERY**	**LEV**	**PEN**	**PEN**	**SXT**	**VAN**
All Patients	**% SUSC**	**78**	**87**	**75**	**71**	**98**	**75**	**94**	**78**	**100**
ALL Ages	# SUSC	62	69	86	88	148	118	148	96	157
	# TESTED	79	79	114	123	151	157	157	123	157
	% SUSC	**80**	**89**	**74**	**73**	**97**	**77**	**94**	**77**	**100**
≥ 17 years old	# SUSC	45	50	66	68	113	92	112	71	118
	# TESTED	56	56	89	92	116	118	118	92	118
	% SUSC	**--**	**--**	**--**	**64**	**100**	**66**	**92**	**80**	**100**
< 17 years old	# SUSC	17	19	20	20	35	26	36	25	39
	# TESTED	23	23	25	31	35	36	36	31	39

M, meningitis; NM, non-meningitis; PO, oral administration.

The susceptibility of *S. pneumoniae* to certain β-lactams is pharmacodynamically interpreted to direct appropriate therapy for meningeal (M) and non-meningeal (NM) infections, and for infections treated with oral penicillin V (PO). In 2013, resistance rates using meningeal and non-meningeal interpretations were 15% and 6% for penicillin, and 22% and 13% for ceftriaxone, respectively. Note, these rates do not reflect actual cases of pneumococcal meningitis. --, denotes insufficient isolates, susceptibility rates not calculated.

***Candida* species**					
All Specimen Sources		**AMB**	**FLUC**	**VORI**	**MICA**
C. albicans	**% SUSC**	**100**	**98**	**99**	**100**
ALL Ages	# SUSC	121	119	120	121
	# TESTED	121	121	121	121
C. glabrata	**% SUSC**	**100**	*****	**(96)**	**100**
ALL Ages	# SUSC	75		72	75
	# TESTED	75		75	75

* Not recommended for empiric therapy.
The susceptibility data for *C. glabrata* against voriconazole, shown in parentheses, is based on the established microbiological breakpoint of ≤0.5 mg/L. Currently, there is insufficient data to demonstrate a correlation of susceptibility testing and clinical outcome for *C. glabrata* infections treated with voriconazole.