

A. Antibigram definitions and utility:

Antibiograms are cumulative pathogen susceptibility reports over a defined period of time (generally 6 months or 1 year) reflecting the percentage of first isolates per patient susceptible to each of the antibiotic agents routinely tested and reported.

However, in this antibiogram some infrequently tested antibiotics are reported, with the denominator and warnings on possibility of selection bias (see below).

For information regarding infrequently tested antibiotics (for example for multidrug resistant organisms), please contact the clinical microbiology staff at Ext 1608/1609.

When an antibiogram is used for empirical antimicrobial therapy selection, its application can be more precise when the infecting organism has been identified. It is less precise when the infecting organism is not known but is suspected based on the site and/or type of infection.^A

Rationale for New Sepsis antibiogram: For positive blood cultures, Gram stain information is usually available several hours or days before the organism identification is known. In these settings, it may be helpful to know the percentages of all gram negative bacilli isolated from blood that are susceptible to specific antimicrobial agents to guide empirical therapy before the organism identification and susceptibility results are available. This information can be obtained by calculating the %S for all gram-negative bacilli grouped together. However, data must be contextualized for any outbreaks that skew data, patient populations differences etc. Gram negative sepsis is common in inpatients and from all samples received in the laboratory from patients admitted to other hospitals or outpatient clinics. Segregating these data for susceptibility rates can help guide empiric treatment in selected cases. For this forstg iteration, this antibiogram includes only ENTERIC gram negatives (beyond E.coli and Kleb with their own respective blood antibiograms), and excludes Acinetobacter and pseudomonads. Information for blood isolates for these organism scan be be obtained from organi-specific syndromic antibiograms.

B. Organism selection for antibiograms:

This antibiogram includes organisms isolated from clinical specimens used for diagnostic purposes. The most frequently isolated organisms are included. With changing epidemiology and increased isolation of some organisms, this antibiogram may be expanded to include its scope in future years.

C. Enhanced syndromic antibiogram (disaggregated by source)

From January 2022, the antibiogram will be segregated, in additon to the organism and visit types (inpatient vs outpatient and clinical laboratory requisitions from other facilities/ outpatients), by specimen sources. The most relevant specimens soruces by organism groups have been included. With sophistication in the local Laboratory Information Systems (LIS) and the introduction of Electronic Health Records (EHR), further segregation can be expected in future years.

D. Methods for antibiogram development:

This antibiogram has been developed as per CLSI M39Ed5^B guidance.

Only verified antimicrobial susceptibility test (AST) results have been included, and the displayed data are quality assured and validated by clinical microbiologists.

For inpatient visits, to avoid over-representation of resistance, only one isolate of an organism is included per visit. Notably, this method can therefore not provide the most resistant isolate per inpatient visit for a given patient. However, this method was chosen as acquired resistance over time is infrequent, although possible.

For the sepsis antibiogram, first isolates were considered. However, to allow consideration of all isolates from a single blood culture (and therefore multiple isolates per patient), the unit of analysis is still per isolate not patient as polymicrobial blood cultures are included and both R and S results are included in the denominator for a single given drug. This is per guidance from M39-Ed5.

NOTE: INPATIENT VISITS include all patients admitted to AKUH wards. OUTPATIENT REQUESTS include patients with AKUH MR numbers who visited outpatient settings who submitted their requests to the clinical laboratory, as well as specimens received from other hospitals and outpatients via community settings. The latter group therefore is very heterogenous. Rates of susceptibility in this group are NOT reflective of AMR rates in community settings (except in predominantly community-acquired infections)

E. Rolling antibiogram features:

From January 2022, the antibiograms, which are rolled out annually will also feature changes in susceptibility trends from the previous year (or 6 months as applicable). These changes must be interpreted with caution, as isolates are not epidemiologically defined. However, the changes (color-coded as indicated below) are meant to identify emerging AMR trends among isolates of a particular group. Changes in susceptibility rates are indicated by color-coded boxes as:

Rolling antibiogram interpretation: **RED**= >5% decrease in percent susceptibility since last 6 months/ last year

Green= >5% increase; gray = $\pm$ 5%, or no change; white= no precedent or comparison figures available

A mostly 'red' antibiogram therefore reflects increasing resistance.

F. Notes on use of this antibiogram:

The percent susceptible results within organism groups are further segregated by the site of infection (or specimen sources), to display the difference in resistance between more serious infections.

The total number of isolates tested may be different depending on the laboratory's site-specific or cascade reporting algorithms. For example, in organisms from CSF specimens, betalactam-betalactamase-inhibitor combinations are not reported; meropenem is reported rather than imipenem. However since the number of CNS infection isolates is small, a separate site-specific antibiogram is not reported; Hence, the difference in denominators tested for each antibiotic.

In cases where differences in denominators produce significant differences in percent susceptible isolates than would be expected, the cells are accompanied by a note (**top right corner red flags**) of warning describing the reason for the noticeable difference.

To see full notes, click on the hyperlinks inside the cells.

Special note for carbapenems: In most organisms, one or two carbapenems are tested routinely, while others are tested only if requested or in case of resistance to the carbapenem being tested (for example, in UTIs, ertapenem is routinely tested for Enterobacterales, and imipenem and meropenem are only tested in ertapenem resistant isolates). The discrepancy in testing protocols results in selection bias and therefore a higher or lower proportion of indicated susceptibility rates. Where this selection bias affects susceptibility rates, a warning comment regarding the selection bias is appended indicated by the red flags and hyperlinks.

Note on colistin: Susceptible category is not reportable for colistin owing to its poor efficacy. The antibiogram notes this and resistance rates are provided for each organism by site of infection, where possible, as footnotes.

G. References:

A. Truong WR, Hidayat L, Bolaris MA, Nguyen L, Yamaki J. The antibiogram: Key considerations for its development and utilization. JAC-Antimicrobial Resistance. 2021 Jun;3(2):dlab060.

B. CLSI M39Ed5

Gram negative Sepsis

			Antibiotic Susceptibility Report Jan-Dec 2024											
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)											
			Ampicillin	Amoxicillin-clavulanate	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Imipenem	Meropenem	Trimethoprim-sulfamethoxazole	Amikacin	Gentamicin	Ciprofloxacin/Levofloxacin	
ADULTS (>18 years)	GRAM NEGATIVE ENTERIC (Fermenters) [†]	AKU INPATIENT VISITS	1.3 (233)	26.2 (233)	15.4 (233)	48.5 (233)	59.3 (231)	60.9 (233)	61.9 (231)	31.8 (233)	66.9 (233)	66.1 (233)	12.5 (224)	
Multifacility (AKU outpatients and lab)		4.4 (107 4)	32.9 (107 1)	19 (107 8)	60.6 (107 2)	75 (105 8)	77.2 (1083)	77.5 (106 6)	35.9 (107 8)	74.3 (107 9)	67.5 (106 8)	11.1 (104 7)		
PEDIATRIC (6m-17 years)		AKU INPATIENT VISITS	0 (42)	23.3 (43)	23.3 (43)	39.5 (43)	53.5 (43)	55.8 (43)	55.8 (43)	34.9 (43)	65.1 (43)	69.8 (43)	20.5 (43)	
		Multifacility (AKU outpatients and lab)	3.3 (240)	14.9 (241)	14.9 (241)	39.3 (224)	43.1 (239)	46.9 (228)	44.7 (237)	36.5 (241)	56 (241)	55.6 (239)	16.9 (241)	
NEONATAL &		AKU INPATIENT VISITS	0 (50)	30 (50)	40 (50)	68.8 (48)	72 (50)	72 (50)	74 (50)	44 (50)	78 (50)	73.5 (49)	44.4 (45)	
		Multifacility (AKU outpatients and lab)	0.3 (167 1)	6.2 (170 8)	10.8 (170 6)	21.1 (150 9)	22.2 (163 5)	26.2 (1469) ¹	22.8 (166 1)	38.4 (170 8)	25.9 (170 8)	28.2 (170 1)	16.3 (169 3)	

Includes Enterobacteriales EXCEPT salmonellae and Shigellae. Non-fermenters (P.aeruginosa, pseudomonads, Acinetobacter) and Aeromonas and Vibrio NOT included

Higher susceptibility rates do not indicate greater activity of imipenem over meropenem as not all isolates were tested for imipenem due to

1 differences in testing recommendations for isolates

Enterobacter Species

		Antibiotic Susceptibility Report Jan-Dec 2024												
		Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)												
ALL INFECTION	Enterobacter spp		Aztreonam	Cefuroxime	Cefixime	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Imipenem	Colistin	Trimethoprim-sulfamethoxazole	Amikacin	Gentamicin	Ciprofloxacin
		INPATIENT VISITS	50.9 (57)		34.6 (81)	61.7 (120)	70.3 (81)	-	76.8 (99)	0 (24) ¹	62.8 (120)	85.8 (120)	75.8 (120)	58 (120)
		OUTPATIENT REQUESTS	48 (281)		35.2 (545)	49.6 (849)	65.5 (747)	76 (695)	-	0 (231)	56.6 (746)	82.2 (852)	72.7 (850)	50.8 (837)

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

2. For treatment of uncomplicated urinary tract infection only

Colistin resistance in ALL outpatients: 8.45%

Klebsiella Pneumoniae

			Antibiotic Susceptibility Report Jan-Dec 2024																		
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)																		
			Amoxicillin-clavulanate	Aztreonam	Cefuroxime	Cefixime	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Imipenem	Meropenem	Colistin	Ceftazidime-avibactam	Trimethoprim-sulfamethoxazole	Amikacin	Gentamicin	Nalidixic acid ²	Ofloxacin ²	Ciprofloxacin/ Levofloxacin	Nitrofurantoin ²	
ALL INFECTIONS	K.pneumoniae	INPATIENT VISITS	24.5 (1191)	36.7 (270)	15.7 (667)	28.9 (673)	37.6 (1179)	50.9 (1191)	63.6 (1036)		0 (447)	See combination antibiogram for CRE (other CREs included) for inpatient isolates only	44.3 (1191)	70.3 (1183)	69.1 (1180)			28.8 (1077)			
		OUTPATIENT REQUESTS	31.9 (6685)	35.6 (862)	16.3 (2309)	42.2 (4772)	38.2 (6725)	57.4 (6681)	68.9 (6191)		0 (2121)		50.8 (6709)	71 (6728)	69.9 (6719)			47.7 (5314)			
Respiratory infections	K.pneumoniae	INPATIENT VISITS	14.5 (393)	30.4 (112)	17.4 (333)	21.4 (112)	23.6 (394)	48.1 (393)	58.6 (321)		58.7 (396)		0 (176)	41.5 (393)	68.6 (395)	66.9 (396)			24.2 (392)		
		OUTPATIENT REQUESTS	20.6 (819)	48.5 (270)	28.6 (674)	32.8 (274)	36.4 (819)	64 (820)	72.7 (630)	73.5 (820)	0 (220)		48 (820)	77.2 (820)	74.3 (819)			31.2 (805)			
UTI (urine)	K.pneumoniae	INPATIENT VISITS	34.9 (418)				32.3 (418)	33.9 (418)	58.7 (418)	72.2 (417)			0 (116)	55.4 (418)	78.3 (418)	76.4 (418)	41.9 (418)	47.4 (409)	43.2 (418)	34.8 (418)	
		OUTPATIENT REQUESTS	42.6 (3990)				46.1 (3985)	49.9 (3995)	68.9 (3983)	82.2 (3977)			0 (701)	62.5 (3990)	83.5 (3990)	80.8 (3989)	53.9 (3975)	59 (3927)	54.9 (3990)	39.9 (3990)	
Sepsis (blood)	K.pneumoniae	INPATIENT VISITS	24.3 (181)			12.4 (137)		22.5 (182)	51.9 (181)	61.4 (176)			63.3 (180)	61.3 (168)	0 (76)	39.8 (181)	63.7 (182)	64.2 (179)			22.3 (182)
		OUTPATIENT REQUESTS	6.7 (1032)			6.6 (810)		9.1 (1033)	20.5 (1033)	23.9 (1009)	25 (1032)		20.4 (928)	0 (796)	26.3 (1033)	30.2 (1033)	35.9 (1031)			13.1 (1021)	

See combination antibiogram for CRE (other CREs included) for inpatient isolates only

- Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities
- For treatment of uncomplicated urinary tract infection only

**Klebsiella
pneumoniae**

Colistin resistance
rates:

INPATIENT	ALL	26.80 %
	Urine	22.40 %
		34.70
	Respiratory	%
	Blood	26%
OUTPATIENT	ALL	14%
		17.50
	Urine	%
		26.80
	Respiratory	%
	Blood	8%

Serratia Species

			Antibiotic Susceptibility Report Jan-Dec 2024													
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)													
			Aztreonam	Cefixime	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Imipenem	Meropenem	Ceftazidime-avibactam	Trimethoprim-sulfamethoxazole	Nalidixic acid ²	Ofloxacin ²	Ciprofloxacin/Levofloxacin	Amikacin	Gentamicin
ALL	Serratia spp	INPATIENT VISITS	43.2 (37)		46.8 (79)	53.6 (69)	63.2 (57)			58.5 (79)			39.7 (78)	59.5 (79)	56.9 (79)	
		OUTPATIENT REQUESTS	24.9 (329)		22.3 (1170)	28 (844)	28.9 (996)			56.9 (1159)			31.1 (666)	30.4 (1176)	29 (1173)	
UTI (urine)	Serratia spp	INPATIENT VISITS	Insufficient number of infections/ isolates to perform cumulative susceptibility analysis													
		OUTPATIENT REQUESTS		46.4 (222)	56.9 (223)	67.3 (153)	68.6 (223)			75.4 (223)	51.6 (223)	52.7 (220)	51.6 (223)	68.6 (223)	63.2 (223)	
Sepsis	Serratia spp	INPATIENT VISITS	Insufficient number of infections/ isolates to perform cumulative susceptibility analysis													
		OUTPATIENT REQUESTS	12.3 (106)		6.7 (659)	7.5 (440)	8.7 (618)	9.6 (387)	8.7 (642)	1.9 (578)	51.9 (659)			10 (659)	11.9 (659)	12.3 (659)

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities
2. For treatment of uncomplicated urinary tract infection only

Mycobacterium tuberculosis

			Antibiotic Susceptibility Report Jan-Dec 2024								
			Numbers below represent percent susceptible isolates (number of isolates tested)								
			Isoniazid	Rifampin	Pyrazinamide	Levofloxacin	Moxifloxacin	Amikacin	Bedaquiline	Clofazimine	Linezolid
Mycobacteria	<i>Mycobacterium tuberculosis</i> Complex		86.8 (1162)	94.7 (1162)	96.8 (1162)	77.8 (1162)					
		Rifampin resistant MTBC					83.5 (67)	91.4 (70)	98.6 (70)	91.4 (70)	95.7 (70)

Non albicans Candida Species

		Antibiotic Susceptibility Report Jan-Dec 2024				
		Numbers below represent percent susceptible isolates (number of isolates tested)				
			Fluconazole	Voriconazole	Caspofungin	Amphotericin
Yeasts	<i>Candida</i> spp (Non-albicans)	<i>INPATIENT VISITS</i>	57 (284)	83.5 (206)	99.7 (314)	99.5 (189)
		<i>OUTPATIENT REQUESTS</i>	73.8 (1007)	96.5 (655)	98.7 (716)	98.9 (189)

NOTES:

Fluconazole Susceptible drug dependent (SDD) results

INP OUTPT

3% 0.40%

WARNING: The group includes species that may have varied spectra of resistance (both inherent or acquired) to azoles, echinocandins, and amphotericin; the antibiogram analysis is **ONLY** an indicator of group susceptibilities; **empiric therapy must always be guided by discussion with a clinical microbiologist**

Candida albicans

		Antibiotic Susceptibility Report Jan-Dec 2024				
		Numbers below represent percent susceptible isolates (number of isolates tested)				
			Fluconazole	Voriconazole	Caspofungin	Amphotericin
Yeasts	<i>Candida albicans</i>	<i>INPATIENT VISITS</i>	100 (127)	100 (121)	100 (120)	100 (5) ¹
		<i>OUTPATIENT REQUESTS</i>	98.8 (321)	98.7 (307)	100 (318)	100 (10) ¹

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

NOTES:

Fluconazole Susceptible drug dependent (SDD)
results

INP OUTPT

0% 1.30%

Enteric fever

		Antibiotic Susceptibility Report Jan-Dec 2024						
		Numbers below represent percent susceptible isolates (number of isolates tested)						
		Azithromycin	Ceftriaxone	Imi-/ Meropenem	Ampicillin	Chloramphenicol	Trimethprim-Sulfamethoxazole	Ciprofloxacin
	<i>Salmonella</i> Paratyphi A		100 (796)		99.9 (796)	99.4 (794)	99.5 (795)	0.9 (796)
	<i>Salmonella</i> Typhi	100 (4559)	32.7 (4562)	100 (4563)	23.8 (4562)	25.4 (4557)	25.3 (4558)	0.2 (4563)

Diarrheal pathogens

		Antibiotic Susceptibility Report Jan-Dec 2024								
		Numbers below represent percent susceptible isolates (number of isolates tested)								
		Ciprofloxacin	Trimethoprim-sulfamethoxazole	Tetracycline	Erythromycin	Azithromycin	Chloramphenicol	Ampicillin	Ceftriaxone	Imi-/Meropenem
Diarrheal pathogens	<i>Campylobacter jejuni/ coli</i>	6.5 (124)		58.9 (124)	89.5 (124)					
	<i>Shigella</i> species	59.8 (127)	28.4 (127)			87.5 (120)	81.1 (127)	25.2 (127)	40.2 (127)	100 (126)
	<i>Vibrio cholerae</i>	97.9 (99)	3 (99)	100 (97)		100 (96)	47.5 (99)	12.1 (99)		

Community acquired pneumoniae (CAP) pathogens

		Antibiotic Susceptibility Report Jan-Dec 2024														
		Numbers below represent percent susceptible isolates (number of isolates tested)														
		Benzylpenicillin	Penicillin-V (oral) for pneumonia	Ampicillin	Amoxicillin-clavulanate	Cefuroxime	Ceftriaxone	Ciprofloxacin	Levo-/Ofloxacin	Azithromycin	Erythromycin	Clindamycin	Chloramphenicol	Tetracycline	Trimethprim-Sulfamethoxazole	Vancomycin
Typical CAP pathogens	<i>Haemophilus influenzae</i>			86.2 (617)		91.3 (617)	100 (617)	58.9 (616)		85.7 (615)			93.3 (593)	84.5 (615)	24.4 (616)	
	<i>Moraxella catarrhalis</i>				100 (123)						76.4 (123)			821. (123)	64.2 (123)	
	<i>Streptococcus pneumoniae</i>		42.8 (362)	96.3 (326)		81.2 (319)			91.7 (325)		38 (337)	64.8 (338)	97.5 (359)	30 (327)	20.1 (323)	100 (345)
	Meningitic breakpoint interpretation	42.8 (362)					98.1 (362)									
	Non-meningitic breakpoint interpretation	†					100 (362)									
†	Benzylpenicillin MICs are not checked for non-meningitis strains, precluding assessment of non-meningitic interpretations for IV benzylpenicillin use in pneumonia; ampicillin is tested by MICs or surrogate disk testing															

Neisseria gonorrhoeae

		Antibiotic Susceptibility Report Jan-Dec 2024					
		Numbers below represent percent susceptible isolates (number of isolates tested)					
		Ceftriaxone	Cefixime	Azithromycin	Tetracycline	Ciprofloxacin	Penicillin
Gonococcal STI	<i>Neisseria gonorrhoeae</i>	100 (44)	100 (44)	100 (44)	13.6 (44)	0 (44)	0 (44)

Anaerobes

		Antibiotic Susceptibility Report Jan-Dec 2024					
		Numbers below represent percent susceptible isolates (number of isolates tested)					
		Metronidazole	Amoxicillin-clavulanate				
Anaerobes	<i>Bacteroides</i> spp	49.3 (209)	48.3 (209)				
	<i>Clostridium</i> spp*	60 (25) ¹	100 (25) ¹				

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

* Does not include or refer to *Clostridium difficile* or *Clostridium tetani*

NOTE: Only routinely tested antibiotics included in cumulative analysis

Corynebacterium diphtheriae

		Antibiotic Susceptibility Report Jan-Dec 2024					
		Numbers below represent percent susceptible isolates (number of isolates tested)					
		Penicillin	Erythromycin	Ciprofloxacin	Meropenem	Trimethoprim-sulfamethoxazole	Tetracycline
Diphtheria	<i>Corynebacterium diphtheriae</i> ^A	15.1 (53)	25.9 (54)	0 (54)	100 (54)	1.6 (54)	83 (54)

C. diphtheriae breakpoints are based on epidemiological cutoffs (ECOFFS) and may not reflect clinical antibiotic efficacy.

^A Susceptibility rates reflect presence of acquired resistance mechanisms in clinical isolates.

BHS group A and B

		Antibiotic Susceptibility Report Jan-Dec 2024						
		Numbers below represent percent susceptible isolates (number of isolates tested)						
		Penicillin	Ceftriaxone	Clindamycin	Erythromycin	Levo-/Ofloxacin	Chloramphenicol	Vancomycin
Beta hemolytic streptococci	<i>Streptococcus pyogenes</i> (GAS)	100 (760)	100 (760)	44.3 (765)	38.2 (753)	84.3 (741)	76.6 (723)	100 (760)
	<i>Streptococcus agalactiae</i> (GBS)	100 (1910)	100 (1910)	42.7 (1023)	32.3 (865)	66 (1022)	80 (111)	100 (1908)

Staphylococcus aureus

		Antibiotic Susceptibility Report Jan-Dec 2024												
		Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)												
			Oxacillin	Penicillin	Clindamycin	Erythromycin	Trimethoprim-sulfamethoxazole	Fusidic acid	Levofloxacin	Tetracycline	Gentamicin ¹	Rifampin	Vancomycin	Linezolid
ALL INFECTION	Staphylococcus aureus	INPATIENT VISITS	25.9 (1052)	0.1 (945)	63.4 (1023)	32.8 (1025)	75 (1052)	73.1 (1008)	24.6 (1052)	67.3 (965)		96.6 (860)	100 (878)	99.9 (860)
		OUTPATIENT REQUESTS	26 (7278)	0.2 (6124)	67.7 (6860)	33.2 (6861)	70 (7285)	76 (6819)	25.2 (7223)	67.1 (6836)		96.3 (5562)	100 (5761)	99.7 (5588)
Respiratory	Staphylococcus aureus	INPATIENT VISITS	25.9 (389)	0.3 (379)	58.2 (389)	31.2 (389)	83.8 (389)	77.4 (389)	17.5 (389)	69 (387)			100 (306)	100 (304)
		OUTPATIENT REQUESTS	36.7 (829)	0.4 (805)	50.9 (829)	24.6 (829)	81.5 (829)	84.1 (823)	13.3 (829)	63.6 (818)			100 (548)	99.8 (549)
Skin, soft tissue, bone	Staphylococcus aureus	INPATIENT VISITS	22.4 (411)	0 (407)	69.1 (411)	32.1 (411)	70.3 (411)	66 (409)	28.5 (411)	64.9 (411)		98 (350)	100 (352)	100 (352)
		OUTPATIENT REQUESTS	21.9 (4582)	0.2 (3750)	71.5 (4582)	34.6 (4582)	65.4 (4582)	75.6 (4573)	26.9 (4572)	67.9 (4570)		96.6 (3744)	100 (3756)	99.6 (3746)
Sepsis (blood)	Staphylococcus aureus	INPATIENT VISITS	27 (159)	0 (159)	56.9 (159)	34.8 (159)	69.2 (159)		30.8 (159)		84.9 (159)	98.1 (158)	100 (159)	99.4 (158)
		OUTPATIENT REQUESTS	19.5 (585)	0 (585)	60.8 (585)	33.3 (585)	74.9 (585)		32.3 (585)		81.2 (585)	96.6 (584)	100 (585)	100 (584)

1. Gentamicin susceptibility indicates synergy with either oxacillin or vancomycin for treatment of endocarditis

Acinetobacter species

			Antibiotic Susceptibility Report Jan-Dec 2024											
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)											
			Ceftazidime	Imipenem	Meropenem	Ciprofloxacin	Amikacin	Gentamicin	Tobramycin	Trimethoprim-sulfamethoxazole	Minocycline	Tigecycline	Piperacillin-tazobactam	Colistin
ALL INFECTIONS	Acinetobacter spp	INPATIENT VISITS	12.2 (697)	10.9 (672)	10.4 (680)	12.3 (691)	29 (697)	24.9 (690)	45.4 (390)	18.3 (697)	94.7 (359)	16.6 (517)	12 (683)	0 (576)
		OUTPATIENT REQUESTS	29.7 (3551)	26.9 (2234)	25.6 (2355)	31.5 (2439)	46.2 (2574)	46.9 (2524)	57.4 (1639)	36.3 (2574)	93.3 (563)	24.4 (817)	30.7 (2432)	0 (1792)
Respiratory	Acinetobacter spp	INPATIENT VISITS	4.1 (436)	4.9 (442)	4.8 (440)	5.2 (440)	22.1 (440)	16.5 (440)	39.2 (390)	12.1 (440)	94.2 (294)	14.3 (412)	4.8 (439)	0 (404)
		OUTPATIENT REQUESTS	15.6 (385)	16.4 (385)	16.3 (386)	14.5 (385)	27 (385)	31.5 (384)	46.2 (279)	20.5 (385)	90.4 (178)	18.7 (283)	15.4 (384)	0 (326)
Skin, soft tissue, bone & joint	Acinetobacter spp	INPATIENT VISITS	4.3 (69)	4.3 (69)	4.3 (69)	2.9 (69)	18.3 (69)	28.2 (69)	33.3 (36)	11.6 (69)	100 (27) ¹	21.3 (61)	2.9 (69)	0 (64)
		OUTPATIENT REQUESTS	11.7 (248)	14.3 (252)	14.6 (253)	15.5 (251)	27.7 (253)	29.4 (252)	50 (110)	20.6 (252)	89.2 (74)	19.8 (192)	14.6 (253)	0 (219)
Sepsis (blood)	Acinetobacter spp	INPATIENT VISITS	26.9 (115)	26.3 (114)	26.1 (115)	24.3 (115)	50.8 (115)	42.4 (114)	51.6 (91)	27.6 (115)			25.2 (111)	0 (84)
		OUTPATIENT REQUESTS	25.2 (1332)	19.7 (1333)	27.5 (1343)	30.5 (1316)	45.3 (1343)	45.6 (1333)	59.6 (1049)	34.1 (1311)			27.5 (1322)	0 (969)

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities
2. For treatment of uncomplicated urinary tract infection only

Colistin resistance rates:

INPATIENT	ALL	5%
	Blood	3.60%
	Respiratory	6%
	SSTI, Bone & Joint	15.60%
OUTPATIENT	ALL	3.00%
	Blood	0.30%
	Respiratory	6.70%
	SSTI, Bone & Joint	1%

Pseudomonas aeruginosa

			Antibiotic Susceptibility Report Jan-Dec 2024									
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)									
			Ceftazidime	Imipenem	Meropenem	Azteronam	Amikacin	Tobramycin	Ciprofloxacin	Piperacillin-tazobactam	Ceftazidime-	Colistin
ALL INFECTION	<i>Pseudomonas aeruginosa</i>	INPATIENT VISITS	78.2 (1212)	72.1 (1220)	72.7 (1226)	63.1 (989)		79.9 (814)	73.7 (1209)	76.3 (1219)	See combination antibiogram for CRPA (inpatient isolates only)	0 (305)
		OUTPATIENT REQUESTS	73.8 (7026)	72.7 (7008)	71.8 (7053)	57 (5949)		72.3 (5065)	62.4 (7018)	73.3 (4011)		0 (2243)
UTI (urine)	<i>Pseudomonas aeruginosa</i>	INPATIENT VISITS	76.5 (238)	74.5 (239)	75 (240)	66.9 (203)	79.4 (219)	72.7 (154)	70.7 (239)	76.6 (239)		0 (57)
		OUTPATIENT REQUESTS	66.6 (1823)	64.5 (1832)	64.4 (1832)	54.5 (1617)	69.2 (1693)	61.9 (1133)	57.9 (1832)	67.5 (1832)		0 (651)
Respiratory infections	<i>Pseudomonas aeruginosa</i>	INPATIENT VISITS	81.9 (597)	74 (600)	75.6 (600)	65.7 (492)		83.9 (461)	77.2 (600)	79.2 (600)		0 (134)
		OUTPATIENT REQUESTS	85.5 (2290)	81.8 (2292)	81.4 (2292)	63.5 (1987)		86.7 (1699)	69.3 (2270)	84.1 (2288)		0 (399)
Skin, soft tissue, bone	<i>Pseudomonas aeruginosa</i>	INPATIENT VISITS	68.7 (233)	66.8 (235)	64.8 (236)	55 (200)		67.4 (178)	65.7 (233)	66.7 (234)		0 (77)
		OUTPATIENT REQUESTS	67.5 (1931)	68.6 (1933)	67.5 (1938)	52.4 (1652)		66.7 (1435)	60.5 (1931)	67 (1933)		0 (624))
Sepsis (blood)	<i>Pseudomonas aeruginosa</i>	INPATIENT VISITS	73.5 (68)	72.5 (69)	68.1 (69)	65 (20) ¹		80.6 (67)	70.6 (68)	73.5 (68)		0 (20) ¹
		OUTPATIENT REQUESTS	67.7 (220)	67.7 (220)	63.8 (220)	57.3 (82)		69.3 (199)	72.1 (219)	65.8 (219)		0 (76)

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

Pseudomonas aeruginosa Colistin
resistance rates:

INPATIENT

ALL	2.30%
Urine	9%
Blood	0.00%
Respiratory	0.70%
SSTI, Bone & Joint	1.30%

OUTPATIENT

ALL	1.80%
Urine	4.50%
Blood	0
Respiratory	1.80%
SSTI, Bone & Joint	0.60%

E.coli

			Antibiotic Susceptibility Report Jan-Dec 2024																				
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)																				
			Ampicillin	Amoxicillin-clavulanate	Aztreonam	Cefuroxime	Cefixime	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Imipenem	Meropenem	Colistin	Ceftazidime-avibactam	Trimethoprim-sulfamethoxazole	Fosfomycin	Amikacin	Gentamicin	Nalidixic acid ²	Ofloxacin ²	Ciprofloxacin/Levofloxacin	Nitrofurantoin ²	
ALL INFECTIONS	<i>Eshcherichia coli</i>	INPATIENT VISITS	6.2 (245 2)	39.3 (245 4)	28.3 (31 5)	9.9 (82 9)	14.6 (179 6)	17.2 (235 5)	59.8 (245 2)	77.9 (220 1)			0 (52 4)	See combination antibiogram for CRE (Other CREs included) for	31.9 (245 2)		81.3 (238 4)	77.1 (237 0)			16.9 (244 9)		
		OUTPATIENT REQUESTS	11.7 (194 10)	52.1 (193 95)	32.1 (94 8)	10.1 (20 36)	22.9 (179 31)	29.6 (193 45)	74.9 (193 68)	89.7 (188 18)			0 (20 42)		36.1 (193 79)			82.1 (193 60)	76.4 (193 33)			26.8 (182 80)	
UTI (urine)	<i>Eshcherichia coli</i>	INPATIENT VISITS	7.5 (150 4)	43 (150 4)	+		14.6 (150 2)	18.6 (150 3)	63.4 (150 4)	81.3 (150 4)			0 (27 8)	See combination antibiogram for CRE (Other CREs included) for	33.9 (150 1)	92.5 (150 3)	80.6 (150 4)	77.3 (150 4)	12.6 (150 2)	22.1 (148 6)	20.8 (149 8)	83 (150 4)	
		OUTPATIENT REQUESTS	12.7 (171 97)	54.3 (173 06)			23.4 (171 81)	28.7 (172 05)	77.5 (171 89)	91.2 (171 42)			0 (14 84)		37.6 (171 90)	91.3 (171 97)	82.2 (172 98)	77.4 (172 01)	16.4 (171 83)	28.8 (170 09)	27.4 (171 72)	84.3 (172 08)	
Sepsis (blood)	<i>Eshcherichia coli</i>	INPATIENT VISITS	3.7 (403)	39.1 (402)			9.2 (32 5)			12.2 (402)	62 (403)	78.6 (397)	79.5 (40 2)	76.4 (33 1)	0 (93)	See combination antibiogram for CRE (Other CREs included) for	29.3 (403)			77.7 (403)	73.3 (400)	9.2 (403)	
		OUTPATIENT REQUESTS	5 (698)	39.7 (698)			12.1 (55 4)			16.9 (702)	60.9 (701)	73.9 (684)	75.8 (69 7)	72.3 (57 5)	0 (19 4)		22 (317)			73.5 (702)	66.8 (692)	15.1 (702)	

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

Coagulase negative staphylococcus (CoNS)



Antibiotic Susceptibility Report Jan-Dec 2024					
Numbers below represent percent susceptible isolates (number of isolates tested)					
			Oxacillin	Vancomycin	Linezolid
CONS from bacteremia	CONS/ SOSA (Coagulase-negative saphylococci, or Staphylococci other than <i>S.aureus</i>)	INPATIENT VISITS	13.9 (1070)	100 (1047)	97.3 (1015)
		OUTPATIENT REQUESTS	8.5 (5830)	100 (5767)	98.7 (5625)

Enterococcus species

		Antibiotic Susceptibility Report Jan-Dec 2024									
		Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)									
			Ampicillin	Chloramphenicol	Ciprofloxacin/ Levofloxacin ²	Tetracycline ²	Synergistic Gentamicin ³	Nitrofurantoin ²	Fosfomycin ²	Vancomycin	Linezolid
ALL INFECTIONS	Enterococcus spp	INPATIENT VISITS	44.1 (927)	85.1 (457)						70.2 (926)	90.6 (299)
		OUTPATIENT REQUESTS	69.7 (4321)	83.6 (1429)						89.6 (4323)	93.9 (524)
UTI (urine)	Enterococcus spp	INPATIENT VISITS	44.9 (488)		14.1 (488)	21.6 (408)		68.5 (492)	77.4 (491)	70.1 (488)	95.9 (146)
		OUTPATIENT REQUESTS	78.4 (2893)		22.2 (2891)	14.4 (2459)		87.5 (2895)	82.7 (2897)	94 (2893)	97.7 (177)
Sepsis (blood)	Enterococcus spp	INPATIENT VISITS	33.1 (124)	87.5 (128)			44.3 (70)			44.8 (125)	88.8 (80)
		OUTPATIENT REQUESTS	50.1 (750)	87.2 (750)			59.7 (496)			73.6 (751)	96.5 (257)

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities
2. For treatment of uncomplicated urinary tract infection only
3. Gentamicin susceptibility indicates synergy with a beta-lactam (e.g., ampicillin) and should not be used alone to treat enterococcal infections

Nocardia

		Antibiotic Susceptibility Report Jan-Dec 2024									
		Numbers below represent percent susceptible isolates (number of isolates tested)									
		Imipenem	Trimethoprim-sulfamethoxazole	Amoxicillin-clavulanate	Clarithromycin	Amikacin	Doxycycline	Minocycline	Ciprofloxacin	Linezolid	Moxifloxacin
Actinomycetes	<i>Nocardia species</i>	32.7 (107)	84.1 (107)	16.8 (107)	26.9 (108)	97.2 (107)	35.2 (108)	22.6 (106)	22 (109)	100 (106)	33.3 (105)



Proteus mirabilis

 آغا خان یونیورسٹی ہسپتال The Aga Khan University Hospital			Antibiotic Susceptibility Report Jan-Dec 2024											
			Numbers below represent percent susceptible isolates (total number of isolates tested for antibiotic)											
			Ampicillin	Amoxicillin-clavulanate	Aztreonam	Cefixime	Ceftriaxone	Piperacillin-tazobactam	Ertapenem	Meropenem	Trimethoprim-sulfamethoxazole	Amikacin	Gentamicin	Ciprofloxacin
ALL INFECTIONS	<i>Proteus mirabilis</i>	INPATIENT VISITS	25.9 (154)	54.5 (154)	50.9 (57)	34.6 (81)	61.7 (120)	93.9 (98)	97.5 (118))	96.7 (91)	21.9 (151))	69.9 (153))	49.3 (152))	28.5 (151))
		OUTPATIENT REQUESTS	26.5 (675)	56.9 (954)	75.9 (220)	47.6 (660)	52.8 (957)	92.8 (950))	93.2 (807))	93.6 (455))	27 (955))	70.3 (954))	50.3 (957))	30.3 (947))

1. Organisms with fewer than 30 isolates should be interpreted with caution as small numbers may bias group susceptibilities

S. maltophilia

		Antibiotic Susceptibility Report Jan-Dec 2024				
		Numbers below represent percent susceptible isolates (number of isolates tested)				
			Trimethoprim-sulfamethoxazole	Levofloxacin	Minocycline	
Serious/ complex infections	<i>Stenotrophomonas maltophilia</i>	INPATIENT VISITS	98.9 (184)	95.1 (184)	96.6 (119)	
		OUTPATIENT REQUESTS	96.9 (446)	95.2 (435)	97.1 (314)	



آغا خان یونیورسٹی ہسپتال
The Aga Khan University Hospital

Combined Antibigram All patients



Antibiotic Susceptibility Report Jan-Dec 2024

Combination antibiograms - ALL Inpatients

ALL INFECTIONS

CRAB Combination antibiogram

Colistin Intermediate % (n)	ADD	% Susceptibility Gained	Activity in combination
95.1 (753)			
	Minocycline	3%	97%
	Tigecycline	1.20%	96%
	Tobramycin	1.60%	96%

CRPA Combination antibiogram

Colistin Intermediate % (n)	ADD	% Susceptibility Gained	Activity in combination
98.4 (309)			
	Ceftazavibactam	0.3	98.70%
	Levofloxacin	0.3	98.70%
	Tobramycin	0	98.40%

CRE Combination antibiogram

Colistin Intermediate % (n)					
76.3 (849)	ADD	% Susceptibility Gained	Activity in combination	PLUS Tigecycl ine	% Susceptibility Gained
	Ceftaz- avibacta m*	5.9	82%		3.3
	Tobramyc in	0.8	77%		85%
	Tigecyclin e	9	85%		
	Minocycli ne	2	78%		
	Amikacin	2.2	78%		
	Levofloxa cin	0	76%		

*Phenotypic susceptibilities
notwithstanding carbapenemase type