ANTIBIOTIC PROPHYLAXIS IN SURGERY: PATTERNS, OUTCOMES AND RECOMMENDATIONS

Dissertation Submitted to

The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

By

Jegadesh Chandran

Under the Supervision and Guidance of

Dr Dhirendra Kumar

2024

PARAS HEALTH

CERTIFICATE

This is to certify that Dr Jegadesh chandran in partial fulfillment of the requirements for the award of the degree of MBA (Hospital Management) from the IIHMR University, Jaipur has successfully completed his dissertation at PARAS HOSPITAL Gurugram during April-08 – July 08 ,2024.

Place: Paras Hospital
Date: 3-7-2024.

Preceptor/Head of the Organization
Name of the organization

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **ANTIBIOTIC PROPHYLAXIS IN SURGERY: PATTERNS, OUTCOMES AND RECOMMENDATIONS** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Jegadesh Chandran.

(Signature)

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Date 7/6/24

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that dissertation titled "**ANTIBIOTIC PROPHYLAXIS IN SURGERY: PATTERNS, OUTCOMES AND RECOMMENDATIONS"** is a record of the research work undertaken by **Dr. Jegadesh Chandran** in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and his approach to the research study has been sincere, scientific, and analytical.

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ABSTRACT

Title: Antibiotic Prophylaxis in Surgery: Patterns, Outcomes, and Recommendations

Author Name: Dr Jegadesh chandran

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Keywords: Antibiotic Prophylaxis, Surgical Site Infections, Surgery, Infection Control, Clinical Outcomes

Background:
Surgical site infections (SSIs) represent a significant burden in healthcare, leading to increased morbidity, prolonged hospital stays, and elevated healthcare costs. Prophylactic administration of antibiotics prior to surgery is a widely adopted strategy to mitigate the risk of SSIs. Despite established guidelines, variations in antibiotic prophylaxis practices and their effectiveness are observed.

Objective:
This study aims to analyze patterns in the administration of surgical antibiotic prophylaxis, evaluate its outcomes in preventing SSIs, and provide evidence-based recommendations to optimize prophylactic protocols.

Methodology:
A retrospective analysis was conducted on patient records from Paras Hospital over a [01/04/24 – 31/04/24]. The study included patients who underwent various surgical procedures and received antibiotic prophylaxis. Data on types of surgery, antibiotics used, timing and duration of prophylaxis, and incidence of SSIs were collected. Statistical analysis was performed to identify patterns, assess the effectiveness of different prophylactic regimens, and determine factors associated with successful infection prevention.

Results: The study reported a relatively high overall compliance rate of 81% with the SAP guidelines. This is an encouraging finding, as it suggests that the majority of the surgical procedures were performed with appropriate antibiotic prophylaxis. However, the non-compliance rate of 19% (186 out of 981 cases) indicates that there is still room for improvement in ensuring adherence to the recommended practices

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to several individuals and institutions without whom this dissertation would not have been possible.

First and foremost, I would like to thank Dr. Dhirender Kumar, my esteemed advisor and mentor, for his invaluable guidance, support, and encouragement throughout the course of this research. His insightful feedback, unwavering patience, and constant motivation have been instrumental in shaping this dissertation. Dr. Kumar's expertise and dedication to academic excellence have greatly influenced my work, and I am profoundly grateful for his mentorship. I also extend my heartfelt thanks to Paras Hospital Gurugram for granting me the opportunity to conduct this study within their esteemed institution. The cooperation and support of the hospital staff have been crucial in the successful completion of this research. I appreciate the access to facilities and data that made this study possible, and I am thankful for the environment that fostered productive research and learning.

I would also like to acknowledge my university for providing me with the necessary resources and a supportive academic environment to pursue this research. The knowledge and skills I have acquired through my academic journey have been instrumental in the successful completion of this dissertation. I am grateful to my professors and peers for their encouragement and constructive feedback throughout this process.

Additionally, I would like to extend my gratitude to my family and friends for their unwavering support and encouragement. Their belief in my abilities and their understanding during the challenging times of this research have been a source of strength and motivation.

In conclusion, this dissertation is the result of the collective efforts and support of many individuals and institutions. I am deeply appreciative of the guidance, assistance, and encouragement I have received throughout this journey. This research would not have been possible without the contributions of each person mentioned here, and I am sincerely grateful for their support.

Thank you all for making this dissertation a reality.

Dr Jegadesh chandran

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Overview

Paras Hospital, Gurugram, is a leading healthcare institution renowned for its comprehensive medical services and advanced healthcare facilities. Established with a vision to provide world-class healthcare services to the community, Paras Hospital has emerged as a trusted name in the healthcare sector, offering a wide range of medical specialties, cutting-edge technology, and a team of highly skilled medical professionals.

Historical Background

Paras Healthcare, the parent organization of Paras Hospital, was founded with the aim of addressing the growing need for quality healthcare services in India. The Gurugram facility a 250 bedded hospital, one of the flagship hospitals under the Paras Healthcare umbrella, was established to cater to the healthcare needs of the rapidly growing population in the National Capital Region (NCR). Since its inception, Paras Hospital, Gurugram, has been committed to delivering patient-centric care, fostering innovation, and maintaining high standards of medical excellence.

Vision and Mission

The vision of Paras Hospital is to be a leading healthcare provider, offering affordable and accessible medical services to all sections of society. The hospital aims to set benchmarks in healthcare delivery through the adoption of best practices, continuous quality improvement, and patient safety initiatives.

The mission of Paras Hospital includes:

Providing Quality Healthcare: Ensuring the delivery of high-quality medical care through a multidisciplinary approach, advanced technology, and skilled healthcare professionals.

Patient-Centric Approach: Focusing on patient care and satisfaction by providing compassionate and personalized services.

Innovation and Excellence: Promoting innovation in healthcare practices and maintaining excellence in medical services.

Community Health: Contributing to the well-being of the community through health education, preventive care, and outreach programs.

Medical Specialties and Services

Paras Hospital, Gurugram, offers a comprehensive range of medical specialties, catering to diverse healthcare needs. Some of the key specialties and services provided by the hospital include:

- Cardiology and Cardiothoracic Surgery:
- Neurology and Neurosurgery:
- Orthopedics and Joint Replacement:
- Oncology:
- Gastroenterology:
- Obstetrics and Gynecology:
- Pediatrics:
- Urology:
- Nephrology:
- Emergency and Critical Care:

24/7 emergency services and intensive care units (ICUs) equipped with advanced life support systems.

Rapid response teams for critical medical emergencies.

recovery.

Conclusion

Paras Hospital, Gurugram, stands as a beacon of excellence in the healthcare landscape, dedicated to providing comprehensive, patient-centric medical services. With its commitment to quality, innovation, and community well-being, Paras Hospital continues to set new benchmarks in healthcare delivery. The hospital's focus on advanced technology, skilled professionals, and compassionate care ensures that it remains a trusted healthcare partner for patients and their families. As it moves forward, Paras Hospital is poised to further enhance its services, embrace new medical advancements, and contribute significantly to the health and well-being of the community it serves.

CHAPTER 1. **INTRODUCTION**

Surgical Antibiotic Prophylaxis and Its Importance

Surgical antibiotic prophylaxis (SAP) refers to the preemptive administration of antibiotics before surgical procedures to prevent postoperative infections, specifically surgical site infections (SSIs). The primary goal of SAP is to reduce the microbial load at the surgical site, thereby minimizing the risk of infection that could complicate the postoperative course. Effective SAP not only protects patients from potential infections but also contributes to the overall success and safety of surgical procedures.

Prevalence and Impact of Surgical Site Infections

Surgical site infections are among the most common healthcare-associated infections, accounting for a significant portion of postoperative complications. These infections can lead to prolonged hospital stays, increased healthcare costs, and higher morbidity and mortality rates. SSIs affect patient outcomes by causing pain, delayed wound healing, and, in severe cases, systemic infections such as sepsis. The prevalence of SSIs varies depending on the type of surgery, the patient's underlying health conditions, and the adherence to preventive measures, including SAP.

Rationale Behind Using Antibiotics for Prevention

The rationale for using antibiotics prophylactically in surgery stems from the need to curb the introduction and proliferation of pathogens during and after the surgical procedure. The surgical environment, despite sterile techniques, can inadvertently expose the wound to microbial contamination from the patient's skin, the surgical instruments, or the operating room environment. Administering antibiotics within a critical time window before the incision ensures adequate tissue concentrations of the drug, providing a protective barrier against potential infections. This practice is rooted in evidence-based guidelines and has been shown to significantly reduce the incidence of SSIs, thereby improving patient outcomes and optimizing healthcare resources.

Thus, Surgical antibiotic prophylaxis is a cornerstone of infection control in surgical practice. By understanding its importance, recognizing the impact of SSIs, and comprehending the rationale behind antibiotic use, healthcare providers can enhance surgical outcomes and ensure patient safety. As surgical techniques and healthcare

systems evolve, continuous evaluation and adherence to SAP protocols remain crucial in mitigating the risks associated with surgical procedures

surgical antibiotic prophylaxis protocol involves timely administration of appropriate antibiotics, typically within 60 minutes before surgical incision, based on local resistance patterns and surgical factors. It emphasizes single-dose administration in most cases to minimize antibiotic exposure, with considerations for redosing during prolonged procedures or significant blood loss. Strict adherence to the protocol, including documentation and monitoring for compliance, is essential to mitigate surgical site infections while minimizing the risk of antibiotic resistance and adverse effects. Regular review and adjustment of the protocol ensure alignment with current best practices and local epidemiology

.During my 3 month dissertation training at Paras Hospitals, Gurugram, I had the unique opportunity to observe and study the implementation of SAP in various surgical settings. This hands-on experience allowed me to witness the practical challenges and successes of SAP protocols. Through discussions with experienced surgeons and infection control specialists, I gained valuable insights into how critical timing and appropriate antibiotic selection are to the success of prophylaxis.

Additionally, I observed firsthand the profound impact that SSIs can have on patient recovery and hospital resources. These infections not only affect the physical well-being of patients but also place a significant emotional and financial burden on them and their families. This experience reinforced the importance of stringent infection control measures and the pivotal role of SAP in safeguarding patient health.

My time at Paras Hospitals also highlighted the ongoing need for education and adherence to SAP guidelines among healthcare professionals. Continuous training and awareness are essential to ensure that the benefits of SAP are fully realized and that patient outcomes are consistently improved.Financial health derived from high patient retention enables the hospital to focus on long-term strategic planning rather than short-term survival tactics. It allows for the implementation of quality improvement initiatives, staff development programs, and community outreach activities, further enhancing the hospital's reputation and patient loyalty.

AIMS AND OBJECTIVES

AIM OF THE STUDY

The primary aim of this study is to evaluate the patterns and outcomes of surgical antibiotic prophylaxis in preventing surgical site infections (SSIs) and to develop evidence-based recommendations for optimizing prophylactic protocols.

OBJECTIVES OF THE STUDY

To analyse the patterns of antibiotic prophylaxis in surgical procedures:

- Examine the types of antibiotics used for prophylaxis in different surgical departments.
- Evaluate the timing of antibiotic administration in relation to the incision time.

To assess the relationship between antibiotic prophylaxis and surgical site infections (SSIs):

- Determine the incidence of SSIs based on the types and timing of antibiotics administered.
- Analyse the impact of different surgical procedures and departments on the effectiveness of antibiotic prophylaxis.

To identify key factors associated with the successful prevention of SSIs:

- Investigate the correlation between the timing of antibiotic administration and the occurrence of SSIs.
- Explore how various surgical procedures and departments influence the incidence of SSIs.

To provide evidence-based recommendations for optimizing antibiotic prophylaxis protocols:

- Develop guidelines for the optimal timing and selection of antibiotics for different types of surgeries.
- Recommend best practices for different departments to minimize the risk of SSIs.

CHAPTER 2. REVIEW OF LITERATURE

SRNO.	AUTHORS (YEAR)	STUDY LOCATION	SAMPLE SIZE	SAMPLING TECHNIQUES	SALIENT FEATURES
1.	Charlotte Hall, Joanna Allen, Gavin Barlow (2015)	NM	NM	NM	This article addresses the significance of antibiotic prophylaxis in preventing surgical site infections while highlighting the need for responsible use to avoid adverse effects and antibiotic resistance. The importance of appropriate antibiotic selection and administration, special patient considerations, and thorough patient education are underscored as critical components of effective SSI

					prevention.
2.	Pardo, Ana del Rio Bueno	Global	83 systematic reviews	Systematic review of literature from PubMed, Cochrane Library, Epistemonikos, and Health Systems Evidence databases	This scoping review maps the (SAP) and identifies key findings and knowledge gaps in the field. The review confirms the role of SAP in reducing postoperative SSIs when administered perioperatively, particularly with first-generation cephalosporins. However, postoperative antibiotic use does not appear to significantly prevent SSIs. The review highlights the need for high-quality systematic reviews and research in diverse populations to inform the development of global guidelines for SSI prevention.

3.	Kamal M. F. Itani (2013)	National Veterans Affairs hospitals	32,459 operations	Retrospective cohort study using national Veterans Affairs data	This study found no significant association between SSIs While adhering to the 60-minute preincision antibiotic administration measure is standard practice, evidence does not support its superiority in reducing SSIs.
4.	Alan R. Salkind, Kavitha C. Rao (2011)	United States	NM	Review of existing literature and guidelines	This article outlines evidence-based guidelines highlighting the importance of appropriate antibiotic selection, timing, and duration. Despite proven benefits, compliance with these guidelines is inconsistent, underscoring the need for increased

					adherence to reduce SSIs effectively.
5.	Marques dos Reis (2021)	Various international settings	14 studies	Systematic review of randomized clinical trials, non-randomized clinical trials.	This systematic review indicates that AMS strategies can significantly improve adherence to surgical antibiotic prophylaxis protocols and potentially reduce SSI rates while offering economic benefits. However, the evidence quality is currently limited, emphasizing the need for further high-quality research.
6.	Dale W. Bratzler and Peter M. Houck	United States	NM	Review of guidelines and	This Project highlights the critical importance of

	(2004)			consens us process	administering the first dose of antimicrobials within 60 minutes before surgical incision and discontinuing prophylaxis within 24 hours post-surgery.

Surgical antibiotic prophylaxis is an important intervention to prevent surgical site infections, but its use must be optimized to address the growing challenge of antibiotic resistance.

Timing of Antibiotic Administration:

The optimal timing for preoperative antibiotic administration is within 60 minutes before the surgical incision is made. Administering antibiotics after the incision or after application of a tourniquet is less effective.

A systematic review found that the timing of preoperative antibiotic administration is important, with the risk of surgical site infection being lower when antibiotics are given within the optimal window.The recommendation to administer preoperative antibiotics within 60 minutes before surgical incision is based on several factors:

Pharmacokinetics:

Antibiotics need sufficient time to reach effective concentrations in the tissues and blood before the incision is made.

Most antibiotics have a half-life of 30-60 minutes, so administering them within 60 minutes allows for adequate tissue penetration and therapeutic levels during the critical period of the surgery.

Surgical Timing:

The timing of surgical incision can vary, and administering antibiotics too early may result in suboptimal tissue concentrations by the time the incision is made.

Giving antibiotics within 60 minutes before incision helps ensure adequate levels are maintained throughout the procedure.

Tourniquet Use:

In some surgeries, a tourniquet is applied to restrict blood flow to the surgical site.

If antibiotics are given after tourniquet application, they may not reach the tissues effectively, as the tourniquet can impair antibiotic distribution.

Evidence from Clinical Studies:

Multiple studies have shown that administering antibiotics within 60 minutes before incision is associated with lower rates of surgical site infections compared to giving them after incision or after tourniquet application.

A systematic review found that the risk of surgical site infection was lower when antibiotics were given within the optimal 60-minute window before incision.

Guidelines and Recommendations:

Major healthcare organizations, such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), recommend administering preoperative antibiotics within 60 minutes before surgical incision.

These guidelines are based on the available evidence and aim to optimize the timing of antibiotic administration for effective prevention of surgical site infections.

In summary, the 60-minute window before incision is recommended based on the pharmacokinetics of antibiotics, the timing of surgical procedures, the potential impact of tourniquets, evidence from clinical studies, and guidelines from leading healthcare organizations. This timing helps ensure adequate antibiotic concentrations at the surgical site during the critical period of the procedure.

Antibiotic Resistance Concerns:

Gram-negative bacteria like E. coli and Klebsiella, as well as Gram-positive bacteria like MRSA, are of particular concern for surgical antibiotic prophylaxis due to increasing antibiotic resistance.

The growing incidence of antibiotic resistance increases the risk of surgical site infections being caused by resistant bacteria, leading to poorer outcomes

In summary, the timing of preoperative antibiotic administration and addressing antibiotic resistance are key considerations for optimizing surgical antibiotic prophylaxis to prevent

CHAPTER 3. METHODOLOGY

Research Question:
What are the patterns and outcomes of surgical antibiotic prophylaxis in preventing surgical site infections (SSIs) at Paras Hospital Gurugram, and how can prophylactic protocols be optimized based on these findings?

Research Design:
This study utilizes a retrospective cohort design to analyze data from patient records. The aim is to evaluate the effectiveness of different antibiotic prophylaxis regimens and identify factors associated with successful prevention of SSIs.

Study Location:
The study was conducted at Paras Hospital, Gurugram, a multi-specialty hospital with a wide range of surgical departments.

Study Duration:
Data collection covered surgical procedures performed from April 1, 2024, to May 31, 2024.

Study Population:
The study included patients who underwent surgical procedures at Paras Hospital Gurugram during the specified study period.

Inclusion Criteria:

- Patients who underwent surgical procedures between April 1 and May 31, 2024.
- Patients who received antibiotic prophylaxis as part of their surgical care.
- Complete patient records including date of surgery, type of surgery, department, antibiotics administered, incision time, and relevant remarks.

Exclusion Criteria:

- Patients with incomplete or missing data on key variables.
- Patients who did not receive prophylactic antibiotics.
- Patients with pre-existing infections at the surgical site.

SAMPLE SIZE: The sample size was determined based on the total number of eligible surgical cases at Paras Hospital Gurugram during the study period

SAMPLING TECHNIQUE: **Comprehensive sampling** method, where all eligible cases within the defined timeframe were included in the study. This approach ensured that the study captured a complete and representative dataset of the hospital's surgical procedures and prophylactic practices during the specified period

Data Collection:

Data were extracted from the hospital's electronic medical records system, focusing on the following variables:

- **Date of Surgery:** The specific date on which the surgery was performed.
- **Surgery Done:** The type of surgical procedure conducted.
- **Department:** The medical department responsible for the surgery.
- **Antibiotics:** Details of the antibiotics administered for prophylaxis, including type and dosage.
- **Incision Time:** The time when the surgical incision was made.

Data Analysis:

- **Descriptive Statistics:** Summarize patient demographics, types of surgeries, departments, and antibiotic usage patterns.
- **Incidence Rates:** Calculate the incidence of SSIs within 30 days post-surgery for different antibiotic regimens and surgical procedures.
- **Comparative Analysis:** Compare SSI rates across different surgical departments and antibiotic prophylaxis protocols.
- **Correlation Analysis:** Assess the relationship between the timing of antibiotic administration and the occurrence of SSIs.

Outcomes Measured:

- Primary Outcome: Incidence of surgical site infections (SSIs) within 30 days post-surgery.
- Secondary Outcomes: Factors associated with reduced SSI rates, including timing and type of antibiotic prophylaxis, type of surgery, and department.

Ethical Considerations:
The study was conducted in accordance with ethical guidelines and approved by the Institutional Review Board (IRB) of Paras Hospital Gurugram. Patient confidentiality was maintained by anonymizing data and using unique health identifiers (UHIDs)

CHAPTER 4. OBSERVATIONS AND RESULTS

Table 4. 1 DISTRIBUTION OF TOTAL NO. OF SURGERIES ACROSS VARIOUS DEPARTMENTS IN THE HOSPITAL (TOTAL SURGERIES n= 981)

(APRIL 1- MAY 31 2024)

OPTHAL	**18**
CTVS	**18**
SURGICAL ONCOLOGY	**21**
NUEROSURGERY	**36**
ENT	**43**
MAS	**139**
ORTHOVASCULAR AND PLASTICS	**198**
UROLOGY	**204**
OBG	**304**

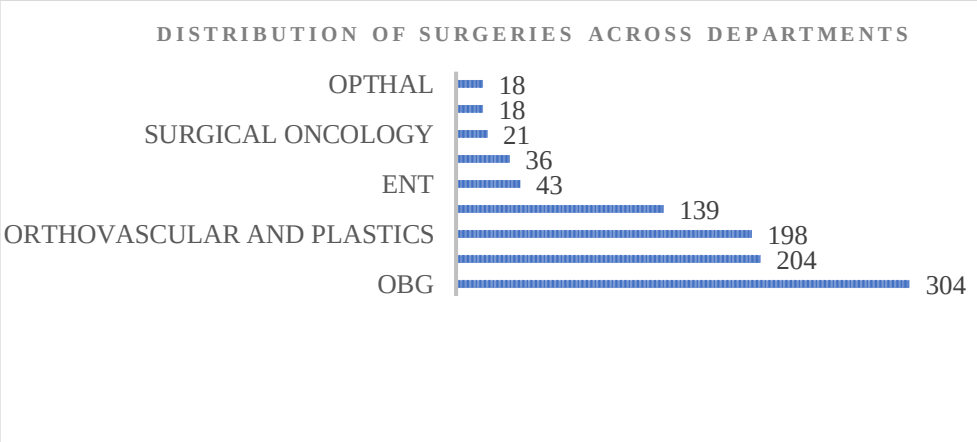

Figure 4. 1 CLUSTERED BAR GRAPH REPRESENTING THE DISTRIBUTION OF SURGERIES ACROSS DEPARTMENT

TABLE 4.1 AND FIGURE 4.1 show the total number of 981 surgeries performed in paras hospital gurugram from April to May 2024 out of which OBG 304, (30.9%) performed the highest number of surgeries while CTVS and Opthal 18, (1.83%) accounted for the lowest number of procedures done .`

Table 4. 2 DISTRIBUTIONS OF NON-COMPLIANCE ACROSS DEPARTMENTS AND BREAK DOWN OF NON COMPLIANCE IN RELATION TO INCISION TIME (15 -60 MINUTES BEFORE INCISION)

Total Surgeries	**981**
Total Compliance-795(Duration within time frame 15-60mins)	**81%**
1) Antibiotics not given	**46**
Department:	
OPTHAL	**18**
CTVS	**1**
SURGICAL ONCOLOGY	**9**
NUEROSURGERY	**10**
ENT	**16**
MAS	**29**
ORTHOVASCULAR AND PLASTICS	**31**
UROLOGY	**49**
OBG	**23**
	186
Non compliance breakup	
Duration not appropriate	**186**
10mts gap	**61**
>1hr	**12**
>2hr	**17**
5mt	**10**
>3hrs	**40**

TABLE 4.2 show the total number of 981 surgeries performed in paras hospital gurugram from April to May 2024 out of 795(81%)procedures where done where proper surgical antibiotic prophylaxis was given(15-60mins before time of incision) . Total non compliance was 186 out of which in 46 cases antibiotic was not given and Urology Department accounted for the highest number of cases (24%).

Table 4.3 DISTRIBUTION OF ANTIBIOTIC USED IN SURGICAL ANTIBIOTIC PROPHYLAXIS

CEFTAZIDIME AND SULBACTAM	**24**
MEROPENAM	**8**
PIPERACILLIN AND CEFTOLOZANE	**28**
AMOXICILLIN AND CLAVULANIC ACID	**65**
AMIKACIN	**90**
CEFOPERAZONE AND SULBACTAM	**136**
CEFUROXIME	**581**

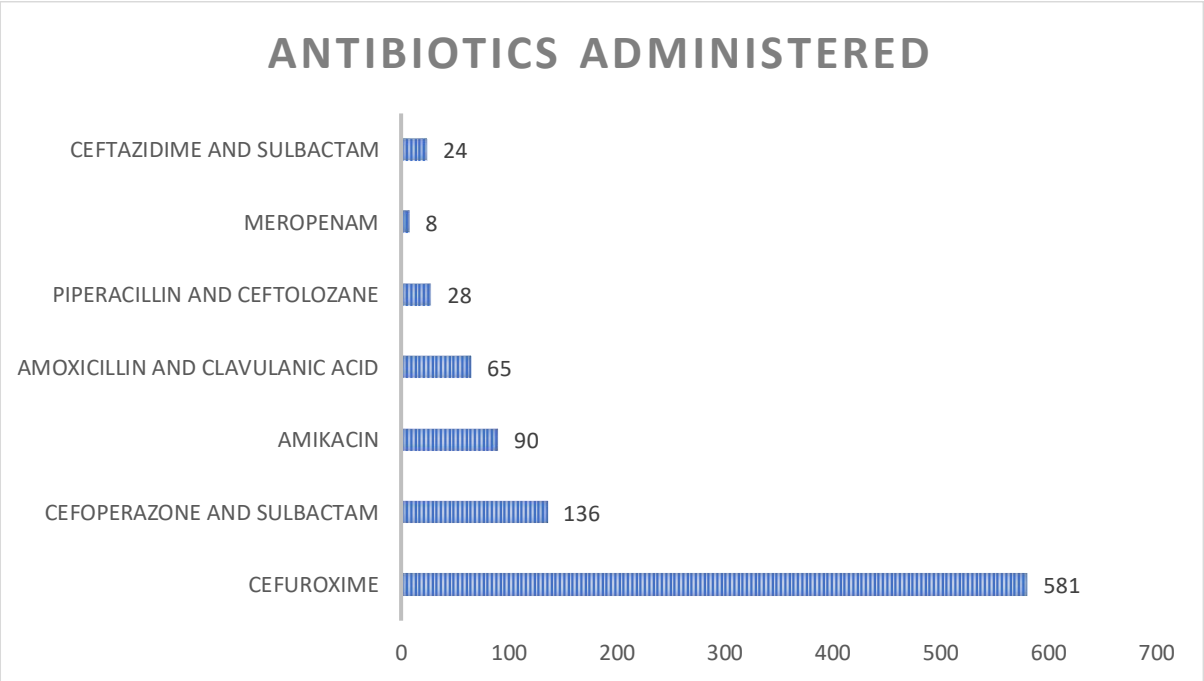

TABLE 4.3 AND FIGURE 4.2 shows the distribution of antibiotics used for antibiotic prophylaxis for the total 981 surgeries done with cefuroxime being the widely used antibiotic 581 (59.2%) and meropenam being the least used antibiotic 8 (0.65%)

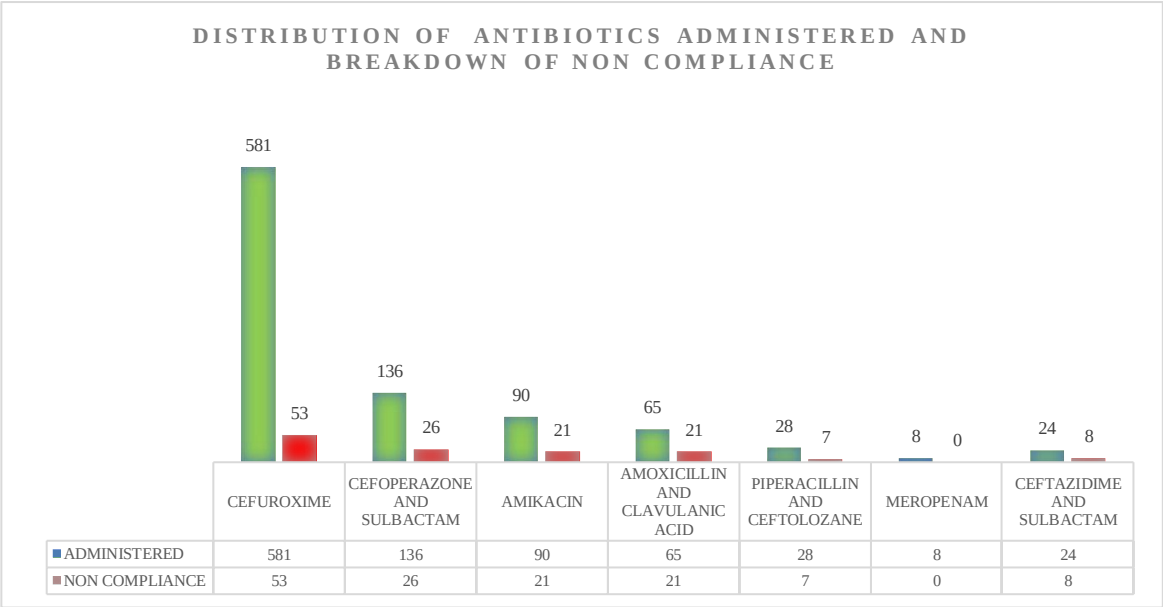

FIGURE 4.3 shows the comparison of non-compliance in the different antibiotic administered with Inj augmentin accounting for the highest percentage of non compliance with 21 out of 65 procedures(32.3%) .Inj supracef even though being the most commonly used antibiotic only 53 cases were non-compliant (9.12%).

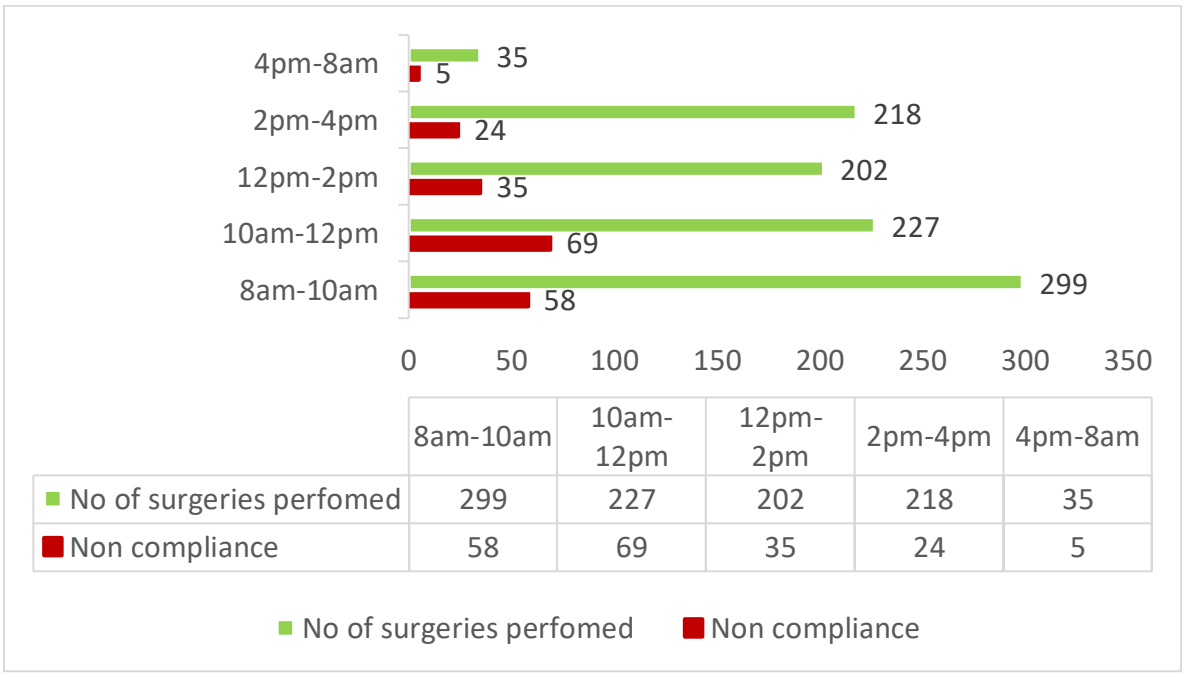

FIGURE 4.4 shows the Time Distribution of surgeries performed with comparison to non-compliances during that period. Most of the Non compliances were distributed towards the morning surgeries with 10-12pm surgeries having the highest No of non-compliance

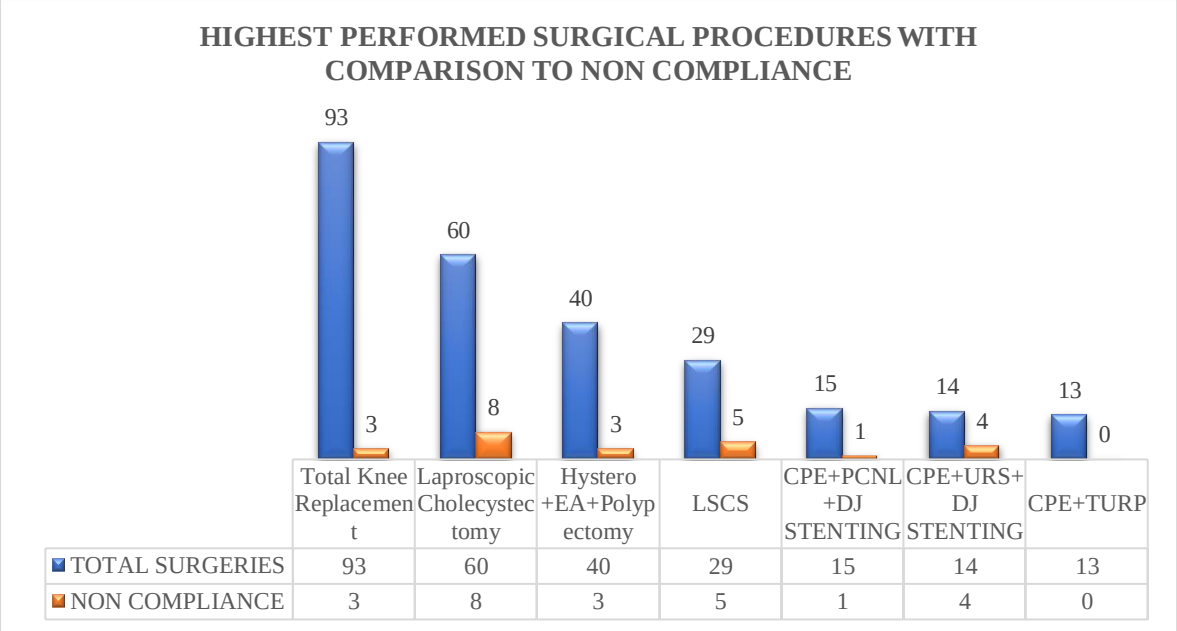

FIGURE 4.5 shows the Distribution of Surgical procedures performed with comparison to non-compliances during that period. TKR was the most performed surgery with 93. Lap cholecystectomy had the highest no of non-compliance with 8. LSCS had the highest percentage with 5 out of 29 (17%)

SURGICAL SITE INFECTION INCIDENCE:

During the period of study there was six reported case of surgical site infection there was six cases of SSI , 4 in the month of April and 2 in month of May .

SSI incidence in cases with SAP	1	795	1.25 per 1000 cases incidence rate
SSI incidence in cases with Non-compliance to SAP	5	186	26.8 per 1000 cases incidence rate

TABLE 4.4 shows the incidence rate of SSI during the period of study in surgical procedures with and without proper surgical antibiotic prophylaxis .

Surgical Procedure Done	Date of surgery	Date of SSI	Compliance	Antibiotics Administered	**Culture Report**
Hystero +EA+Polypectomy	02-04-24	10-04-24	Non compliance, antibiotic given 3 hrs before Sx.	Augmentin	**E.coli (Hospital flora)**
Lap cholecystectomy	10-04-24	22-04-24	Non compliance, Antibiotic given 2hrs before Sx	Cefuroxime	**Klebsiella(Hospital flora)**
LSCS	12-04-24	25-4-24	Non compliance, antibiotic given 3hrs before Sx	Cefuroxime	**E.coli(Hospital flora)**
CPE+URS+DJ Stenting	17-04-24	28-4-24	compliance ,antibiotic administered 45mins before Sx	Cefoperazone and Sulbactam	**Kleibsiella(Hospital flora)**
Lap cholecystectomy	12-5-24	21-5-24	Non compliance, antibiotic administered 2 hrs before Sx	Cefuroxime	**Staph.Aureus(Hospital flora)**
TLH+BSO+Adhesiolysis	17-5-24	28-5-24	Non compliance , Antibiotic administered 3hrs before Sx	Augmentin	**E.coli** **Kleibsiella(Hospital flora)**

TABLE 4.5 shows the Cases of SSI recorded during the period of study .

CHAPTER 5. DISCUSSION

Results

Antibiotic Usage Patterns

The analysis of antibiotic usage for prophylaxis revealed the following patterns:

The most used antibiotic was cefuroxime, which was administered in 581 cases. This was followed by, cefoperazone-sulbactam in 136 cases, amikacin in 90 cases, amoxicillin-clavulanic acid used in 65 cases, piperacillin-tazobactam in 28 cases, ceftazidime-sulbactam in 24 cases, and meropenem in 8 cases.

Incidence of Surgical Site Infections

- During the study period, a total of 6 cases of surgical site infections (SSIs) were documented. Interestingly, 5 cases of SSIs occurred in the non-compliant group, where the incision was made more than 2 hours after the antibiotic prophylaxis was administered.
- The overall incidence of SSIs in the study population was 0.61% (6 out of 981 cases).
- In all 6 cases of SSIs, the surgical wounds were culture-positive for the flora present in the operating room. These infections were managed with appropriate antibiotic therapy based on the culture sensitivity, and the wounds healed without any further complications

Discussion

The findings of this study provide valuable insights into the compliance with surgical antibiotic prophylaxis (SAP) guidelines and its impact on surgical site infections (SSIs) in a tertiary care hospital setting.

Compliance Rates and Antibiotic Usage

The study reported a relatively high overall compliance rate of 81% with the SAP guidelines. This is an encouraging finding, as it suggests that the majority of the surgical procedures were performed with appropriate antibiotic prophylaxis. However, the non-compliance rate of 19% (186 out of 981 cases) indicates that there is still room for improvement in ensuring adherence to the recommended practices.

The analysis of antibiotic usage patterns revealed that cefuroxime was the most commonly used antibiotic for prophylaxis, followed by amoxicillin-clavulanic acid, cefoperazone-sulbactam, and amikacin. This suggests that these antibiotics are widely accepted and considered effective for SAP in the study setting. All this antibiotics are short term antibiotics with larger therapeutic window .

Interestingly, amoxicillin-clavulanic acid had the highest non-compliance rate, with 21 out of 65 cases (32.3%) being non-compliant. This finding warrants further investigation to understand the specific reasons behind the higher non-compliance associated with this antibiotic regimen.

Timing of Antibiotic Administration

A crucial aspect highlighted by the study is the importance of timely administration of antibiotics for effective prophylaxis. The study found that in 40 cases, the surgical incision was made more than 3 hours after the antibiotic dose, and in 46 cases, no antibiotic was given at all.

This delay or absence of antibiotic prophylaxis is a significant concern, as it can substantially increase the risk of SSIs. The study's finding that 5 cases of SSIs occurred in the non-compliant group, where the incision was made more than 2 hours after the antibiotic dose, underscores the importance of ensuring that antibiotics are administered within the recommended 60-minute window before the surgical incision.

Surgeons' Perception and Justification

One of the key reasons for non-compliance identified in the study was the surgeons' perception that if the patient was already on an antibiotic dose previously, they did not need to be given another prophylactic dose before the surgery. This perception needs to be addressed through targeted education and awareness programs.

The justification for administering an additional prophylactic dose, even if the patient is already on antibiotics, lies in the pharmacokinetics of the drugs. Antibiotics have a specific duration of action, and their levels in the body may have decreased significantly by the time of the surgery, leaving the patient vulnerable to SSIs. Administering another dose before the procedure ensures that adequate antibiotic concentrations are maintained during the critical period of the operation. This practice is supported by guidelines and recommendations from major healthcare organizations.

Limitations

This study has several limitations that should be considered when interpreting the findings. Firstly, it was a single-center study, and the results may not be generalizable to other healthcare settings. Secondly, the retrospective nature of the data collection may have led to incomplete or inaccurate recording of information in the patient records.Additionally, the study did not assess the impact of other factors that may influence the risk of SSIs, such as patient comorbidities, surgical technique, and postoperative care. These factors could also play a significant role in the development of surgical site infections and should be considered in future research

CHAPTER 6. CONCLUSION

This comprehensive study on surgical antibiotic prophylaxis at Paras Hospital Gurugram aimed to investigate compliance patterns, outcomes, and factors influencing adherence to prophylactic guidelines. The study spanned from April 1, 2024, to May 31, 2024, encompassing 981 surgical procedures. It highlighted the importance of timely and appropriate antibiotic administration to prevent surgical site infections (SSIs) and provided critical insights into current practices and areas for improvement

Key Findings and Implications

Compliance and Non-Compliance Patterns:

- The overall compliance rate with antibiotic prophylaxis protocols was 81% (795 out of 981 cases). This indicates a significant adherence to guidelines among surgical teams, which is crucial for minimizing the risk of SSIs.
- Non-compliance was observed in 186 cases (19%). Major reasons included:
- No antibiotic given: 46 cases
- Incision time greater than 3 hours after antibiotic dose: 40 cases
- Most Noncompliance occurred in morning surgeries which suggest that surgeons are not administered additional dose due to the morning dose of antibiotics
- The most commonly used antibiotics were Cefuroxime, administered in 581 cases, followed by Cefoperazone and Sulbactam, Amikacin, and others. However, Amoxicillin and Clavulanic Acid (Augmentin) had the highest non-compliance rate, with 21 out of 65 administrations not adhering to guidelines. They all are short acting antibiotics with Large therapeutic window so there is no contradiction for an additional dose to be given before time of incision.
- Most common surgical procedure was TKR and LSCS had the highest percentage of non compliance with 17 %.

Incidence of Surgical Site Infections (SSIs):

- Six SSIs were recorded during the study period: four in April and two in May. These infections were concentrated in the OBG (3 cases), Urology (1 cases), and MAS (1 case) departments.
- Notably, Five SSI cases were linked to non-compliance where the surgical incision was made more than two hours after antibiotic prophylaxis. These infections were culture-positive for flora present in the operating theatre, underscoring the critical role of timely prophylaxis.
- Following appropriate antibiotic therapy, all infected wounds healed without complications, highlighting the importance of addressing non-compliance to prevent such infections.

Justification for Prophylactic Dose Despite Previous Antibiotic Use:

- Optimal Tissue Concentration: Achieving peak antibiotic concentrations at the time of incision is essential for preventing bacterial colonization and subsequent infection.
- Timing and Half-Life: Antibiotic levels decline over time, and an earlier dose may not maintain adequate levels throughout the surgical procedure.
- Targeted Coverage: The timing of prophylactic antibiotics is designed to cover the period of highest risk for bacterial contamination.
- Evidence-Based Guidelines: Guidelines from the CDC and WHO recommend administering prophylactic antibiotics within 60 minutes before incision to maximize efficacy and reduce the risk of SSIs

Recommendations for Improvement

To enhance compliance with antibiotic prophylaxis protocols and reduce the incidence of SSIs, the following strategies are recommended:

- **Education and Training:** Regular educational sessions and workshops for surgical teams to reinforce the importance of timely antibiotic administration and adherence to guidelines.
- **Protocol Reinforcement:** Implementing stringent protocols and checklists to ensure that prophylactic antibiotics are administered within the recommended time frame before surgery.
- **Real-Time Monitoring:** Utilizing electronic health records and real-time monitoring systems to track antibiotic administration and compliance rates. This can help identify and address non-compliance promptly.
- **Feedback and Audits:** Conducting regular audits of surgical procedures and providing feedback to surgical teams on their compliance rates and SSI outcomes. This can motivate teams to adhere to guidelines and improve patient outcomes.
- **Targeted Interventions:** Developing targeted interventions for departments with higher non-compliance rates, such as OBG, Urology, and MACE, to address specific challenges and improve adherence to prophylactic protocols.

Future Research Directions

The findings from this study provide a foundation for future research on surgical antibiotic prophylaxis. Further studies could explore:

Correlation Between Compliance and SSI Rates:

Investigating the direct correlation between compliance rates and SSI incidence across different surgical departments and procedures.

Cost-Effectiveness:

Assessing the cost-effectiveness of various antibiotic prophylaxis strategies and their impact on healthcare costs and patient outcomes.

Patient Factors:

Analyzing patient-specific factors, such as comorbidities and immune status, that may influence the risk of SSIs and the effectiveness of prophylactic antibiotics.

In conclusion, this study highlights the critical importance of adherence to antibiotic prophylaxis protocols in preventing surgical site infections at Paras Hospital Gurugram. Despite a high overall compliance rate, significant areas for improvement remain, particularly in the timing of antibiotic administration. Addressing misconceptions about the need for additional prophylactic doses and reinforcing evidence-based guidelines can enhance compliance and reduce the incidence of SSIs.

By implementing targeted interventions, education, and real-time monitoring, healthcare providers can improve adherence to prophylactic protocols, enhance patient outcomes, and reduce the burden of SSIs. The findings from this study provide valuable insights and a strong foundation for ongoing efforts to optimize surgical care and patient safety

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