2021 UAH Antibiograms

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 2021 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 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.

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. Finally, we would like to thank Dr. Darren Hudson for maintaining www.antibiogram.ca.

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UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 ADULT CUMULATIVE GRAM-NEGATIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

ADULT 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]**
Citrobacter freundii complex	90	R	R	[b]	R	[b]	[b]	[b]	99	99		93	89	71		77	91
Citrobacter koseri	49	R	96	98		98		98	100	100		100	100	96		98	80
Enterobacter cloacae complex	249	R	R	[b]	R	[b]	[b]	[b]	90	99		98	96	87		89	44
Escherichia coli (ALL)	1727	54	76	97	83	83		86	100	100		91	91	63		75	96
Escherichia coli (ESBL only)	208	R			R	R	R	R	100	100		71	66	5		44	88
Haemophilus influenzae	80	76															
Klebsiella (Enterobacter) aerogenes	49	R	R	[b]	R	[b]	[b]	[b]	100	100		100	100	92		98	
Klebsiella oxytoca	135	R	94	96		98		96	100	100		99	99	93		93	82
Klebsiella pneumoniae	438	R	92	96	92	93		93	100	100		97	97	83		89	32
Morganella morganii	48	R	R	[b]	R	[b]	[b]	[b]	100	100		83	96	79		79	R
Proteus mirabilis	180	85	96	100	97	98		98	100	100		91	93	87		80	R
Pseudomonas aeruginosa (CF)	106	R	R	90		R	82	R	R	85	73		84	67		R	
Pseudomonas aeruginosa (non-CF)	481	R	R	95		R	91	R	R	92	89		97	83		R	
Serratia marcescens	63	R	R	[b]	R	[b]	[b]	[b]	100	100		100	97	92		98	R
Stenotrophomonas maltophilia	160	R	R	R			41	R	R	R	R	R	R		91	99	

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

[a]Urinary tract isolates only with at least 30 unique isolates only.

[b]This organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combinations *in vivo*.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 ADULT CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

ADULT GRAM-POSITIVE (≥18 years old)	*n*	**Ampicillin**	**Penicillin**	**Ceftriaxone**	**Cloxacillin**[a]	**Clindamycin**	**Erythromycin**	**Levofloxacin**	**Nitrofurantoin**[b]	**Tetracycline**[c]	**Trimethoprim/ Sulfamethoxazole**	**Vancomycin**	**Linezolid**
Staphylococcus aureus (ALL)	1784				76	82		79	99	96	93	100	100
Staphylococcus aureus (MRSA)	430				R	79		28		95	92	100	100
Staphylococcus aureus (MSSA)	1352				100	83		95	100	97	93	100	100
Coagulase-negative Staphylococcus species	245				36	55		54		87	57	100	100
Staphylococcus lugdunensis	81				98	91		99		100	100	100	100
Enterococcus faecalis	827	100							99	21		99	99
Enterococcus faecium	304	11							18	26		64[d]	99
Viridans group streptococci	39		64	97		87						100	
Streptococcus anginosus group	45		100	100		84						100	
Streptococcus pneumoniae (meningitis BPs)[e]	77		71	75								100	
Streptococcus pneumoniae (non-meningitis BPs)[e]	77		98	100		91	65[f]	100		77	78	100	

[a]Cephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

[b]Urinary tract isolates only with at least 30 unique isolates.

[c]Tetracycline susceptibility predicts susceptibility to doxycycline.

[d]Of the vancomycin-resistant *Enterococcus faecium* isolates tested against daptomycin, 27/27 (100%) were susceptible dose-dependent.

[e]Interpretive breakpoints (BPs) are defined differently for CSF and non-CSF isolates. Numbers do not reflect meningitis rates.

[f]Erythromycin predicts susceptibility to azithromycin.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 CUMULATIVE YEAST ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

YEAST (ALL AGES, STERILE SITES)	*n*	Amphotericin B[a]	Fluconazole	Micafungin
Candida albicans	55	100	96	100
Candida glabrata	34	97	94[b]	100

[a]Using interpretive breakpoints from EUCAST.

[b]Represents susceptible dose-dependent isolates.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 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]**
Enterobacter cloacae complex	40	R	R	[b]	R	[b]	[b]	[b]	93	100		98	98	90		85	
Escherichia coli (ALL)	479	56	81	97	91	89	92	91	99	99		92	92	77		78	98
Escherichia coli (ESBL only)	38	R			R	R	R	R	100	100		63	55	11		47	
Klebsiella pneumoniae	48	R	94	98	95	96	96	96	100	100		98	98	88		88	<u>21</u>
Pseudomonas aeruginosa (non-CF)	68	R	R	99		R	97	R	R	94	91		100	97		R	
Stenotrophomonas maltophilia	57	R	R	R			35	R	R	R	R	R	R		100	100	

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

[a]Urinary tract isolates only with at least 30 unique isolates.

[b]This organism may develop resistance to third generation cephalosporins and beta-lactam/beta-lactamase inhibitor combinations *in vivo*.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 PEDIATRIC CUMULATIVE GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

PEDIATRIC GRAM-POSITIVE (<18 years old)	*n*	**Ampicillin**	**Penicillin**	**Ceftriaxone**	**Cloxacillin[a]**	**Clindamycin**	**Erythromycin**	**Levofloxacin**	**Nitrofurantoin[b]**	**Tetracycline[c]**	**Trimethoprim/ Sulfamethoxazole**	**Vancomycin**	**Linezolid**	**Gentamicin[d]**
Staphylococcus aureus (ALL)	489				82	86	74	86		98	88	100	100	*97*
Staphylococcus aureus (MRSA)	86				R	91	41	46		98	83	100	100	*91*
Staphylococcus aureus (MSSA)	403				100	85	81	95		98	89	100	100	*98*
Coagulase-negative Staphylococcus species	51				39	54	37	59		98	59	100	100	*65*
Enterococcus faecalis	154	100		R		R			98	29	R	100	100	*85*

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

[a]Cephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

[b]Urinary tract isolates only with 30 unique isolates.

[c]Tetracycline susceptibility predicts susceptibility to doxycycline.

[d]Used for synergistic purposes only.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 GSICU CUMULATIVE GRAM-NEGATIVE AND GRAM-POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

GSICU GRAM-NEGATIVE	*n*	Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cefixime	Ceftazidime	Ceftriaxone	Ertapenem	Meropenem	Imipenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Trimethoprim/ Sulfamethoxazole
Escherichia coli	54	52	63	83	81		81	100	100		96	96	65		70
Pseudomonas aeruginosa	35	R	R	91	R	86	R	R	80	80		100	74		R
Stenotrophomonas maltophilia	33	R	R	R		18	R	R	R	R	R	R		88	100

GSICU GRAM-POSITIVE	*n*	Cloxacillin[a]	Clindamycin	Levofloxacin	Tetracycline[b]	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid
Staphylococcus aureus (ALL)	156	75	77	84	99	94	100	100
Staphylococcus aureus (MRSA)	39	R	72	49	97	95	100	100
Staphylococcus aureus (MSSA)	117	100	79	96	99	94	100	100

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

[a]Cephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.

[b]Tetracycline susceptibility predicts susceptibility to doxycycline.

UNIVERSITY OF ALBERTA HOSPITAL ANTIBIOGRAM
2021 CROSS CANCER INSTITUTE CUMULATIVE GRAM-NEGATIVE and GRAM POSITIVE ISOLATES (PERCENT SUSCEPTIBLE ISOLATES)

CROSS CANCER INSTITUTE GRAM-NEGATIVE	*n*	Ampicillin	Amoxicillin/ Clavulanate (PO)	Piperacillin/ Tazobactam	Cephalexin[a]	Cefixime	Ceftriaxone	Ertapenem	Meropenem	Gentamicin	Tobramycin	Ciprofloxacin	Trimethoprim/ Sulfamethoxazole	Nitrofurantoin[a]
Escherichia coli	81	65	81	95	84	85	88	100	100	94	81	64	86	100

Underlined values represent a ≥10% decrease from the previous year.
[a]Urinary tract isolates only.

CROSS CANCER INSTITUTE GRAM-POSITIVE	*n*	Ampicillin	Cloxacillin[a]	Clindamycin	Levofloxacin	Nitrofurantoin[b]	Tetracycline[c]	Trimethoprim/ Sulfamethoxazole	Vancomycin	Linezolid
Staphylococcus aureus	54		91	87	93		93	96	100	100
Enterococcus faecalis	34	100				100	15	R	100	100

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.
[a]Cephalosporin (e.g., cefazolin) activity inferred by activity of cloxacillin for *Staphylococcus* spp.
[b]Urinary tract isolates only with 30 unique isolates.
[c]Tetracycline susceptibility predicts susceptibility to doxycycline.