

## INTRODUCTION

1. Antibiotics have been a critical public health tool, saving lives of million people around the world. Today, however, both rampant prescription and inappropriate consumption of unnecessary antibiotics is serious public health concern<sup>1</sup>

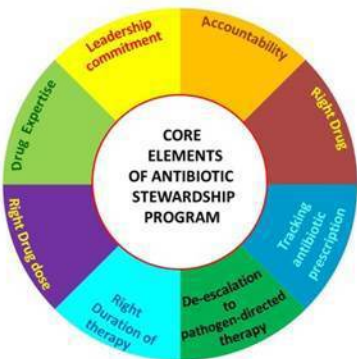
2. Antibiotic resistance is an evolutionary consequence *via* natural selection and random mutation. Antibiotic's put an environmental pressure on bacteria allowing only mutated (*containing antibiotic-resistance genes*) strains to survive and eventually grow. Bacteria transfer this mutated genetic information in horizontal fashion by plasmid exchange. If a bacterium carries several resistance genes, it is called multidrug-resistant bacteria or a Superbug.

## CONTRIBUTING FACTORS FOR ANTIBIOTIC RESISTANCE

1. Self-medication by many patients.
2. Changing antibiotic resistance patterns.
3. Unnecessary prescription of heavy antibiotics.
4. Incomplete antibiotic course taken by many patients.
5. No restriction on OTC dispensing of antibiotics in India.

## OBJECTIVES OF ANTIMICROBIAL STEWARDSHIP PROGRAM

1. To raise awareness about antimicrobial resistant (AMR) strains.
2. To reduce collateral damage to natural microflora.
3. To minimize adverse events of drug overdose.
4. To reduce healthcare and associate costs.
5. To limit transmission of AMR strains.
6. To minimize drug related toxicity.



## IDSA identified problematic microorganisms causing AMR, commonly called abbreviated as "ESCAPE"

	Pathogen	Infection associated with Pathogen	People requiring hospitalization	Deaths	Significance
E	<i>Enterococcus faecium</i>	Vancomycin-resistant enterococci (VRE)	66000	1300	CRE are resistant to nearly all antibiotics including carbapenems—the antibiotic of last resort.
S	<i>Staphylococcus aureus</i>	Methicillin <sup>1</sup> <i>staphylococcus aureus</i> (MRSA)	80000	11285	Severe MRSA infections most commonly occur during or soon after inpatient medical care.
C	<i>Clostridium difficile</i>	<i>Clostridium difficile</i> colitis	250,000	14000	Medical costs \$1 Billion/ year. Deaths increased 400% between 2000-2007 due to fluoroquinolones <sup>2</sup> strain.
A	<i>Acinetobacter baumannii</i>	Multidrug-Resistant <i>acinetobacter</i>	12000	500	At least three different classes of antibiotics no longer cure resistant <i>Acinetobacter</i> infections.
P	<i>Pseudomonas aeruginosa</i>	Multidrug-Resistant <i>P. aeruginosa</i>	51000	440	Nearly or all antibiotics no longer cure these infections.
E	<i>Enterobacter species</i>	Carbapenem <sup>3</sup> <i>enterobacteriaceae</i> (CRE)	140,000	1700	Extended Spectrum $\beta$ -Lactamase (ESBL) cause <i>b. actera</i> to become resistant to penicillins and cephalosporins.

**4Ds**  
of optimal  
antimicrobial therapy

Right Drug  
Right Drug-dose  
Right Duration of therapy  
De-escalation to pathogen-directed therapy

### LABORATORY DETECTION OF ANTI MICROBIAL RESISTANCE:

- Early and Rapid Identification of Antibiotic Resistant microbe is critical in prudent and rational antibiotic usage aiding in ASPs.
- Clinical specimens: Blood, CSF, urine, sputum, genital & wound specimens. Testing either by disk diffusion/broth dilution. Result is reported as:

**Susceptible** means bacteria can't grow if the drug is present. This indicates an effective antibiotic.

**Resistant** means bacteria can grow even if the drug is present. This indicates an ineffective antibiotic.

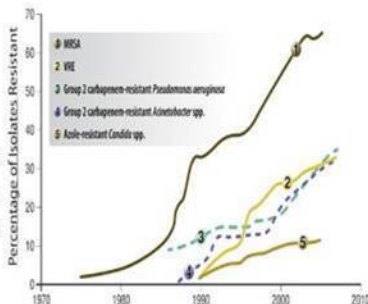
**Intermediate** means a higher dose of the antibiotic is needed to prevent growth.

### PHENOTYPIC ASSAYS

- Antibiogram: Semi-Quantitative (Disk Diffusion) & Quantitative (Broth micro-dilution)
- Automated Instrument based methods (VITEK 2 and VITEK MS)
- TAT is 48 hrs.
- Require bacteria in pure culture from clinical specimen.
- Provide only general information about the resistance mechanisms.

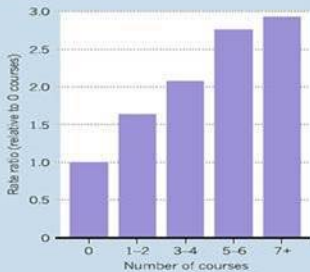
### GENOTYPIC ASSAYS

- DNA hybridization and PCR sequencing-based assay.
- Molecular based and drug resistance assay.
- TAT is 30min-2hrs.
- Performed directly with clinical specimens reducing procedure time.
- Provides definite answer for presence/absence of specific resistance determinants within study isolate.



### TROUBLING CORRELATION

The risk of inflammatory bowel diseases in children rises with the number of courses of antibiotics taken.



### TESTS OFFERED BY METROPOLIS INDIA HEALTHCARE

TEST NAME	TEST CODE	TEST NAME	TEST CODE
Automated Identification (VITEK MS/VITEK 2)	P0061	VRE screen	V0021
Fungal Antibiogram (Yeast)	F0065	Culturing and Sensitivity from Blood / CFS	C0184 / C0189
MRSA screen by PCR	M0099	MRSA Screen (Culture / VITEK 2)	M0068

References: 1. Antibiotic resistance threats in the United States, 2013, CDC Report 2. "The Chennai Declaration" A.Gafur *et al*, 2013 3. [http://www.idsociety.org/Stewardship\\_Policy/](http://www.idsociety.org/Stewardship_Policy/) 4. BMC-ready-with-policy-on-best-use-of-antibiotics/articleshow/46881728.cms