



CLINICAL ANALYTICAL

What Is an Antibiogram?

- Summarizes antimicrobial susceptibility data for bacterial isolates recovered by a microbiology laboratory over a defined period.

WHY ANTIBIOGRAM IS REQUIRED?

- *For the clinician*
 - Deciding empirical therapy, while waiting for C/S reports
 - Provides knowledge on prevalence of most common pathogens
- *For the microbiologist*
 - Helps in antibiotic resistance monitoring and infection control
- *For the administrator*
 - Policy formulation
 - Optimizing resources

TYPES-

Types	Definition	Data Presentation	Purpose	Clinical significance	Contextualization
Cumulative	<ul style="list-style-type: none"> Represents overall antimicrobial susceptibility for all isolates combined within a specified location or timeframe 	<ul style="list-style-type: none"> Presents combined susceptibility rates for all isolates without detailed subgroup breakdowns 	<ul style="list-style-type: none"> Offers an overall view of antimicrobial resistance. 	<ul style="list-style-type: none"> Useful for general trends may miss clinically significant differences in specific patient groups or conditions. 	<ul style="list-style-type: none"> Offers an overall summary of susceptibility patterns for all isolates combined
Stratified	<ul style="list-style-type: none"> Segregates antimicrobial susceptibility data on specific parameters like patient demographics, specimen types. 	<ul style="list-style-type: none"> Displays susceptibility data categorized by specific factors like patient age, specimen type, or clinical units, 	<ul style="list-style-type: none"> Allows for the identification of subgroup-specific resistance trends 	<ul style="list-style-type: none"> Provides nuanced data Targeted antibiotic selection possible 	<ul style="list-style-type: none"> Focuses on specific subgroup details, aiding in tailoring antibiotic therapy based on particular patient subsets or clinical scenarios

COMPONENTS OF ANTIBIOGRAM

- Time frame
- Name of the facility
- Methodology
- List of organisms
- Number of isolates analyzed
- List of antibiotics (or antifungals)
- Percent susceptibility (range 0-100%)

HOW TO MAKE A CLINICAL STRATIFIED ANTIBIOGRAM

Local Antibioqram of a specific area can be made by these points:

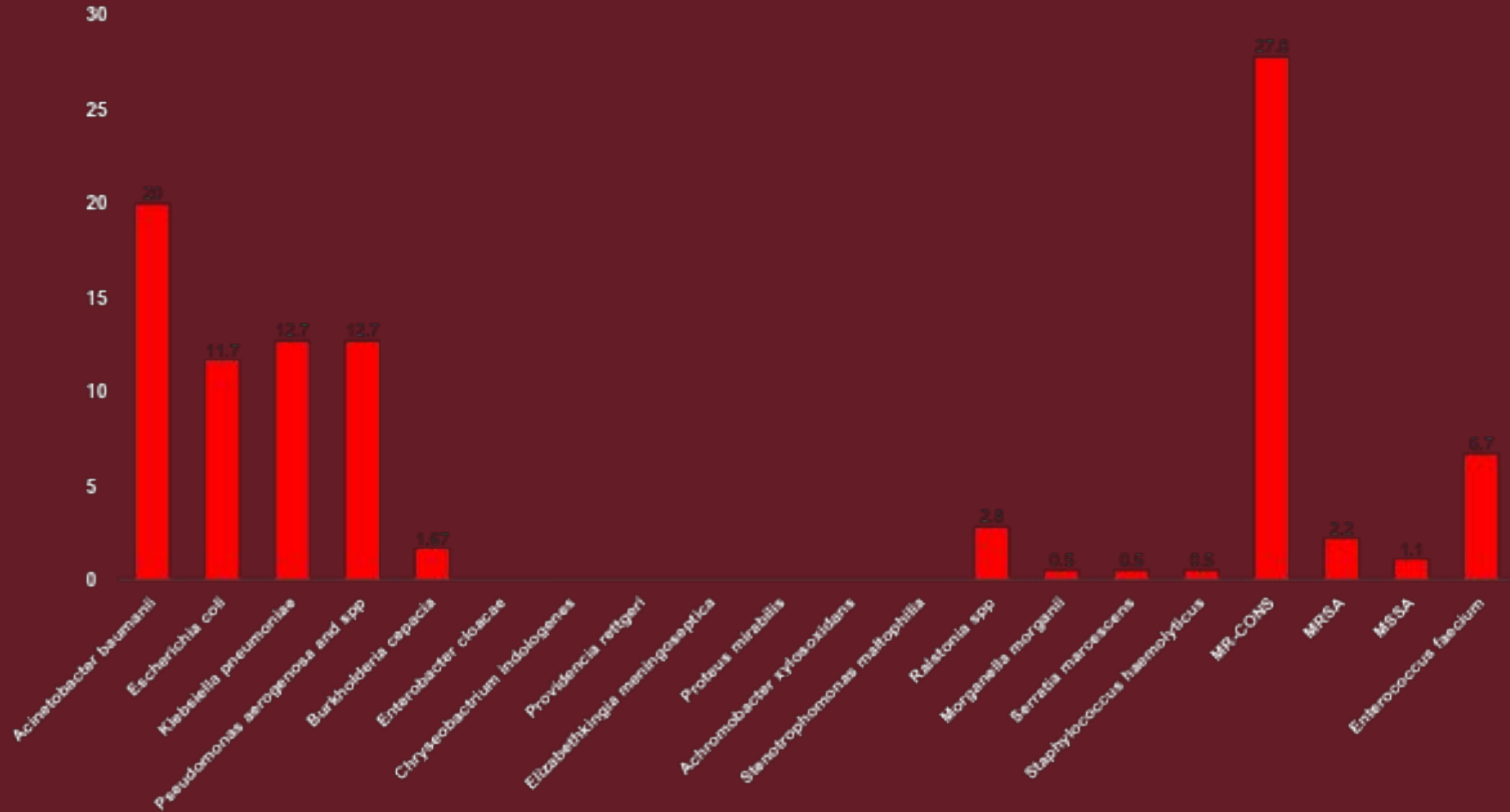
- Data Collection:
 - Select you target population
 - Obtain culture and sensitivity data from the patient's records.
 - Data can be collected from the Microbiology lab.

HOW TO MAKE A LOCAL CLINICAL ANTIBIOGRAM (cont....)

- Compile and analyze the gathered data.
- Select a patient from the population:
 - See the empirical antibiotic the patient is on
 - Culture-guided antibiotic leads to change in empirical treatment?
 - YES: Response
 - YES: First Line antibiotic for the disease
 - No: Check for other antibiotics given
 - No: Continued empirical antibiotic/ Cultured organisms: non-pathogenic
 - Chart the data in percentage values: (Percentage susceptibility)

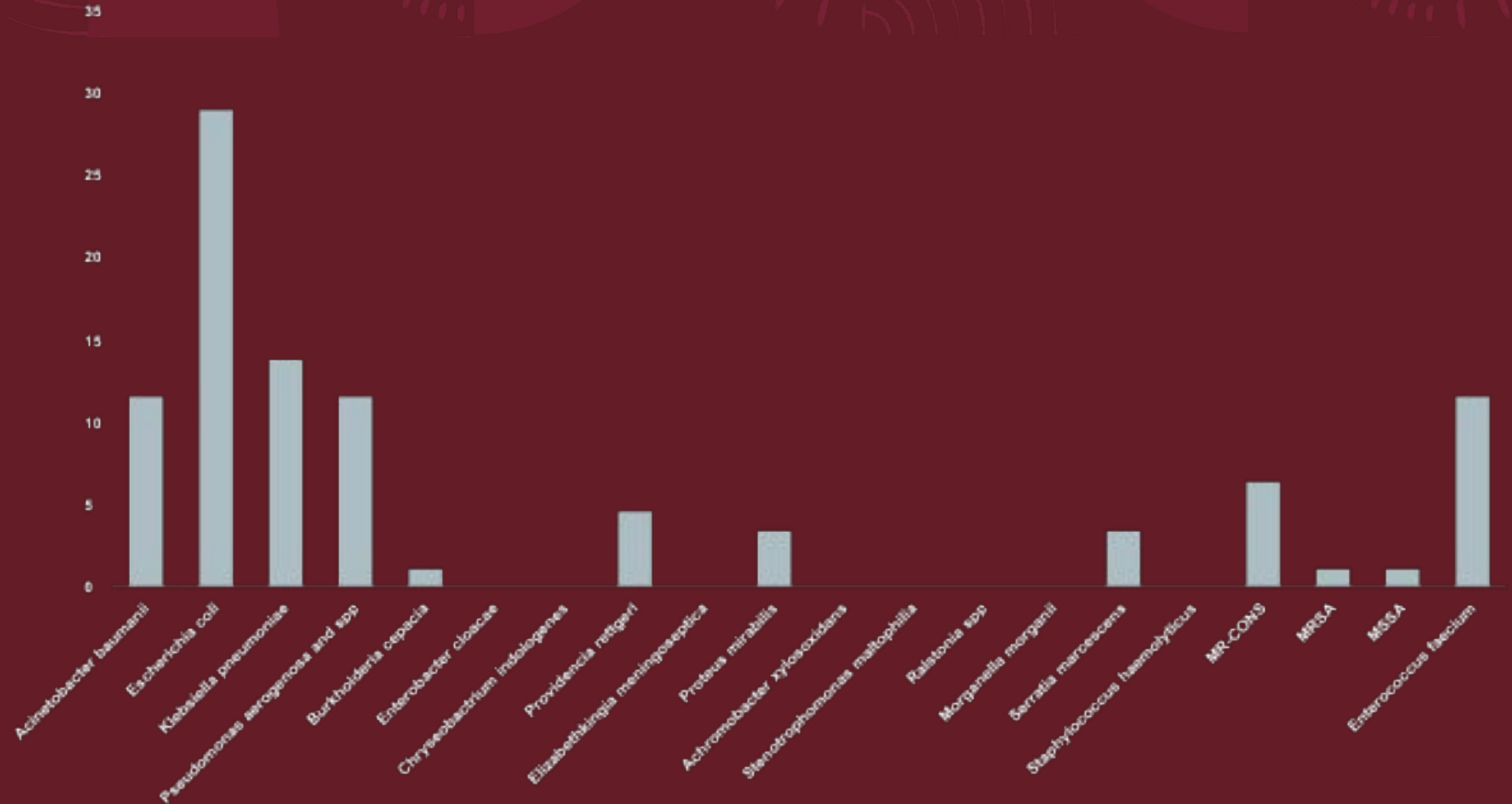
MICU CLINICAL ANTIBIOGRAM

Blood Culture Isolates in MICU



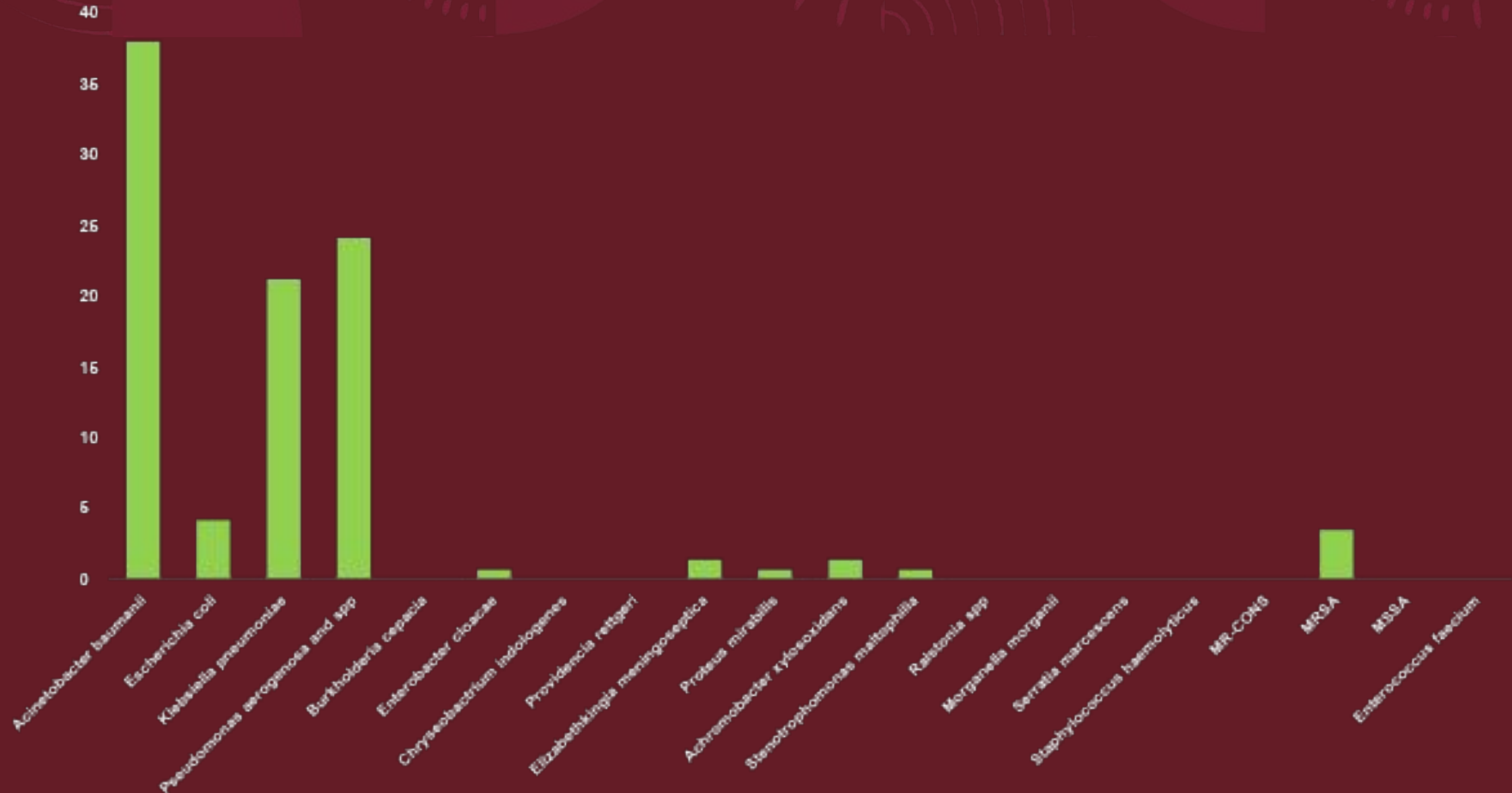
MICU CLINICAL ANTIBIOGRAM

Urine Isolates IN MICU



MICU CLINICAL ANTIBIOGRAM

Respiratory (Sputum /Endotracheal/TT/ Bal) Isolates from MICU



MICU CLINICAL ANTIBIOGRAM

- Most common MDR pathogen: *Acinetobacter baumannii* (n=127)
- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

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ACINETOBACTER BAUMANII		
Sr No.	ANTIBIOTIC	SUSCEPTIBILITY %
1	COLISTIN	96.36
2	MINOCYCLINE	42.8
3	COTRIMOXAZOLE	26.31
4	GENTAMYCIN	7.3
5	IMIPENEM	5.45
6	LEVOFLOXACIN	5.1
7	CIPROFLOXACIN	4.1
8	MEROPENEM	3.9
9	CEFTAZIDIME	3.7
10	CEFEPIME	1.9
11	AMIKACIN	1.18
12	PIPERACILLIN TAZOBACTAM	0.99

MICU CLINICAL ANTIBIOGRAM

- 2nd Most common GN MDR pathogen: *Klebsiella pneumoniae* (n=68)
- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

Very few samples were tested for Ceftazidime-Avibactam and Minocycline (n=1)
(Susceptibility 100%)

MICU CLINICAL ANTIBIOGRAM

- 2nd Most common GN MDR pathogen: Klebsiella pneumoniae (n=68)
- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

Very few samples were tested for Ceftazidime-Avibactam and Tigecycline (n=1) (Susceptibility 100%)

KLEBSIELLA PNEUMONIAE		
Sr No.	ANTIBIOTIC	SUSCEPTIBILITY %
1	COLISTIN	100
2	MINOCYCLINE	100
3	CEFTAZIDIME-AVIBACTAM	100
4	TIGECYCLINE	80
5	IMIPENEM	10
6	AZTREONAM	10
7	CIPROFLOXACIN	10
8	ERTAPENEM	10
9	GENTAMYCIN	9
10	PIPERACILLIN TAZOBACTAM	7.8
11	MEROPENEM	6
12	CEFEPIME	1.6
13	CEFUROXIME	0
14	COTRIMOXAZOLE	0
15	CEFTRIAXONE	0
16	LEVOFLOXACIN	0

MICU CLINICAL ANTIBIOGRAM

- 3rd Most common MDR pathogen: *Pseudomonas aeruginosa* (n=60)
- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

MICU CLINICAL ANTIBIOGRAM

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- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

PSUEDOMONAS AERUGINOSA		
Sr No.	ANTIBIOTIC	SUSCEPTIBLTY %
1	COLISTIN	98
2	AMIKACIN	80
3	AZTREONAM	66
4	CEFEPIME	66
5	CEFTAZIDIME	50
6	COTRIMOXAZOLE	50
7	FOSFOMYCIN	50
8	CEFTAZIDIME-AVIBACTAM	50
9	PIPERACILLIN TAZOBACTAM	40
10	MEROPENEM	33
11	IMIPENEM	30
12	CEFTRIAZONE	20
13	DORIPENEM	16
14	CIPROFLOXACIN	12
15	ERTAPENEM	10
16	CEFUROXIME	8

MICU CLINICAL ANTIBIOGRAM

- 4th Most common GN MDR pathogen: Escherichia coli(n=49)
- Most Common Empirical antibiotic given in MICU: Piperacillin-Tazobactam > Meropenem

MICU CLINICAL ANTIBIOGRAM

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E. COLI		
Sr No.	ANTIBIOTIC	SUSCEPTILITY %
1	COLISTIN	100
2	FOSFOMYCIN	100
3	MINOCYCLINE	100
4	TIGECYCLINE	100
5	AMIKACIN	68
6	GENTAMYCIN	64
7	IMIPENEM	50
8	ERTAPENEM	38
9	MEROPENEM	21
10	PIPERACILLIN-TAZOBACTAM	20
11	COTRIMOXAZOLE	14
12	CEFUROXIME	0
13	AZTREONAM	0
14	CEFTRIAXONE	0
15	CEFTAZIDIME	0
16	CIPROFLOXACIN	0

MICU CLINICAL ANTIBIOGRAM

- Most common Gram Positive MDR pathogen: Methicillin-resistant Coagulase negative Staphylococci (n=48)
- Most Common Empirical antibiotic given in MICU: Vancomycin > Teicoplanin

MICU CLINICAL ANTIBIOGRAM

- Prevalence of Carbapenem-resistant *Acinetobacter baumannii* (CRAB): 95% of all positive strains (110)
- Prevalence of Vancomycin-resistant *Enterococcus* (VRE): 84% (of 12 cases)

Organism	Total Number of isolates seen (Blood C/S, Urine C/S and Respiratory C/S)	Piperacillin-tazobactam	Cefuroxime	Meropenem	Aztreonam	Cotrimoxazole	Cefepime	Doripenem	Amikacin	Colistin	Ceftriaxone	Imipenem	Ceftazidime	Gentamicin	Ertapenem	Ciprofloxacin	Levofloxacin	Tigecycline	Minocycline	Fosfomycin	Ceftazidime/avibactam
(PERCENTAGE SUSCEPTIBILITY \ NUMBER OF ISOLATES TESTED)																					
Acinetobacter baumannii	127	0.99/101	N.A.	3.9/101	N.A.	26.31/95	1.9/101	N.A.	1.18/110	96.36/110	0/25	5.45/110	3.7/108	7.3/95	N.A.	4.1/96	5.1/86	N.A.	41.8/86	N.A.	N.A.
Escherichia coli	45	20/45	0/40	21/48	0/2	14/45	8 (80D)/48	N.A.	68/49	100/49	0/49	50/49	0/10	64/49	38/46	0/49	0/4	100/5	100/4	100/4	N.A.
Klebsiella pneumoniae	64	7.3/64	0/50	6/64	10/40	0/10	1.6/60	0/26	10/60	97.8/64	0/50	10/60	N.A.	5/40	10/40	10/40	0/4	80/5	100/1	0/2	100/1
Pseudomonas aeruginosa	66	40/60	0/60	33/60	66/30	50/60	66/60	16/10	80/30	58/60	20/60	30/60	50/40	N.A.	10/60	12/60	30/40	N.A.	N.A.	50/2	50/2
Burkholderia cepacia	4	25/4	N.A.	100/4	0/2	100/4	0/2	N.A.	0/2	100/2	0/3	50/4	66/4	N.A.	N.A.	100/3	100/3	N.A.	66/3	N.A.	N.A.
Enterobacter cloacae	1	100/1	0/1	100/1	N.A.	100/1	100/1	N.A.	100/1	100/1	100/1	100/1	100/1	100/1	100/1	100/1	N.A.	N.A.	N.A.	N.A.	N.A.
Chryseobacterium indologenes	1	100/1	N.A.	0/1	0/1	100/1	100/1	N.A.	0/1	N.A.	N.A.	0/1	0/1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Providencia rettgeri	4	75/4	N.A.	75/4	100/4	100/1	50/4	N.A.	0/1	N.A.	N.A.	66/4	50/4	N.A.	50/4	0/4	0/4	N.A.	N.A.	N.A.	N.A.
Elizabethkingia meningoseptica	2	0/2	0/2	0/2	0/2	100/2	0/2	0/2	0/2	N.A.	0/2	0/2	0/2	N.A.	0/2	0/2	N.A.	N.A.	100/2	N.A.	N.A.
Proteus mirabilis	4	100/4	N.A.	100/4	100/4	0/4	100/4	N.A.	0/4	N.A.	0/4	100/4	100/4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Achromobacter xylosoxidans	2	100/2	N.A.	0/2	0/2	0/2	0/2	N.A.	0/2	50/2	0/2	0/2	100/2	N.A.	N.A.	0/2	0/2	N.A.	N.A.	N.A.	N.A.
Stenotrophomonas maltophilia	1	N.A.	N.A.	N.A.	N.A.	100/1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	100/1	N.A.	N.A.
Ralstonia spp	5	0/5	N.A.	20/5	0/3	100/3	100/3	N.A.	0/3	N.A.	N.A.	33/3	33/3	0/3	N.A.	66/3	66/3	N.A.	N.A.	N.A.	N.A.
Morganella morganii	1	100/1	N.A.	100/1	0/1	0/1	N.A.	N.A.	100/1	0/1	0/1	0/1	0/1	100/1	N.A.	0/1	0/1	N.A.	N.A.	N.A.	N.A.
Serratia marcescens	4	N.A.	N.A.	25/4	25/4	0/4	0/4	N.A.	0/4	N.A.	N.A.	0/4	0/4	N.A.	N.A.	N.A.	N.A.	N.A.	100/4	0/4	100/4

LEGEND	
	HIGHLY SUSCEPTIBLE (FIRST LINE)
	MODERATELY SUSCEPTIBLE (>50 %)
	LEAST SUSCEPTIBLE (RESISTANT)
	ANTIBIOTIC NOT TESTED

ANTIBIOGRAM GRAM POSITIVE BACTERIA

Organism	Total Number of Isolates seen (Blood C\S, Urine C\S and Respiratory C\S)	Cotrimoxazole	Linezolid	Ciprofloxacin	Penicillin	Tetracycline	Gentamycin	Tigecycline	Doxycycline	Levofloxacin	Gentamycin High-dose	Teicoplanin	Fosfomycin	Cefoxitin	Clindamycin	Chloramphenicol	Nitrofurantoin	Erythromycin	Ceftaroline	Vancomycin	Daptomycin
MR-CONS	48	35\48	80\48	4\48	2\48	64\48	65\48	100\5	0\5	6\48	100\3	92\25	0\2	7\38	15\48	100\3	100\7	4\48	N.A.	100\48	100\40
MRSA	4	24\1	100\4	0\4	0\4	100\4	75\4	N.A.	N.A.	0\4	N.A.	N.A.	N.A.	0\4	25\4	N.A.	100\1	0\4	N.A.	100\4	100\4
MSSA	2	100\2	100\2	100\2	0\2	100\2	N.A.	N.A.	N.A.	0\2	N.A.	100\2	N.A.	N.A.	50\100	N.A.	N.A.	0\2	N.A.	100\2	100\2
Enterococcus faecium	12	N.A.	50\12	0\12	0\12	0\12	N.A.	100\6	N.A.	0\12	0\6	8\12	N.A.	N.A.	N.A.	N.A.	0\2	0\12	N.A.	16\12	100\4
Staphylococcus haemolyticus	1	0\1	100\1	0\1	0\1	0\1	N.A.	N.A.	N.A.	0\1	N.A.	100\1	N.A.	0\1	0\1	N.A.	N.A.	0\1	0\1	100\1	100\1

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CLINICAL VIGNETTE

1. A 56-year-old diabetic male presented to the ED with complaints of fever and SOB over 7 days. XRAY chest is suggestive of Right-sided Lobar consolidation. There is a history of use of some antibiotics 1 month back for UTI. He is started on empirical antibiotics in the form of Inj Piperacillin-Tazobactam and Azithromycin. However, his condition worsens over the next 3 days. Cultures showed a growth of *Pseudomonas aeruginosa* with culture sensitivity mentioned below. What antibiotic will you choose as per your local antibiogram?

Antibiotic	Sensitivity
CEFTRIAZONE	R
CEFEPIME	I
PIPERACILLIN-TAZOBACTAM	R
CEFTAZIDIME	S
MEROPENEM	I
COTRIMOXAZOLE	I
AMIKACIN	S

CLINICAL VIGNETTE

2. A 30-year-old male is admitted to your ICU with complaints of SOB for 7 days associated with fever. Scrub IgM Elisa was positive. His X-ray is suggestive of bilateral fluffy opacities. Considering the possibility of scrub ARDS, he is intubated and mechanically ventilated. On day 4, post-intubation, he develops a new-onset fever spike. His ET culture shows a growth of *Acinetobacter baumannii* which is susceptible to amikacin and cotrimoxazole. He is started on amikacin and later cotrimoxazole. His condition doesn't improve. What antibiotic will you add in this case?



THANK YOU.