2016 Antibiogram

Central Zone

Alberta Health Services

including

Red Deer Regional Hospital

St. Mary's Hospital, Camrose

Alberta Health Services

Introduction

This antibiogram is a cumulative report of the antimicrobial susceptibility rates of common microbial pathogens isolated from infections in samples submitted to the Red Deer Regional Hospital and to Camrose St. Mary's Hospital Microbiology laboratories to antimicrobials available on the hospital formularies. These cumulative data in general reflect overall rates of antimicrobial susceptibilities throughout Central Zone since the large majority of samples submitted from the Central Zone are processed in these two hospital microbiology laboratories. The antibiogram is intended to be used as an *in vitro* resource to assist with empiric antimicrobial therapy.

The antibiogram represents the results of first clinical isolates, collected from individual patients, in a calendar year from a specific body site. The rationale is to avoid over-representation of antimicrobial resistance that may develop during prolonged stays in hospital. Susceptibility rates for individual species (or groups of similar species) of less than 30 isolates are not calculated, due to limited statistical significance and interpretive value.

This antibiogram contains summary data for the 2016 calendar year and is divided alphabetically into Gram-negative and Gram-positive bacterial species. Specific anaerobic bacteria are included in the lists even if they have fewer than 30 strains isolated. Yeast isolates are not included because the laboratories do not perform susceptibility testing on yeasts (or fungi). For susceptibility results on those micro-organisms the reader can consult http://www.antibiogram.ca

A significant amount of work is required to generate these data, and the efforts of Debbie Dyrland and Valerie Burton in the Microbiology Laboratories are gratefully acknowledged.

The Antibiogram is available in PDF format at http://www.albertahealthservices.ca/lab/Page3294.aspx

Inquiries and feedback can be directed to Dr. Robert Rennie, Microbiology Consultant at robert.rennie@albertahealthservices.ca

Comments on Bacterial species included in the Antibiogram

Gram-negative bacteria

Acinetobacter includes both the *A. baumannii* complex, *A. lwoffii*, and unspeciated isolates.

Bacteroides includes both *B. fragilis*, and *B. fragilis* group isolates (*B. thetaiotaomicron, B. ovatus, B. uniformis* and *B. vulgatus*). Piperacillin-tazobactam is not reported for 2016. The agent was not available for testing for a large portion of the year.

Citrobacter species are separated from *C. freundii* and include *C. amalonaticus, C. braakii, C. koseri, C. werkmanii , C. youngae*, and unspeciated isolates.

Enterobacter species include unspeciated isolates other than *E. aerogenes* and *E. cloacae* complex.

Extended spectrum beta-lactamase producing strains of Enterobacteriaceae are included with their specific genera (e.g. *E. coli* and *Klebsiella*).

Gram-positive bacteria

Beta-haemolytic streptococci are grouped together and include. *S. pyogenes* (Group A), *S. agalactiae* (Group B) *S. equisimilis*, *S. equi* and *S. zooepidemicus* (Group C and Group G) isolates.

Coagulase negative staphylococci include *S. epidermidis*, and a variety of other species. Most of the coagulase negative staphylococci isolated are considered part of normal flora, and antimicrobial susceptibilities are not routinely performed on these micro-organisms.

Vancomycin –resistant enterococci (VRE) are included and separated from *E. faecalis and E. faecium* isolates for epidemiological purposes (less than 30 isolates in 2016) and to provide information for treatment options in cases of serious infections with these organisms. For 2016, there were only two isolates of E. faecalis VRE isolated; the rest were *E. faecium*.

Staphylococcus aureus is divided into MSSA and MRSA strains for epidemiological purposes and for treatment options for MRSA as required.

The *Streptococcus anginosus* group includes *S. anginosus, S. constellatus* and *S. intermedius* species. All these species are generally grouped for reporting purposes as *S. anginosus* group since they have similar antimicrobial susceptibility patterns. For 2016, *Streptococcus bovis* group has been added.

For other species not listed in the Tables (e.g., fewer than 30 isolates), information is available on a specific basis by contacting Dr. Robert Rennie through the Microbiology Laboratory at Red Deer Regional Hospital 1-403-343-4731.

Comments on the 2016 Antibiogram

Note:

In the **2015** Antibiogram, a small number of susceptibilities were inadvertently reported in error.

e.g. *Enterobacter sp*. and *Citrobacter fruendii*. Intrinsic resistance in to amoxicillin-clavulanate.

Klebsiella oxytoca. Overcalled resistance in to amoxicillin-clavulanate.

Haemophilus influenzae. Overcalled resistance to Ceftriaxone.

Bacteroides fragilis group. Amikacin and nitrofurantoin were inadvertently included in the data set.

These errors have been resolved and the data are correct for the 2016 Antibiogram.

Summary of Susceptibility Rate Changes in the 2016 Antibiogram

Greater than 5% change year over year. In some cases fewer isolates within a species may accentuate differences. Presence of strains with specific mechanisms of resistance may also alter overall susceptibility rates for certain antimicrobial agents. For details, please consult the Microbiologist for Central Zone.

Gram-negative bacteria

- *Acinetobacter species*. Reduced susceptibility to most antimicrobials reported by 10 – 20%.
- *Citrobacter fruendii*. 8% increased susceptibility to SXT.
- *Citrobacter species*. 15% increased susceptibility to Nitrofurantoin.
- *Enterobacter cloacae* complex and *Enterobacter sp.* 11 – 17% increased susceptibility to Nitrofurantoin.
  Haemophilus influenzae. Decreased susceptibility to Ampicillin, meropenem and SXT
- *K. oxytoca* and *K. pneumoniae*. Increased susceptibility to Nitrofurantoin.
- *M. morganii*. 18% decreased susceptibility tetracycline.
- *P. mirabilis*. 9% increased susceptibility to amoxicillin-clavulanate.

Gram-positive bacteria

- Coagulase-negative staphylococci. Some changes in susceptibility may occur that are a result of different species being isolated. Since most coagulase negative staphylococci are not speciated these changes cannot be quantified readily.
- *E. faecium* and VRE. 10% increased susceptibility to Nitrofurantoin.
- S. aureus – MSSA. Inducible Clindamcyin Resistance. In the Table the Header is % S (susceptible), so only 15% of MSSA strains had inducible clindamycin resistance in 2016.
- *S. pneumoniae*. 20 – 25% increased susceptibility to erythromycin and SXT. Increased susceptibility to penicillin (oral) and decreased susceptibility to penicillin (non-meningitis breakpoint). These changes tend to reflect occurrence of different strains in the population. No significant change in the penicillin (meningitis breakpoint) susceptibility rates.

For additional information on interpretation of the Tables or on antimicrobial agents not reported in the Tables, please contact the Microbiologist through one of the laboratories in Central Zone.

Abbreviations

Abbreviation Glossary for Antimicrobials in this Antibiogram

Antimicrobial	Abbreviation	Antimicrobial	Abbreviation
Amikacin	AMK	Levofloxacin	LEV
Ampicillin	AMP	Linezolid	LNZ
Amoxicillin-Clavulanate	AMC	Meropenem	MERO
Ceftriaxone	CAX	Metronidazole	MTZ
Ceftazidime	CAZ	Nitrofurantoin	NIT
Ciprofloxacin	CIP	Penicillin	PEN
Clindamycin	CLIN	Penicillin-meningitis	P-MEN
Cloxacillin	CLOX	Penicillin non-meningitis	P- NMEN
Doxycycline	DOXY	Piperacillin-Tazobactam	P-T
Ertrapenem	ERT	Rifampin	RIF
Erythromycin	ERY	Streptomycin Synergy	STRSYN
Fosfomycin	FOS	Tetracycline	TET
Gentamicin	GEN	Tigecycline	TIG
Gentamicin Synergy	GM500	Tobramycin	TOB
Imipenem	IMI	Trimethoprim-sulfamethoxazole	SXT
Inducible Clinda Resist.	ICR	Vancomycin	VAN

Gram-negative bacteria (2016)	Antimicrobial Agent (% S)																			
Organism (No.)	Amikacin (AMK)	Amox/Clav (AMC)	Ampicillin (AMP)	Ceftazidime (CAZ)	Ceftriaxone (CAX)	Ciprofloxacin (CIP)	Clindamycin (CLIN)	Doxycycline (DOXY)	Ertapenem (ERT)	Fosfomycin (FOS)	Gentamicin (GEN)	Imipenem (IMI)	Meropenem (MERO)	Metronidazole (MTZ)	Nitrofurantoin (NIT)	Piperacillin/ Tazobactam(P-T)	Tetracycline (TET)	Tobramycin (TOB)	Trimethoprim/ Sulpha (SXT)	Levofloxacin (LEV)
Acinetobacter species (33)	94	41	37	61	0	100					100		96		0	81	100	91	89	
Bacteroides fragilis group (16)							75							100						
Citrobacter freundii (99)	100	0	0	90	87	95			100		98		100		97	89	86	99	86	
Citrobacter species (251)	100	61	16	92	91	97			99		98		100		93	94	91	98	94	
Enterobacter aerogenes (85)	100	0	0	95	94	98			100		100		100		16	92	95	100	99	
Enterobacter cloacae complex (314)	100	0	0	83	80	97			88		99		97		39	84	90	99	93	
Enterobacter species (81)	100	11	0	88	88	95			94		99		99		44	89	88	100	89	
Escherichia coli (9585 incl ESBL's)	99	84	60	93	93	83			100	98	93	99	100		97	96	77	93	80	
Haemophilus influenzae (54)			43		97								83						62	
Klebsiella oxytoca (305 incl ESBL's)	100	93	0	98	95	99			100		98		100		87	94	94	98	97	
Klebsiella pneumoniae (1352 incl ESBL's)	100	97	0	98	98	97			100		98		100		48	97	91	98	96	
Morganella morganii (109)	99	0	0	85	89	80			99		83		99		0	95	30	90	71	
Proteus mirabilis (515)	99	94	77	98	98	82			99		94		100		0	99	0	95	76	
Pseudomonas aeruginosa (596)	96	0	0	91	0	88			0		93		93		0	90	0	99	0	
Serratia marcescens (63)	100	0	0	100	98	100			98		100		98		0	97	29	87	100	
Stenotrophomonas maltophilia (40)								80											96	79

Gram-positive bacteria (2016)	Antimicrobial Agent (%S)																			
Organism (No.)	Ampicillin (AMP)	Ceftriaxone (CAX)	Ciprofloxacin (CIP)	Clindamycin (CLIN)	Cloxacillin (CLOX)	Erythromycin (ERY)	Gentamicin (GEN)	Gentamicin Synergy Screen (GM500)	Inducible Clindamycin resistance (ICR)	Linezolid (LNZ)	Nitrofurantoin (NIT)	Penicillin (PEN)	Penicillin (Meningitis) (P-Men)	Penicillin (Non-meningitis) (P-NMEN)	Rifampin (RIF)	Streptomycin Synergy Screen (STRSYN)	Tetracycline (TET)	Tigicyline (TIG)	Trimethoprim-sulpha (SXT)	Vancomycin (VAN)
Beta hemolytic Strep (179)	100			64		60						100								100
Coagulase negative Staph (100)			57	47	44	35	79		94	100	100	18			100		87	100	64	100
Enterococcus faecalis (2167)	99		77	0		7		78		97	99					86	17	100		99
Enterococcus faecium (199)	23		19	0		6		89		95	33					75	60	100		100
Enterococcus faecium (VRE) (29)	0		0	0		0		97		100	22					46	69	100		0
Staph aureus MSSA (2141)			88	80	100	76	99		85	100	99	28			100		97	100	97	100
Staph aureus MRSA (873)			51	69	0	48	99		97	100	99	0			100		97	100	98	100
Staph lugdunensis (58)			100	86	97	88	100		91	100	100	78			98		95	100	100	100
Strep anginosis group (41)	95											100								100
Strep bovis group (130)		100										98								100
Strep pneumoniae (72)						74						76	93	100					84	100