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IMPACT OF ANTIMICROBIAL STEWARDSHIP IN SURGICAL SITE INFECTIONS

[1]*Dr. Fabin, [2]Mahesh Waghchaure, [3]Dr. Rahul Kamble, [4]Punya Prakash and [5]Dr. Prajakta Pawar

[1]Clinical Pharmacologist, Americares India Foundation.

[2]Infection Control Nurse, Americares India Foundation.

[3]Project Lead, Americares India Foundation.

[4]Assistant Professor, Srinivas College of Pharmacy, Mangalore.

[5]Quality Manager, Narayani Hospital, Nashik.

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***Corresponding Author**
Dr. Fabin
Clinical Pharmacologist,
Americares India
Foundation.

ABSTRACT

Surgical site infections (SSIs) are the most common health care associated infections. The appropriate use of Surgical Antibiotic Prophylaxis (SAP) is a key component to reduce SSIs, while its inappropriate application is a major cause of some emerging infections and selects for antibiotic resistance. We describe an Antimicrobial Stewardship (AMS) intervention on SAP appropriateness because "Antimicrobial stewardship programs (ASPs) have become a fundamental pillar in optimizing antimicrobial usage, improving patient care, and reducing antimicrobial resistance (AMR). The prospective Observational study was conducted in Narayani hospital, nashik in surgical units by implementing hospital evidence-based guidelines and a new workflow to optimize the process of administering and documenting the SAP. We analyzed 2662 surgical cases from Jun 2022 to April 2023 for 2 SAP parameters of appropriateness: choice and timing and an audit was performed every month to analyze the results. The analysis and audit demonstrated that most of the surgical patients received antibiotics and the most prescribed antibiotics were cefuroxim (62%) and Ceftriaxone (21%) and a significant improvement of appropriate choice (72-100%), surgical prophylaxis compliance (86-100%) and rate of SSI also reduced. Our study demonstrates a model of successful antimicrobial stewardship intervention that improves appropriateness on SAP.

KEYWORDS: Surgical site infections (SSIs), Surgical Antibiotic Prophylaxis (SAP), Antimicrobial Stewardship (AMS).

INTRODUCTION

Surgical antibiotic prophylaxis (SAP) is a very brief course of antibiotics initiated closely before the start of operative procedures to reduce postoperative surgical site infections (SSIs). Prophylaxis refers to the prevention of an infection and can be characterized as primary prophylaxis, secondary prophylaxis, or eradication. Clinical practice guidelines are intended to provide practitioners with a standardized approach to the rational, safe, and effective use of antimicrobial agents for the prevention of surgical-site infections (SSIs) based on currently available clinical evidence and emerging issues.

OBJECTIVES

The goal of antibiotic surgical prophylaxis is to ensure adequate serum and tissue levels of the drug at the time of incision, and for the duration of surgery.[1] Antibiotic regimen should include agent(s) that are safe, active against the most likely infecting organisms as well as being cost effective.[2] Optimal dosing, timing of the first dose, and redosing to maintain adequate level during the procedure are more important than administration after the operation.[3] According to the 2017 CDC guideline for the prevention of surgical site infection, administration of post-operative antibiotic doses is not recommended in clean and clean-contaminated procedures.[4,5,6]

MATERIALS AND METHODS[7,8,9,10]

STUDY CRITERIA

1. Inclusion criteria[11,12,13]

- The number of patients who had clean surgeries and received surgical antibiotic prophylaxis.

2. Exclusion criteria[14,15]

- The patients did not received antibiotic before surgery.

PARAMETERS[16,17]

- Timing
- Redosing
- Appropriate dose

- Selection of Surgical prophylaxis antibiotic

STUDY METHODOLOGY[18,19]

Study Setting

This Project is conducted at Narayani Hospital in collaboration with Americares-India Foundation project "parivartan" The study period for the projects from June 2022 till Jan 2024 (2 Years).

STUDY DESIGN AND DURATION

Prospective, Observational study was conducted from July 2022 to April 2023. Data were collected using data abstraction format among surgical inpatients prescribed with surgical antibiotic prophylaxis.[20] Surgical antimicrobial prophylaxis guidelines were used as data assessment protocols.[21]

STUDY PROCEDURE[22,23]

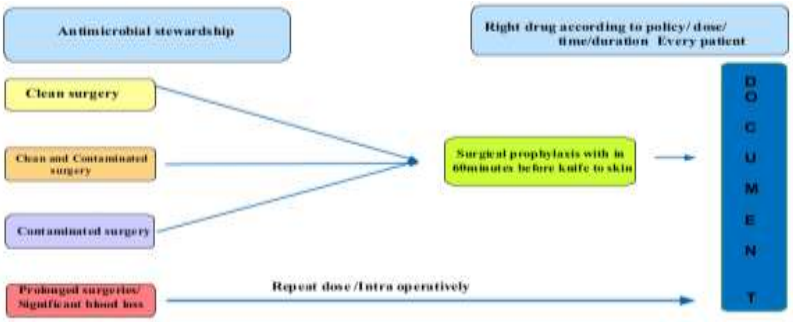
This study included reviewing the medical records of patients who had a surgical procedure in the surgical ward during the study period. So patients of both genders and from all age groups who visited the surgical ward were included, and patients in other departments were excluded.

- The collected data included the total number of patients who had surgeries and the number and percentage of patients who received surgical antimicrobial prophylaxis.[24]
- The data were collected using an Excel sheet and analyzed descriptively. The results were represented as numbers and percentages. The percentages were calculated by.

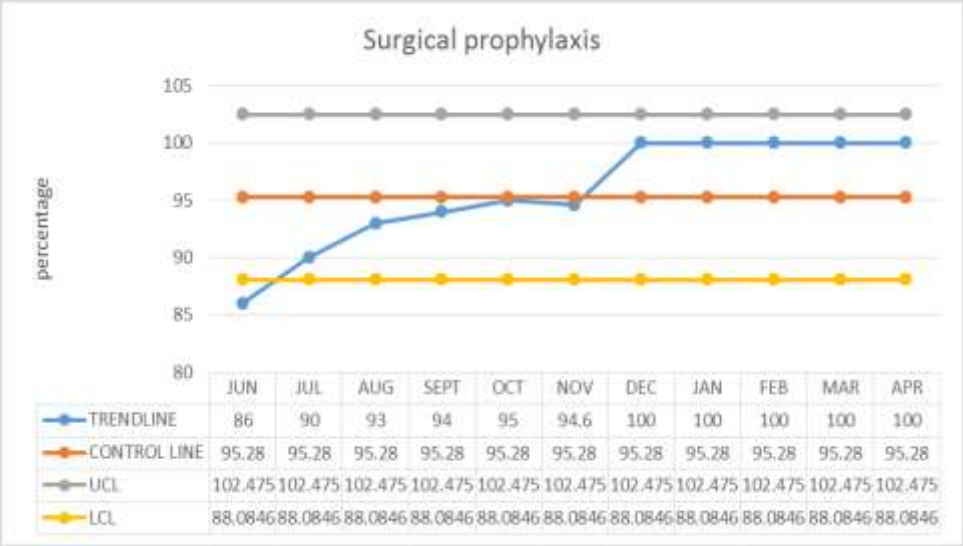
QUALITY TOOLS USED[24,25]

CONTROL CHARTS (DMAIC)

Flow Charts

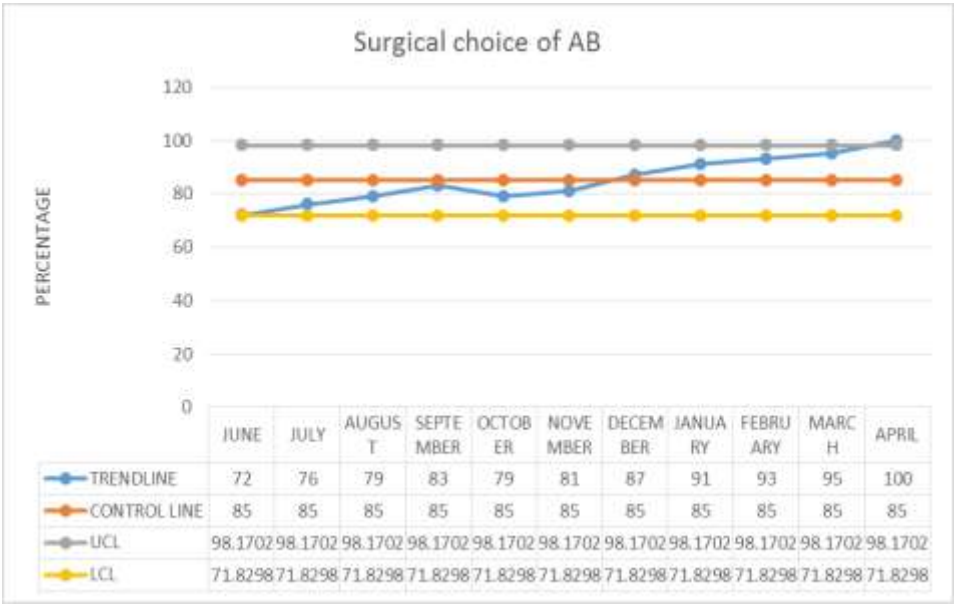


RESULTS



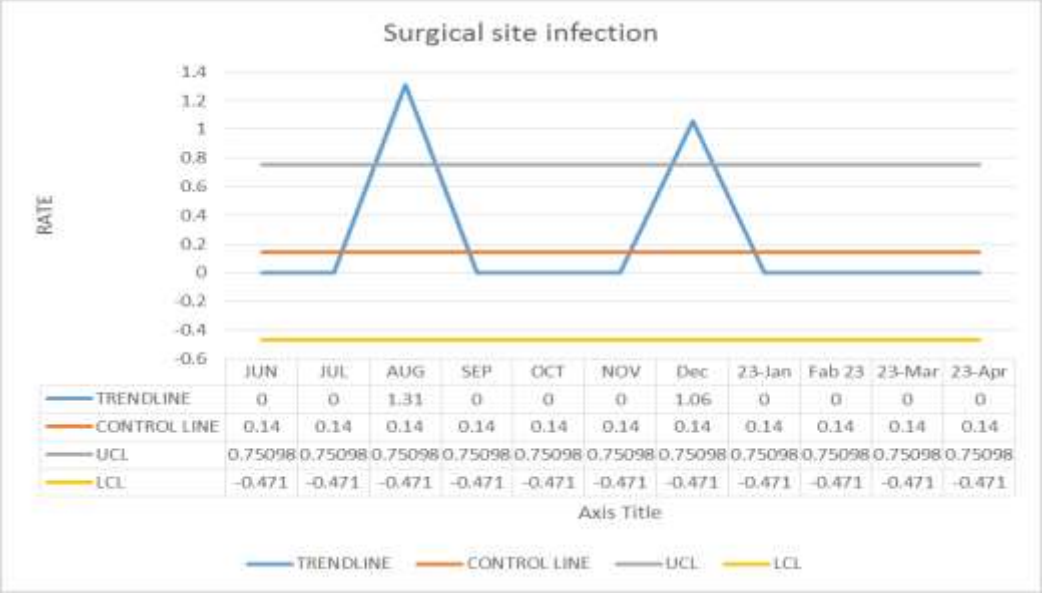
	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR
TRENDLINE	86	90	93	94	95	94.6	100	100	100	100	100
CONTROL LINE	95.28	95.28	95.28	95.28	95.28	95.28	95.28	95.28	95.28	95.28	95.28
UCL	102.475	102.475	102.475	102.475	102.475	102.475	102.475	102.475	102.475	102.475	102.475
LCL	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846	88.0846

- Surgical prophylaxis compliance depends on appropriate dose, antibiotic given with in one hr of surgical incision, antibiotic redosing, prescribing antibiotic for well accepted surgeries.
- At Initial stage compliance of surgical prophylaxis was 86% later it shows gradual increase of 100%.



	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
TRENDLINE	72	76	79	83	79	81	87	91	93	95	100
CONTROL LINE	85	85	85	85	85	85	85	85	85	85	85
UCL	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702	98.1702
LCL	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298	71.8298

- Surgical choice of antibiotic has started at 72% compliance later it found that gradual increase in compliance of surgical choice of antibiotics 100 %.



- Rate of surgical site infection was found to be decresed after the initiation of antimicrobial stewardship program.

DISCUSSION

Most of the studies published in the literature are observational and retrospective, and they analyze the compliance to SAP by reviewing medical charts. Only a few studies have reported some suggested actions to increase compliance. This study was designed by Parivartan team. It attempted to overcome the obstacles preventing the implementation of adequate SAP by the definition of hospital guidelines on SAP with the involvement of surgeons and consultants as well as the creation of a protocol which has standardized the work flow and tried to overcome the organizational and logistical problems. In our protocol, we have programmed certain actions.

1. The SAP administration were monitored on a daily basis.
2. Audits with feedback on appropriateness of prescription were performed.
3. Medical grand rounds were performed to promote the excellence and quality in Surgical Antibiotic Prophylaxis.
4. Education and Training.

All the actions were performed by a AMS team In our study, the implementation of a model with a definition of the workflow and accountability and the systematic collection of data by a surveillance team granted a meaningful implementation of the compliance with a significant

improvement of appropriate choice (72-100%), overall compliance (86-100%) and reduction in the Surgical Site infection.

CONCLUSION

The appropriateness of SAP is a key component to reduce SSIs. Approximately 15% of all antibiotics in hospital are prescribed for SAP, and this can be a major cause of some emerging infections and of the selection of antibiotic resistance, increasing healthcare costs. Many guidelines have been published, but the overall compliance remains poor. There is no universally recognized intervention to improve the appropriateness of SAP. In this study we suggest an antimicrobial stewardship intervention that seemed to improve appropriateness.

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