Original Article

SRHU MEDICAL JOURNAL

# Effectiveness of Teaching Program on Knowledge of Health Care Workers regarding prevention bundle of Surgical Site Infection in a Tertiary Care Teaching Hospital, Dehradun, Uttarakhand, India

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Surgical Site Infections (SSIs) are the third most common hospital-acquired infections, contributing to significant morbidity, mortality, and healthcare costs. Despite improvements in infection control practices, SSIs remain a leading cause of extended hospital stays, increased mortality rates, and the use of intensive care. This study aimed to assess the knowledge of healthcare workers regarding the prevention bundle for SSIs and evaluate the effectiveness of a teaching program designed to enhance their knowledge. A quasi-experimental design was used, with data collected through structured knowledge questionnaires before and after the intervention. The study was conducted at Himalayan Hospital, Dehradun, and involved healthcare workers from various surgical units. Results indicated a significant increase in post-test knowledge scores, with a mean difference of 2.91 points ($p < 0.05$), demonstrating that the teaching program was effective in improving the knowledge of healthcare workers regarding SSI prevention. However, improvements in documentation practices are still needed to achieve comprehensive improvements in SSI prevention.

**Keywords:** Surgical Site Infection (SSI), Hospital-acquired infection, Healthcare workers, Knowledge audit, Prevention bundle, Teaching program, Infection control, Surgical wound care.

## Introduction

Surgical Site Infections (SSIs) rank as the third most frequently reported hospital-acquired infection, comprising 14 to 16 percent of all such infections among hospitalized patients, as per the National Nosocomial Infections Surveillance. These infections significantly contribute to heightened morbidity and mortality following surgeries. According to CDC criteria, surgical wounds are categorized as clean, clean contaminated, contaminated, or dirty wounds[1].

Despite improvements in infection control practices, such as enhanced operating room ventilation, sterilization methods, and antimicrobial prophylaxis, SSIs continue to cause considerable morbidity, prolonged hospital stays, and even fatalities. The mortality rate associated with SSI stands at 3%, with 75% of SSI-related deaths directly linked to the infection[2].

SSIs lead to extended hospitalization, escalated antibiotic prescriptions, and increased laboratory expenses. Patients who contract these infections are 60% more likely to require intensive care, face a fivefold higher risk of readmission, and have twice the mortality rate of non-infected patients. Notably, an estimated 40-60% of these infections can be prevented. This study was conducted to do the knowledge audit on SSI among the health care workers[3].

The impact of surgical site infections extends beyond the patient, affecting hospitals and families by increasing the patient's length of stay, resulting in both social and economic losses. Various factors, including host attributes, wound conditions, and surgical-related factors, contribute to the occurrence of SSIs[4].



**Cite this article as:** Singh A., Tripathi M., Bala K.,,Mittal G., Effectiveness of Teaching Program on Knowledge of Health Care Workers regarding prevention bundle of Surgical Site Infection in a Tertiary Care Teaching Hospital, Dehradun,

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Manuscript received: 10.05.24; Revision accepted: 20.07.24

The incidence of surgical site infections (SSI) remains high, posing a significant disease burden and leading to severe postoperative complications with notable impacts on morbidity and mortality.

According to the National Nosocomial Infections Surveillance (NNIS) system, SSI rank as the third most frequently reported hospital-acquired infections, constituting 12%-16% of all such infections in hospitalized patients[5].

It has been noted that SSI occurrence depends on various factors, including the quality of care provided by healthcare workers during the pre, intra, and post-operative phases, as well as the underreporting of SSI incidents. Enhancing healthcare workers' understanding of the SSI bundle is crucial for improving documentation related to SSI surveillance. Therefore, a knowledge audit of healthcare workers regarding the SSI bundle was conducted to address this issue.

**Objectives:**

1. To determine the knowledge of health care workers regarding prevention bundle of SSI.
2. To ass the effectiveness of teaching programme regarding prevention bundle of SSI among health care workers.

**Research Methodology:**

**Research Approach:**

- **First Phase:** Descriptive approach to identify the level of knowledge about SSI bundle.
- Second Phase: Evaluative approach: to improve the knowledge about prevention bundle of SSI.

**Research Design:**

- **Quasi- experimental design Setting:** Himalayan Hospital, Dehradun, Uttarakhand.

**Population:** Health Care workers working in tertiary care hospital

**Sample:** Health Care workers working in all surgical units of selected hospital, Dehradun

**Sample Technique:** Total enumerative sampling technique were used

**Sample size:**

**Data collection instruments:**

1. Structured Knowledge Questionnaire regarding Surgical Site Infection.
2. Prevention Bundle form of SSI and Maintenance checklist of SSI to assess the documentation related to SSI.

**Results:**

The first knowledge audit was done in September 2022. The intervention includes teaching and training was done for three months. There after teaching and training continued every month.

The results are presented in the following sections

**Section- 1**

Percentage distribution of Qualification of health care workers

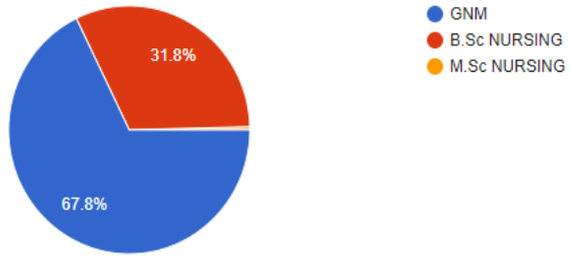


Fig1: Qualification distribution of sample (n=242)

Data presented in figure no.1; shows the percentage distribution of qualification of sample which shows that most (67.8%) of health care workers were GNM and 31.8% of health care workers were B.Sc (N) and only 0.4% were M.Sc (N).

**Section: 2**

Table No.1 depicts the pertest and post-test level of knowledge regarding prevention bundle of SSI among health care workers. The max. score was 20. In pre-test the lower score was 4 and in post-test it was 9. The mean and SD for pre-test was (12.11±2.46) and for post-test (15.02±2.52) with the mean difference 2.91. Hence, it could be inferred that there was a difference in knowledge score between pre and post-test.

Table no.2 shows that post-test mean knowledge score (15.02±2.52) regarding prevention bundle of SSI was higher than the pre-test mean knowledge score (12.11±2.46) and the mean difference was 2.91. The calculated t value was 6.96. Hence it could be inferred that that there was significant difference between pre and post knowledge score which means teaching was an effective method to enhance the knowledge of health care workers

**Table No 1: Mean, SD range, median and mean percentage of knowledge of health care workers regarding surgical site infection bundle care.**

**n=242**

| S.N. | Variable | Maximum score | Range of Score | Median | Mean±SD | Mean Difference | Mean % |
|---|---|---|---|---|---|---|---|
| 1. | **Pretest** Knowledge | 20 | 4-17 | 12 | 12.11±2.46 | 2.91 | 60.55% |
| 2. | **Posttest** Knowledge | | 9-19 | 15 | 15.02±2.52 | | 75.1% |

**Table No. 2: Effectiveness of an Instructional Teaching Programme regarding Prevention of SSI on the knowledge of health care workers**

n=242

| Knowledge Scores | Mean ± SD | Mean difference | 't' value |
|---|---|---|---|
| Pre-test | 12.11±2.46 | **2.91** | **6.96*** |
| Post-test | 15.02±2.52 | | |

't'$_{61}$=1.968 at the level of p< 0.05 * significant

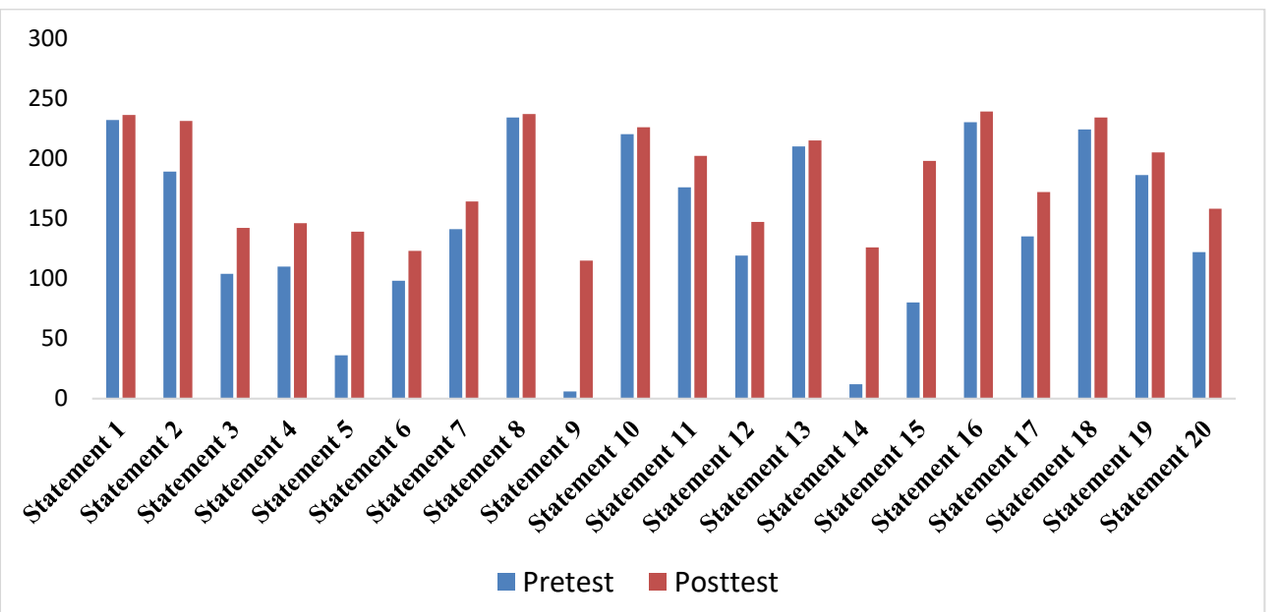


Fig 1: showing statement wise responses of health care workers regarding prevention bundle of SSI

**Table no.3 Percentage distribution of correct responses regarding prevention bundle of SSI among health care workers.**

| S. No | Statement | Percentage of Pre-test | Percentage of Post-test |
|---|---|---|---|
| **1.** | Full form of SSI | 95.9% | 97.9% |
| **2.** | ASA Stands for | 78.1% | 82.2% |
| **3.** | What is the most common healthcare acquired infection (HAI) among hospitalized patients? | 43% | 66.5 |
| **4.** | What is the mortality rate of SSI? | 45.5% | 75.2% |
| **5.** | A surgical site infection can occur up to how many days after an operative procedure? | 14.9% | **73.7%** |
| **6.** | What is the average additional length of stay in the hospital for patients that develop a surgical site infection? | 40.5% | 92.5% |
| **7.** | Following statement is true regarding dehiscence of wound in surgery EXCEPT. | 58.3% | 91% |
| **8.** | Superficial infection is the infection which involves. | 97.9% | 99% |
| **9.** | Complication of non-infectious surgical site wound include. | 2.5% | **78.3%** |
| **10.** | Criteria for fulfilling surgical site infection is: | 90.9% | 99% |
| **11.** | Most important aspect to prevent sepsis in post-operative patient is: | 72.7% | 93.3% |
| **12.** | During peri-operative care following criteria is to be met, EXCEPT: | 49.2% | 77.2% |
| **13.** | Classification of surgical site infection. | 86.8% | 98% |
| **14.** | Antibiotic prophylaxis pre or post -op has been shown to significantly decrease SSI rates for selected procedures. | 5% | **64.5%** |
| **15.** | Ideally antiseptic use for skin preparation in pre and peri - operative to be done. | 33.1% | **75.6%** |
| **16.** | Causes of Surgical Site Infection: | 95% | 99% |
| **17.** | A surgical client develops a wound infection during hospitalization. How is this type of infection classified? | 55.8% | 84.7% |
| **18.** | What action by the nurse is most important when performing a dressing change using surgical aseptic technique? | 92.6% | 98.3% |
| **19.** | What are the signs of Surgical Site Infection EXCEPT: | 76.9% | 95% |
| **20.** | How often first dressing should be changed. | 50.4% | 83.4% |

Table no.3 shows that there were significant increase in the post test knowledge score after the teaching program regarding prevention bundle of SSI among health care workers. It is also observed that in the statement no 5, 9,14 and 15 showed the significantly increase in the percentage.

**Major Findings:**

1. It has been observed that in terms of qualification of sample, most (67.8%) of health care workers were GNM and 31.8% of health care workers were B.Sc (N) and only 0.4% were M.Sc (N).
2. In pre-test the lower score was 4 and in post-test it was 9. The mean and SD for pre-test was (12.11±2.46) and for post-test (15.02±2.52) with the mean difference 2.91. Hence, it could be inferred that there was a difference in knowledge score between pre and post-test.
3. The calculated t value was 6.96. Hence it could be inferred that that there was significant difference between pre and post knowledge

score which means teaching was an effective method to enhance the knowledge of health care workers.

4. It has been observed that majority of the participants showed the increase in knowledge for the item no 5, 9, 14 and 15 respectively and had good level of knowledge regarding bundle care of SSI for which they had poor knowledge in pre-test.
5. Improvement in the knowledge regarding bundle care of SSI has been observed after completion of teaching and training among health care workers. But the documentation practices required more training and motivation which will be continued till the desired improvement will be achieved.

**Discussion:**

The primary goal of this study was to assess the knowledge regarding prevention bundle of SSI among health care workers. The view point of the findings had been explored with the findings of the referenced studies.

1. Findings of the present study showed that in pre-test the lower score was 4 and in post-test it was 9. The mean and SD for pre-test was (12.11±2.46) and for post-test (15.02±2.52) with the mean difference 2.91. Hence, it could be inferred that there was a difference in knowledge score between pre and post-test. The findings were supported by a study conducted by Jils Thottungal Suresh, according to the mean pre-test (10.50±2.20) knowledge score the mean was less as compared to the post-test (19.40±1.90) knowledge score. The findings of this study showed the increase in the level of knowledge at post-test.

2. In the present study findings it shows that the calculated t value was 6.96. Hence it could be inferred that that there was significant difference between pre and post knowledge score which means teaching was an effective method to enhance the knowledge of health care workers. The findings were supported by a study conducted by **Nadia Bassuoni Elsharkawy, et.al:** the study results revealed a significant improvement of all participants' knowledge and practices four weeks after educational sessions with mean score of (23.06±.86 & 121.78±2.79 respectively).

**Conclusion:** The quality improvement project on the prevention bundle of SSI achieved the objectives of assessing the knowledge and improving the knowledge of health care workers. The findings of the study recommend the improvement is still required in the documentation practice regarding SSI among health care workers who are working in all surgical areas of hospital.

**Recommendations:**

1. Continuous training and teaching about the prevention bundle of SSI among health care workers.
2. Project on the documentation related to SSI bundle care.

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