

2022 UAH Antibigrams

University of Alberta Hospital
Cross Cancer Institute
Stollery Children's Hospital



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 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. The data presented represents cultures collected between **January 1, 2022 and Dec 4, 2022**.

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 limited statistical significance.

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

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.

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UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2022 ADULT CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

ADULT GRAM-NEGATIVE (≥18 years old)	<i>n</i>	Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cephalexin ^a	Cefixime	Ceftazidime	Ceftriaxone	Ertapenem	Meropenem	Imipenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
<i>Citrobacter freundii</i> complex	87	R	R	^b	R	^b	^b	^b	100	100		90	90	82		83	93
<i>Enterobacter cloacae</i> complex	263	R	R	^b	R	^b	^b	^b	89	99		98	97	89		89	47
<i>Escherichia coli</i> (ALL)	1602	52	76	96	84	83		85	100	100		91	91	64		76	96
<i>Escherichia coli</i> (ESBL only)	206	R			R	R	R	R	99	100		73	67	8		43	89
<i>Klebsiella (Enterobacter) aerogenes</i>	43	R	R	^b	R	^b	^b	^b	93	95		100	95	86		93	
<i>Klebsiella oxytoca</i>	143	R	90	92		96		92	100	100		97	97	92		94	85
<i>Klebsiella pneumoniae</i>	416	R	88	94	89	89		89	99	100		95	94	83		88	28
<i>Klebsiella pneumoniae</i> (ESBL only)	38	R			R	R	R	R	100	100		55	50	18		29	16
<i>Morganella morganii</i>	56	R	R	^b	R	^b	^b	^b	100	100		89	91	73		73	R
<i>Proteus mirabilis</i>	178	85	98	100	97	98		98	100	100		93	94	84		78	R
<i>Pseudomonas aeruginosa</i> (CF)	129	R	R	92		R	90	R	R	88	71		84	62		R	
<i>Pseudomonas aeruginosa</i> (non-CF)	508	R	R	95		R	92	R	R	90	90		97	86		R	
<i>Serratia marcescens</i>	83	R	R	^b	R	^b	^b	^b	99	99		98	94	90		100	R
<i>Stenotrophomonas maltophilia</i>	140	R	R	R			41	R	R	R	R	R	R		<u>81</u>	100	

Underlined values represent a ≥10% decrease from the previous year; CF: cystic fibrosis.

^aUrinary tract isolates only with at least 30 unique isolates only.

^bThis organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combinations *in vivo*.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2022 ADULT CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

ADULT GRAM-POSITIVE (≥18 years old) <i>n</i>		Ampicillin	Penicillin	Ceftriaxone	Cloxacillin ^a	Clindamycin	Erythromycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline ^c	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid
<i>Staphylococcus aureus</i> (ALL)	1625				75	84		78	99	96	91	100	100
<i>Staphylococcus aureus</i> (MRSA)	397				R	84		27		94	90	100	100
<i>Staphylococcus aureus</i> (MSSA)	1228				100	84		95	99	97	92	100	100
<i>Coagulase-negative Staphylococcus species</i>	267				34	58		55		88	60	100	100
<i>Staphylococcus lugdunensis</i>	69				94	90		100		100	100	100	100
<i>Enterococcus faecalis</i>	874	100							100	21		99	100
<i>Enterococcus faecium</i>	314	9							15	20		61 ^d	99
Viridans group streptococci	43		70	100		83						100	
<i>Streptococcus anginosus</i> group	33		100	100		81						100	
<i>Streptococcus pneumoniae</i> (meningitis BPs) ^e	98		77	87								98	
<i>Streptococcus pneumoniae</i> (non-meningitis BPs) ^e	98		98	100		90	76 ^f	100		85	74	98	

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

^bUrinary tract isolates only with at least 30 unique isolates.

^cTetracycline susceptibility predicts susceptibility to doxycycline.

^dOf the vancomycin-resistant *Enterococcus faecium* isolates tested against daptomycin, 23/24 (96%) were susceptible dose-dependent.

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

^fErythromycin predicts susceptibility to azithromycin.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM 2021/2022 CUMULATIVE YEAST ISOLATES (PERCENT SUSCEPTIBLE)				
YEAST (ALL AGES, STERILE SITES)		Amphotericin B ^a	Fluconazole	Micafungin
	<i>n</i>			
<i>Candida albicans</i>	84	100	98	100
<i>Candida glabrata</i>	59	98	92 ^b	100

^aUsing interpretive breakpoints from EUCAST.

^bRepresents susceptible dose-dependent isolates.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2022 PEDIATRIC CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

PEDIATRIC GRAM-NEGATIVE (<18 years old)	n	Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cephalexin ^a	Cefixime	Ceftazidime	Ceftriaxone	Ertapenem	Meropenem	Imipenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
<i>Enterobacter cloacae</i> complex	36	R	R	^b	R	^b	^b	^b	92	100		94	94	86		86	
<i>Escherichia coli</i> (ALL)	383	55	80	98	89	90	92	91	100	100		93	93	77		77	99
<i>Escherichia coli</i> (ESBL only)	34	R			R	R	R	R	100	100		65	62	12		44	
<i>Klebsiella oxytoca</i>	42	R	95	98		100	100	98	100	100		100	100	95		95	98
<i>Klebsiella pneumoniae</i>	48	R	92	100	91	98	98	96	100	100		100	100	98		92	40
<i>Pseudomonas aeruginosa</i> (non-CF)	76	R	R	95		R	93	R	R	89	91		97	89		R	
<i>Pseudomonas aeruginosa</i> (CF)	30	R	R	100		R	100	R	R	97	90		100	93		R	
<i>Stenotrophomonas maltophilia</i>	39	R	R	R			36	R	R	R	R	R	R		95	100	

^aUrinary tract isolates only with at least 30 unique isolates.

^bThis organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combinations *in vivo*.

CF: cystic fibrosis

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM 2022 PEDIATRIC CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)														
PEDIATRIC GRAM-POSITIVE (<18 years old)		Ampicillin	Penicillin	Ceftriaxone	Cloxacillin ^a	Clindamycin	Erythromycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline ^c	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid	Gentamicin ^d
<i>n</i>														
<i>Staphylococcus aureus</i> (ALL)	443				81	86	73	86		97	90	100	100	99
<i>Staphylococcus aureus</i> (MRSA)	82				R	87	37	40		94	83	100	100	98
<i>Staphylococcus aureus</i> (MSSA)	361				100	87	82	97		97	91	100	100	99
<i>Coagulase-negative Staphylococcus species</i>	49				41	63	37	79		98	67	100	100	86
<i>Enterococcus faecalis</i>	188	100							99	24		100	100	91

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

^bUrinary tract isolates only with 30 unique isolates.

^cTetracycline susceptibility predicts susceptibility to doxycycline.

^dUsed for synergistic purposes only.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2022 GSICU CUMULATIVE GRAM-NEGATIVE AND GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

GSICU GRAM-NEGATIVE		Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cefixime	Ceftazidime	Ceftriaxone	Ertapenem	Meropenem	Imipenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimethoprim/ Sulfamethoxazole
<i>n</i>															
<i>Escherichia coli</i>	42	43	60	90	79		81	100	100		90	83	62		<u>55</u>
<i>Pseudomonas aeruginosa</i>	31	R	R	97	R	91	R	R	81	87		<u>84</u>	87		R

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

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

GSICU GRAM-POSITIVE		Cloxacillin ^a	Clindamycin	Levofloxacin	Tetracycline ^b	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid
<i>n</i>								
<i>Staphylococcus aureus</i> (ALL)	143	75	82	82	99	95	100	100
<i>Staphylococcus aureus</i> (MRSA)	36	R	86	36	97	92	100	100
<i>Staphylococcus aureus</i> (MSSA)	108	100	80	97	99	96	100	100

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.

^bTetracycline susceptibility predicts susceptibility to doxycycline.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2022 CROSS CANCER INSTITUTE CUMULATIVE GRAM-NEGATIVE and GRAM POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

CROSS CANCER INSTITUTE GRAM-NEGATIVE		Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cephalexin ^a	Cefixime	Ceftriaxone	Ertapenem	Meropenem	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin ^a
	<i>n</i>													
<i>Escherichia coli</i>	68	63	79	94	83	78	82	100	100	90	90	68	81	96

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

^aUrinary tract isolates only.

CROSS CANCER INSTITUTE GRAM-POSITIVE		Ampicillin	Cloxacillin ^a	Clindamycin	Levofloxacin	Nitrofurantoin ^b	Tetracycline ^c	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid
	<i>n</i>									
<i>Staphylococcus aureus</i>	46		96	93	93		96	100	100	100
<i>Enterococcus faecalis</i>	32	100				100	25	R	100	100

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 with 30 unique isolates.

^cTetracycline susceptibility predicts susceptibility to doxycycline.