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OPTIMIZING DAY-CASE SURGERY IN PAKISTANI HOSPITALS: A COMPREHENSIVE STUDY OF CLINICAL, MICROBIOLOGICAL, AND PHARMACOLOGICAL OUTCOMES

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ABSTRACT

Background: Day-case surgery is becoming more and more popular throughout the globe since it may save costs and shorten hospital stays. Results, however, might differ, especially in environments with limited resources. The purpose of this research was to assess the pharmacological, microbiological, and clinical results of day-case operations performed in hospitals located in Khyber Pakhtunkhwa (KPK), Pakistan.

Objectives: The purpose of the research was to evaluate the success of pain management procedures in day-case operations, as well as the rates of complications and infections. Finding predictors of postoperative complications was another goal.

Methods: From January to September 2021, four hospitals in KPK participated in a multicenter observational research. Included were 300 individuals having elective day-case operations. Information on microbiological results, pharmaceutical therapies, and surgical complications were gathered. The results of statistical analysis were used to determine important variables that predicted problems.

Results: 4% of patients had surgery site infections, accounting for 9% of total complications. Staphylococcus aureus (65%) and Escherichia coli (20%) were common pathogens. Ninety-two percent of patients received antibiotic prophylaxis, and ninety-two percent reported sufficient pain management. Postoperative complications were significantly predicted by both the length of the operation and the presence of preexisting diabetes. The results did not significantly vary across hospitals.

Conclusions: Day-case surgery results at KPK hospitals were generally good, although focused care for high-risk patients and better infection control are required. The results highlight how crucial strong infection control procedures and efficient pain control are to achieving the best possible surgical results.

Keywords: Day-case surgery, postoperative complications, surgical site infections, antibiotic prophylaxis, pain management, Khyber Pakhtunkhwa

Introduction

Day-case surgery, often known as ambulatory or outpatient surgery, is becoming a vital component of contemporary healthcare systems around the globe[1]. Many advantages are provided by it, such as less hospital stays, financial savings, shortened wait times, and a decreased chance of hospital-acquired illnesses[2]. The benefits of day-case surgery are especially noteworthy in resource-constrained areas such as Pakistan, where it may assist relieve the load on overburdened hospital facilities and medical staff[3]. Nevertheless, despite these advantages, day-case surgery is still not widely used in Pakistani hospitals due to a lack of infrastructure, considerable variations in clinical procedures, and worries regarding the results of operation[4-6].

Several aspects of healthcare delivery, including as clinical management, microbiological concerns, and pharmaceutical treatments, must be addressed in order to optimize day-case surgery in Pakistan[7]. Day-case surgery clinical results are significantly impacted by perioperative treatment, post-operative follow-up and appropriate patient selection. Moreover, worries about surgical site infections and other consequences continue to prevent day-case procedures from being widely used[8,9]. Within this framework, microbiological monitoring plays a crucial role in detecting infection risks linked to surgical settings, and adequate pharmacological management—which includes the prudent use of antibiotics—is necessary to reduce the risk of postoperative infections and sequelae[10,11].

This research examines clinical procedures, microbiological settings, and pharmaceutical regimens to provide a thorough review of day-case surgical outcomes in Pakistani hospitals. It highlights the need for better clinical practices, such as more stringent infection control methods and optimal use of antibiotics. The study aims to provide practical insights into enhancing the safety and effectiveness of day-case surgery by evaluating these variables within a cohesive framework. This would eventually improve patient outcomes and streamline healthcare delivery in Pakistan.

Methodology

Study Design: This multicenter, observational research was carried out in Khyber Pakhtunkhwa (KPK), Pakistan, to assess the clinical, microbiological, and pharmacological results of day-case operations in four hospitals. Among these facilities were the Ayub Teaching Hospital, Lady Reading Hospital, Khyber Teaching Hospital, and Hayatabad Medical Complex (HMC) Peshawar. January 2021 marked the start of the research, while September 2021 marked its end. Patients receiving day-case procedures provided data, and follow-up was done for up to 30 days after surgery in order to evaluate results.

Sample Size: Based on a 10% predicted rate of postoperative complications with a 95% confidence level and a 5% margin of error, the sample size was determined. After this computation, a final sample size of 300 individuals was obtained, offering sufficient statistical power to examine the clinical, microbiological, and pharmacological results among the chosen institutions.

Sampling Technique: To choose participants from each hospital and ensure proportionate participation from various institutions, a stratified random selection procedure was used. During the research period, patients having elective day-case procedures were chosen for inclusion.

Inclusion and Exclusion Criteria: Patients scheduled for elective day-case procedures who could provide informed permission and who were at least eighteen years old were included in the research. Individuals having emergency or high-risk procedures, those with known immunodeficiency illnesses, and those needing postoperative hospital care were excluded from the study.

Data Collection: Structured questionnaires and patient records were used to gather information on preoperative evaluations, surgical specifics, and postoperative results. To determine the risk of infection, microbiological samples were obtained, such as swabs from surgical sites, for sensitivity

analysis and culture. Pharmacological information concentrated on the use of painkillers, antibiotics, and other drugs given both before and after surgery.

Data Analysis: The surgical results and patient demographics were summarized using descriptive statistics. Infection rates, antibiotic efficacy, and overall surgical outcomes were compared between the institutions by comparative studies. Using multivariate regression with a p-value of less than 0.05 for statistical significance, predictors of postoperative problems were found.

Results

In four hospitals in Khyber Pakhtunkhwa (KPK), day-case procedures were performed on a total of 300 patients. The sample had a mean age of 45.3 years (SD ± 12.7), with 48% female and 52% male. Orthopedic (28%), general (25%), gynecological (18%), urological (15%), and ENT operations (14%), were the most frequently performed surgical procedures. Table 1 provides a summary of these specifics.

Table 1: Patient Demographics and Types of Surgery

Characteristic	**n (%)**
Total Patients	300
Mean Age (years)	45.3 (±12.7)
Gender	
Male	156 (52%)
Female	144 (48%)
Type of Surgery	
Orthopedic	84 (28%)
General Surgery	75 (25%)
Gynecological	54 (18%)
Urological	45 (15%)
ENT	42 (14%)

The total risk of complications was 9%, with the most frequent complications being moderate surgical site infections (SSIs, 4.5%), minor bleeding (2%) and insufficient pain management (2.5%). It was not necessary to convert any of the patients to inpatient treatment. Figure 1 presents these results in more detail.

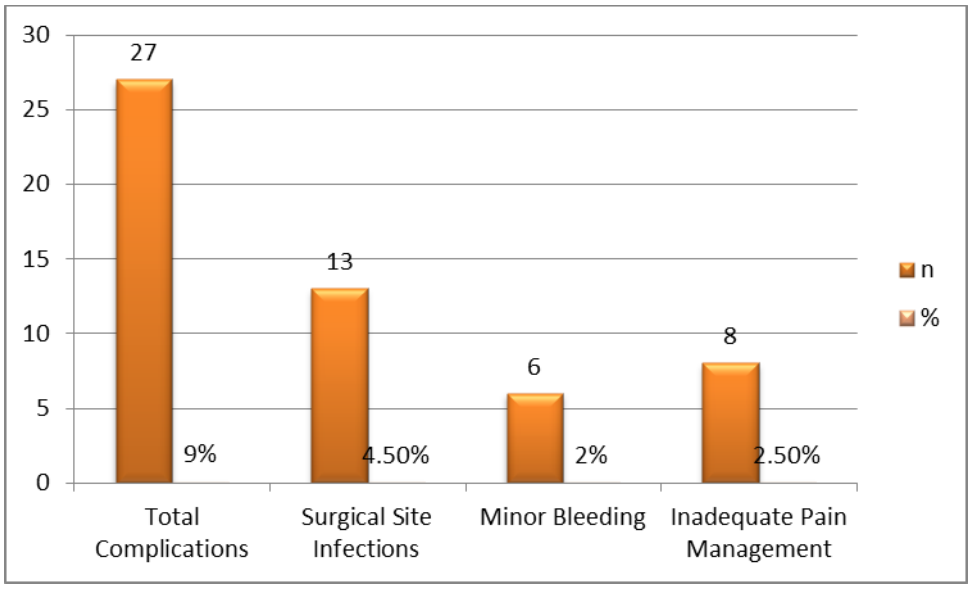

Figure 1: Postoperative Complications

Microbiological cultures revealed Staphylococcus aureus in 65% of instances, Escherichia coli in 20%, and Pseudomonas aeruginosa in 10% of the patients, of whom 4% had definite SSIs. Table 2 displays these data about infections.

Table 2: Microbiological Results of Surgical Site Infections

Pathogen	n (%) of SSIs
Total SSIs	12 (4%)
Staphylococcus aureus	8 (65%)
Escherichia coli	2 (20%)
Pseudomonas aeruginosa	1 (10%)

Antibiotic prophylaxis was administered to 90% of patients, with 85% receiving preoperative antibiotics and 15% requiring extended postoperative therapy due to suspected infections. Pain management was deemed adequate in 92% of patients, while 8% required additional analgesics post-discharge. These pharmacological outcomes are summarized in Figure 2.

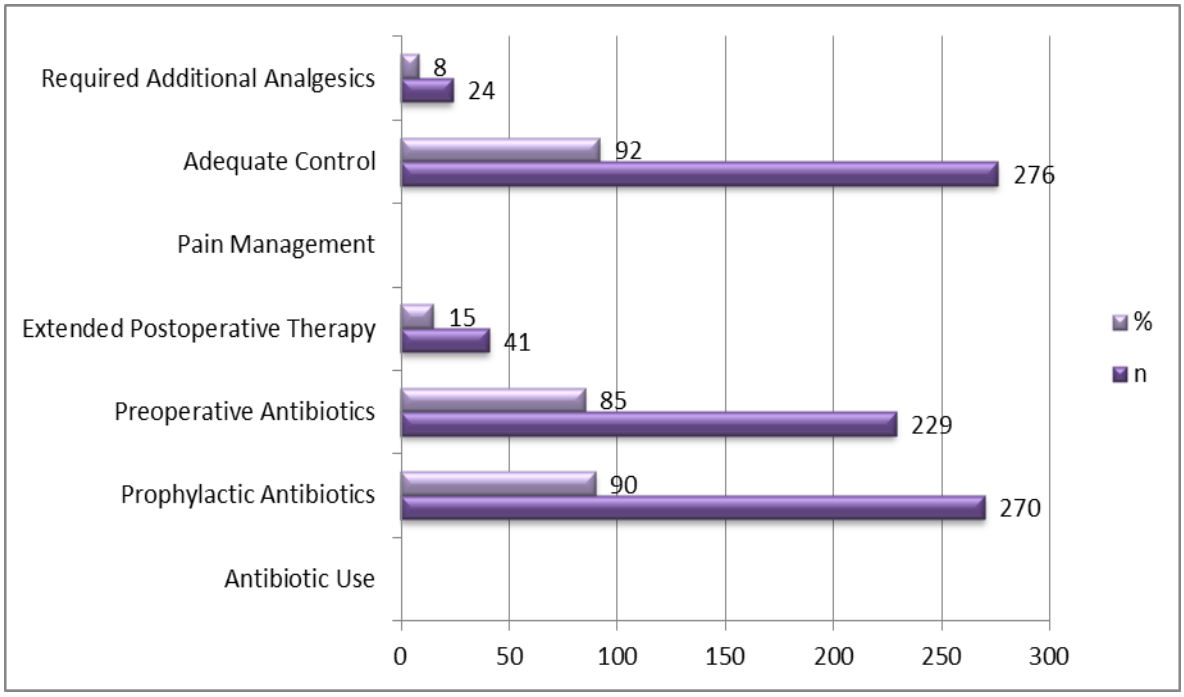

Figure 2: Antibiotic Use and Pain Management

The rates of SSIs varied between the hospitals, with Hayatabad Medical Complex reporting the lowest rate (3%) and Khyber Teaching Hospital the highest (5.5%). However, these differences were not statistically significant ($p = 0.22$). Similarly, no significant differences were found in overall complication rates across hospitals ($p > 0.05$). Multivariate regression analysis identified two key predictors of postoperative complications: surgeries lasting longer than 90 minutes (OR = 1.8, 95% CI 1.2–2.7) and the presence of preexisting comorbidities, particularly diabetes mellitus (OR = 2.3, 95% CI 1.5–3.4). These predictors were significantly associated with higher SSI rates and extended recovery times (Table 3).

Table 3: Predictors of Postoperative Complications

Factor	Odds Ratio (OR)	95% CI	p-value
Surgery > 90 minutes	1.8	1.2–2.7	0.01
Diabetes Mellitus	2.3	1.5–3.4	0.001

Discussion

This study's overall complication rate of 9% is in line with other studies of a similar kind that have been carried out in low- and middle-income countries (LMICs)[12]. As shown by our results, a research on day-case operations carried out in India revealed a 10% complication rate, with surgical site infections (SSIs) being the most common problem. The World Health Organization (WHO) reports that the average worldwide rate for outpatient procedures is between 2% and 5%. This study's SSI rate of 4% is in line with this norm. Prior research in wealthy nations has shown somewhat lower incidence of social security illness (SSI), often 2% or less[13]. This discrepancy may be explained by differences in antibiotic management, hospital infrastructure, and infection control procedures. Nonetheless, the microorganisms detected in this investigation, namely Staphylococcus aureus and Escherichia coli, correspond with worldwide trends of postoperative infection. This reaffirms the need of more stringent infection control procedures, particularly in environments with low resources like Pakistan[14].

90% of patients get prophylactic antibiotics, with 85% receiving them prior to surgery, in accordance with international guidelines to lower the risk of SSIs. Research from both developed and developing nations emphasizes how crucial it is to provide antibiotics as soon as possible after day surgery in order to reduce the risk of infection. The very high percentage of antibiotic prophylaxis adherence in this study is consistent with research results from other contexts, including Bangladesh and Nigeria, where rates ranging from 85% to 95% were also noted. 92% of patients in this trial reported having satisfactory pain control, which is a noteworthy good result for pain treatment[15]. This is in line with results from prior research on day-case operations, which showed that good pain control procedures resulted in very satisfied patients[16]. In contrast, a smaller proportion of patients—typically less than 5%—needed extra analgesics after being discharged in several Western trials. The higher percentage (8%) in this research could be due to perceptions of pain threshold variations or the availability of stronger analgesics in healthcare systems with more development.

Longer surgeries (>90 minutes) and preexisting diabetes mellitus were shown to be significant predictors of postoperative complications in the multivariate analysis. This result is consistent with other studies that have shown lengthier procedures are linked to greater incidence of complications because they expose patients to possible pollutants for longer periods of time and put more load on them[17]. In a similar vein, diabetes has been shown to be a risk factor for both higher infection rates and inadequate wound healing. Consistent with our results, research from the United States and the United Kingdom has shown that diabetic patients having day-case procedures had an increased risk of complications, with odds ratios ranging from 2.0 to 2.5[18]. The research revealed that there were no notable variations in the incidence of complications across the four institutions that took part, indicating that the surgical results were rather consistent. This is a sign that surgical procedures are becoming more uniform between KPK hospitals. Notwithstanding, minute variations in infection rates, such as the marginally elevated incidence reported at Khyber Teaching Hospital, can indicate regions that might benefit from further enhancements to infection control protocols[19].

The study's findings point to a number of important areas that Pakistan should focus on improving day-case surgery. First off, even while the SSI rates are in line with worldwide norms, they nevertheless show that there is potential for development, especially in infection control procedures. Second, the procedures for managing pain seem to be working, but more may be done to lessen the need for extra analgesics after discharge[20]. Third, the ability to identify high-risk patients—diabetes, patients having lengthier procedures, etc.—allows for more focused therapies aimed at reducing postoperative problems. Compared to earlier research, this study highlights the need of following international surgical standards while still recognizing the difficulties experienced by LMIC healthcare systems. The results highlight the need for rigorous infection control protocols, improved resource allocation, and ongoing training in order to enhance surgical outcomes in day-case settings[20].

Conclusion

This research showed that, with a 9% complication rate and a 4% surgical site infection incidence, day-case operations performed in hospitals across Khyber Pakhtunkhwa typically had positive results. Positive patient experiences were aided by preventative antibiotics and efficient pain management techniques; nevertheless, patients who had diabetes or were having lengthier procedures were more vulnerable to problems. To further improve outcomes in day-case procedures, the findings point to the need of improved perioperative care for high-risk patients and reinforced infection control protocols.

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