

2019 UAH Antibigrams

University of Alberta Hospital

Cross Cancer Institute

Stollery Children's Hospital



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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 2019 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 unless otherwise indicated.

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

We would like to acknowledge the effort of the APL - UAH Clinical Microbiology staff for generating the data presented herein. We would also like to thank the UAH/MAZ/KEC Antimicrobial Stewardship Program and the Stollery Children's Hospital Antimicrobial Stewardship Program for helping review this document. Lastly, we would like to acknowledge Dr. Darren Hudson, UAH, for his assistance with synthesizing antibiogram data.

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**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2019 ADULT CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

ADULT GRAM-NEGATIVE (≥18 years old)	n	β-Lactams										Aminoglycosides		Other Mechanisms of Action			
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ Tazobactam	Ertapenem	Meropenem	Imipenem	Cephalixin ^a	Cefixime	Ceftazidime	Ceftriaxone	Cefuroxime	Gentamicin	Tobramycin	Ciprofloxacin	Minocycline	Trimethoprim/ Sulfamethoxazole
<i>Acinetobacter baumannii</i>	34			85		100			85			100		100		97	
<i>Citrobacter freundii</i> complex	75			^b	96	99			^b	^b	^b	99	99	<u>84</u>		89	96
<i>Citrobacter koseri</i>	38			92	97	100			89		92	97	100	97		95	79
<i>Enterobacter cloacae</i> complex	229			^b	91	99			^b	^b	^b	97	96	89		88	40
<i>Escherichia coli</i> (ALL)	1704	50	78	89	99	99		84	83		86	85	90	66		71	96
<i>Escherichia coli</i> (ESBL only)	217				99	99						77	66	<u>10</u>		37	87
<i>Haemophilus influenzae</i>	^c	71														64	
<i>Klebsiella (Enterobacter) aerogenes</i>	67			^b	99	99			^b	^b	^b	97	99	94		95	7
<i>Klebsiella oxytoca</i>	180		91	92	100	99			99		94	99	99	94		92	84
<i>Klebsiella pneumoniae</i> (ALL)	477		93	93	99	99		93	92		93	96	95	88		90	34
<i>Klebsiella pneumoniae</i> (ESBL only)	33				100	100						61	52	27		33	<u>15</u>
<i>Morganella morganii</i>	61			^b	100	100			^b	^b	^b	87	90	<u>72</u>		75	
<i>Proteus mirabilis</i>	169	83	94	100	100	100		97	96		98	94	96	80		85	
<i>Pseudomonas aeruginosa</i> (CF)	102			89		<u>82</u>		<u>72</u>			90	63	82	<u>53</u>			
<i>Pseudomonas aeruginosa</i> (non-CF)	593			84		90		89			90	90	95	78			
<i>Serratia marcescens</i>	78			^b	99	99			^b	^b	^b	99	94	92		97	
<i>Stenotrophomonas maltophilia</i>	201										41					99	97

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

^aUrinary tract isolates only.

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

^cFor *Haemophilus influenzae*, denominators are as follows: Ampicillin n=153, Cefuroxime n=52 (Jan-Nov 2019 data), Trimethoprim/Sulfamethoxazole n=50.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2019 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)	2021				77	81		80	99	96	95	100	100	98
<i>Staphylococcus aureus</i> (MRSA)	471					75		31	99	95	96	100	100	96
<i>Staphylococcus aureus</i> (MSSA)	1598				100	82		94	99	96	95	100	100	99
<i>Coagulase-negative Staphylococcus species</i>	201				43	56		54	100	93	64	100	100	83
<i>Staphylococcus lugdunensis</i>	68				97	91		97	100	96	100	100	100	100
<i>Enterococcus faecalis</i>	857	99						78	99	21		99	99	78
<i>Enterococcus faecium</i>	338	8						9	<u>22</u>	<u>29</u>		78	99	87
Viridans group streptococci	66		<u>56</u>	97								100		
<i>Streptococcus anginosus</i> group	47		87	98								100		
<i>Streptococcus pyogenes</i>	57		100			91	91 ^e							
<i>Streptococcus pneumoniae</i> (meningitis BPs) ^d	140		76	88								100		
<i>Streptococcus pneumoniae</i> (non-meningitis BPs) ^d	140		99	96		89	72 ^e	99		81 ^f	71	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
2019 CUMULATIVE YEAST ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

YEAST (ALL AGES, STERILE SITES)		Amphotericin B^a	Fluconazole	Micafungin
<i>n</i>				
<i>Candida albicans</i>	36	100	100	100
<i>Candida glabrata</i>	30	100	87 ^b	100

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

^aUsing interpretive breakpoints from EUCAST.

^bThis number represents % susceptible dose-dependent isolates.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2019 CUMULATIVE ANAEROBE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

ADULT ANAEROBE (≥18 years old)		Penicillin	Clindamycin	Meropenem	Metronidazole
<i>n</i>					
<i>Bacteroides fragilis</i>	37	0	49	95	96

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

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2019 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	Gentamicin	Tobramycin	Ciprofloxacin	Minocycline	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
<i>Enterobacter cloacae</i> complex	45			^b	93	100			^b	^b	^b	96	96	96		82	56
<i>Escherichia coli</i> (ALL)	557	52	83	93	100	100	90	91	93	92	92	92	<u>79</u>		71	97	
<i>Escherichia coli</i> (ESBL only)	43				100	100					74	63	<u>28</u>		<u>28</u>	<u>86</u>	
<i>Klebsiella oxytoca</i>	38		95	97	100	100	^c	95	97	95	92	92	89		89	84	
<i>Klebsiella pneumoniae</i>	54		89	93	100	100	^c	89	89	91	89	89	89		89	46	
<i>Pseudomonas aeruginosa</i> (non-CF)	99			92		92			96		89	97	91				
<i>Stenotrophomonas maltophilia</i>	65								35					100	100		

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

^aUrinary tract isolates only.

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

^cInsufficient number of isolates tested to report.

**UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2019 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)	583				77	85	71	84	99	97	91	100	100	97	
<i>Staphylococcus aureus</i> (MRSA)	137					82	39	<u>48</u>	100	99	91	100	100	97	
<i>Staphylococcus aureus</i> (MSSA)	461				100	86	81	94	99	97	90	100	100	98	
<i>Coagulase-negative Staphylococcus species</i>	36				31	54	44	64	100	94	<u>53</u>	100	100	<u>64</u>	
<i>Enterococcus faecalis</i>	182	100						95	99	20		100	100	81	92
<i>Streptococcus pneumoniae</i> (meningitis BPs) ^d	45		69	91								100			
<i>Streptococcus pneumoniae</i> (non-meningitis BPs) ^d	45		100	93		89	<u>73</u> ^e	100			<u>64</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
2019 GSICU CUMULATIVE GRAM-NEGATIVE AND GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)**

GSICU GRAM-NEGATIVE		β-Lactams							Aminoglycosides		Other Mechanisms of Action		
		Ampicillin	Amoxicillin/ Clavulanate	Piperacillin/ Tazobactam	Ertapenem	Meropenem	Cefixime	Ceftriaxone	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
<i>n</i>													
<i>Escherichia coli</i>	43	40	62	79	95	100	74	78	95	98	74	79	93

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

Other Gram negative organisms were in insufficient quantities to report on this year's antibiogram.

^aUrinary tract isolates only.

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>	106		79	80	82	100	98	96	100	100	98

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

Other Gram positive organisms were in insufficient quantities to report on this year's antibiogram.

^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
2019 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	Cephalexin ^a	Cefixime	Ceftriaxone	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
	<i>n</i>													
<i>Escherichia coli</i>	80	58	80	90	99	99	87	86	88	91	89	75	80	95

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

Other Gram negative organisms were in insufficient quantities to report on this year's antibiogram.

^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>n</i>										
<i>Staphylococcus aureus</i>	52		85	83	83	100	96	96	100	100	96
<i>Enterococcus faecalis</i>	35	100			91	97	21		100	100	79

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

Other Gram positive organisms were in insufficient quantities to report on this year's antibiogram.

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

^bUrinary tract isolates only.

^cUsed for synergistic purposes only.