



Critically important antimicrobials: use and AMR trends
in health sector in kerala.

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Nightmare bacteria and Blackwaters of kerala





WHO 2017 ANTIBIOTICS GUIDANCE

ACCESS

AMOXICILLIN | AMIKACIN
CHLORAMPHENICOL
AMOXICILLIN + CLAVULANIC ACID
AMPICILLIN
BENZATHINE BENZYL PENICILLIN BENZYL PENICILLIN
CEFALEXIN | CEFAZOLIN | CLOXACILLIN
PHENOXYMETHYLPENICILLIN
PROCAINE BENZYL PENICILLIN
CLINDAMYCIN
DOXYCYCLINE
GENTAMICIN
METRONIDAZOLE
NITROFURANTOIN
SULFAMETHOXAZOLE + TRIMETHOPRIM

WATCH

QUINOLONES FLUOROQUINOLONES
3RD- GENERATION CEPHALOSPORINS (WITH OR WITHOUT BETA-LACTAMASE INHIBITOR)
MACROLIDES
GLYCOPEPTIDES
ANTIPSEUDOMONAL
PENICILLINS + BETA-LACTAMASE INHIBITOR
CARBAPENEMS
PENEMS

RESERVE

AZTREONAM
FOSFOMYCIN (IV)
4TH GENERATION CEPHALOSPORINS
OXAZOLIDINONES
5TH GENERATION CEPHALOSPORINS
TIGECYCLINE
POLYMYXINS
DAPTOMYCIN

WHO Critically Important Antimicrobials for Human Medicine 5th revision

Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR)

October 2016

Summary of classification and prioritization of antimicrobials categorized as Critically Important, Highly Important and Important

Medically Important Antimicrobials	Antimicrobial class	Criterion (Yes = ●)				
		C1	C2	P1	P2	P3
	CRITICALLY IMPORTANT ANTIMICROBIALS					
Critically Important	HIGHEST PRIORITY					
	Cephalosporins (3 rd , 4 th and 5 th generation)	●	●	●	●	●
	Glycopeptides	●	●	●	●	●
	Macrolides and ketolides	●	●	●	●	●
	Polymyxins	●	●	●	●	●
	Quinolones	●	●	●	●	●
	HIGH PRIORITY					
	Aminoglycosides	●	●		●	●
	Ansamycins	●	●		●	
	Carbapenems and other penems	●	●	●	●	
	Glycylcyclines	●	●			
	Lipopeptides	●	●			
	Monobactams	●	●	●		
	Oxazolidinones	●	●			
Highly Important	Penicillins (natural, aminopenicillins, and antipseudomonal)	●	●		●	●
	Phosphonic acid derivatives	●	●	●	●	
	Drugs used solely to treat tuberculosis or other mycobacterial diseases	●	●	●	●	
	HIGHLY IMPORTANT ANTIMICROBIALS					
	Amidopenicillins		●			
	Amphenicols		●			
	Cephalosporins (1 st and 2 nd generation) and cephamycins		●			
	Lincosamides		●			
	Penicillins (anti-staphylococcal)		●			
	Pseudomonic acids		●			
	Riminoferazines	●			NA	
	Steroid antibacterials		●			
	Streptogramins		●			
	Sulfonamides, dihydrofolate reductase inhibitors and combinations		●			
Important	Sulfones	●				
	Tetracyclines	●				
	IMPORTANT ANTIMICROBIALS					
	Aminocyclitols					
	Cyclic polypeptides					
	Nitrofurantoin				NA	
	Nitroimidazoles					
	Pleuromutilins					

C1	Criterion 1
	The antimicrobial class is the sole, or one of limited available therapies, to treat serious bacterial infections in people.
C2	Criterion 2
	The antimicrobial class is used to treat infections in people caused by either: (1) bacteria that may be transmitted to humans from nonhuman sources, or (2) bacteria that may acquire resistance genes from nonhuman sources.
P1	Prioritization criterion 1
	High absolute number of people, or high proportion of use in patients with serious infections in health care settings affected by bacterial diseases for which the antimicrobial class is the sole or one of few alternatives to treat serious infections in humans.
P2	Prioritization criterion 2
	High frequency of use of the antimicrobial class for any indication in human medicine, or else high proportion of use in patients with serious infections in health care settings, since use may favour selection of resistance in both settings.
P3	Prioritization criterion 3
	The antimicrobial class is used to treat infections in people for which there is evidence of transmission of resistant bacteria or resistance genes from non-human sources.

WHO CIA list 5th rev. : <http://who.int/foodsafety/publications/antimicrobials-fifth/en/>

AGISAR: http://who.int/foodsafety/areas_work/antimicrobial-resistance/agisar/en

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WHO/NMH/FOS/FZD/17.1



World Health Organization



6 pathogens for AMR surveillance

1. *Acinetobacter* spp
2. *E. coli*
3. *Klebsiella* spp
4. *Pseudomonas aeruginosa*

GNB

5. *Staphylococcus aureus*
6. *Enterococcus* spp

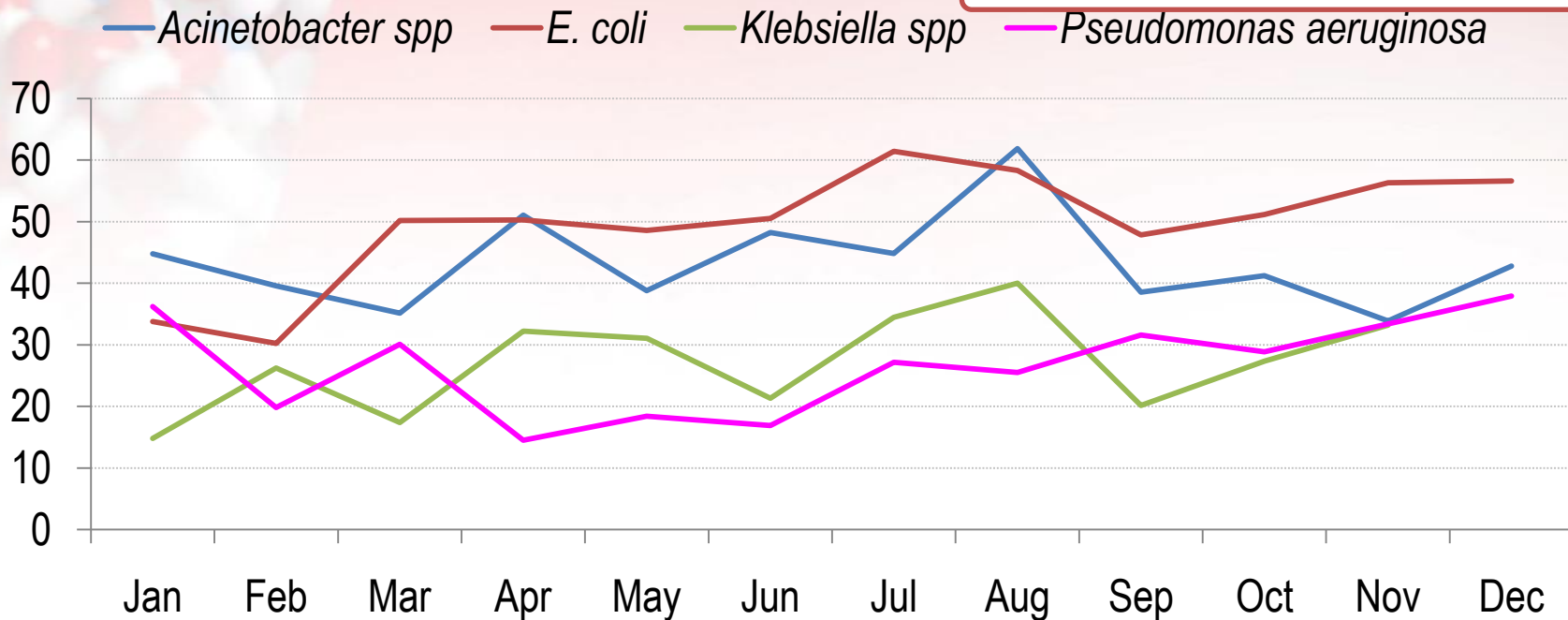
GPC



% of ESBL producers

% of ESBL producers (India)

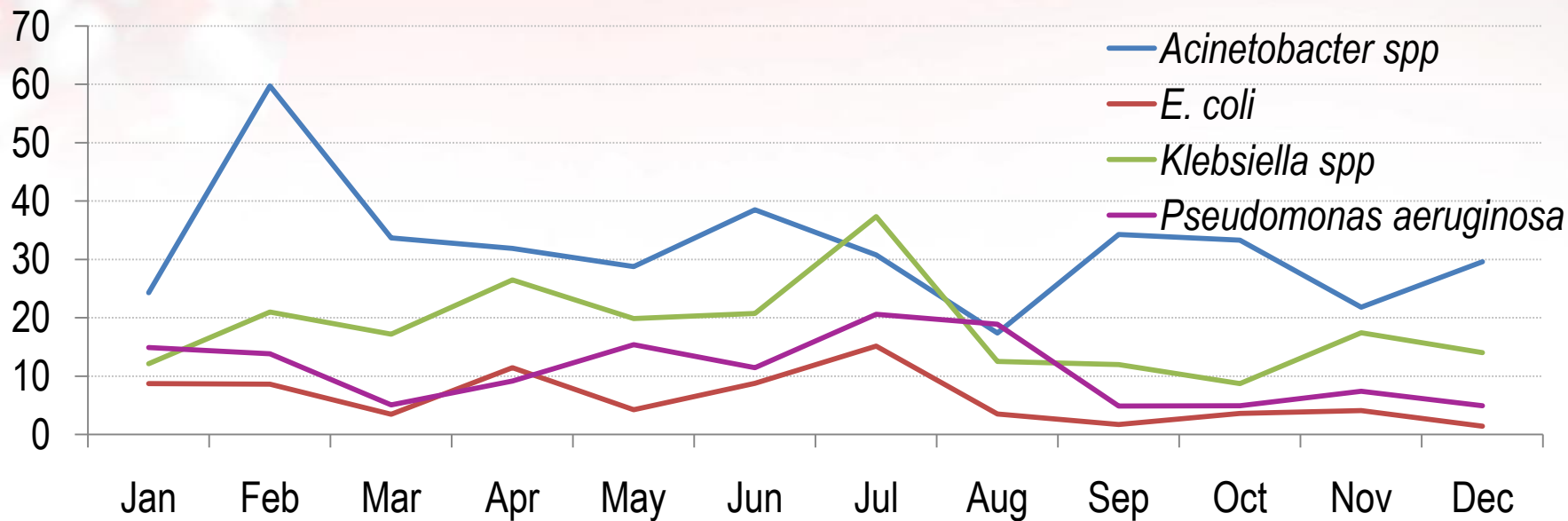
<i>Acinetobacter</i> spp	65
<i>E. coli</i>	61
<i>Klebsiella</i> spp	62
<i>Pseud. aeruginosa</i>	65



Carbapenem resistance

Carbapenem resistance (India)

<i>Acinetobacter</i> spp	70
<i>E. coli</i>	12
<i>Klebsiella</i> spp	51
<i>Pseud. aeruginosa</i>	42



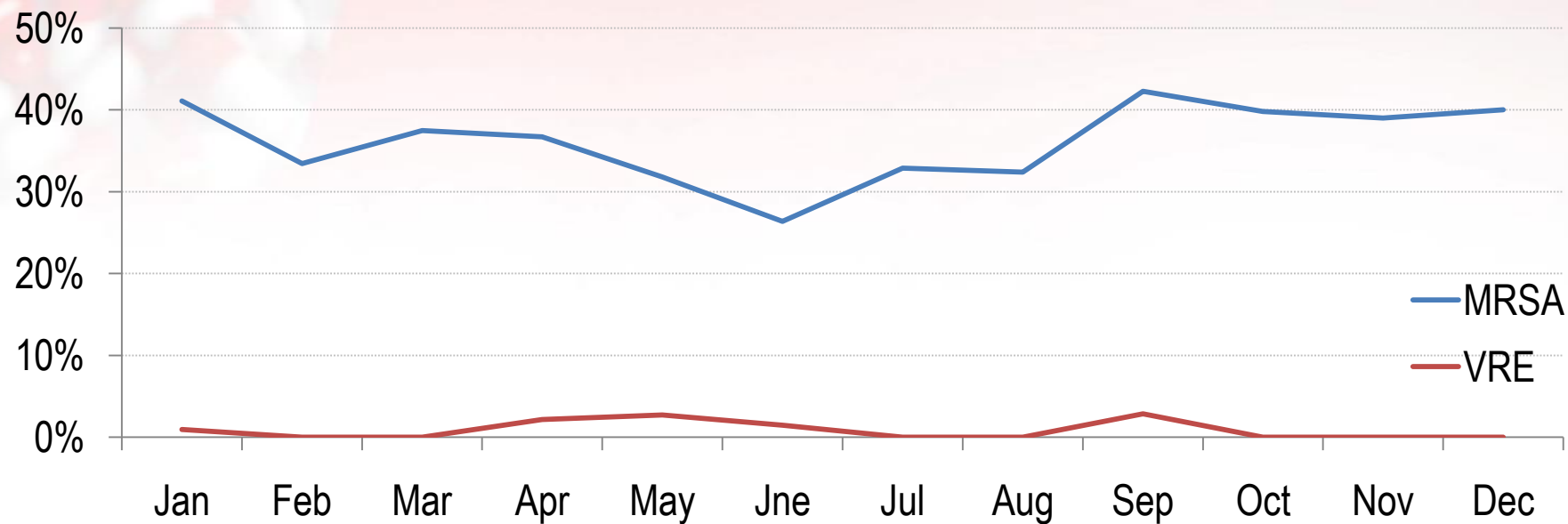



Gr

Resistance (India)

MRSA 47

VRE 12



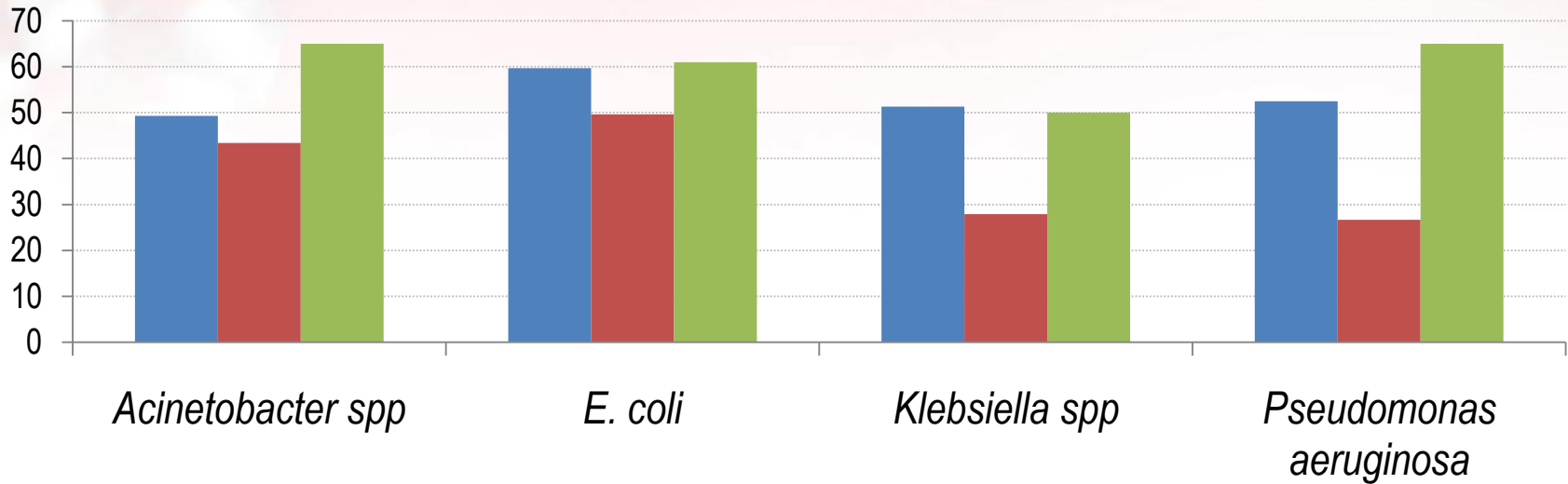


Six bacteria are the most deadly antibiotic-resistant bacteria, identified as urgent or serious threats by CDC

- CRE (carbapenem-resistant Enterobacteriaceae)
- MRSA (methicillin-resistant *Staphylococcus aureus*)
- ESBL-producing Enterobacteriaceae (extended-spectrum β -lactamases),
- VRE (vancomycin-resistant enterococci),
- *Pseudomonas aeruginosa* , carbapenem resistant
- CRAB -carbapenem resistant *Acinetobacter baumannii*

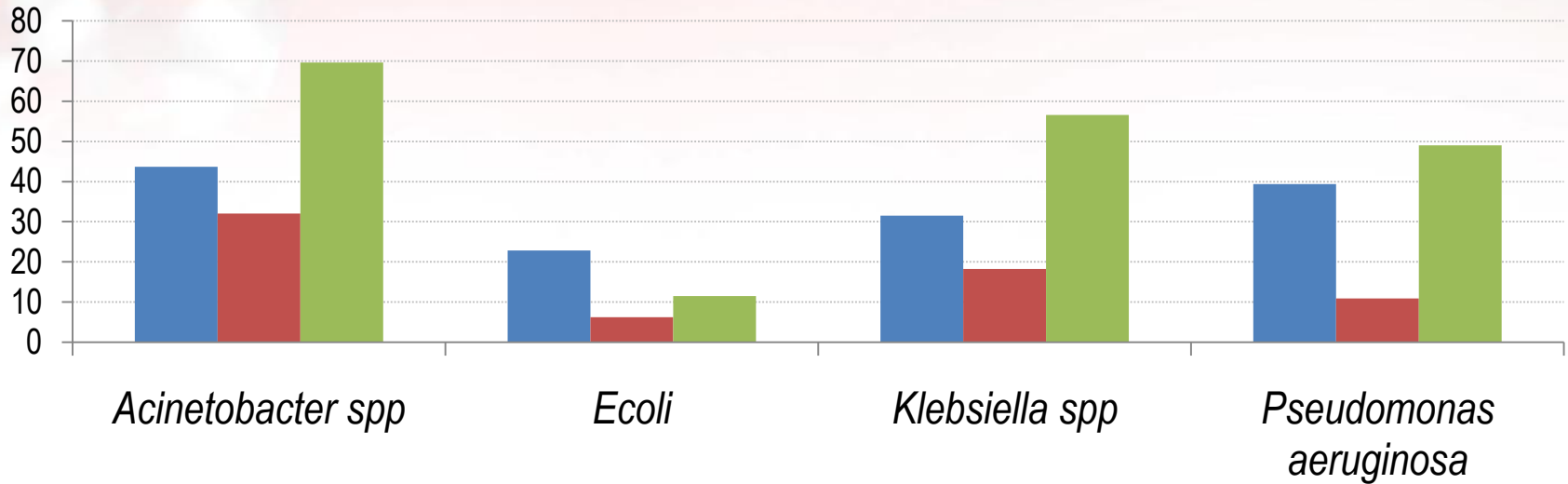
ESBL production

■ % ESBL producers Kerala 2017 ■ % ESBL producers Kerala 2018
■ % ESBL producers India



Carbapenem resistance

■ Carbapenem resistance Kerala 2017 ■ Carbapenem resistance Kerala 2018
■ Carbapenem resistance in India





COLISTIN RESISTANCE



A drowning man will clutch at a straw.

- Thomas More





ELSEVIER

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Genome Note

Genome sequence of a multidrug-resistant *Klebsiella pneumoniae* ST78 with high colistin resistance isolated from a patient in India

Merin Paul ^a, Lekshmi Narendrakumar ^a, Arya R. Vasanthakumary ^b, Iype Joseph ^a, Sabu Thomas ^a  

Global Tricycle Surveillance



ESBL *E.coli*

***Klebsiella pneumoniae* as a key trafficker of drug resistance genes from environmental to clinically important bacteria**

Kelly L Wyres and Kathryn E Holt



Klebsiella pneumoniae is an opportunistic bacterial pathogen known for its high frequency and diversity of antimicrobial resistance (AMR) genes. In addition to being a significant clinical problem in its own right, *K. pneumoniae* is the species within which several new AMR genes were first discovered before spreading to other pathogens (e.g. carbapenem-resistance genes KPC, OXA-48 and NDM-1). Whilst *K. pneumoniae*'s contribution to the overall AMR crisis is impossible to quantify, current evidence suggests it has a wider ecological distribution, significantly more varied DNA composition, greater AMR gene diversity and a higher plasmid burden than other Gram negative opportunists. Hence we propose it plays a key role in disseminating AMR genes from environmental microbes to clinically important pathogens.



- Antibiotic utilization data calculated using ATC/DDD method and DOT.
- The main purpose of the ATC/DDD system is as a tool for presenting drug utilization statistics with the aim of improving drug use.
- Use of the ATC/DDD system allows standardization of drug groups and represents a stable drug utilization metric to enable comparisons of drug use between countries, regions, and other health care settings, and to examine trends in drug use over time and in different settings.



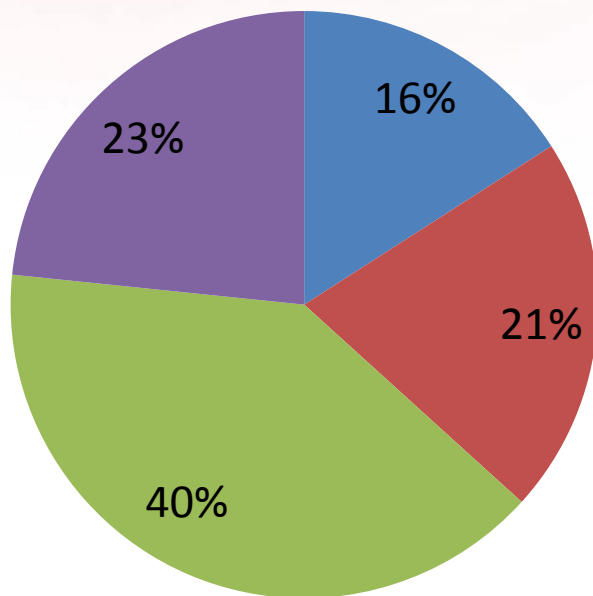
We selected Five ICUs of MCH, Trivandrum. They are:

- MICU
- SSB MICU
- NEUROSURGERY ICU
- NEUROSURGERY TRAUMA ICU
- CCU
- Collected the data of WHO RESERVE AND WATCH Antibiotics on a daily basis and calculated the DDD &DDD per 1000 Patient days with the help of Microsoft Excel sheet

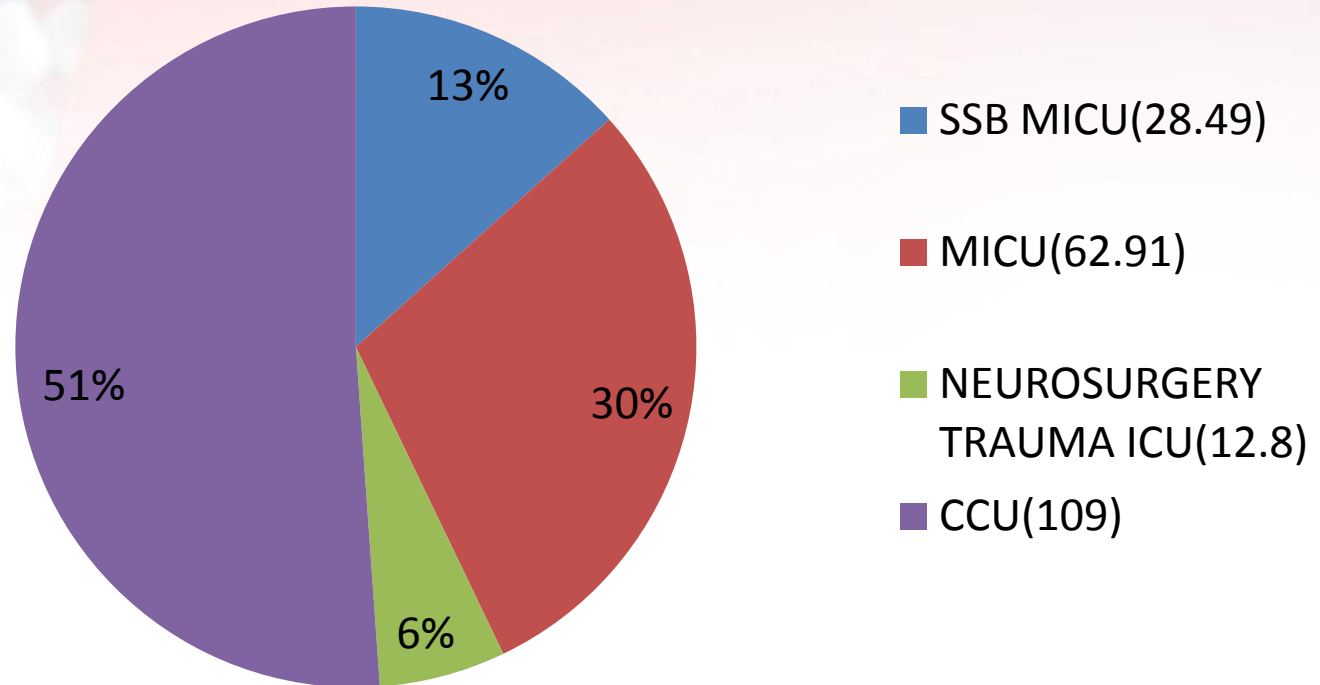


Vancomycin Consumption in Various ICUs of MCH, Trivandrum

MICU(37.07) SSB MICU(48.43)
NEURO Sx TRAUMA ICU(92.9) NEURO SURGERY(54.41)

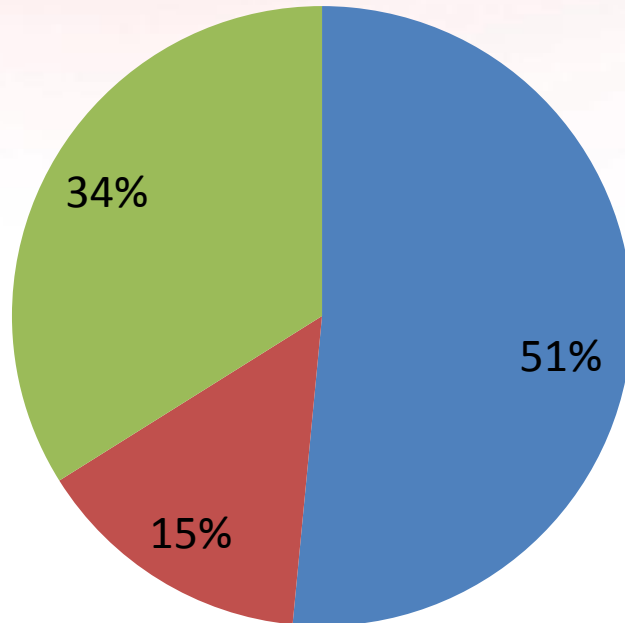


Consumption of Amikacin



Levofloxacin

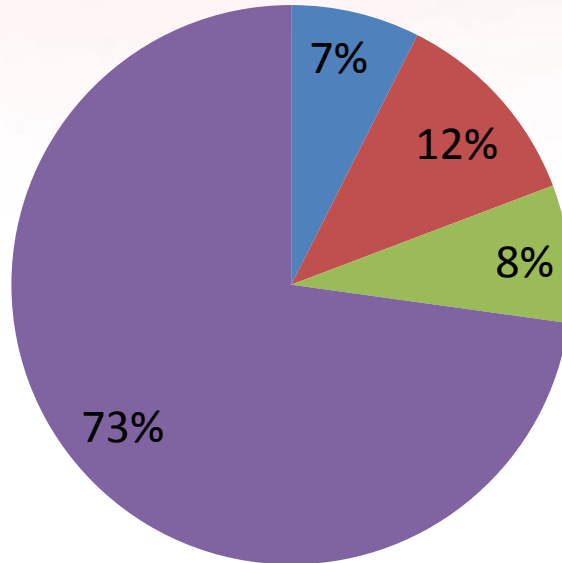
■ MICU(75.27) ■ SSB MICU(21.3) ■ CCU(49.54)



Ceftazidime

WHO WATCH DRUG

■ MICU(13.48) ■ SSB MICU(21.36) ■ NeuroSX Trauma ICU(14.4) ■ CCU(131.86)





Cefoperazone + Sulbactam

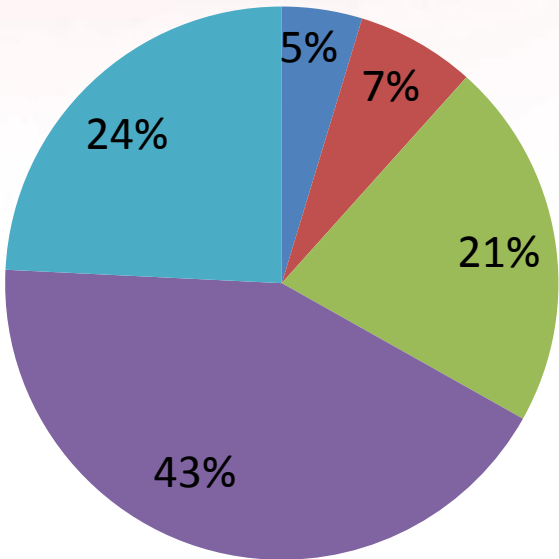
MICU(30.33)

SSB MICU(44.87)

NEURO SX TRAUMA (139.07)

NEURO SX ICU (275.5)

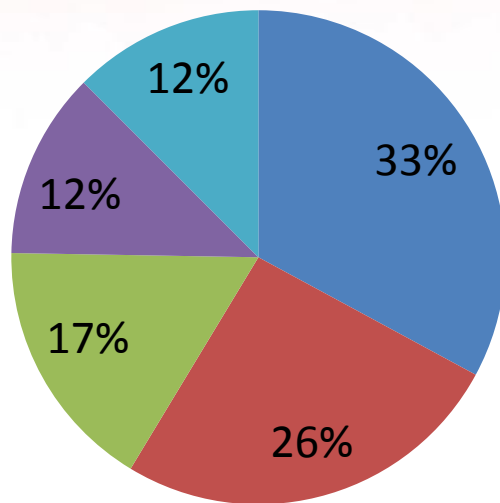
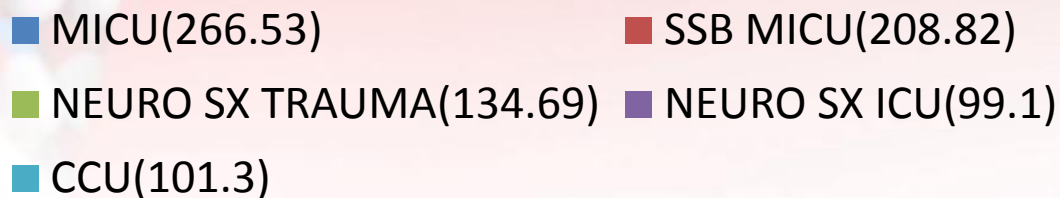
CCU(156.6)





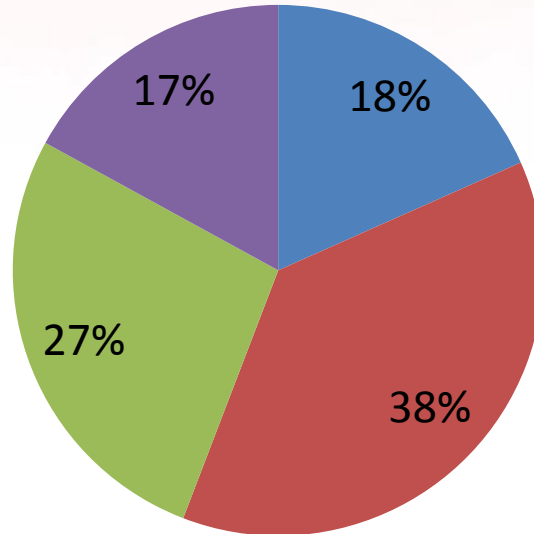
Piperacillin-Tazobactam

WHO WATCH DRUG



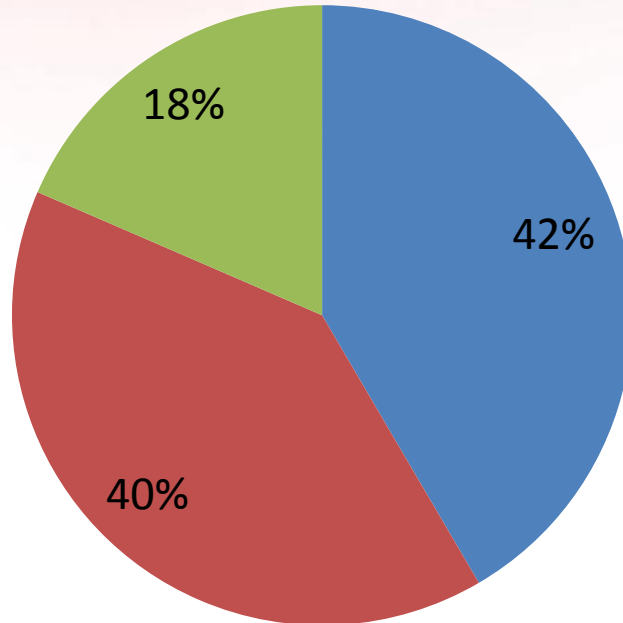
Meropenem WHO RESERVE DRUG

■ MICU(133.13) ■ SSB MICU(272.03)
■ NEURO Sx TRAUMA ICU(197) ■ CCU(123.58)



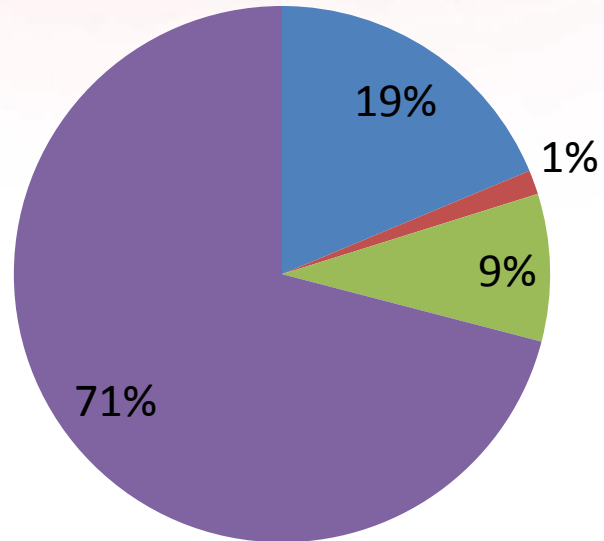
LINEZOLID WHO RESERVE DRUG

■ MICU(74.16) ■ SSB MICU(71.25) ■ CCU(33)



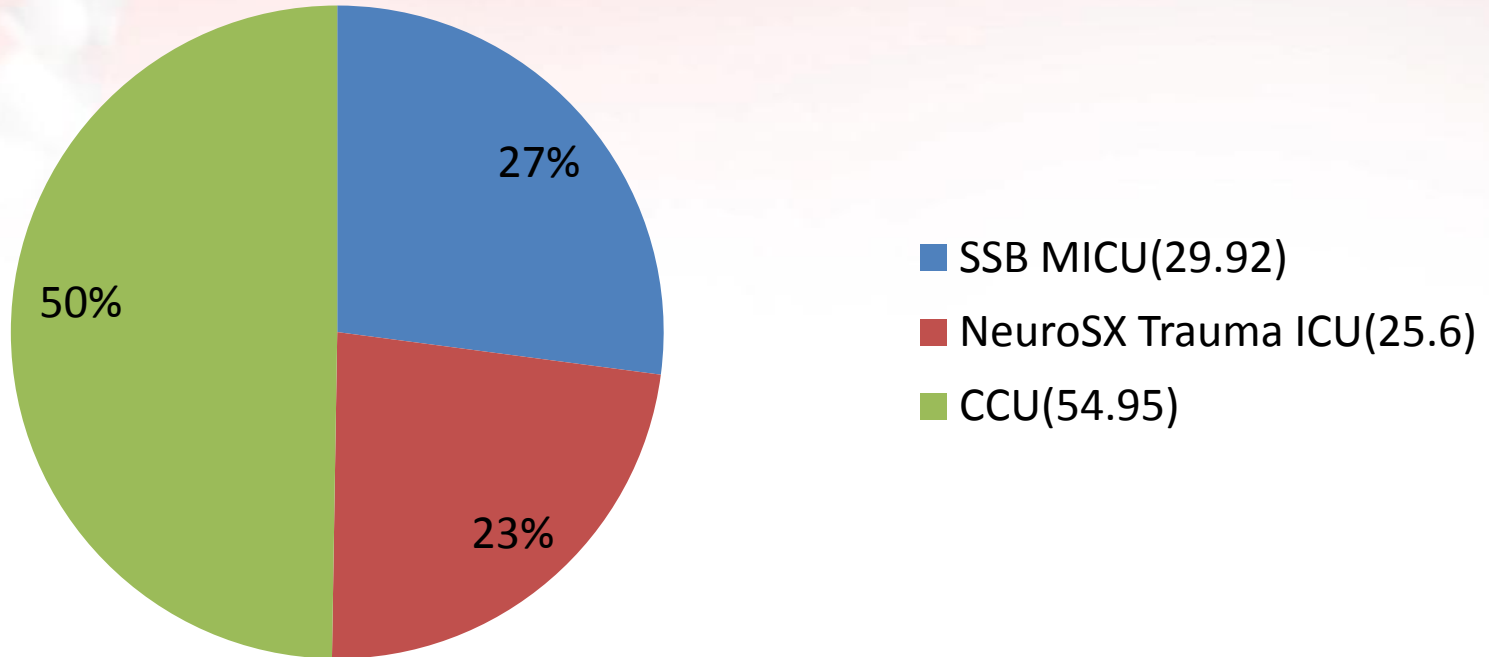
COLISTIN

■ MICU(60.67) ■ SSB MICU(4.73)
■ Neuro SX Trauma ICU(28.84) ■ CCU(230.18)

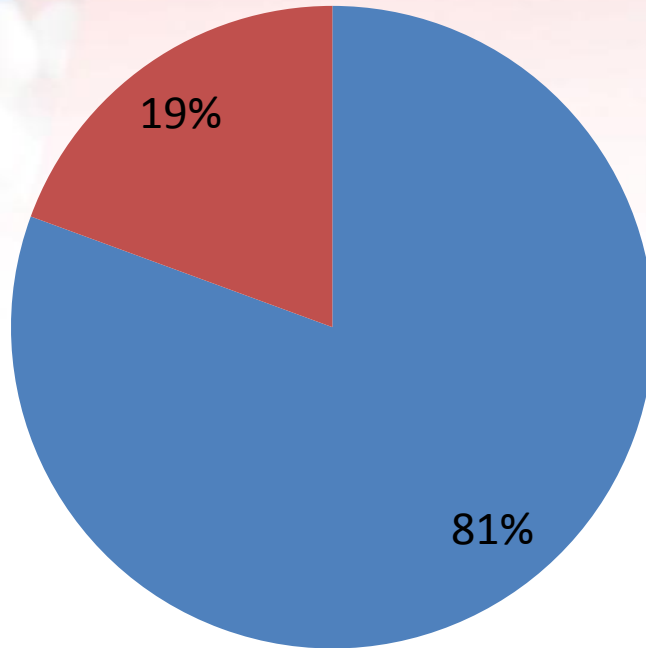




TIGECYCLINE WHO RESERVE DRUG



TEICOPLANIN WHO RESERVE DRUG

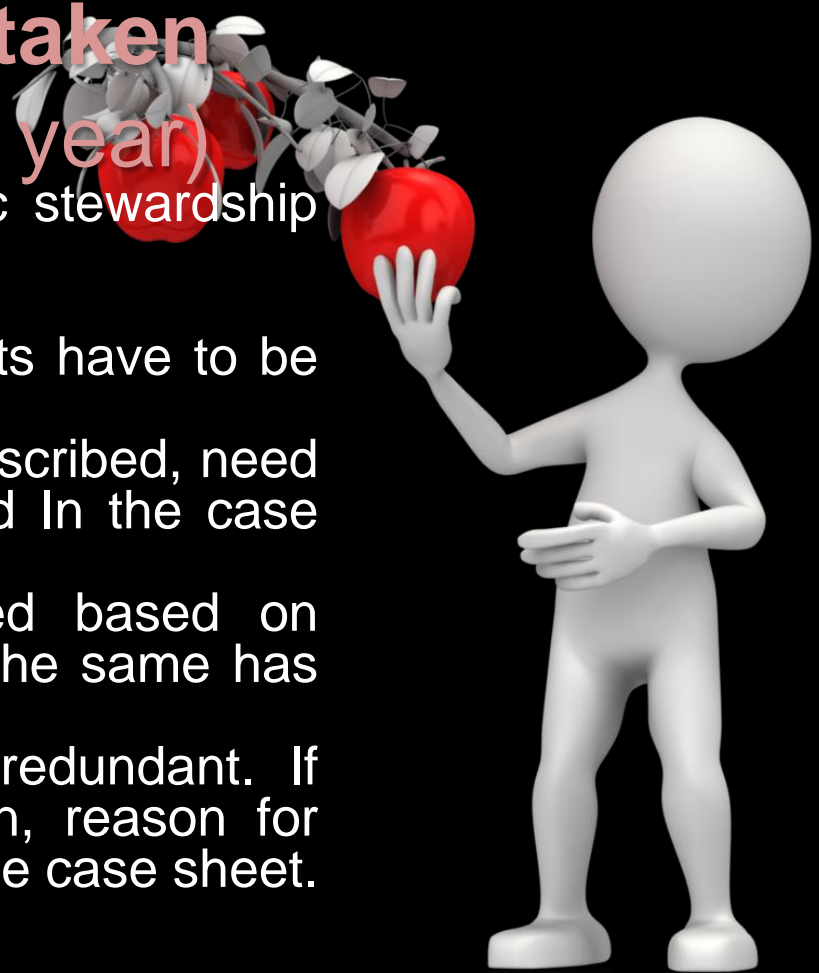


■ SSB MICU(19.94)

■ Neuro Sx Trauma ICU(4.8)

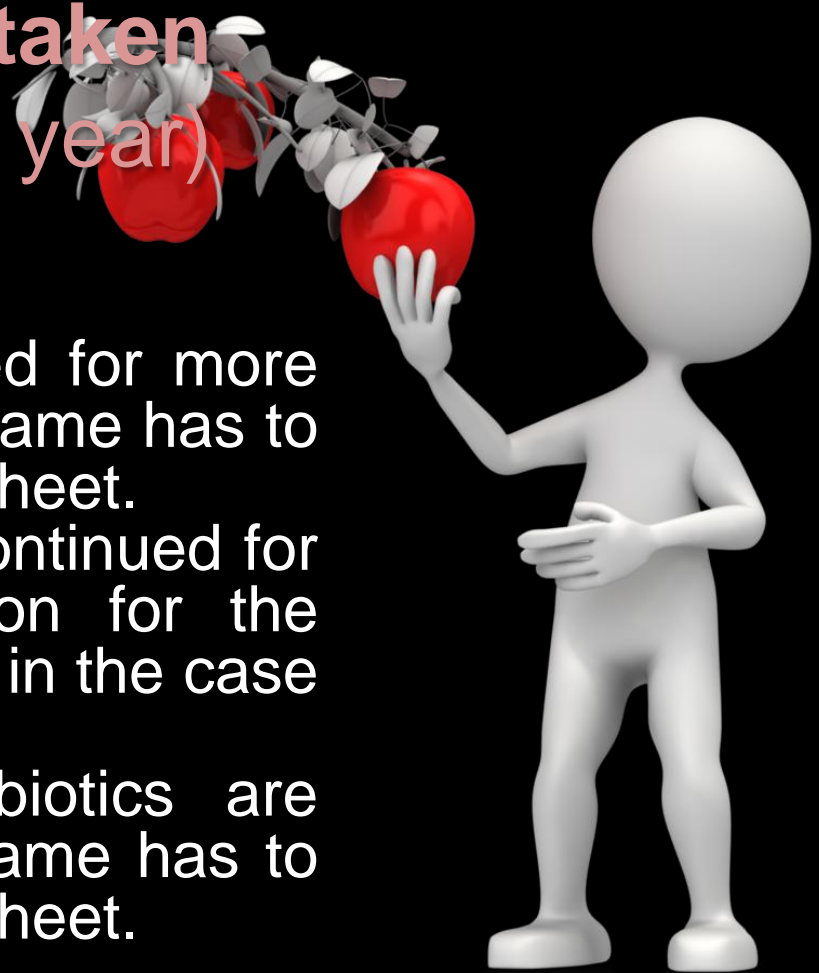
Activities undertaken (last 1 year)

- . Low hanging fruit model for Antibiotic stewardship was implemented
 - a. Antibiotic prescription for inpatients have to be put under a bracket.
 - b. If WHO reserve antibiotics are prescribed, need for the same has to be documented In the case sheet.
 - c. If de-escalation is not practiced based on susceptibility report, the reason for the same has to be documented in the case sheet.
 - d. Double anaerobic coverage is redundant. If double anaerobic coverage is given, reason for the same has to be documented In the case sheet.



Activities undertaken (last 1 year)

- e. If antibiotics are continued for more than 7 days, reason for the same has to be documented in the case sheet.
- f. If surgical prophylaxis is continued for more than 48 hours reason for the same has to be documented in the case sheet.
- g. If more than two antibiotics are prescribed, reason for the same has to be documented in the case sheet.



THANK YOU



If you can't fly, then **run**.
If you can't run, then **walk**.
If you can't walk, then **crawl**,
but by all means, **keep moving**.

- Martin Luther King Jr.

