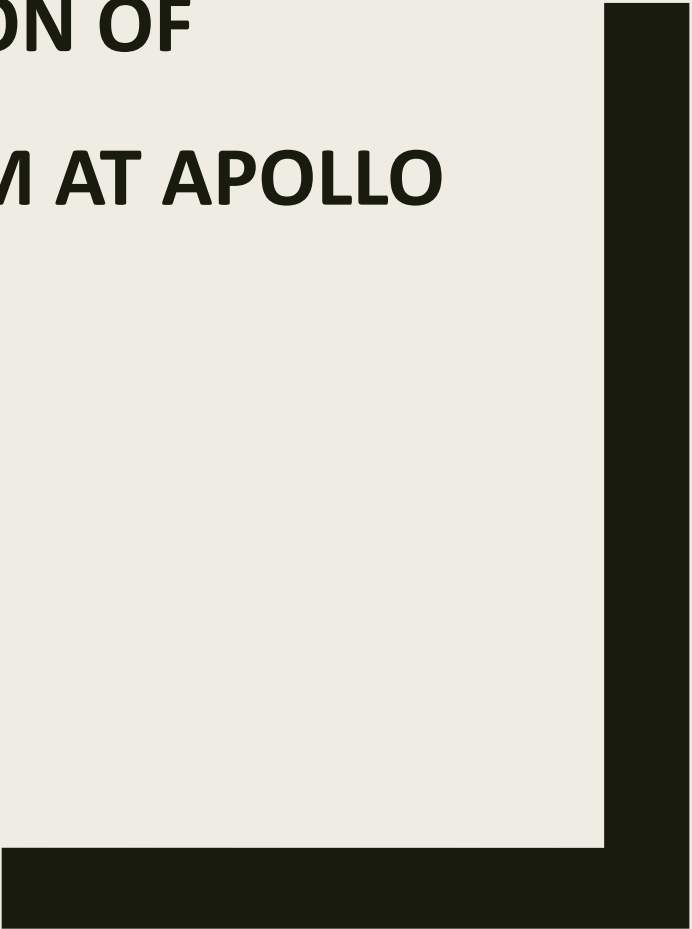


**A STUDY ON IMPLEMENTATION OF
ANTIBIOTIC STEWARDSHIP PROGRAM AT APOLLO
HOSPITALS, CHENNAI.**

Reshma Ramesh

0646

**MBA Hospital and Health Management
IIHMR University, Jaipur.**



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INTRODUCTION

- There has been an increased emergence of antibiotic resistant micro-organisms and resulted in increased morbidity, mortality and cost of care to the patient.
- Anti-microbial resistance patterns can vary regionally and among different hospitals and even within the same community.
- Infections are the most common reasons for patients to seek medical advice and for antibiotics to be prescribed.
- Inappropriate or indiscriminate use of antibiotics can increase the cost of care by increasing drug cost, increasing toxicity, increasing resistance, and increasing laboratory costs.
- Prophylactic antibiotic use in some hospitals remains a problem where they are prescribed unnecessarily and empirically for complaints where no antibiotic is required or when culture and sensitivity results are readily unavailable.

RESEARCH QUESTIONS & OBJECTIVES

Questions

- 1) What is the antibiotic stewardship program(ASP) at Apollo Hospital, Chennai?
- 2) How is the antibiotic stewardship program implemented at Apollo Hospital, Chennai?

Objectives

- To review the antibiotic stewardship program at Apollo Hospital, Chennai.
- To study the appropriateness of Antibiotic Stewardship Program using input, process and output measures.

OPERATIONAL DEFINITION:

- High End Antibiotics: The organization has identified 10 high end antibiotics which are administered during serious infection or serious illness .
- De-escalation: Discontinuing the broad spectrum antibiotic to narrow spectrum antibiotics according to the culture sensitivity report.
- Empirical therapy: Initiating the high-end antibiotic regiment when culture report is not available.
- Definite therapy: Change in treatment of antibiotics according to the antimicrobial sensitivity pattern.

REVIEW OF LITERATURE

STUDY TITLE	AUTHOR	YEAR	DETAILS
The Influence of Inadequate Antimicrobial Treatment of Bloodstream Infections on Patient Outcomes in the ICU Setting.	Ibrahim, E. H., Sherman, G., Ward, S., Fraser, V. J., & Kollef, M. H.	2000	- The study was conducted to identify the patients who received inadequate antimicrobial treatment and arrive at a relationship between inadequate treatment and patient’s outcome. - Less than half of the study population received inadequate antimicrobial treatment. - The mortality rate was high, who received inadequate antimicrobial and has lead to septic shock and mortality.
A cost analysis of a broad-spectrum antibiotic therapy in the empirical treatment of health care-associated infections in cirrhotic patients.	Cristina, L., Vincenza D., Giancarlo C., et al.	2017	- The study briefs about the use of broad-spectrum antibiotics which has resulted in cost-saving in Hospital Acquired Infection in Liver Cirrhotic patients. - A retrospect data on antibiotic daily doses, days of treatment, length of hospital stay, and DRG (diagnosis-related group) were analysed and the profitability of hospitalizations was calculated by considering DRG tariffs divided by length of hospital stay. - It was found that the profitability of hospitalisation with standard therapy was higher than broad spectrum therapy, but treatment failure was less with broad spectrum antibiotics.

STUDY TITLE	AUTHOR	YEAR	DETAILS
Cost-effectiveness analysis of an antimicrobial stewardship team on bloodstream infections: a probabilistic analysis.	Marc, H., Maureen K., Michael, P., Gary, A., Noskin, Todd, A., Lee.	2009	• The author measured the cost effectiveness in terms of QALY(quality adjusted life years) gained over life years. • Cost effective analysis is a measure to assess the interventions introduced. • The incremental cost-effective ratio was calculated in blood stream infection treatment between standard treatment and ASP treatment.. • • It was found that the cost for continuing the ASP is in favour that the treatment was cost effective.
High Burden of Antimicrobial Resistance and Mortality Among Adults and Children with Community-Onset Bacterial Infections in India.	Mave, V., et al.	2017	• There has been repandly use of antibiotics in the last twenty years. • The study proves there is a relationship between prior antimicrobial use and multi drug resistance micro-organisms and increased risk of mortality. • The findings of the study suggest the prescription of empiric antibiotics in the community must be regulated. • There is also a lack of data on the adverse consequence of MDR bacterial infection in low- and middle-income countries.

METHODOLOGY

- **Study area** – Apollo Hospitals , Chennai - Critical Care Unit , Speciality ICU and Wards

Study population:

- **Patients (records)** who received the high-end antibiotic treatment (i.e. Meropenem, poly B , Tigecycline and colistin) in CCU and wards (18 wards and 5 ICUs).
- **Staff** who were responsible for control and prevention of infection in CCU and wards with respect to Antibiotic treatment regimen i.e. Primary Consultant, Intensivists, Antibiotic Surveillance Nurse, CCU nurses, Infection Disease Consultants.
- **Study design:** The research design is descriptive in nature.
- **Sample size:** 515 patient records (Feb-April, 2019)
- **Inclusion criteria:** Patients who are admitted in CCU, Wards and specialty ICU receiving the high-end antibiotic treatment and consumed Meropenem, Colistin, Poly B and Tigecycline.

■ **Exclusion criteria:**

Patients who received all other broad and narrow spectrum antibiotics are excluded from the study.
Expired patients and patients who left against medical advice.

■ **Duration of the study:** February to April 2019

■ **Methods of Data collection :**

Review of the ASP, patients records (information on patient name, UHID, diagnosis, antibiotic administered, duration, dosage were collected from patient file and from the antibiotic surveillance nurse), and cost related data

Interaction with staff

- *Clinical Pharma -1*
- *Primary Consultant-6*
- *Intensivists-3*
- *Antibiotic Surveillance Nurse- 1*
- *CCU nurses-2*
- *Infection Disease Consultants -3*

Data Collection Tools

Review and interactions were made based on Systems Framework- Input, process and outcome framework

Data Analysis: Process Flow; and Cost reduction analysis -cost of the vials of Colistin, Poly-B, Tigecycline, Meropenem were collected from the Pharmacy Department.

SYSTEMS FRAMEWORK

INPUT, PROCESS, OUTCOME

INPUT

- Availability of Antibiotic Stewardship Program
- Availability of guidelines for empiric treatment.
- Process Mapping of Antibiotic Stewardship Program.

PROCESS

- Percentage of Appropriate De-escalation

OUTCOME

- Cost reduction Analysis in de-escalated cases under empiric therapy.

RESULTS



About Antibiotic Stewardship Program

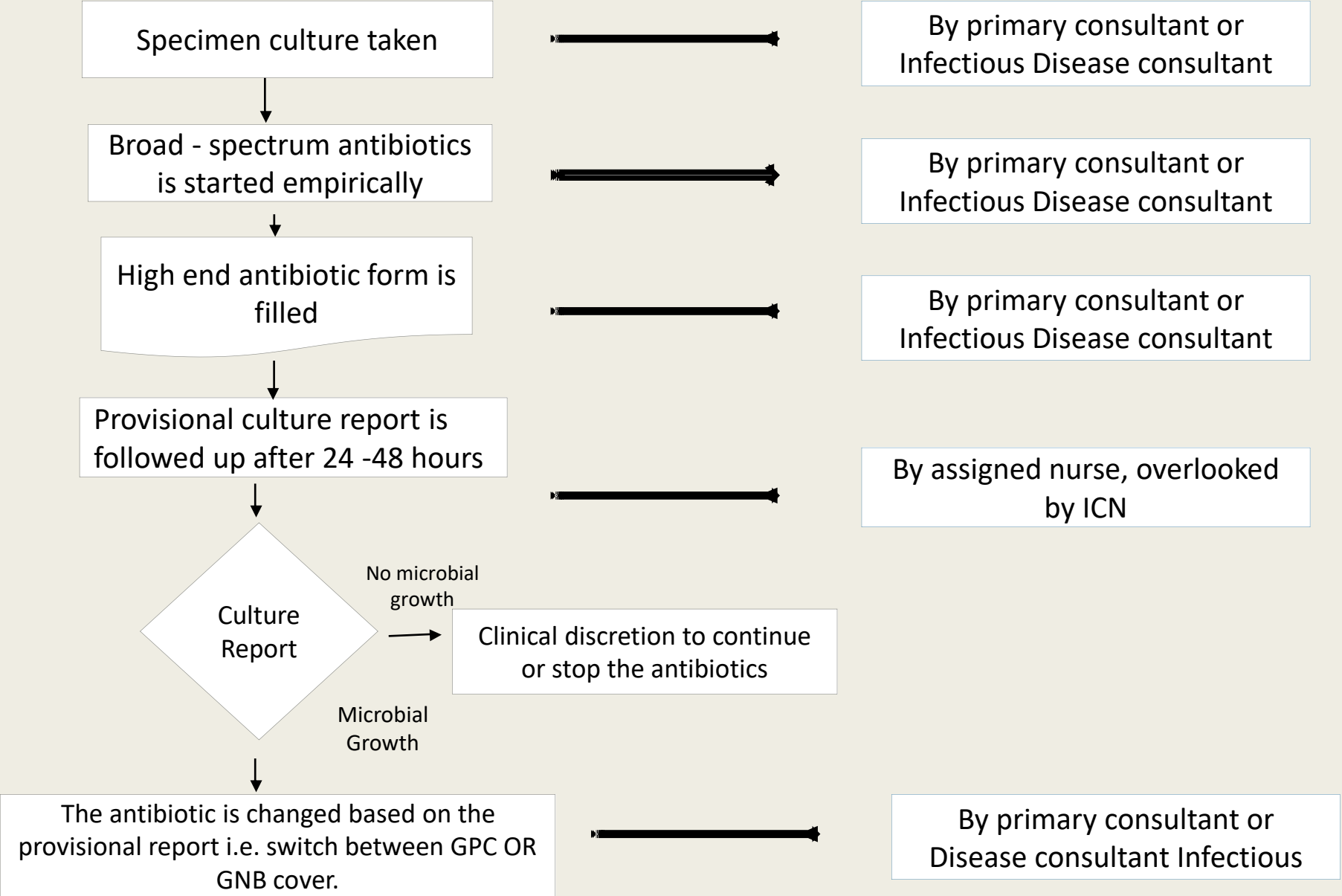
- For a good Prevention and Control programme it requires administrative , scientific leadership, financial and human resource commitment.
- Aim of the Antibiotic stewardship Program is to control the over use of broad-spectrum antibiotics.
- Antibiotic Stewardship Program (ASP) is a hospital-based program, initiated
 - To improve the optimum use of antibiotics,
 - To optimise the treatment of infections and
 - To reduce the adverse events of antibiotic use.
 - To reduce the multi drug resistant organisms (MDRO).
 - And to reduce the cost of care to the patients.
- Thus improves the quality of patient care and patient safety through improved cure rates, reduced treatment failures and increased frequency of correct prescribing of antibiotics for therapy and prophylaxis.

1:INPUT

- ASP at Apollo Hospitals, Chennai was started in 2009.
- A dedicated multidisciplinary team, skilled to manage and prevent infection in the hospital.
- **Members of ASP Team:**
 1. *Infectious Disease Consultant*
 2. *ICN – In charge*
 3. *ICN – Antibiotic Surveillance Nurse*
 4. *Clinical Pharmacist*
 5. *Clinical Microbiologist.*
- There are specific guidelines available for initiating an empiric Antibiotic therapy.
- It includes
 - *prescribing the right choice of drug for the infection diagnosed.*
 - *Dosage and frequency of the antibiotic regimen*
 - *Culture based treatment*
- A process flow is defined and is followed for initiating the high end antibiotic treatment.

PROCESS MAPPING FOR INITIATING HIGH-END ANTIBIOTICS

PROCESS FLOW



PERSONNEL INVOLVED

By primary consultant or Infectious Disease consultant

By primary consultant or Infectious Disease consultant

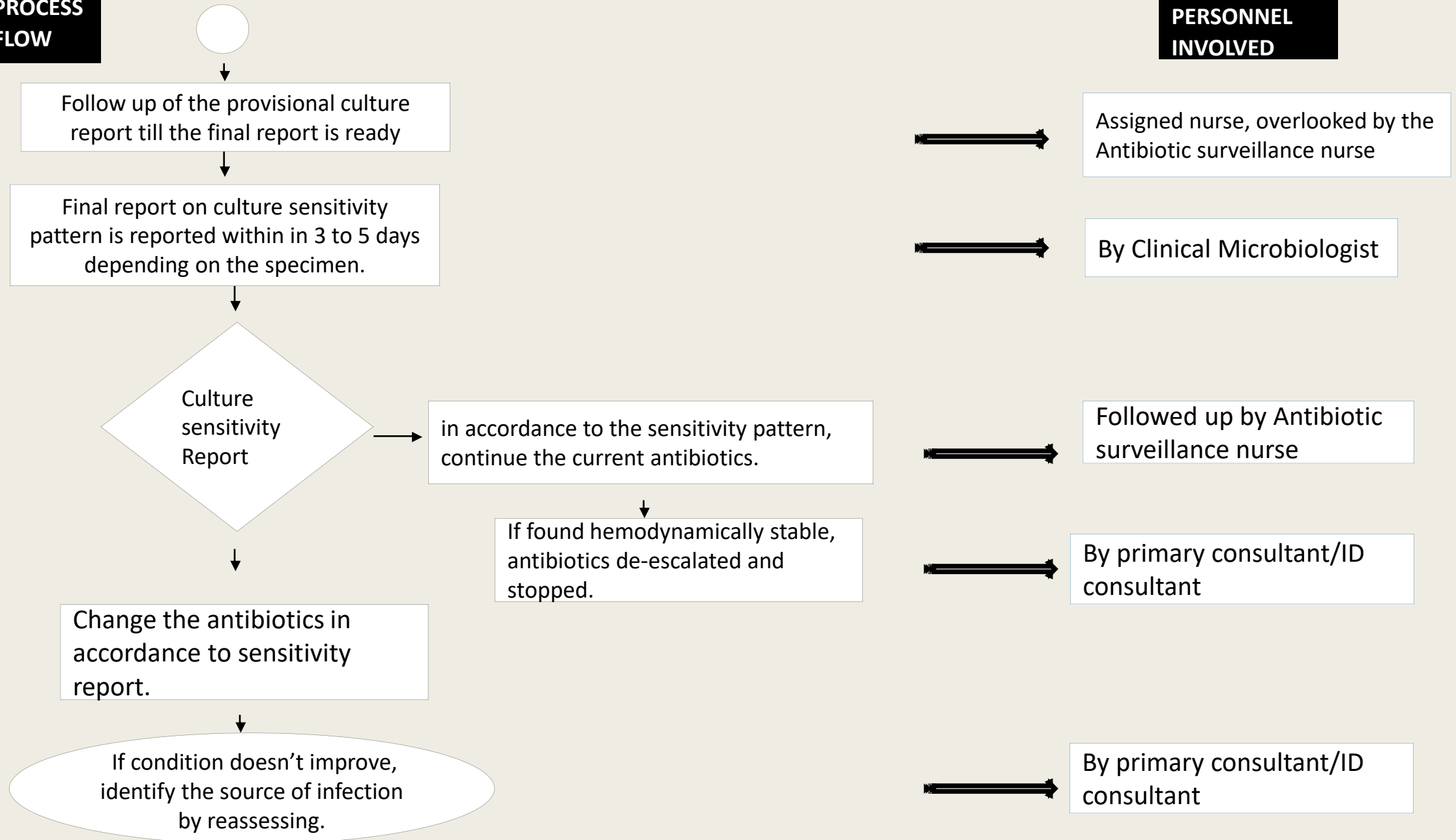
By primary consultant or Infectious Disease consultant

By assigned nurse, overlooked by ICN

By primary consultant or Disease consultant Infectious

PROCESS FLOW

PERSONNEL INVOLVED



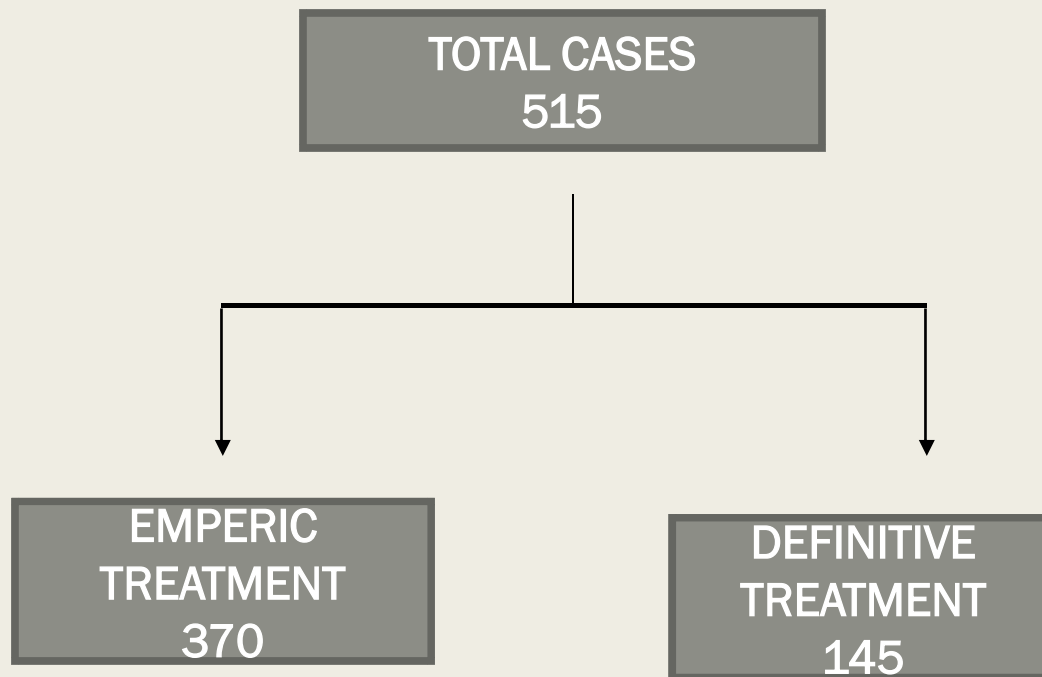
2.PROCESS MEASURES:

The Appropriateness of ASP can be measured by calculation the percentage of appropriate de-escalation.

At Apollo hospitals , de-escalation occurs at the following stages

- When culture report showed no proven infection and the patient clinical status improves
- When the patient clinical status improves after receiving a stat dose.
- When a patient receives multiple antibiotics empirically and the number of antibiotics is reduced based on the culture report.
- When culture report shows microbial growth, and ID consultant advises to de-escalate the antibiotics as per clinical discretion.

PERCENTAGE of APPROPRIATE DE-ESCALATION



- Percentage of patients who are eligible for ASP intervention resulting in cost saving
 $= 370/515 = 71.8\%$
- Out of the 370 patients, 344 patients are eligible for de-escalation .
- Percentage of appropriate de-escalation in empiric therapy = $344/370 = 92.9\%$
- The remaining patients (n=26) continue as definitive therapy due to their co-morbid conditions

PERCENTAGE OF APPROPRIATE DE-ESCALATION :

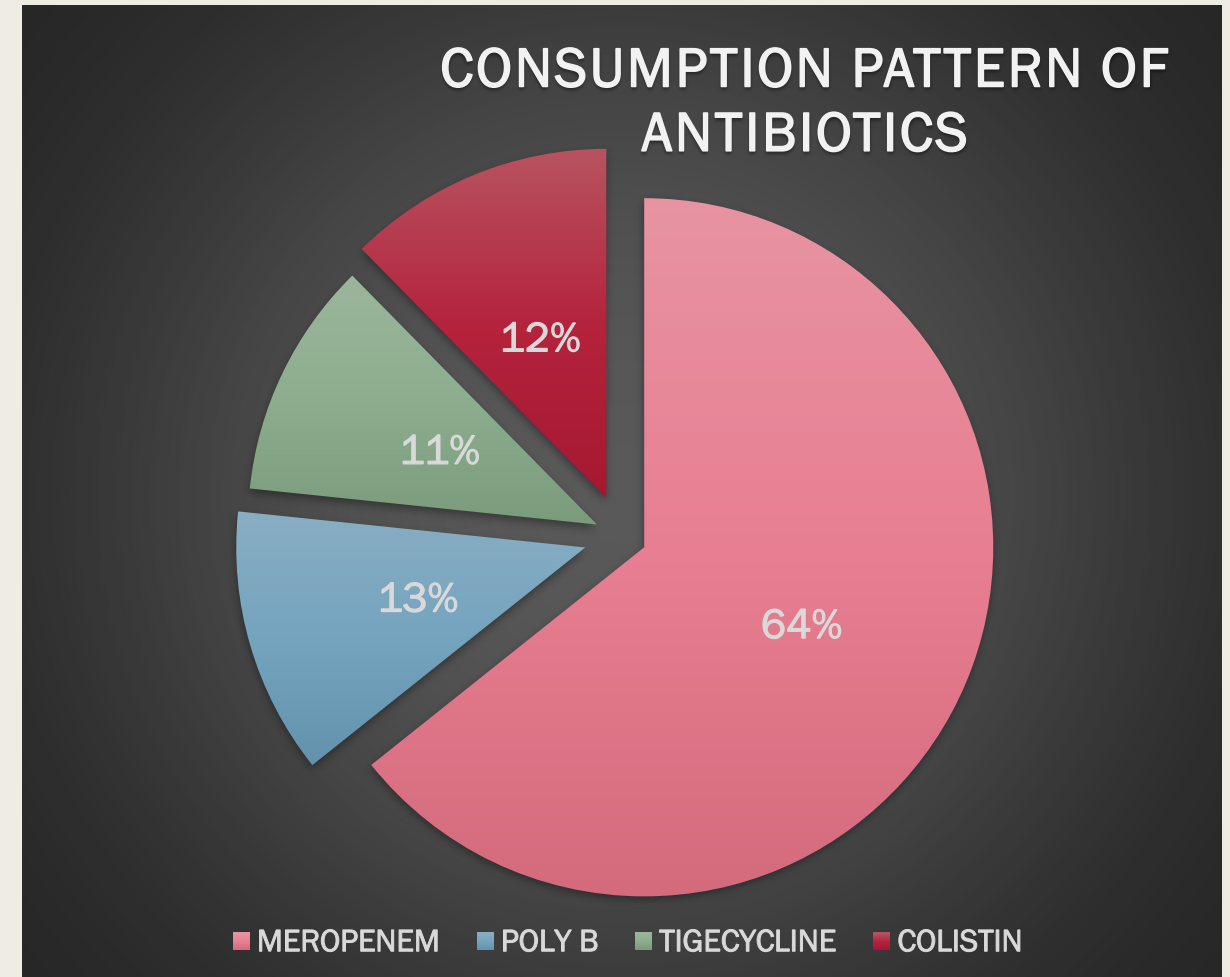
S.NO	CRITERIA FOR DE-ESCALATION	n
1.	Culture report showed no proven and the patient clinical status improves.	17
2.	Patient clinical status improves after receiving a stat dose.	90
3.	Patient receives multiple antibiotics empirically and the number of antibiotics is reduced based on the culture report.	87
4.	Culture report shows microbial growth, and ID Consultant de-escalates the antibiotics as per clinical discretion.	150
	Total number of patients de-escalated	344
	Percentage of appropriate de-escalation $= (344/370) * 100$	92.9%

3.OUTCOMES

- Out of 344 cases, the consumption pattern of antibiotics among Meropenem Poly B Colistin and Tigecycline are

MEROPENEM	234
POLY B	45
TIGECYCLINE	40
COLISTIN	45

n = 344

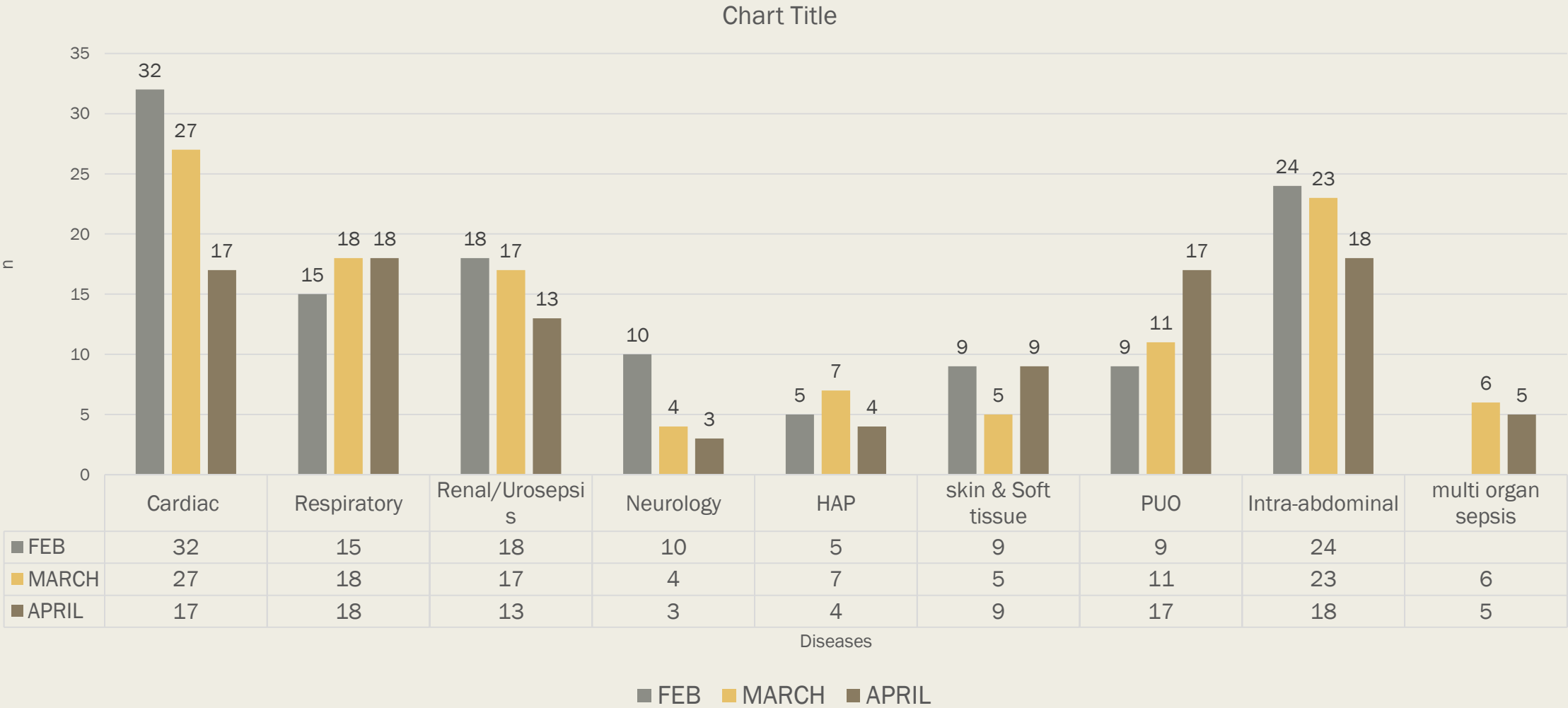


COST REDUCTION ANALYSIS :

- Cost reduction analysis is done in patients who were de-escalated to narrow spectrum antibiotics or stopped the antibiotic regimen depending upon the underlying sepsis.
- The cost of the vials of Colistin, Poly-B, Tigecycline, Meropenem were collected from the Pharmacy Department.
- $\text{Total dosage} = \text{Daily dosage} \times \text{total number of days drug administered.}$
- $\text{Total Cost incurred} = \text{Total dosage} \times \text{cost of one vial}$
- $\text{Anticipated cost} = \text{Total dosage of standard treatment regimen, specific to the underlying disease} \times \text{cost of one vial.}$
- $\text{Cost saved} = \text{Anticipated cost} - \text{Total cost incurred}$

Distribution of Patients by Diseases (Feb-Apr 2019)

n=344



Contd...

PERCENTAGE OF COST SAVED			
	FEB	MARCH	APRIL
Meropenem	↓ 47	→ 51	→ 65
Tigecyclin	↓ 45	→ 50	↑ 73
Colistin	↑ 71	→ 56	→ 54
Poly B	→ 66	↑ 74	↑ 78



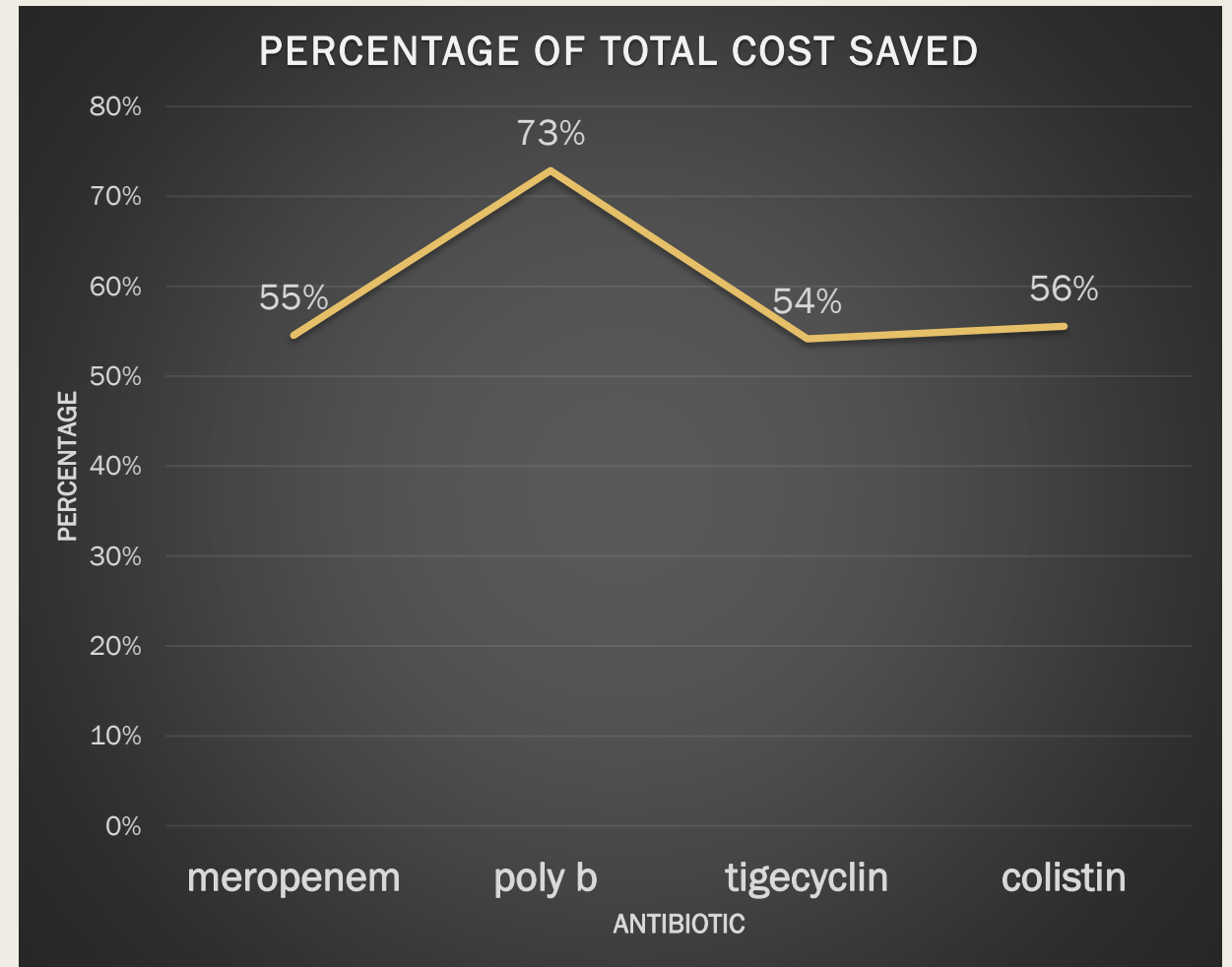
when % more than 70 and above



when % between 50 - 69



when % less than 49



RESULTS: A Snapshot

INPUT

- Availability of Antibiotic Stewardship Program
- Availability of guidelines for empiric treatment.
- Process Mapping of Antibiotic Stewardship Program.

PROCESS

% of Appropriate
De-escalation = 92.8%

OUTCOME

Cost reduction Analysis in de-escalated cases :

Meropenem – 55% cost saved.
Poly B -73%
Tigecycline -54%
Colistin – 56%
The average cost saved per person is INR 33,000/-

CONCLUSION:

- The implemented Antibiotic Stewardship Program is found to be effective.
- A strong infection prevention and control program (IPC) and a successful antimicrobial stewardship Program can have reduced Multi-Drug Resistant Organisms (MDROs).
- The program assesses the incidence of MDRO's and ensures the incidence of Hospital Acquired Infection (HAI) rates are low.
- Hence the best partner for Anti-microbial Stewardship for an organisation is its Prevention and Control of Infection.

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THANK YOU