

2018 UAH Antibigrams

University of Alberta Hospital

Cross Cancer Institute

Stollery Children's Hospital

Department of Laboratory Medicine and Pathology



Introduction

The antibiograms presented herein represent cumulative annual antimicrobial susceptibility rates of the most common microbial pathogens isolated from clinical specimens submitted to the University of Alberta Hospital (UAH) Clinical Microbiology Laboratory. This report represents the 2018 local susceptibility rates at the University of Alberta Hospital, Stollery Children's Hospital, and the Cross Cancer Institute, and is to be used as a resource to direct empiric antimicrobial therapy.

Antibiograms are generated by compiling 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, regardless of specimen type or body site, is selected for analysis. Susceptibility rates for organisms represented by less than 30 isolates are not included due to the limited statistical significance.

The susceptibility testing methods used by the UAH Clinical Microbiology Laboratory include VITEK-2, gradient diffusion, microbroth dilution and disk diffusion. Interpretation of susceptibility testing results is based on Clinical and Laboratory Standards Institute (CLSI) guidelines.

The data presented herein is also available at the following website: www.antibiogram.ca.

We would like to acknowledge the effort of the entire clinical microbiology technologist staff generating the data presented herein and UAH antimicrobial stewardship for helping review this document. We would also like to acknowledge Dr. Darren Hudson, UAH, for his assistance with synthesizing antibiogram data.

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**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 ADULT CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

ADULT GRAM-NEGATIVE (≥18 years old)		β-Lactams										Aminoglycosides			Other Mechanisms of Action				
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ tazobactam	Ertapenem	Meropenem	Imipenem	Cephalexin ^a	Cefixime	Ceftazidime	Ceftriaxone	Cefuroxime	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Minocycline	Trimethoprim/ sulfamethoxazole	Nitrofurantoin ^a
<i>n</i>																			
<i>Acinetobacter baumannii</i>	38				100								100	100	97		94		
<i>Citrobacter freundii</i> complex	74			c	100	100			c	c	c		100	95	97	94		89	93
<i>Citrobacter koseri</i>	30			100	100	100			96		100		100	100	100	100		100	76
<i>Klebsiella (Enterobacter) aerogenes</i>	56			c	98	100			c	c	c		100	100	100	100		100	8
<i>Enterobacter cloacae</i> complex	274			c	93	99			c	c	c		98	95	94	93		84	<u>47</u>
<i>Escherichia coli</i> (ALL)	1768	51	78	83	99	99		84	82		86		99	91	90	74		73	97
<i>Escherichia coli</i> (ESBL only)	222				99	99							97	72	62	21		39	90
<i>Haemophilus influenzae</i>	^d 72											78						60	
<i>Klebsiella pneumoniae</i> (ALL)	475		92	91	99	100		92	92		93		99	95	93	93		88	43
<i>Klebsiella pneumoniae</i> (ESBL only)	40				92	100							97	50	27	35		<u>22</u>	32
<i>Morganella morganii</i>	57			c	100	100			c	c	c		100	82	96	84		73	
<i>Proteus mirabilis</i>	169	81	97	98	99	98		95	96		97		98	94	94	86		79	
<i>Pseudomonas aeruginosa</i> (CF)	78			88 ^b		92	84				87		53	66	87	83			
<i>Pseudomonas aeruginosa</i> (non-CF)	549			86 ^b		87	85				89		97	93	96	86			
<i>Serratia marcescens</i>	69			c	100	100			c	c	c		100	100	95	100		98	
<i>Stenotrophomonas maltophilia</i>	222										41						99	96	

Underlined values represent a ≥10% decrease from the previous year.

^aUrinary tract isolates only.

^bRepresents activity of piperacillin only.

^cThis organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combination during prolonged therapy.

^dFor *Haemophilus influenzae*, denominators are as follows: Ampicillin n=237, Cefuroxime n=73, Trimethoprim/Sulfamethoxazole n=70.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 ADULT CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

ADULT GRAM-POSITIVE (≥18 years old)		β-Lactams				Other Mechanisms of Action							Aminoglycosides	
		Ampicillin	Penicillin	Ceftriaxone	Cloxacillin ^a	Clindamycin	Erythromycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline	Trimethoprim/ sulfamethoxazole	Vancomycin	Linezolid	Gentamicin ^c
<i>n</i>														
<i>Staphylococcus aureus</i> (ALL)	2035				77	77	80	99	97	95	100	100	97	
<i>Staphylococcus aureus</i> (MRSA)	460					65	29	99	95	92	100	100	91	
<i>Staphylococcus aureus</i> (MSSA)	1575				100	81	94	99	97	96	100	100	99	
<i>Coagulase-negative Staphylococcus species</i>	211				41	52	52	99	91	60	100	100	80	
<i>Staphylococcus lugdunensis</i>	84				96	89	100	100	97	100	100	100	100	
<i>Enterococcus faecalis</i>	861	99					78	98	18		99	99	75	
<i>Enterococcus faecium</i>	323	11					10	35	<u>47</u>		71	100	82	
Viridans group streptococci	77		70	96							100			
<i>Streptococcus anginosus</i> group	52		<u>86</u>	100							100			
<i>Streptococcus pyogenes</i>	56		100		87	87 ^e								
<i>Streptococcus pneumoniae</i> (meningitis BPs) ^d	151		78	86							100			
<i>Streptococcus pneumoniae</i> (non-meningitis BPs) ^d	151		98	95		77	71 ^e	98		77 ^f	78	100		

Underlined values represent a ≥10% decrease from the previous year.

^aCephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp. ^bUrinary tract isolates only. ^cUsed for synergistic purposes only.

^dBreakpoints (BPs) are defined differently for CSF and non-CSF isolates. Numbers do not reflect meningitis rates.

^eErythromycin predicts susceptibility to azithromycin. ^fTetracycline predicts susceptibility to doxycycline.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2017 and 2018 COMBINED CUMULATIVE YEAST ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

YEAST (ALL AGES, STERILE SITES)		Amphotericin B^a	Fluconazole	Micafungin
	<i>n</i>			
<i>Candida albicans</i>	95	100	100	100
<i>Candida glabrata</i>	55	98	96 ^b	95

^aUsing interpretive breakpoints from EUCAST.

^bThis number represents % susceptible dose-dependent isolates.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 PEDIATRIC CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

PEDIATRIC GRAM-NEGATIVE (<18 years old)	n	β-Lactams						Cephalosporins				Aminoglycosides			Other Mechanisms of Action			
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ tazobactam	Ertapenem	Meropenem	Imipenem	Cephalexin ^a	Cefixime	Ceftazidime	Ceftriaxone	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Minocycline	Trimethoprim/ sulfamethoxazole	Nitrofurantoin ^a
<i>Enterobacter cloacae</i> complex	49			c	97	100		c	c	c	100	100	97	89		83	63	
<i>Escherichia coli</i> (ALL)	465	54	83	89	99	99	90	90	91	91	99	91	92	90		71	98	
<i>Escherichia coli</i> (ESBL only)	32				96	100					93	62	53	46		53	100	
<i>Klebsiella pneumoniae</i>	45		89	<u>78</u>	100	100	91	<u>82</u>	<u>82</u>	<u>80</u>	96	91	91	98		91	<u>31</u>	
<i>Pseudomonas aeruginosa</i> (non-CF)	68			92 ^b		92	94		94		97	92	97	95				
<i>Stenotrophomonas maltophilia</i>	46								34						100	97		

Underlined values represent a ≥10% decrease from the previous year.

^aUrinary tract isolates only.

^bRepresents activity of piperacillin only.

^cThis organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combination during prolonged therapy.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 PEDIATRIC CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

PEDIATRIC GRAM-POSITIVE (<18 years old)		β-Lactams				Other Mechanisms of Action							Aminoglycosides		
		Ampicillin	Penicillin	Ceftriaxone	Cloxacillin ^a	Clindamycin	Erythromycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline	Trimethoprim/ sulfamethoxazole	Vancomycin	Linezolid	Gentamicin ^c	Streptomycin ^c
<i>n</i>															
<i>Staphylococcus aureus</i> (ALL)	527				77	83	74	87	99	96	94	100	100	98	
<i>Staphylococcus aureus</i> (MRSA)	119					75	46	62	100	98	92	100	100	96	
<i>Staphylococcus aureus</i> (MSSA)	408				100	86	81	94	99	96	94	100	100	98	
<i>Coagulase-negative Staphylococcus species</i>	38				39	38	28	68	100	86	68	100	100	78	
<i>Enterococcus faecalis</i>	178	100						96	99	20		100	99	85	96
<i>Streptococcus pneumoniae</i> (meningitis BPs) ^d	32		<u>77</u>	96								100			
<i>Streptococcus pneumoniae</i> (non-meningitis BPs) ^d	32		100	100		97	84 ^e	100			<u>78</u>	100			

Underlined values represent a ≥10% decrease from the previous year.

^aCephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

^bUrinary tract isolates only.

^cUsed for synergistic purposes only.

^dBreakpoints (BPs) are defined differently for CSF and non-CSF isolates. Numbers do not reflect meningitis rates.

^eFor *S. pneumoniae*, erythromycin predicts susceptibility to azithromycin.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 GSICU CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

GSICU GRAM-NEGATIVE		β-Lactams									Aminoglycosides			Other Mechanisms of Action			
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ tazobactam	Ertapenem	Meropenem	Imipenem	Cephalexin ^a	Cefixime	Ceftazidime	Ceftriaxone	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ sulfamethoxazole	Nitrofurantoin ^a
<i>n</i>																	
<i>Enterobacter cloacae</i> complex	35			^c	88	97			^c	^c	^c	100	100	100	94	91	51
<i>Escherichia coli</i>	61	41	67	72	100	100		85	72		79	100	89	90	<u>70</u>	<u>62</u>	98
<i>Pseudomonas aeruginosa</i> (non-CF)	38			78 ^b		76	76			84		94	92	97	81		

Underlined values represent a ≥10% decrease from the previous year.

^aUrinary tract isolates only.

^bRepresents activity of piperacillin only.

^cThis organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combination during prolonged therapy.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 GSICU CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

GSICU GRAM-POSITIVE		β-Lactams		Other Mechanisms of Action						Aminoglycosides	
		Ampicillin	Cloxacillin ^a	Clindamycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline	Trimethoprim/ sulfamethoxazole	Vancomycin	Linezolid	Gentamicin ^c
<i>n</i>											
<i>Staphylococcus aureus</i>	154		77	73	85	100	95	97	100	100	97
<i>Staphylococcus aureus</i> (MRSA)	35			61	48	100	85	91	100	100	91
<i>Staphylococcus aureus</i> (MSSA)	119		100	77	95	100	98	98	100	100	99
<i>Enterococcus faecalis</i>	30	100			73	96	16		100	100	73
<i>Enterococcus faecium</i>	34	2			6	<u>27</u>	50		<u>61</u>	100	<u>70</u>

Underlined values represent a ≥10% decrease from the previous year.

^aCephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

^bUrinary tract isolates only.

^cUsed for synergistic purposes only.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2018 CROSS CANCER INSTITUTE CUMULATIVE GRAM-NEGATIVE and GRAM POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

CROSS CANCER INSTITUTE GRAM-NEGATIVE		β-Lactams									Aminoglycosides			Other Mechanisms of Action		
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ tazobactam	Ertapenem	Meropenem	Imipenem	Cephalexin ^a	Cefixime	Ceftriaxone	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ sulfamethoxazole	Nitrofurantoin ^a
<i>Escherichia coli</i>	<i>n</i> 69	<u>48</u>	75	87	99	100		<u>79</u>	87	90	99	<u>86</u>	83	74	<u>61</u>	96

Underlined values represent a ≥10% decrease from the previous year.

^aUrinary tract isolates only.

CROSS CANCER INSTITUTE GRAM-POSITIVE		β-Lactams		Other Mechanisms of Action						Aminoglycosides	
		Ampicillin	Cloxacillin ^a	Clindamycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline	Trimethoprim/ sulfamethoxazole	Vancomycin	Linezolid	Gentamicin ^c
<i>Staphylococcus aureus</i>	<i>n</i> 30		90	87	87	100	100	100	100	100	100
<i>Enterococcus faecalis</i>	37	100			77	100	13		100	100	86

^aCephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

^bUrinary tract isolates only.

^cUsed for synergistic purposes only.