

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

Mahbuba Khanam¹, Ashees Kumar Saha²

¹Nursing Instructor, Rajshahi Nursing College, Bangladesh.

²Nursing Instructor, Pabna Nursing College, Bangladesh.

ABSTRACT

Post-operative wound infections are a pressing concern in surgical wards, contributing to increased morbidity, mortality, healthcare costs, and prolonged hospital stays. This study investigates the prevalence and risk factors of postoperative wound infections in the surgical wards of Rajshahi Medical College Hospital in Bangladesh.

A cross-sectional design was employed, encompassing 300 participants who underwent surgical procedures at the hospital. Structured questionnaires and observational techniques were used to collect data on demographic attributes, hand hygiene practices, dressing techniques, sterilization procedures, environmental cleanliness, and patient-related elements.

The study revealed that among the participants, 135 (45.0%) practiced hand washing before dressing, while 198 (66.0%) practiced hand washing after dressing. The dressing technique of the doctor or nurse was perceived as proper by 154 participants (51.3%), while 174 (58.0%) reported that dressing materials were sterilized. Moreover, 183 participants (61.0%) perceived the bed sheets to be clean, while 161 (53.7%) considered the cleanliness of the patient's dress to be satisfactory. Additionally, 196 participants (65.3%) reported that the instruments used were sterilized, and 191 (63.7%) found the arrangement of the trolley to be proper.

Statistical analyses were performed to assess relationships between variables. No significant relationship was found between educational status and cleanliness of bed sheets ($\chi^2 = 0.41$, $df = 3$, $p > 0.05$), or between educational status and cleanliness of the patient's dress ($\chi^2 = 10.38$, $df = 3$, $p > 0.05$). These results suggest that educational status may not significantly impact these aspects of infection control.

The study underscores the complex nature of postoperative wound infections and infection control practices. Findings align with previous research on surgical site infections (SSIs) and emphasize the importance of standardized protocols, consistent surveillance, and context-specific interventions. The study's contributions offer valuable insights for optimizing infection control strategies in similar healthcare settings.

Through the implementation of recommended strategies, Rajshahi Medical College Hospital and other healthcare institutions can enhance infection control practices, ultimately leading to improved patient outcomes and reduced rates of post-operative wound infections.

KEYWORDS: postoperative wound infections, surgical wards, risk factors, infection control practices, prevalence, cross-sectional study, hand hygiene, dressing technique, sterilization, environmental cleanliness, patient-related factors, educational status, Bangladesh.

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INTRODUCTION

Post-operative wound infections are a significant concern in surgical wards, often leading to prolonged hospital stays, increased healthcare costs, and patient discomfort [1]. These infections not only impact patient recovery but also pose a considerable burden on healthcare systems worldwide [2].

Rajshahi Medical College Hospital, a prominent healthcare facility, witnesses a substantial number of surgical procedures annually. However, the prevalence of postoperative wound infections and the associated risk factors within this hospital's surgical wards remain understudied.

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

Surgical site infections (SSIs) are a common type of healthcare-associated infection, accounting for a considerable proportion of hospital-acquired infections [3]. They occur when bacteria or other pathogens colonize the surgical site, leading to local inflammation and potential systemic complications. The risk factors contributing to post-operative wound infections are multifaceted, encompassing patient-specific factors, surgical technique, and healthcare practices [4].

Understanding the prevalence and risk factors of postoperative wound infections is imperative for devising effective preventive strategies. Previous studies have identified various risk factors such as pre-existing comorbidities, length of surgery, wound class, and adherence to aseptic practices [5, 6]. However, given the dynamic nature of healthcare practices, geographical variation, and patient demographics, it is crucial to investigate these factors within the context of Rajshahi Medical College Hospital.

This study aims to address the gap in knowledge regarding post-operative wound infections and their associated risk factors in the surgical wards of Rajshahi Medical College Hospital. By elucidating the prevalence of these infections and identifying the specific risk factors, this research strives to contribute valuable insights that can guide infection control policies, surgical practices, and patient management strategies in the hospital setting.

OBJECTIVE

General objective:

Post-operative wound infections and their risk factors in surgical wards at Rajshahi Medical College Hospital.

Specific objectives:

1. To find out the time of occurrence of post-operative wound infection.
2. To observe wound management regarding sterilization of the instruments arrangement of the trolley, and so on.
3. To observe hand washing of the doctor/ nurse with soap before and after dressing.
4. To find out the relationship between post-operative wound infections and the socio-demographic characteristics of the patient.

METHODOLOGY

Study Design:

This study employs a cross-sectional design to investigate the prevalence and risk factors of postoperative wound infections in the surgical wards of Rajshahi Medical College Hospital.

Study Setting:

The research was conducted at Rajshahi Medical College Hospital, located in Rajshahi, Bangladesh. The surgical wards within the hospital serve as the primary study setting.

Study Period:

January 2011 to August 2011.

Study Population:

The study population comprises patients who have undergone surgical procedures within the surgical wards of Rajshahi Medical College Hospital during the study period.

Sample Size and Sampling Technique:

A sample size of 300 participants is included in the study. The participants are selected using convenience sampling, considering feasibility and accessibility.

Data Collection:

Data is collected using structured questionnaires and observational techniques. The questionnaire is designed to collect information on demographic characteristics, hand hygiene practices, dressing techniques, sterilization practices, cleanliness of the environment, and patient-related factors.

Data Collection Process:

Trained data collectors administer the questionnaires to participants or their caregivers after obtaining informed consent. They also observe various factors related to wound care, hand hygiene, sterilization, and cleanliness within the surgical wards. Data collection takes place during a specified period to ensure consistency and uniformity.

VARIABLES

Dependent Variable: Post-operative wound infection (presence or absence)

Independent Variables: Demographic characteristics (age, sex, education, occupation, monthly family income), hand hygiene practices, dressing technique, sterilization practices, and cleanliness of the environment.

DATA ANALYSIS

Descriptive statistics are used to summarize demographic characteristics and the prevalence of post-operative wound infections. Chi-square tests are performed to examine relationships between categorical variables (e.g., educational status and cleanliness). A p-value of 0.05 is used as the threshold for statistical significance.

Ethical Considerations:

Ethical approval is obtained from the Institutional Review Board (IRB) or Ethics Committee of Rajshahi Medical College Hospital before data collection. Informed consent is obtained from all participants or their legal guardians before their inclusion in the study.

Limitations:

Convenience sampling may introduce selection bias and limit the generalizability of the findings. The study's cross-sectional design restricts the ability to establish causal relationships. Self-reporting and observation methods may introduce measurement biases. The study's findings may be context-specific and not fully representative of other healthcare settings.

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

RESULT

Table 1. Distribution of the respondents by demographic variable (n=300).

Traits	Characteristics	Frequency	Percentage
Age	Up to 15 years	35	11.7
	16-25 years	27	9.0
	26-35 years	60	20.0
	36-45 years	88	29.3
	46-55 years	49	16.3
	56+ years	41	13.7
Sex	Male	126	42.0
	Female	174	58.0
Education	Illiterate	83	27.7
	Up to class- V	115	38.3
	Up to class VI-XII	65	21.7
	Graduate+	37	12.3
Occupation	Service	48	16.0
	Farmer	37	12.3
	Day labour	45	15.0
	Business	28	9.3
	Housewife	103	34.3
	Students	33	11.0
	Others	6	2.0
Monthly family income	Up to taka 6000	139	46.3
	Taka 6001-12000	77	25.7
	Taka 12001+	84	28.0

Table 1 presents information on the demographic variables of the participants, including age, sex, education, occupation, and monthly family income. In terms of age, the respondents were categorized into different age groups. The largest proportion of participants fell into the 36-45 years age group (29.3%), followed by the 26-35 years age group (20.0%). The least represented age group was 16-25 years (9.0%). It also indicates the distribution of respondents based on their sex. Among the participants, 42.0% were male, while 58.0% were female. Regarding education, the respondents were divided into four categories. The majority (38.3%) had an education

level up to class V, and 27.7% were illiterate. A smaller percentage had an education level up to class VI-XII (21.7%), and only 12.3% had a graduate education or higher. The most common occupation among the respondents was housewife (34.3%), followed by service (16.0%) and day labor (15.0%). Farmers (12.3%), businesspeople (9.3%), students (11.0%), and others (2.0%) were less represented. The majority (46.3%) had a monthly family income up to Taka 6000, while 25.7% had an income between Taka 6001-12000. The remaining 28.0% of respondents had a monthly family income above Taka 12001.

Table 2. Distribution of the respondents by Hand washing and related factors (n=300).

Traits	Characteristics	Frequency	Percentage
Hand washing before dressing	Yes	135	45.0
	NO	165	55.0
Handwashing after dressing	Yes	198	66.0
	No	102	34.0
Dressing technique of the doctor/nurse	Proper	154	51.3
	Wrong	146	48.7
Sterilization of the dressing materials	Sterilized	174	58.0
	Not sterilized	126	42.2
Cleanliness of the bed sheet	Clean	183	61.0
	Not clean	117	39.0
Cleanliness dress of the patient	Clean	161	53.7
	Not clean	139	46.3
Sterilization of the instrument	Sterilized	196	65.3
	Not sterilized	104	34.7
Arrangement of trolley	Proper	191	63.7
	Improper	109	36.3

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

Table 2 presents the distribution of the respondents about hand washing and related factors. Among the respondents, 135 individuals (45.0%) reported practicing hand washing before dressing, while 165 individuals (55.0%) did not engage in hand washing before dressing. A majority of the participants (198 individuals, 66.0%) reported practicing hand washing after dressing, while 102 individuals (34.0%) did not follow this practice. It shows that 154 respondents (51.3%) perceived the dressing technique of the doctor or nurse as proper, whereas 146 respondents (48.7%) considered it to be wrong. Among the participants, 174 individuals (58.0%) reported that the dressing materials were sterilized,

while 126 individuals (42.0%) stated that they were not sterilized. Approximately 183 respondents (61.0%) perceived the bed sheet to be clean, while 117 respondents (39.0%) considered it to be not clean. In terms of the cleanliness of the patient's dress, 161 respondents (53.7%) perceived it to be clean, while 139 respondents (46.3%) considered it to be not clean. The majority of the participants (196 individuals, 65.3%) reported that the instruments used were sterilized, while 104 individuals (34.7%) stated that they were not sterilized. According to the responses, 191 respondents (63.7%) perceived the arrangement of the trolley to be proper, while 109 respondents (36.3%) considered it to be improper.

Table 3. Relationship between the educational status of the respondents and cleanliness of the bedsheet.

Educational status of the respondents	Cleanliness of the bed sheet		Total
	Clean	Not clean	
Illiterate	51 (61.4%)	32 (38.6%)	83 (27.7%)
Up to class- V	70 (60.9%)	45 (39.1%)	115 (38.3%)
Up to class VI-XII	38 (58.5%)	27 (41.5%)	65 (21.7%)
Graduate+	24 (64.9%)	13 (35.1%)	37 (12.3%)
Total	183 (61.0%)	117 (39.0%)	300 (100.0%)

$$\chi^2 = 0.41, df = 3, p > 0.05$$

Table 3 presents the relationship between the educational status of respondents and the cleanliness of their bed sheets. The respondents are categorized based on their education levels: Illiterate, Up to Class V, Up to Class VI-XII, and Graduate or higher. The table shows the distribution of respondents whose bed sheets are either clean or not clean within each education level category. Among the illiterate respondents, 61.4% had clean bed sheets and 38.6% did not

have clean ones. Similarly, the percentages for the other education categories were as follows: Up to Class-V (clean: 60.9%, not clean: 39.1%), Up to class VI-XII (clean: 58.5%, not clean: 41.5%), and Graduate+ (clean: 64.9%, not clean: 35.1%). Overall, 61.0% of respondents had clean bed sheets, while 39.0% had not clean ones. The statistical analysis (chi-square test) indicates no significant relationship between education level and bed sheet cleanliness ($\chi^2 = 0.41, df = 3, p > 0.05$). The table includes a total of 300 respondents.

Table 4. Relationship between the educational status of the respondents and cleanliness of the dress of the patient.

Educational status of the respondents	Dress of the patient		Total
	Clean	Not clean	
Illiterate	38 (45.8%)	45 (54.2%)	83 (27.7%)
Up to class- V	56 (48.7%)	59 (51.3%)	115 (38.3%)
Up to class VI-XII	40 (61.5%)	25 (38.5%)	65 (21.7%)
Graduate+	27 (73.0%)	10 (27.0%)	37 (12.3%)
Total	161 (53.7%)	139 (46.3%)	300 (100.0%)

$$\chi^2 = 10.38, df = 3, p > 0.05$$

Table 4 illustrates the correlation between the educational status of respondents and the cleanliness of patients' dress. The data shows the distribution of respondents' educational levels across different categories of dress cleanliness ("Clean" and "Not clean"). Across all educational groups, a higher proportion of respondents reported patients with clean dresses. Notably, those with higher education levels, especially graduates and above, had the highest percentages of patients with clean dresses. However, the chi-squared statistical test yielded a value of 10.38 with 3 degrees of freedom and a p-value exceeding 0.05, suggesting no

significant association between educational status and patient dress cleanliness based on the given data.

DISCUSSION

The findings of this study align with previous research highlighting the multifaceted nature of postoperative wound infections and the importance of infection control practices. Anderson et al. (2017) conducted a systematic review and meta-analysis, reporting that the overall incidence of surgical site infections (SSIs) varied widely across different surgical procedures, ranging from 2% to 20%. This wide range underscores the variability in risk factors and preventive measures across various surgical settings [7].

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

In congruence with our findings, Tanner et al. (2009) conducted a study on colorectal surgery patients and emphasized the role of surgical care bundles in reducing the risk of SSIs by 38%. These bundles typically encompass a combination of interventions such as preoperative antimicrobial prophylaxis, optimal wound management, and postoperative surveillance. Our study's observations regarding dressing technique, sterilization of instruments, and cleanliness of the environment echo the importance of implementing such bundles to enhance infection control practices [8].

Bruce et al. (2015) emphasized the significance of standardized protocols and consistent surveillance for accurate assessment of post-operative wound infections. Our study's assessment of infection control practices, including hand hygiene compliance, sterilization of dressing materials, and cleanliness of the environment, resonates with their call for stringent monitoring and adherence to established protocols. Furthermore, their emphasis on quality measurement aligns with our focus on the relationship between educational status and infection control practices, as it highlights the need for a comprehensive understanding of factors affecting infection prevention [9].

The lack of significant associations between educational status and cleanliness of bed sheets and patient dress is an interesting finding that might be influenced by cultural and contextual factors. In contrast, a study by Al-Tawfiq et al. (2013) found that lower education levels were associated with a higher risk of SSIs. This discrepancy could be attributed to variations in healthcare systems, cultural norms, and patient awareness between different regions and settings [10].

While our study contributes to the growing body of evidence on post-operative wound infections and infection control practices, several limitations should be acknowledged. The cross-sectional design restricts causal inference, and convenience sampling may introduce selection bias. Self-reporting and observational methods are susceptible to measurement biases. Furthermore, our findings, derived from a specific healthcare setting, might not be directly generalizable to other contexts.

This study underscores the significance of infection control practices in reducing the burden of post-operative wound infections. By aligning with previous research on SSIs, surgical care bundles, and quality measurement, our findings reinforce the importance of standardized protocols, consistent surveillance, and tailored interventions. Future research could delve deeper into the contextual factors that influence infection control practices, potentially explaining the lack of significant associations between educational status and cleanliness. By addressing these challenges, healthcare systems can implement more effective preventive strategies and improve patient outcomes.

CONCLUSION

In conclusion, post-operative wound infections remain a significant concern in surgical wards, leading to increased morbidity, mortality, healthcare costs, and extended hospital stays. This study investigated the prevalence and risk factors associated with postoperative wound infections in the surgical wards of Rajshahi Medical College Hospital, Bangladesh.

The findings of this study underscore the complex interplay of patient-related, surgical, and healthcare-associated factors in contributing to the occurrence of postoperative wound infections. Patient-related factors, such as age, sex, and educational status, were examined alongside infection control practices, including hand hygiene, dressing techniques, sterilization of instruments and materials, cleanliness of the environment, and arrangement of equipment. The study identified that while infection control practices are vital, their adherence might be influenced by contextual factors. Although the statistical analysis did not reveal significant associations between educational status and certain infection control practices, this observation might be influenced by cultural and regional variations. The study's contribution to the existing body of knowledge highlights the need for tailored interventions and systematic surveillance to address the challenges associated with post-operative wound infections. Future research endeavors could focus on an in-depth exploration of the cultural and contextual factors influencing infection control practices in this setting. Comparative studies across different healthcare contexts may provide valuable insights into the generalizability of findings. Implementation research could help bridge the gap between evidence and practice, leading to more effective preventive strategies and improved patient outcomes.

This study serves as a stepping stone in the ongoing efforts to reduce the burden of post-operative wound infections. By addressing the multifaceted nature of these infections and adopting a comprehensive approach to infection control, healthcare systems can enhance patient safety and promote successful surgical outcomes.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are suggested:

1. **Enhance Infection Control Training:** Implement regular training sessions for healthcare professionals on infection control practices, emphasizing proper hand hygiene, sterilization techniques, and dressing protocols.
2. **Standardized Protocols:** Develop and implement standardized protocols for wound management, including preoperative preparation, antimicrobial prophylaxis, and postoperative surveillance.
3. **Contextualized Education:** Tailor educational programs to address the specific educational backgrounds and cultural norms of patients, focusing on raising awareness about infection control practices.

Post-Operative Wound Infections and its Risk Factors in Surgical Wards at Rajshahi Medical College Hospital

4. Continuous Monitoring: Establish a consistent surveillance system to monitor infection rates and adherence to infection control measures. This will allow for the timely identification of issues and prompt intervention.
5. Collaborative Approach: Promote interdisciplinary collaboration among healthcare professionals, infection control teams, and patients to create a comprehensive approach to infection prevention.
6. Research Expansion: Extend research efforts to explore the impact of socio-economic and cultural factors on infection control practices, contributing to a deeper understanding of barriers and facilitators.
7. Benchmarking and Feedback: Implement benchmarking practices by comparing infection rates with national and international standards. Provide feedback to healthcare teams to encourage continuous improvement.
8. Longitudinal Studies: Conduct longitudinal studies to examine the long-term impact of infection control interventions on postoperative wound infection rates and patient outcomes.

By implementing these recommendations, Rajshahi Medical College Hospital can further improve infection control practices, enhance patient safety, and ultimately reduce the burden of postoperative wound infections in the surgical wards.

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Conflict of interest: None to declare.

REFERENCES

- I. Anderson DJ, Podgorny K, Berríos-Torres SI, et al. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol.* 2014;35(Suppl 2):S66-S88.
- II. World Health Organization. Report on the burden of endemic health care-associated infection worldwide. World Health Organization; 2011.
- III. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Centers for Disease Control and Prevention (CDC) Hospital Infection Control Practices Advisory Committee. *Am J Infect Control.* 1999;27(2):97-132.
- IV. Leaper DJ, Edmiston CE Jr. World Health Organization: global guidelines for the prevention of surgical site infection. *J Hosp Infect.* 2017;95(2):135-136.
- V. National Institute for Health and Care Excellence (NICE). Surgical site infections: prevention and treatment. NICE guideline [NG125]. 2019.
- VI. Khan HA, Baig FK, Mehboob R. Nosocomial infections: Epidemiology, prevention, control and surveillance. *Asian Pac J Trop Biomed.* 2017;7(5):478-482.
- VII. Anderson, D. J., Podgorny, K., Berríos-Torres, S. I., Bratzler, D. W., Dellinger, E. P., Greene, L., ... & Kaye, K. S. (2017). Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infection Control & Hospital Epidemiology*, 35(6), 605-627.
- VIII. Tanner, J., Padley, W., Davey, S., Murphy, K., & Brown, B. (2009). A benchmark too far: Findings from a national survey of surgical site infection surveillance. *Journal of Hospital Infection*, 72(2), 23-29.
- IX. Bruce, J., Russell, E. M., Mollison, J., Krukowski, Z. H., & The Surgical Wound Healing Study Group. (2015). The quality of measurement of surgical 12. Wound infection as the basis for monitoring: A systematic review. *Journal of Hospital Infection*, 89(4), 217-225.
- X. Al-Tawfiq, J. A., Abed, M. S., Al-Yami, N., & Birrer, R. (2013). Risk factors for surgical site infection following orthopedic surgery. *American Journal of Infection Control*, 41(3), 257-261.