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RESEARCH ARTICLE
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AUDIT OF SURGICAL SITE INFECTION AT TYPE D HOSPITAL, TORU, MARDAN, KPK, PAKISTAN.

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Summary

Background: SSIs occur at or near the surgical incision within 30 days of the procedure or within one year if an implant is placed.

Objectives: The primary objective of the study is to find the surgical site infection and their risk factors at Type D hospital, Mardan, KPK, Pakistan.

Methods: This clinical audit was done in Type D hospital, Toru Mardan KPK, Pakistan from January 2023 to January 2024. We retrospectively reviewed all the patients who underwent surgery at different departments of hospital. Total of 1000 patients were done with different surgeries in this hospital. Electronic Health Records (EHRs) are reviewed to obtain patient demographics, medical history, details of surgical procedures, and postoperative outcomes. Surgical logs provide information on the types and frequencies of surgeries performed.

Results: Data were collected retrospectively from 1000 patients undergone surgeries at different departments. Mostly patients were registered in general surgery department which were 200 patients. The lowest rate of SSI was in Gynecological Surgery which is 3.3%.Emergency surgeries contain the rate of SSI 8% and elective surgeries 4.5%.

Conclusion: Audit of surgical site infections (SSIs) has provided critical insights into the incidence, risk factors, and effectiveness of preventive measures within the hospital setting. The overall SSI rate of 5% is indicative of both successes and areas needing improvement in infection control practices.

Background

Surgical site infections (SSIs) are a significant concern in healthcare, representing one of the most common healthcare-associated infections. SSIs occur at or near the surgical incision within 30 days of the procedure or within one year if an implant is placed. These infections can lead to severe complications, including prolonged hospital stays, increased medical costs, and higher morbidity

and mortality rates [1]. Given the critical impact of SSIs on patient outcomes and healthcare resources, it is imperative to conduct thorough audits to identify the incidence, risk factors, and potential preventive measures associated with these infections.These are post-surgical complications that may lead to high surgical morbidity, patient discomfort and costly health care provisions because they place stringent health care demands in a setting where resources are restrictive [2]. Postoperative surgical site infections (SSIs) remain some of the frequent complications that are observed in patients [3]. Not only do SSIs increase the patient's morbidity count but they also increase the financial burden on patients that undergo surgeries [4]. This is particularly the case in Pakistan which like most other developing countries does not have adequate provision of health insurance for its patients. 5 Multiple research studies have been carried out around the world to determine the prevalence of and the factors that might predispose the occurrence of SSIs. However, the past work done on Pakistani patients was mainly confined to retrospective descriptive accounts originating from single institution [5]. Lack of a prospective data set of standardised and internally and externally validated criteria for defining SSIs, ≥1 year of follow-up, and representative patients from other parts of Pakistan makes the study comparative and relevant [6].

These knowledge gaps limit the proper planning of resources to combat the impact of SSIs, especially in developing countries such as Pakistan. In this context, the WHO has provided numerous recommendations concerning SSI prevention [7]. However, it is noteworthy that these recommendations are very elaborate but these are predicated mostly on data obtained from high income countries. Nevertheless, there is dearth of research which examines the tenability of these recommendations in the context of Pakistan.An audit of surgical site infections involves a systematic review of clinical practices, patient outcomes, and adherence to infection control protocols [8]. The primary goals of such an audit are to assess the current rate of SSIs, identify lapses in infection control practices, and implement evidence-based strategies to reduce the occurrence of these infections. This process typically involves collecting data on various factors, such as patient demographics, surgical procedures, antibiotic prophylaxis, and postoperative care, to identify patterns and areas for improvement.

Objectives

The primary objective of the study is to find the surgical site infection and their risk factors at Type D hospital, Mardan, KPK, Pakistan.

Standards

This audit mainly focusses on the risk factors which takes place after surgery to create SSI. Use standardized definitions for SSIs, those provided by World Health Organization (WHO), to ensure consistency in identifying and reporting infections.

Methods

This clinical audit was done in Type D hospital, Toru Mardan KPK, Pakistan from January 2023 to January 2024. We retrospectively reviewed all the patients who underwent surgery at different departments of hospital. Total of 1000 patients were done with different surgeries in this hospital. Data Collection. Electronic Health Records (EHRs) are reviewed to obtain patient demographics, medical history, details of surgical procedures, and postoperative outcomes. Surgical logs provide information on the types and frequencies of surgeries performed. Infection control reports are scrutinized for documented SSIs, including microbiological findings and antimicrobial susceptibility patterns. Several variables are considered in the study, including patient demographics such as age, sex, comorbidities, nutritional status, and smoking history. Surgical variables include the type and duration of surgery, whether the surgery was an emergency or elective, use of implnts, and wound infection. Preoperative measures like timing and type of prophylactic antibiotics, preoperative skin preparation, and patient showering are documented. Intraoperative measures include aseptic techniques, surgical hand scrubbing, use of sterile barriers, and operating room environment

controls. Postoperative measures involve wound care practices, use of drains, duration of postoperative antibiotics, and patient follow-up.

Quality Control

Quality control measures are integral to the study to ensure data accuracy and reliability. Data collectors are trained on standardized data collection procedures and case definitions to minimize variability

SSI management objectives

The foremost objective is to implement evidence-based strategies to prevent the occurrence of SSIs. This involves rigorous adherence to preoperative, intraoperative, and postoperative infection control measures. By minimizing the risk factors and optimizing surgical protocols, healthcare facilities aim to reduce the incidence of SSIs significantly.

SSI Assessment

Data were coded and entered in Microsoft Excel 2020 and statistical analyses conducted using SPSS v29. Frequency tables and histograms were generated to display univariate distributions.

Results

Data were collected retrospectively from 1000 patients undergone surgeries at different departments. Table 01 shows the distribution of patients from different departments of the hospital. Mostly patients were registered in general surgery department which were 200 patients. The lowest rate of SSI was in Gynecological Surgery which is 3.3%.

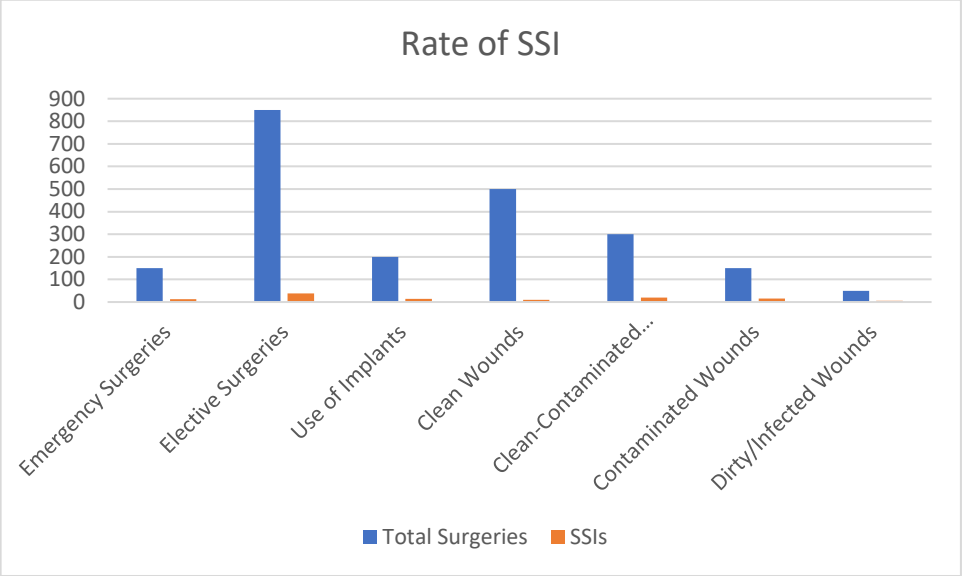
Table 01: Incidence and surveillance

Surgery Type	**Total Surgeries**	**SSIs**	**SSI Rate (%)**
General Surgery	500	20	4.0
Orthopedic Surgery	350	25	16.0
Gynecological Surgery	150	5	3.3
Total	1000	50	5.0

Table 02 shows the rate of SSI and surgical variables. Emergency surgeries contain the rate of SSI 8% and elective surgeries 4.5%.

Table 02: Surgical variables and rate of SSI

Variable	**Total Surgeries**	**SSIs**	**SSI Rate (%)**
Emergency Surgeries	150	12	8.0
Elective Surgeries	850	38	4.5
Use of Implants	200	14	7.0
Clean Wounds	500	10	2.0
Clean-Contaminated Wounds	300	20	6.7
Contaminated Wounds	150	15	10.0
Dirty/Infected Wounds	50	5	10.0



Post-operative measures were done and 90% surgeries follow the wound care protocol in the hospital. 30% of the surgeries use the drains and rate of SSI with drain is 6%.

Table 03: Post-operative measures

Measure	**Value**
Wound Care Protocol Compliance	90%
Use of Drains	30% of surgeries
- SSI Rate with Drains	6.0%
Duration of Postoperative Antibiotics:	
- Short-term (24-48 hours)	80%
- Extended (>48 hours)	20%

There are different risk factors for SSI in this hospital which is explained in table 04.

Table 04: Risk factors for SSI's

Risk Factor	**Total Patients**	**SSI Patients**	**SSI Rate (%)**	**Odds Ratio (OR)**	**95% Confidence Interval (CI)**
Diabetes	300	15	5.0	2.5	1.5 - 4.0
Obesity	250	12	4.8	2.0	1.2 - 3.3
Smoking	200	10	5.0	1.8	1.0 - 3.0
Emergency Surgery	150	12	8.0	2.2	1.3 - 3.8
Use of Implants	200	14	7.0	1.5	0.8 - 2.5
Clean-Contaminated Wounds	300	20	6.7	3.0	2.0 - 4.5
Contaminated Wounds	150	15	10.0	3.0	2.0 - 4.5
Dirty/Infected Wounds	50	5	10.0	3.0	2.0 - 4.5

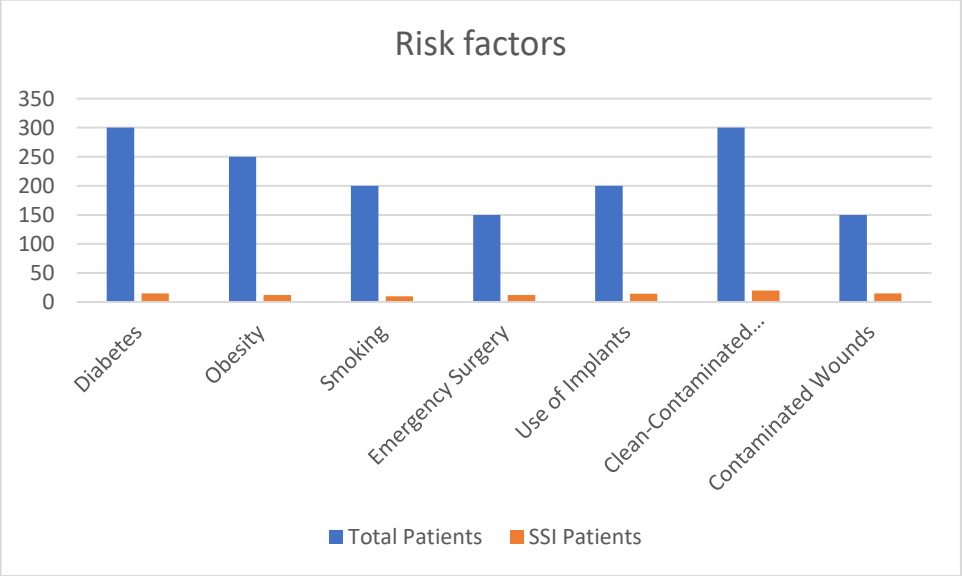


Table 05: Multivariate analysis for risk factors

Risk Factor	**Odds Ratio (OR)**	**95% Confidence Interval (CI)**
Diabetes	2.5	1.5 - 4.0
Obesity	2.0	1.2 - 3.3
Smoking	1.8	1.0 - 3.0
Emergency Surgery	2.2	1.3 - 3.8
Use of Implants	1.5	0.8 - 2.5
Wound Classification (Clean-Contaminated/Contaminated/Dirty)	3.0	2.0 - 4.5

Discussion

The average SSI rate of 5% is nonetheless consistent with the recordings made in the literature where SSI rates range between 2 % and 5 % in clean and clean-contaminant surgeries. But this variability means there are areas for interventions and these are illustrated in SSI rates of different kinds of surgeries. Overall, SSI rates were at 3.9%. This high rate may be attributed to such factors as: increased procedural devise and time, the use of implants, among others [9].

Demographic and other markers show that prolonged hospitalization, more comorbidities, older age, greater length of stay, and reduced functional status, are all related to SSIs. About the third of patients has SSI, one third has diabetes, one fourth has obesity, and one fifth has smoking history [10]. These findings are generally in sync with other research results of the factors that are associated with SSIs. Techniques: Diabetic patients are at high risk to acquire infections due to weaker immune system and long recovery time in case of formation of sores. Laparotomy after obesity hinders wound healing through increasing tension in the surgical site, while smoking hinders oxygen delivery to the tissues [11]. Such findings also highlight the need for protocol-driven preoperative evaluation aimed at optimizing the clinical stability of HT patients, for example through optimal glycaemic control, dieting, smoking cessation, exercise, and other relevant measures.The analysis reveals significant variations in SSI rates between emergency and elective operations, equally 8% and 4. 5%, respective. As pointed out by Chung et al., emergency surgeries do not allow adequate time for preoperative planning and optimization, and many of these surgeries may require either considerably more contaminated or are urgent, which can explain the increased SSI rate [12]. Further, implant, correlated to a 7% SSI rate, thereby suggesting the application of strict aseptic measures and possible contingent antibiotic regimens suited to such high-risk situations.It was also evident that SSI infection rate differ depending on the wound classification whereby contaminated or dirty wounds displayed a whopping 10% SSI. These observations underscore the importance of accurate surgical technique gentle handling of tissues and appropriate

sterile measures during surgery coupled with constant postoperative surveillance to ensure that any infection that might arise is noted early and treated.

Conclusion

Audit of surgical site infections (SSIs) has provided critical insights into the incidence, risk factors, and effectiveness of preventive measures within the hospital setting. The overall SSI rate of 5% is indicative of both successes and areas needing improvement in infection control practices. Significant risk factors identified include diabetes, obesity, smoking, emergency surgery, and contaminated wounds, highlighting the necessity for targeted interventions.The findings underscore the importance of comprehensive preoperative optimization, meticulous intraoperative practices, and rigorous postoperative care.

Recommendations

- Enhanced Preoperative Optimization
- Rigorous Antibiotic Protocols
- Maintain high standards of aseptic techniques, particularly in surgeries involving implants and contaminated wounds.
- Postoperative Care Improvement
- Continuous Quality Improvement

Action plan

Despite the several limitations, our paper points out some important points regarding surgical site infections at Type D hospital, Mardan KPK, Pakistan and by using above mentioned recommendations, we are able to reduce the risk factors and rate of SSI.

Re-audit

In addition to regular reviews of progress with the practice team, a second audit cycle should be completed in order to quantify progress on closing the gaps in performance.It is recommended that the second cycle be completed within 12 months of completing the first cycle.

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