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Research Protocol

Nursing Section

Effectiveness of Self-instructional Module on Knowledge Regarding Prevention of Surgical Site Infection among Postoperative Cardiac Patients: A Research Protocol

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ABSTRACT

Introduction: Heart failure, often known as congestive heart failure or congestive cardiac failure, is a common, expensive, debilitating, and potentially fatal condition that arises when the heart is unable to produce enough pump action to sustain blood flow to meet the body's needs. An integral part of managing cardiovascular risk is leading a healthy lifestyle.

Need of the study: Surgical Site Infections (SSI) in cardiac surgery remain a significant medical problem due to the deteriorated postoperative quality of life, increased mortality, more extended hospital stays, and increased treatment costs.

Aim: The present study aims to evaluate the effectiveness of Self-Instructional Modules (SIM) on knowledge regarding the prevention of SSI among postoperative cardiac patients.

Materials and Methods: A quasi-experimental research design (one group pretest, post-test research design) will be conducted at AVBRH Sawangi (Meghe), Wardha, Maharashtra, India from March 2024- March 2025. A total of 140 subjects will be included in the study. A structured questionnaire based on the knowledge will be used to assess the effectiveness of the SIM on the prevention of SSI. The tools will consist of Section-I: Demographical data like age, gender, family income, occupation, education, stay in the hospital after surgery, and the type of cardiac surgery. Section-II: Structured knowledge questionnaire on the prevention of SSI among postoperative cardiac patients. A SIM will be provided to the postoperative cardiac patients regarding the prevention of SSI. One-way ANOVA will be applied to statistically evaluate the association of demographic variables with the level of knowledge regarding the prevention of SSI. A paired t-test will be used for the pre and post-test evaluation of the participants. A p-value of <0.05 will be considered significant.

Keywords: Cardiac surgery, Hospital infections, Post operative infections

INTRODUCTION

The SSIs represent one of the most significant complications faced by surgical patients, being strongly correlated with poorer prognoses. SSIs impact up to 10% to 20% of individuals undergoing major surgical procedures [1]. Infections occurring during cardiac surgery constitute a life-threatening complication that is associated with elevated morbidity and mortality rates. Furthermore, SSIs or postoperative wound infections can impede the postsurgical recovery of numerous patients. Although these infections infrequently arise within 30 days following surgery due to various risk factors, the potential for SSI poses a notable challenge in the context of cardiac surgery, delaying recovery and hindering the pursuit of enhanced recovery following cardiac procedures [2]. A number of risk factors that predispose patients to SSI are identified, including smoking, excessive alcohol consumption, hyperglycaemia, hypoalbuminemia, hypo or hyperthermia, and colonisation by Staphylococcus aureus. It is imperative to adopt various measures to mitigate these factors and reduce the risk of SSI [3]. Cardiothoracic surgery stands as a fundamental approach for the treatment of cardiovascular disorders, encompassing not only the widely recognised Coronary Artery Bypass Grafting (CABG) and valvular repairs or replacements but also procedures such as aortic aneurysm repair, arrhythmia corrections, and heart transplants. The median sternotomy incision, which involves a vertical, inline division of the sternum, has remained a steadfast technique within the cardiothoracic surgical domain for several decades. In addition, the median sternotomy method diminishes pulmonary impairment by circumventing extensive rib spreading and intercostal muscle dissection, often necessary in lateral thoracotomy techniques [4]. The escalation of antibiotic resistance among common bacterial strains can, in part be attributed to the pervasive use of various antibiotic agents. Prophylactic and therapeutic antibiotic interventions are conventionally applied in cardiac surgical units and not surprisingly infections caused by methicillin-resistant Staphylococcus aureus have emerged as a significant concern among surgical infections in cardiac patients [5].

This study will fill the gap in the existing literature by addressing the lack of structured patient education and standardised SIM for preventing SSI in postoperative cardiac patients and will introduce a comprehensive and patient-centred SIM, ensuring that patients and caregivers receive clear, structured, and accessible education on wound care, hygiene, and early signs of infection. By developing a standardised SIM, this study will help bridge the gap between theoretical guidelines and practical patient education, ensuring uniformity in SSI prevention practices.

REVIEW OF LITERATURE

Heart failure is the most common cause of death among coronary artery bypass graft patients and education on homecare of post-CABG should be an essential component of nursing care focused on helping patients take care of themselves at home, following discharge from the hospital as family member plays a vital role in the rehabilitation process. SSIs are common healthcare-related infections that increase illness and medical costs. While factors like age, diabetes, and smoking are well-known risks, gender differences in SSI rates are less studied. A study using data from Germany's infection surveillance system (KISS) analysed 438,050 surgeries from 2005 to 2010 across different specialties. It found that men had a higher rate of SSIs in abdominal surgery while women had

a greater risk in cardiac surgery (5.50% in women vs. 3.02% in men). These findings suggest that SSI risks depend on both gender and the type of surgery. More research is needed to understand the reasons behind these differences and develop better prevention strategies [6].

A study by Devi J et al., examined the effectiveness of a SIM in the caregivers of post-CABG patients and concluded that education level and occupation had a significant impact on knowledge about SSI prevention. This means that patients with higher education and different occupations had better awareness of SSI prevention. By following the instructions provided, patients and caregivers could better manage postoperative care, reduce the risk of infections, and promote faster recovery [7]. A study by Ghonaem SA et al., concluded that patients who received planned discharge instructions had better knowledge, felt more confident in managing their health, and had fewer complications than those who did not receive such instructions. The study found a strong link between knowledge and self-confidence, proving that proper discharge education helps patients take better care of themselves [8].

A study in Saudi Arabia assessed awareness and knowledge of SSIs among 375 patients. It found that nearly half (49.1%) had poor awareness, especially those who were illiterate or from the Northern region. Patients without prior surgery or SSI history also had lower awareness. Older adults and those with less education were more at risk. The study emphasized the need for better patient education through healthcare professionals and digital platforms to reduce SSIs and improve hospital outcomes [9].

The present study aims to evaluate the effectiveness of SIMs on knowledge regarding the prevention of SSI among postoperative cardiac patients.

Primary objectives:

- Assess the existing knowledge related to the prevention of SSI among postoperative cardiac patients.
- To assess the effectiveness of SIMs related to the prevention of SSI among postoperative cardiac patients.

Secondary objectives:

- To compare the pre and Post interventional knowledge related to the prevention of SSI among postoperative cardiac patients.
- To associate the post-test knowledge score with selected demographic variables.

Null hypothesis: The SIM will not demonstrate a significant effect on enhancing knowledge related to the prevention of SSIs in postoperative cardiac patients.

Alternate hypothesis: The SIM will demonstrate a significant effect on enhancing knowledge related to the prevention of SSIs in postoperative cardiac patients.

MATERIALS AND METHODS

A quasi-experimental research design (one group pretest, post-test research design) will be conducted at AVBRH Sawangi (Meghe), Wardha, Maharashtra, India from March 2024 - March 2025. Before the research informed consent will be taken from the participants as well as the Institutional Ethical Clearance (IEC) has been obtained from the institutional ethics committee, with reference number DHIMER(DU)/IEC/2024/213.

Inclusion criteria:

- Patients who are suffering from cardiac disease and have undergone surgery;
- Postoperative cardiac patients who are willing to participate in this study;
- Those patients who have developed postoperative SSI;
- Those patients who understand the Marathi and English language.

Exclusion criteria:

- Postoperative cardiac patients who are critically ill and mentally ill;
- Postoperative cardiac patients who are not willing to participate in the study.

Sample size calculation: The formula used: By using the Cochran formula for the sample size estimation:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Considering the proportion of SSI before the introduction of the SIM=18.86 % [10].

Minimum sample size required= 140.

The sample will be drawn using a non-probability purposive sample technique.

Tools of data collection: A self-structured knowledge questionnaire will be used to assess the effectiveness of the SIM on the prevention of SSI as a data collection instrument. The questionnaire will be developed by a researcher with a Master's degree in nursing specializing in medical-surgical nursing. Its validity and reliability will be assessed by an Associate Professor of medical-surgical nursing. The questionnaire has a reliability score of 94.57%. The tools will consist of Section I: Demographical data like age, gender, monthly income (Income classification/ categorisation according to the Kuppuswamy income scale) [11], occupation, education, stay in hospital after surgery, and type of cardiac surgery. Section II: Structured knowledge questionnaire on the knowledge regarding prevention of SSI among postoperative cardiac patients. The section includes 20 close-ended questions on the meaning, causes, risk factors, risk reduction, signs, and treatment of SSI. Score 1 will be given for the correct answer; Score 0 will be given for the wrong answer. Knowledge will be graded from poor knowledge to very good knowledge based on scores: Poor is 0-5, Moderate is 6-10, Good is 11-15, and Very Good is 16-20 [Annexure 1].

Study Procedure

The SIMs will be given to the postoperative cardiac patients on the same day. The SIM includes definition of surgical-site infection, the importance of prevention of surgical-site infection, signs and symptoms of infection, wound care instructions: cleaning solution, frequency, changing dressings, daily inspection, lifestyle and personal hygiene, follow-up, and medications.

Outcomes: Knowledge will be assessed at the baseline and on the 7th day, the post-test knowledge will be assessed to evaluate the effectiveness of SIMs.

STATISTICAL ANALYSIS

R software will be employed to conduct statistical analyses on the data collected from participants. The data will be systematically categorised and analysed using both descriptive and inferential statistical methods. Descriptive statistics will encompass key measures, including the mean, standard deviation, and mean percentage. For inferential statistics, a One-way ANOVA will be applied to assess the association between demographic variables and the levels of knowledge. Furthermore, to evaluate changes in knowledge among participants, a paired t-test will be utilised for pre- and post-test comparisons. A p-value of <0.05 will be considered statistically significant.

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ANNEXURE-1

Section A: - Demographic data

Sample No:

1. Age (in years)

a) 30-40 (years) b) 41-50 (years)
c) 51-60 (years) d) Above 60 (years)

2. Education

a) Primary education b) Secondary education
c) Graduate d) Postgraduate and above

3. Gender

a) Male b) Female
c) Transgender

4. How long did you stay in the hospital after surgery?

a) Since one week b) Since two week
c) Since three week d) More than a months

5. Monthly income of the family in rupees

a) 5000-15,000 b) 15,001-25,000
c) 25,001-35,000 d) 35,001-45,000
e) 45,001-55,000 f) >55,000

6. Occupation

a) Government job b) Private job
c) Homemaker d) Retired

7. What type of cardiac surgery did you have?

a) Coronary Artery Bypass Graft (CABG)
b) Valve replacement/repair
c) Heart transplant

Section B: Knowledge regarding prevention of Surgical Site Infection (SSI).

1. What is a Surgical Site Infection (SSI)?

A. An infection that occurs in the lungs after surgery
B. An infection that occurs at the site of surgery
C. An infection that occurs in the urinary tract
D. An infection that occurs in the bloodstream

2. Why is it important to prevent Surgical Site Infections (SSIs)?

A. To promote faster healing
B. To increase hospital stay
C. To cause more discomfort
D. To increase healthcare costs

3. Which of the following is a sign of a Surgical Site Infection (SSI)?

A. Decreased pain
B. Redness around the wound
C. Dryness around the wound
D. Reduced swelling

4. How often should you wash your hands before and after touching your wound?

A. Only before touching the wound
B. Only after touching the wound
C. Both before and after touching the wound
D. Never

5. What should you use to clean your wound?

A. Soap and water
B. Harsh chemicals
C. Antiseptic solution like saline
D. Alcohol

6. How frequently should you clean your wound as per the healthcare provider's directions?
A. Once a week
B. Once a month
C. Once or twice a day
D. Never

7. What should you do if your old dressing shows signs of infection?
A. Ignore it
B. Reuse it
C. Report it to your healthcare provider
D. Wash it and reuse it

8. How should you cover your wound when showering?
A. With a waterproof material
B. With a cloth
C. With a paper towel
D. Leave it uncovered

9. Which of the following activities should be avoided to keep the wound dry?
A. Walking
B. Swimming
C. Watching TV
D. Reading

10. What should you do if you notice increased redness, swelling, or pain around your wound?
A. Wait a week
B. Do nothing
C. Contact your healthcare provider immediately
D. Cover it with a thicker dressing

11. Why is it important to attend all scheduled follow-up appointments?
A. To socialise
B. To monitor the healing process and address concerns
C. To avoid staying home
D. To get more medications

12. Why should you avoid smoking after surgery?
A. It has no effect on healing
B. It can delay healing and increase the risk of infection
C. It makes you feel better
D. It is recommended by healthcare providers

13. What type of diet is recommended to support recovery?
A. High in sugars
B. Balanced diet rich in proteins, vitamins, and minerals
C. High in fats
D. Low in nutrients

14. Which of the following is a sign you should seek immediate medical attention?
A. Feeling very energetic
B. Increased appetite
C. Fever above 100.4°F (38°C)
D. Clear wound discharge

15. What should you do if you notice pus or an unusual smell from your wound?
A. Cover it and ignore
B. Wash it with water only
C. Contact your healthcare provider immediately
D. Apply more dressing

16. How much water should you drink to stay hydrated and support healing?
A. Very little
B. Plenty of water
C. Only sugary drinks
D. No liquids

17. Why is rest important after surgery?
A. To delay healing
B. To give your body time to heal
C. To increase energy levels quickly
D. To avoid feeling tired

18. How often should you check your wound for signs of infection?
A. Once a month
B. Once a week
C. Daily
D. Never

19. What is the role of antibiotics in preventing Surgical Site Infections (SSIs)?
A. To cause infection
B. To treat and prevent infections
C. To delay healing
D. To increase discomfort

20. What should you do if your wound dressing gets wet?
A. Leave it as is
B. Change it immediately
C. Dry it with a towel
D. Ignore it