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RESEARCH ARTICLE
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COMPLETING THE AUDIT LOOP:SURGICAL SITE INFECTION AT TYPE D HOSPITAL, TORU, MARDAN, KPK, PAKISTAN

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Abstract

Introduction: Surgical Site Infections (SSIs) represent a significant concern in healthcare, posing risks to patient safety, prolonging hospital stays, and increasing medical costs.

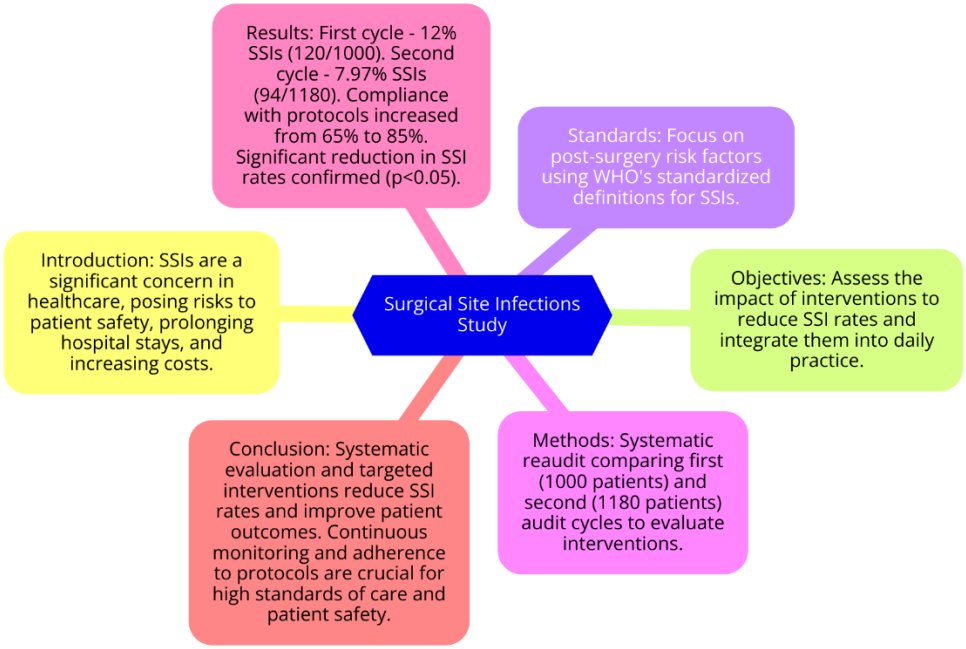
Objectives: The goals of reaudit in the context of Surgical Site Infections (SSIs) are to assess the impact of previously implemented interventions, ensuring they have effectively reduced SSI rates and have been integrated into daily practice.

Methods: The reaudit of Surgical Site Infections (SSIs) follows a systematic approach to evaluate the impact of interventions implemented after the initial audit. A retrospective cohort study design is employed to compare data from the first and second audit cycles.In the first audit cycle, data from 1000 patients were collected and analyzed.In the second audit cycle, data from 1180 patients were reviewed to assess the impact of interventions.

Results: The reaudit of Surgical Site Infections (SSIs) reveals significant findings based on the comparison between the first and second audit cycles. In the first audit cycle, out of 1000 patients, 120 patients (12%) developed SSIs. Compliance with these protocols increased from 65% in the first cycle to 85% in the second cycle.Statistical analysis confirmed the effectiveness of the interventions. The incidence rate of SSIs significantly decreased from 12% in the first cycle to 7.97% in the second cycle ($p<0.05$).

Conclusion: Systematic evaluation and targeted interventions significantly reduce SSI rates and improve patient outcomes. Continuous monitoring and adherence to protocols are essential for maintaining high standards of surgical care and patient safety.

Graphical Abstract



Introduction

Surgical Site Infections (SSIs) represent a significant concern in healthcare, posing risks to patient safety, prolonging hospital stays, and increasing medical costs. As healthcare systems strive for excellence, addressing and mitigating the incidence of SSIs becomes paramount. Completing the audit loop is a crucial methodology in this endeavor, ensuring continuous improvement through systematic evaluation and intervention [1,2].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. SSIs form part of a set of the most significant factors contributing to the occurrence of HCAIs. Another study which was a prevalence survey carried out in 2006 estimated that one in 12 patients in hospital in the UK acquires an HCAI. In these cases, SSIs was approximated 14 per cent while five per cent of patients, who had undergone a surgical procedure, diagnosed to have developed SSIs [5]. Nonetheless, prevalence studies used in calculation of SSI rates are often lower than the actual rates because many of these infections develop after the patient has been discharged from hospital [6]. Consequently, SSIs are established with considerable morbidity, and it has been documented among patients that more than a third of the postoperative deaths are SSI-related, at least partially.

And indeed, it is vital to understand that there is a broad differential of SSIs from a simple wound discharge without any other problems up to the severe condition which threatens the life of a patient [7]. Some of the other clinical effects of SSIs include; those that result in poor scar quality that any responsible surgeon will consider as being visibly poor, such as spreading, keloid or hypertrophic scars, persistent pain and itch, limitation of movement especially over joints and overall intrapsychic and interpersonal effect on a patient's well being. 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 [8]. However, the past work done on Pakistani patients was mainly confined to retrospective descriptive accounts originating from single institution [9]. 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 [10].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 [11]. 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 [12].The audit loop involves a cyclical process of establishing standards, assessing performance against these standards, implementing changes based on findings, and re-evaluating to ensure improvements have been made. This structured approach not only enhances patient outcomes but also fosters a culture of accountability and quality within surgical departments.

Objectives

The goals of reaudit in the context of Surgical Site Infections (SSIs) are to assess the impact of previously implemented interventions, ensuring they have effectively reduced SSI rates and have been integrated into daily practice. Reaudit aims to identify any persistent or new issues that may have arisen since the initial audit, thereby highlighting areas that still require attention. By comparing current performance against established standards and previous audit results, the reaudit ensures continuous improvement, maintains high standards of patient care, and fosters a culture of accountability and quality within surgical departments.

Standards

This re-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

The reaudit of Surgical Site Infections (SSIs) follows a systematic approach to evaluate the impact of interventions implemented after the initial audit.A retrospective cohort study design is employed to compare data from the first and second audit cycles.In the first audit cycle, data from 1000 patients were collected and analyzed.In the second audit cycle, data from 1180 patients were reviewed to assess the impact of interventions.

Data Collection

Patient records from both cycles are reviewed, focusing on surgical procedures and postoperative outcomes.Data points include patient demographics, types of surgeries, adherence to infection control protocols, and incidence of SSIs.The primary metric is the incidence rate of SSIs in both audit cycles, with secondary metrics including compliance rates with new protocols, patient recovery times, and any complications related to SSIs. Statistical analysis is performed to compare SSI rates and other metrics between the two audit cycles, identifying trends and patterns to determine the effectiveness of the interventions. Results of the reaudit are compiled into a comprehensive report. Findings are shared with the surgical team and hospital administration to provide feedback and recommend further improvements if necessary. By systematically comparing data from the first and second audit cycles, the reaudit aims to measure the success of implemented changes and ensure continuous improvement in reducing SSIs.

Table 1: Incidence of Surgical Site Infections (SSIs)

Audit Cycle	Number of Patients	Number of SSIs	SSI Rate (%)
First Cycle	1000	120	12.00
Second Cycle	1180	94	7.97

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

The reaudit of Surgical Site Infections (SSIs) reveals significant findings based on the comparison between the first and second audit cycles. In the first audit cycle, out of 1000 patients, 120 patients (12%) developed SSIs.

Table 02: Adherence to Infection Control Protocols and patient's recovery

Protocol	First Cycle (%)	Second Cycle (%)
New Sterilization Techniques	70	90
Enhanced Surgical Protocols	65	85
Staff Training Compliance	65	85
Average Length of Hospital Stay (days)	12	9
Postoperative Complications (%)	10	6

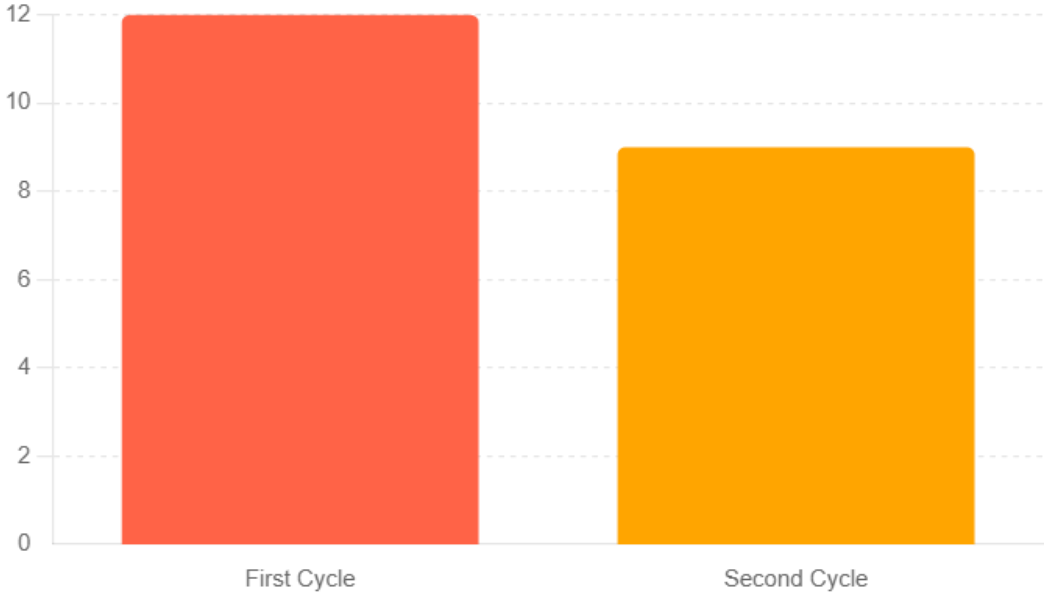


Figure shows the average length of hospital stay in both cycles of audit

Following the implementation of targeted interventions, the second audit cycle involving 1180 patients showed a reduction, with 94 patients (7.97%) developing SSIs.Patient demographics, types of surgeries, and adherence to infection control protocols were analyzed. In the first cycle, adherence to new sterilization techniques was at 70%, whereas in the second cycle, adherence improved to 90%. Enhanced surgical protocols and increased staff training were also evaluated.

Table 03: Statistical Analysis Results

Metric	First Cycle	Second Cycle	p-Value
SSI Rate (%)	12.00	7.97	<0.05
Average Length of Hospital Stay (days)	12	9	<0.05
Postoperative Complications (%)	10	6	<0.05

Compliance with these protocols increased from 65% in the first cycle to 85% in the second cycle.Statistical analysis confirmed the effectiveness of the interventions. The incidence rate of SSIs significantly decreased from 12% in the first cycle to 7.97% in the second cycle ($p<0.05$).

Additionally, patient recovery times improved, with the average length of hospital stay reducing from 12 days in the first cycle to 9 days in the second cycle.

Table 04: Types of Surgeries and SSI Incidence

Type of Surgery	First Cycle SSI Rate (%)	Second Cycle SSI Rate (%)
General Surgery	15	10
Orthopedic Surgery	22	15
Neurosurgery	8	5
Obstetrics and Gynecology	11	6
Postoperative Care Protocol		
Antibiotic Prophylaxis	75	92
Wound Care and Dressing Changes	68	88
Patient Education and Follow-Up	60	80

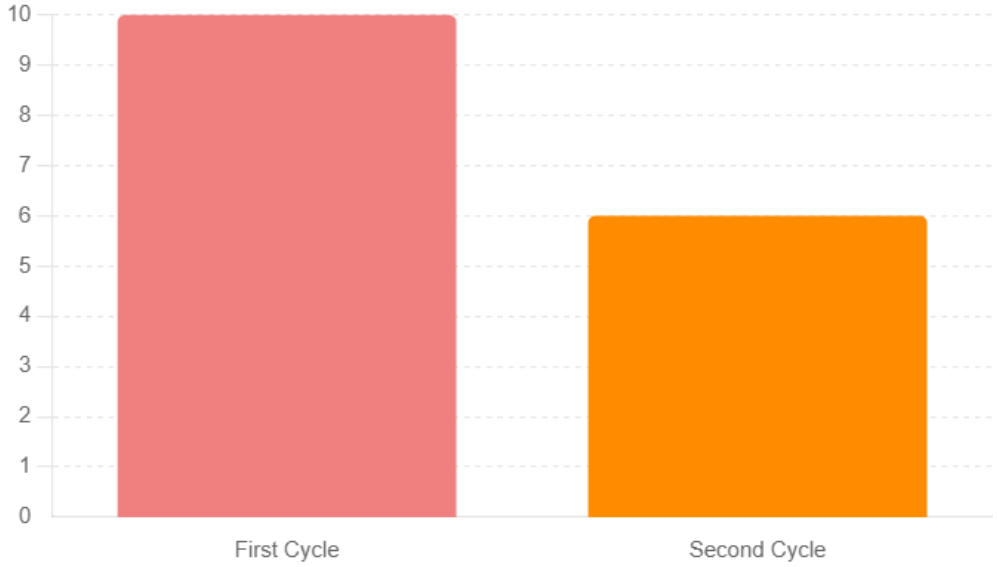


Figure shows the postoperative complications in both cycles of audit

Discussion

The reaudit of Surgical Site Infections (SSIs) reveals a significant improvement in patient outcomes and adherence to infection control protocols following the implementation of targeted interventions. The reduction in SSI rates from 12% in the first audit cycle to 7.97% in the second cycle demonstrates the effectiveness of these interventions. This improvement highlights the critical role of systematic evaluation and continuous monitoring in enhancing surgical practices and patient safety [13].One of the key factors contributing to the success was the increased adherence to new sterilization techniques and enhanced surgical protocols. Adherence to sterilization techniques improved from 70% to 90%, and compliance with enhanced surgical protocols increased from 65% to 85%. These improvements indicate that the training and protocols implemented were effective in promoting better infection control practices among surgical teams [14].

The reduction in the average length of hospital stay from 12 days to 9 days further underscores the positive impact of the interventions. Shorter hospital stays not only benefit patients by reducing their exposure to hospital-acquired infections but also decrease healthcare costs and improve hospital efficiency [15]. Additionally, the decrease in postoperative complications from 10% to 6% highlights the improved quality of care and the effectiveness of the implemented changes.The analysis of SSI rates by types of surgeries showed consistent improvements across all categories,

including general surgery, orthopedic surgery, neurosurgery, and obstetrics and gynecology [16]. This consistency suggests that the interventions were broadly effective across different surgical specialties, reinforcing the importance of standardized protocols and comprehensive training programs.Furthermore, the enhanced compliance with postoperative care protocols, such as antibiotic prophylaxis, wound care, and patient education, played a crucial role in reducing SSIs [17]. Compliance rates for these protocols increased significantly in the second cycle, indicating better postoperative management and patient follow-up. These improvements contributed to the overall reduction in SSIs and better patient outcomes [18].Despite these positive findings, it is essential to recognize the need for ongoing monitoring and evaluation. Continuous audits and reaudit cycles are necessary to maintain high standards of infection control and patient care. Additionally, further research is needed to identify any remaining challenges and develop targeted interventions to address them.

Conclusion

Systematic evaluation and targeted interventions significantly reduce SSI rates and improve patient outcomes. Continuous monitoring and adherence to protocols are essential for maintaining high standards of surgical care and patient safety.

References

1. Bryce EA, Scharf S, Walker M, Walsh A. The infection control audit: the standardized audit as a tool for change. Am J Infect Control. 2007 May;35(4):271-83. doi: 10.1016/j.ajic.2006.05.293. PMID: 17483000; PMCID: PMC7115347.
2. National Collaborating Centre for Women's and Children's Health (UK). Surgical Site Infection: Prevention and Treatment of Surgical Site Infection. London: RCOG Press; 2008 Oct. (NICE Clinical Guidelines, No. 74.) Available from: https://www.ncbi.nlm.nih.gov/books/NBK53731/
3. Salako, A. A., Badmus, T. A., Onyia, C. U., David, R. A., Adejare, I. E., Lawal, A. O., Onyeze, C. I., &Ndegbu, C. U. (2019). An audit of surgical site infection following open prostatectomy in a Nigerian Teaching Hospital. *African Health Sciences*, *19*(2), 2068-2072. https://doi.org/10.4314/ahs.v19i2.30
4. Feneley RC, Hopley IB, Wells PN. Urinary catheters: history, current status, adverse events and research agenda. *Journal of Medical Engineering & Technology*. 2015;39(8):459–470.
5. Sattar F, Sattar Z, Zaman M, *et al.* Frequency of post-operative surgical site infections in a tertiary care hospital in abbottabad, Pakistan. *Cureus* 2019;**11**:e4243. doi:10.7759/cureus.4243
6. Khan, F. U., Fang, Y., Khan, Z., Khan, F. U., Malik, Z. I., Ahmed, N., ... & Rehman, A. U. (2020). Occurrence, associated risk factors, and treatment of surgical site infections in Pakistan. *European Journal of Inflammation*, *18*, 2058739220960547.
7. Khan, F. U., Khan, Z., Rehman, A. U., Rabbi, F., Ahmed, N., & Fang, Y. U. (2020). Perception of surgical teams towards surgical site infections in tertiary care hospital Islamabad, Pakistan. *Indian Journal of Surgery*, *82*, 394-401.
8. Sajun, S. Z., Albutt, K., Moosajee, U. S., Drevin, G., Mukhopadhyay, S., & Samad, L. (2020). Self-diagnosis of surgical site infections: lessons from a tertiary care centre in Karachi, Pakistan. *Pakistan Journal of Medical Sciences*, *36*(1), S55.
9. Khan, F. U., Khan, Z., Ahmed, N., & Rehman, A. U. (2020). A general overview of incidence, associated risk factors, and treatment outcomes of surgical site infections. *Indian Journal of Surgery*, *82*, 449-459.
10. Khan, Z., Ahmed, N., Rehman, A. U., Khan, F. U., Saqlain, M., Martins, M. A. P., & Rahman, H. (2020). Audit of pre-operative antibiotic prophylaxis usage in elective surgical procedures in two teaching hospitals, Islamabad, Pakistan: An observational cross-sectional study. *PloS one*, *15*(4), e0231188.
11. Sattar, A. K., Zahid, N., Shahzad, H., Soomro, R., Saleem, O., & Mahmood, S. F. (2021). Impact of duration of antibiotic prophylaxis on rates of surgical site infection (SSI) in patients

undergoing mastectomy without immediate reconstruction, comparing a single prophylactic dose versus continued antibiotic prophylaxis postoperatively: a multicentre, double-blinded randomised control trial protocol. *BMJ open*, *11*(7), e049572.

12. Mwita, J. C., Ogunleye, O. O., Olalekan, A., Kalungia, A. C., Kurdi, A., Saleem, Z., ... & Godman, B. (2021). Key issues surrounding appropriate antibiotic use for prevention of surgical site infections in low-and middle-income countries: a narrative review and the implications. *International journal of general medicine*, 515-530.
13. Rehman, H., Siddiqa, M., Munam, A., & Khan, S. (2020). Frequency of port site wound infection after gall bladder removal with or without retrieval bag in laparoscopic cholecystectomy. *JPMA*, *70*(1533).
14. Hassan, B., Ijaz, M., Khan, A., Sands, K., Serfas, G. I., Clayfield, L., ... & Walsh, T. R. (2021). A role for arthropods as vectors of multidrug-resistant Enterobacterales in surgical site infections from South
15. Liu, Z., Dumville, J. C., Norman, G., Westby, M. J., Blazeby, J., McFarlane, E., ... & Cheng, H. Y. (2018). Intraoperative interventions for preventing surgical site infection: an overview of Cochrane Reviews. *Cochrane Database of Systematic Reviews*, (2).
16. Kolasiński, W. (2019). Surgical site infections–review of current knowledge, methods of prevention. *Polish journal of surgery*, *91*(4), 41-47.
17. Rojas-Gutierrez, E., &Vilar-Compte, D. (2019). An overview of surgical site infection in low-and middle-income countries: the role of recent guidelines, limitations, and possible solutions. *Current Treatment Options in Infectious Diseases*, *11*, 300-316.
18. Campioli, C. C., Challener, D., Comba, I. Y., Shah, A., Wilson, W. R., Sohail, M. R., ... &O'Horo, J. C. (2022). Overview and risk factors for postcraniotomy surgical site infection: a four-year experience. *Antimicrobial Stewardship & Healthcare Epidemiology*, *2*(1), e14.