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The Effect of an Educational Training Program on Nurses' Performance Regarding Surgical Care Bundle for General Surgery Patients

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Abstract: **Background: A surgical care bundle refers to a set of evidence-based practices or interventions that are implemented collectively to improve patient outcomes and reduce complications associated with surgery. Aim: to evaluate the effect of an educational training program on nurses' performance regarding surgical care bundle for general surgery patients. Design: A quasi- experimental design. Settings: Sohag General Hospital affiliated to Ministry of Health, Sohag Governorate in general surgical department & operating theater. Subjects: A convenient sample of fifty nurses who working at the previously mentioned settings & a convenient sample of one hundred and twenty general surgery patients in the same facility. Tools of data collection: Tool (1): Nurses' characteristics questionnaire. Tool (II): Nurses' knowledge assessment questionnaire. Tool (III): Nurses' practice observational checklist. Tool (IV): Nurses' attitudes Likert scale. Tool (V): Surgical Site Infection (SSI) assessment questionnaire consists of: Part (1): Patients' medical and demographic data and part (2): Southampton Surgical Site Infection Grading System. Results: This study revealed that the majority of studied nurses had satisfactory knowledge level in post program implementation. While four-fifths of them had satisfactory knowledge level in pre-program implementation. Also, the vast majority of the studied nurses had competent practice in post program implementation, compared to preprogram implementation, more than half of them had competent practice level. Additionally, more than two-fifths of the studied nurses had a negative attitude preprogram while the majority of them had a positive attitude post program. There is a positive correlation between nurses' total level of knowledge, practices and attitude pre and post program implementation. The study group demonstrated highly significantly better outcomes with normal healing compared to control group. Conclusion: Educational program was effective in improving nurses' performance regarding surgical care bundle and decrease incidence of SSI among general surgery patients. Recommendation: Development of a training program should be conducted periodically with various teaching methods for nursing staff in surgical wards and ORs to improve their performance regarding surgical care bundle.**

Keywords: **Educational Training Program, Nurses' performance, Surgical Care Bundle, General Surgery Patients.**

1. INTRODUCTION

General surgery is a medical specialty that focuses on the diagnosis, preoperative, operative, and postoperative management of a wide range of surgical conditions. Surgeons in this field perform procedures involving the abdomen, digestive tract, endocrine system, liver, colon, and other areas. They may also handle trauma surgery, emergency surgeries, and certain types of cancer surgeries. General surgeons are equipped to deal with a variety of conditions such as appendicitis, hernias, and gallbladder diseases. Their role is integral to managing both elective and emergency surgical cases, providing care that addresses a wide spectrum of health issues **(Maloney et al., 2022).**

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A surgical site infection (SSI) is an infection that occurs at the site of a surgical incision or operation. It can develop within 30 days of surgery (or up to one year for implant surgeries) and may present with symptoms like redness, swelling, warmth, pain, and drainage of pus from the wound. SSIs are categorized as superficial, deep, or organ/space infections, depending on the affected tissue layers. They can arise due to contamination during the procedure, poor wound care, or compromised immune function. Factors like diabetes, smoking, and obesity may increase the risk of SSIs. Prevention strategies include maintaining sterile techniques during surgery, administering prophylactic antibiotics, and ensuring proper post-surgical wound care. If left untreated, SSIs can lead to serious complications, including sepsis **(Seidelman et al., 2023).**

A surgical care bundle is a set of evidence-based practices designed to reduce the risk of surgical complications, particularly surgical site infections (SSIs). These bundles are typically composed of a series of interventions that are implemented together to improve patient outcomes. A typical surgical care bundle might include practices such as administering prophylactic antibiotics within one hour before surgery, maintaining normothermia during surgery, ensuring proper skin antisepsis, using appropriate wound closure techniques, and promoting timely post-operative care like early mobilization and effective pain management. The goal is to ensure that best practices are followed consistently, reducing the likelihood of complications and improving recovery times. Surgical care bundles have been shown to significantly improve patient safety and reduce morbidity and mortality rates in surgical settings **(Pop-Vicas et al., 2024).**

Nurses play a crucial role in applying the surgical care bundle to ensure patient safety and improve outcomes during the surgical process. Their responsibilities start preoperatively, where they ensure that the patient receives the correct prophylactic antibiotics on time and confirm proper skin antisepsis is performed before surgery. During the procedure, nurses assist in maintaining a sterile environment, monitoring the patient's temperature to prevent hypothermia, and supporting the surgical team in following infection control practices. Postoperatively, nurses are key in monitoring the surgical site for signs of infection, ensuring the proper wound dressing is applied, and encouraging early mobilization to prevent complications like blood clots. Additionally, they educate the patient about postoperative care and symptoms to watch for, ensuring that the bundle's practices are consistently followed to reduce the risk of complications and promote faster recovery. Their attention to detail and adherence to the bundle protocols directly influence patient outcomes and recovery **(Li et al., 2021).**

Significance of the study

Surgical site infections (SSIs) continue to be a significant healthcare concern in Egypt, as they do globally. The rate of SSIs in Egypt varies depending on the type of surgery, hospital settings, and local infection control practices, but studies suggest that the incidence is notable. Overall SSI rate in Egypt was around 10-15%, which is higher than the global average of about 5%. This reflects both the challenges in infection control and the healthcare infrastructure. The rates can also vary depending on the specific type of surgery. For example, abdominal surgeries, orthopedic procedures, and cesarean sections tend to have higher rates of SSIs. SSIs occurred in approximately 12.5% of patients undergoing abdominal surgeries **(Abou-Taleb et al., 2024).**

The events of surgical site infection negatively affect patients and healthcare organization. The frequency of surgical site infections in Egypt related to general surgeries is 17%. Nearly 12 out of every 100 surgical patients developed surgical site infection. In 75% of patients, the cost of surgical site infection did not exceed 230 Egyptian Pounds, from the hospital perspective, and 6524 Egyptian Pounds, from patient perspective. 60% of the costs, tolerated by the hospital, were due to consumables; thus, they could be totally saved if all these surgical site infections had been prevented **(Abu-Sheasha et al., 2018).**

Even though preventable, surgical site infection happens in up to 30% of surgeries, represent 14% of Health Associated Infections (HAIs), 11% of patients who undergo surgery are infected in this process, it is associated with significant morbidity, mortality, and expanded health care costs **(Patil et al., 2018; WHO, 2018).** It is considered a healthcare-related problem in which a wound infection happens after surgical interventions **(Maurya & Mendhe, 2014).**

AIM OF STUDY

The aim of this study is to evaluate the effect of an educational training program on nurses' performance regarding surgical care bundle for general surgery patients. **This will be achieved through:**

1. Assess nurses' knowledge regarding surgical care bundle.
2. Assess nurses' practice regarding surgical care bundle.

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3. Assess nurses' attitude regarding surgical care bundle.
4. Design an educational training program regarding surgical care bundle based on basic assessment.
5. Implement the designed educational training program regarding surgical care bundle.
6. Evaluate the effect of applying the designed educational training program regarding surgical care bundle on the incidence rate of surgical site infection among general surgery patients.

Research Hypothesis

H1: At the end of the study, the mean nurses' knowledge score regarding surgical care bundle will be improved after implementation of an educational training program than before.

H2: At the end of the study, the mean nurses' practice score regarding surgical care bundle will be improved after implementation of an educational training program than before.

H3: At the end of the study, the mean nurses' attitude score regarding surgical care bundle will be improved after implementation of an educational training program than before.

H4: At the end of the study, the incidence regarding surgical site infection among general surgery patients will be decreased after implementation of an educational training program than before.

Research Questions

1. What is the effect of an educational training program on nurses' knowledge regarding surgical care bundle for general surgery patients?
2. What is the effect of an educational training program on nurses' practice regarding surgical care bundle for general surgery patients?
3. What is the effect of an educational training program on nurses' attitude regarding surgical care bundle for general surgery patients?
4. What is the effect of applying an educational training program regarding surgical care bundle on the incidence rate of surgical site infection for general surgery patients?

2. SUBJECTS AND METHODS

This study was conducted under the following four main designs as following:

I- Technical Design

II- Operational Design

III- Administrative Design

IV- Statistical Design

I- Technical Design:

Technical Design for this study included a description of the research design, setting, subjects, and tools of data collection.

Research design:

A quasi-experimental research design was utilized to fulfill the aim of this study.

Research setting:

Sohag General Hospital affiliated to Ministry of Health, Sohag Governorate in general surgical department & operating theater.

Sampling:

A convenient sample of (50) nurses who work at the previously mentioned settings were included in the study. In addition, there was a convenient sample of (120) general surgery patients at the same facility

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Tools for data collection:

Three tools were used to collect the data, were designed by the researcher in a simple Arabic language after reviewing the related literature and after reviewing from the researcher' supervisors, they consisted of the following:

Tool (I): Nurses' characteristics questionnaire: It was adapted from **Naeem et al., 2020** and modified by the researcher and it is written in Arabic language for collecting data. It included items incorporated information on the nurses **include** age, gender, academic qualification, years of experience in surgical wards and OR, and presence of surgical site infection prevention guidelines.

Tool (II): **Nurses' knowledge assessment questionnaire:** To assess nurses' knowledge about surgical site infection and surgical care bundle. It was adapted from **Mengesha, (2018) and Sickder et al., (2014)** and modified by the researcher based on surgical site infection prevention guidelines of **WHO,** (**2019)** and an extensive review of pertinent literature **Mert Boga, (2019)** and **Dubois, (2018)**; which contained 30 questions divided into 15 multiple choice questions covered the surgical site infection definition, signs & symptoms, causes, risk factors, preventions, causative organisms, degrees, types, diagnosis and 15 complete questions related to surgical care bundle definition, goals, indications, preoperative care bundle, intraoperative care bundle, postoperative care bundle, surgical care bundle team, and outcomes of surgical care bundle for patients and surgical team.

Scoring system:

A scoring system followed to assess nurses' knowledge regarding surgical care bundle. The correct answer is scored as one point, and the incorrect answer will be scored as a zero point. These scores will be summed and converted into percentage scores.

Total scoring will be classified into two categories:

- **Satisfactory** if the percentage score is ≥ 85%.
- **Unsatisfactory** if the percent score is < 85%.

Tool (III): Nurses' practice observational checklist: This tool is used to assess the nurses' practice of surgical care bundle; it was adapted from **Getaneh et al., (2020) and Sickder et al., (2014)**, then modified by the researcher based on evidence-based clinical practice guidelines, and standards specific to prevention of SSIs that have been published and updated by **WHO, (2019)**, and after reviewing of the related literature **Albishi et al., (2019) and Mengesha, (2018)**. It consists of steps that covered nurses' application for preoperative (8 steps), intra-operative (8 steps) and postoperative (4 steps) measures of SSI prevention.

Scoring system:

A scoring system followed to assess nurses' practice; each checklist assigned a score according to sub-items. Therefore, A score (1) was given in the action done completely and score (0) was given in the action not done. These scores are summed up and converted into a percentage score, and according to total scoring is classified into two categories:

- **Competent** practice if score ≥ 85%.
- **Incompetent** practice if score < 85%.

Tool (IV): : Nurses' attitudes Likert scale: This tool is used to assess nurses' attitudes toward surgical care bundle; it is designed by the researcher after reviewing the related literature **(Chisanga, 2017; Kolade et al., 2017)**.

Scoring system:

A scoring system followed to assess nurses' attitude in which responses answered in a three-point Likert scale ranging from "agree to disagree". The total attitude score = 30. Total scoring classified into two categories:

- **Positive attitude:** if the percentage score was ≥ 85%.
- **Negative attitude:** if the percentage score was < 85% based on data entering and statistical analysis.

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Tool (V): Surgical Site Infection (SSI) assessment questionnaire:

This tool adapted from **Hassan et al. (2021) and Bailey et al. (1992)** and is used to evaluate the incidence of surgical site infection among surgical patients and measured the effectiveness of the surgical care bundle on prevention of surgical site infection. It is divided into two parts:

Part 1: Patients' medical and demographic data:

It is adapted from **Hassan, et al., (2021)** and it included items incorporated information on the patient's name of surgery, age, gender, presence of chronic diseases, presence of surgical drains, weight, height, and types of surgical sutures.

Part 2: Southampton Surgical Site Infection Grading System:

The Southampton score is adapted from **Bailey, et al. (1992)** to assess surgical wounds. Wounds were graded according to any complications and their extent. This system is divided into five main criteria.

Scoring system:

This wound grading system was used to grade the severity of the post-surgical wound infection. Each sign and symptom were observed, categorized, and evaluated as present = 1 or not present = 0 using the total score of the Southampton SSI grading system. Surgical site infections are divided into four categories: no SSI (Grade 0), mild (Grades 1–2), moderate (Grades 3–4) and severe (Grade 5) according to this system.

II- Operational Design:

The Operational design included the preparatory phase, validity, reliability, ethical consideration, pilot study, and fieldwork.

Preparatory phase

An extensive review of recent, current, national and international related literature in various aspects of the problems was done to design the study tools and to be acquainted with various aspects of the problems.

Content validity:

To achieve the criteria of trust worthiness of the tool of data collection in this study. Tools of data collection were tested for content validity by five expert professors from Medical-Surgical Nursing department, Faculty of nursing, Helwan university for clarity, relevance, comprehensiveness, simplicity, and applicability.

Reliability of tool:

The developed tool was tested for reliability on all of each part. The reliability process was assessed by measuring their internal consistency by using the Cronbach alpha coefficients test. it was including the following:

Items	Cronbach's alpha coefficients
Reliability for knowledge	0.754
Reliability for practice	0.805
Reliability for attitude	0.791
Reliability for (SSI) assessment	0.812

Pilot study:

The pilot study was conducted on 10% of the study subjects which consisted of 5 nurses & 12 general surgery patients. it was conducted to evaluate to the clarity of questions and time needed to complete the study tools. Based on the pilot study findings, no modification were made. Pilot sample was included in the study sample.

Field Work:

- Data was collected over 8 months, started from the beginning of November 2023 to the end of June 2024, it was done during the morning shifts. The researcher was available three days per week from 9 a.m. to 2 p.m. in the previously mentioned settings.

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- First, the researcher filled the observational checklists by observing each nurse while caring for general surgery patients which took from 15-30 minutes for each procedure according to its difficulty and the nurses' attitude questionnaire took 30 minutes to be filled by the nurses.

- Secondly, the researcher assessed nurses' knowledge regarding surgical care bundle for general surgery patients at Sohag General Hospital affiliated to Ministry of Health, Sohag Governorate by using self-administered questionnaire which was developed by the researcher in simple Arabic language, and it took 45 minutes to be filled by the nurses.

- Then, the researcher distributed the Likert attitude scale regarding surgical care bundle for studied nurse.
- The sessions of the instructional program started after collecting of questionnaire, observation sheets and attitude scale from all subjects of the study.
- The researcher assessed the incidence of surgical site infection among general surgery patients (control group) before applying surgical care bundle.
- Each session was preceded by an open discussion about any question and brief summary about what was being discussed in the previous session. At the end of each session, the researcher summarized the key topics and verified that the nurses understood the information presented.
- The researcher provided instructional program sessions for nurses regarding surgical care bundles through use of several teaching methods such as: group discussion, question and answer, brainstorming, demonstration and re-demonstration as well as distribution of explanatory related booklets at the beginning of the sessions.
- The researcher followed postoperative surgical patients (study group) to evaluate the effectiveness of surgical care bundle on reducing incidence of surgical site infection.

III- Administration Design:

A written letter should be issued from the faculty of nursing Helwan University. Approval obtained from the mentioned settings administration.

Ethical Considerations:

Ethical approval was obtained from the scientific ethical committee, Faculty of Nursing, Helwan University, after submitting a proposal for the research and examining all papers by the concerned committee. Then the purpose and nature of the study were explained to the participants and oral permission were taken from the nurses & general surgery patients and informed that each study subject is free to withdraw at any time through the study without giving any reasons.

IV- Statistical Design:

Data collected from the studied sample was analyzed and tabulated using the Statistical Package for Social Science (SPSS) version 20. Qualitative data was presented as numbers and percentages. The statistical tests used the chi-square test, means, slandered deviation, and Correlation test which showed good internal consistency construct validity.

3. RESULTS

Table (1): Number and percentage distribution of studied nurses according to their characteristics (N=50).

Nurses' demographic characteristics	N	%
Age (year)		
20- <30	19	38
30- <40	20	**40**
40 or more	11	22
Mean ± SD	**33.4 ± 7.58**	

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Gender		
Male	18	36
Female	32	**64**
Marital Status		
Married	25	50
Not married	25	50
Educational Level		
Diploma of secondary nursing degree	12	24
Health technical institute	25	**50**
Technical institute of nursing	10	20
Bachelor of nursing science	3	6
Surgical and OR experience (year)		
< 5	22	**44**
5 - <10	15	30
10 - <15	5	10
15 or more	8	16
Mean ± SD	**7.8 ± 6.2**	
Training Courses regarding Surgical Site Infection (SSI) Prevention		
No	50	100
Presence of Surgical Site Infection Prevention Guidelines		
No	50	100

Table (1) shows that more than two fifths (40%) of the studied nurses were in the age group 20 -< 30 years old with mean age 33.4 ± 7.58 years. More than half (64%) of the studied nurses were females. Half (50%) of the studied nurses graduated from health technical institute. Also, 44% of them had < 5 years of experience in surgical and OR and all (100%) of them didn't attend any training courses regarding SSI and there are not any SSI prevention guidelines.

Fig:(1): Percentage distribution of the studied nurses' total level of knowledge regarding surgical site infection and surgical care bundle for general surgery patients pre and post program implementation (n=50).

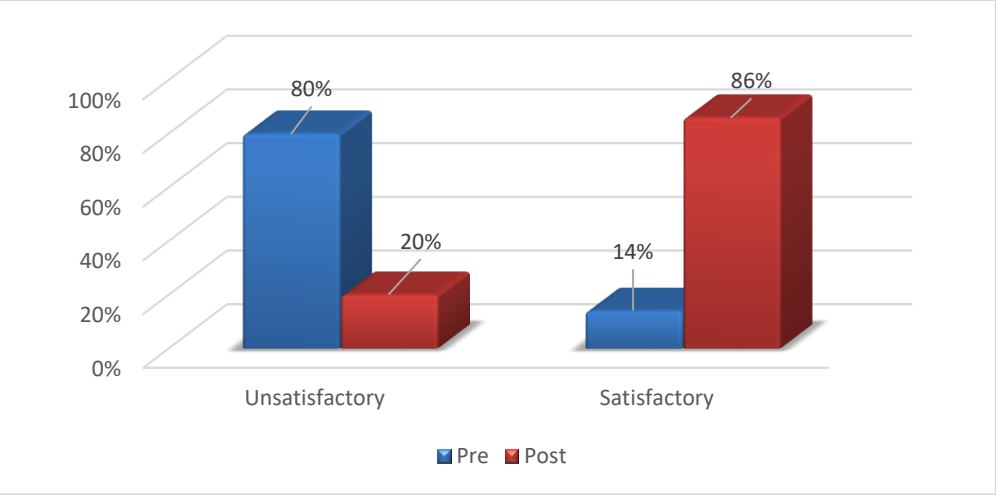

Figure (1) represents that (80%) of the studied nurses had unsatisfactory level of knowledge regarding SSI and surgical care bundle for general surgery patients before educational program interventions. While (86%) of them had satisfactory level of knowledge regarding SSI and surgical care bundle for general surgery patients after educational program interventions.

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Figure (2): Distribution of the studied nurses' total practice level pre and post educational program implementation (no=50).

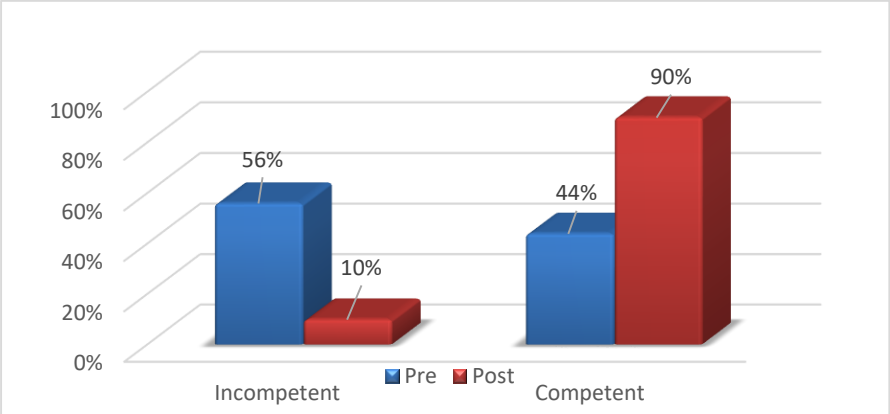

Figure (2) shows that (56%) of the studied nurses had an incompetent level of practice regarding surgical care bundle for general surgery patients before training educational program intervention. While (90%) of them had competent level regarding surgical care bundle for general surgery patients after training educational program intervention.

Figure (3): Total nurses' attitude toward surgical care bundle (pre /post program implementation (no=50).

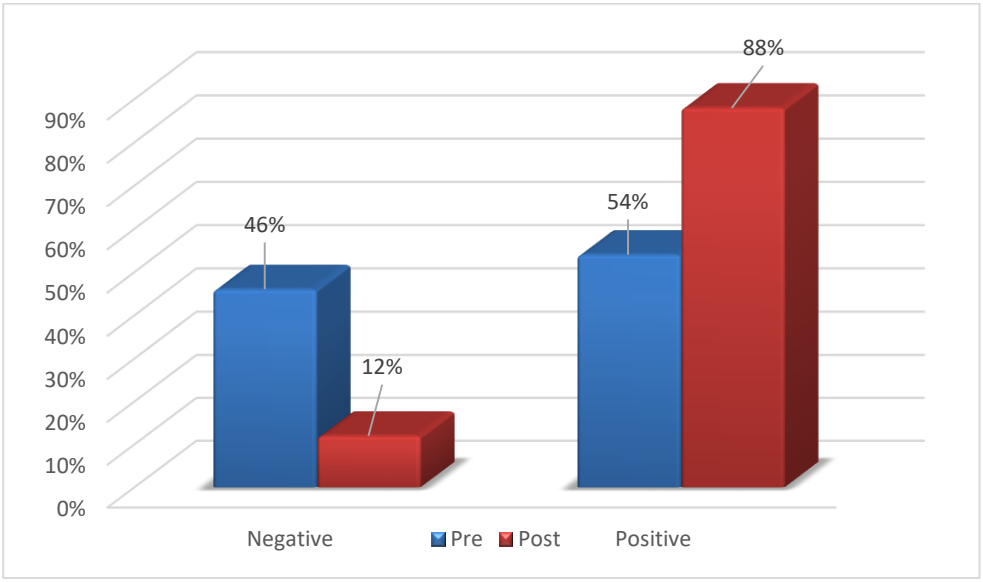

Figure (3) showed that (46%) of the studied nurses had a negative attitude towards Surgical Care Bundle Before Intervention. While (88%) of them had a positive attitude towards Surgical Care Bundle after Intervention.

Table (2): Correlation Between Knowledge, Practice, and Attitude Scores of the studied nurses (pre /post program implementation) (no=50).

Pearson Correlation	Knowledge score		Practice score	
	r	P-value	r	P-value
Pre				
Practice score	0.384	<0.001**		
Attitude score	0.198	0.035*	0.169	0.015*
Post				
Practice score	0.284	<0.001**		
Attitude score	0.234	0.003*	0.395	<0.001**

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Table (5): presents correlations between knowledge, practice, and attitude scores both before and after the implementation. Before the intervention, there was a significant positive correlation between practice scores and knowledge scores ($p < 0.001$), indicating that higher knowledge was associated with better practice scores. Attitude scores also had a positive correlation with practice scores ($p = 0.015$) and knowledge scores ($p = 0.035$). After the intervention, practice scores continued to show a strong positive correlation with knowledge scores ($p < 0.001$), and attitudes were positively correlated with both practice ($p < 0.001$) and knowledge scores ($p = 0.003$).

Figure (4): Percentages of SSI for Study and Control groups (n=120)

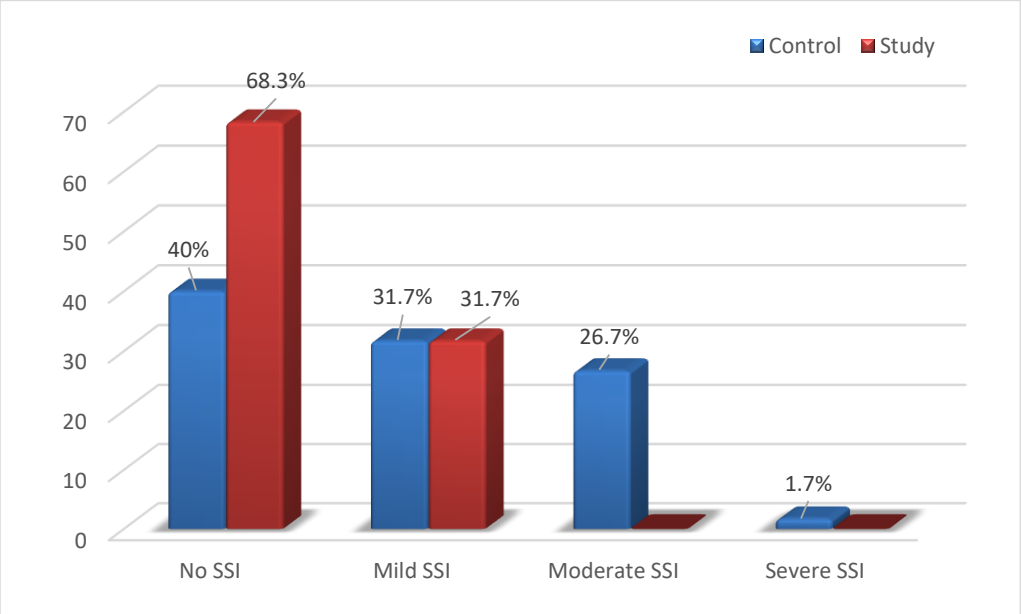

Figure (4) illustrates that no SSI for Study group was (68.3%) compared with (40%) for control group. While mild SSI is still the same at (31.7%). Moderate SSI and Severe SSI for study group decreased dramatically to (0%) which were (26.7%) and (1.7%), respectively, for control group.

Table (3): Correlation of knowledge, practice, and attitude scores of the studied nurses with Southampton Surgical Site Infection Grading System pre and post program implementation (no=50).

Pearson Correlation	Southampton Surgical Site Infection Grading System			
	Pre-program implementation		Post program implementation	
	r	P-value	r	P-value
Knowledge score	-0.425	<0.001**	-0.375	0.005*
Practice score	-0.375	0.002*	-0.482	<0.001**
Attitude score	-0.394	<0.001**	-0.806	<0.001**

Table (3) presents correlations between knowledge, practice, and attitude scores of studied nurses and the Southampton Surgical Site Infection Grading System both before and after the intervention. Before the intervention, knowledge and attitude scores had a highly significant negative correlation with the grading system ($p < 0.001$), indicating that higher knowledge was associated with better surgical site infection outcomes. While Practice scores also showed a significant negative correlation ($p = 0.002$), suggesting improved practice is linked to better infection grading. On the other hand, in post -intervention all correlations were stronger. Knowledge scores showed a significant negative correlation with infection grading ($p = 0.005$) while Practice and attitudes scores demonstrated a highly significant negative correlation ($p < 0.001$).

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4. DISCUSSION

A surgical care bundle is a set of evidence-based best practices designed to improve patient outcomes and minimize complications in surgical settings. These bundles typically consist of a series of interventions that are implemented together as a standard care protocol before, during, and after surgery. Key components may include proper antibiotic prophylaxis, temperature management, blood sugar control, and timely removal of catheters or drains. Research has shown that the implementation of surgical care bundles can significantly reduce the incidence of surgical site infections (SSIs), improve overall patient recovery, and lower healthcare costs. By adhering to these guidelines, healthcare providers ensure a comprehensive approach to surgical patient care that maximizes safety and efficiency **(Aiken, et al., 2014).**

Part I: Demographic characteristics of the studied nurses:

Regarding the study nurses' characteristics, the age distribution of nurses in this study shows that more than three quarters of nurses are below 40 years old. This suggests a relatively young nursing workforce, likely with varying levels of experience but predominantly in the early to mid-stages of their careers. This age distribution highlights the need for continuous education, mentorship, and professional development to ensure that younger nurses are well-prepared to assume leadership roles and adhere to best practices such as surgical care bundles. This finding aligns with a similar study by **Tanner, et al., (2015)** in their thesis, "Do surgical care bundles reduce the risk of surgical site infections in patients undergoing colorectal surgery? A systematic review and cohort meta-analysis of 8, 515 patients", which also found a high concentration of nurses in the 30-40 age range, though with a slightly higher proportion of nurses aged 40+ and a lower percentage in the 20-30 age group.

In this study, almost two-thirds of nurses are female, with males comprising only more than a third. Marital status is evenly split, with half of nurses married and the other half unmarried. Regarding education, half of nurses hold a diploma from a health technical institute, followed by almost a quarter had a secondary nursing degree diploma, a nursing technical institute diploma were a fifth, and a bachelor's degree in nursing science more than one in twenty. These findings suggest a predominantly female workforce with a strong presence of nurses holding diplomas, indicating a need for further educational development. A similar study by **Koek, et al., (2017)** found that females represented seven in ten of the nursing workforces, with males at less than a third, and marital status was slightly more skewed towards married nurses with more than half.

In terms of education, **Koek's** study revealed that less than a fifth of nurses with a bachelor's degree compared to this study, with three-fifths also holding diplomas. Both studies highlight a trend of a predominantly female workforce with a strong emphasis on diploma-level education, though there is a noticeable shift towards higher educational qualifications, indicating an evolving trend in nursing education. This comparison suggests that while diplomas remain common, there is a global movement toward encouraging nurses to pursue higher degrees to meet the growing demands of modern healthcare.

In this study, more than two-fifths of nurses reported having less than 5 years of experience in surgical and operating room settings, while all nurses indicated they had not received previous training on surgical site infections (SSI) or SSI prevention guidelines. This suggests a relatively inexperienced workforce in terms of surgical practice, coupled with a lack of formal education on a critical aspect of patient safety—SSI prevention. This gap in training could potentially affect the nurses' ability to effectively implement the best practices for infection control in surgical settings which may increase patients' risk for SSI. Similar findings were reported in a study by **Weiser, et al., (2018),** in their thesis "Effectiveness of a multidisciplinary patient care bundle for reducing surgical-site infections", which found that more than two fifths of nurses in surgical units had less than 5 years of experience, and the majority reported insufficient or no formal training on SSI prevention. Weiser, et al., emphasized the importance of targeted education and training programs to improve nurses' knowledge and practices related to infection prevention. Both studies highlight a critical need for continued education and specialized training to enhance surgical care quality and reduce the risk of SSIs.

Part II: nurses' knowledge regarding surgical care bundle:

In this study, it was found that four-fifths of the nurses had an unsatisfactory total level of knowledge regarding surgical site infections (SSI) and the surgical care bundle for general surgery patients before undergoing educational program implementation. However, after the educational program, majority of the nurses demonstrated a satisfactory level of

knowledge on these topics, indicating a significant improvement in their understanding. This highlights the positive impact of targeted educational interventions on enhancing nurses' knowledge about infection control practices and evidence-based care protocols like the surgical care bundle. A similar study by **van der Slegt, et al., (2013)** in their thesis "Implementation of a bundle of care to reduce surgical site infections in patients undergoing vascular surgery" found that just over three quarters of nurses initially had limited knowledge about SSI prevention, but following an educational program, majority of them showed significant improvement in their understanding of SSI prevention strategies and care bundles. Both studies underline the importance of ongoing education and training to improve nurses' competence in managing surgical patients and preventing infections.

In contrast, a study by **Lavu, et al., (2012)** in their thesis "Perioperative surgical care bundle reduces pancreatic-duodenectomy wound infections" found inconsistent results. While three-quarters of nurses initially lacked knowledge on SSI prevention, only more than half showed significant improvement in their understanding after an educational intervention, indicating a lower effectiveness of the program. Furthermore, the study reported that some nurses still struggled to apply the surgical care bundle in practice, despite showing improvements in knowledge. These discrepancies may reflect differences in the educational content, duration of the training, or the specific needs of the healthcare settings, suggesting that while educational programs can be effective, their impact may vary based on context and execution. Both studies highlight the importance of tailored educational programs but also underscore the need for further research to determine the most effective methods for knowledge translation into practice.

Part III: nurses' practice regarding surgical care bundle for general surgery patients:

Regarding the studied nurses' total practice level regarding surgical care bundle. The present study illustrated that, majority of nurses had competent practice level in post program implementation compared to half of them has competent practice level in preprogram implementation. This result is consistent with **Park, et al., (2020),** in their thesis "Implementing a multidisciplinary care bundle to reduce colon surgical site infections", they found that more than four-fifths of their studied nurses had a competent total practice level post program implementation. This result didn't agree with **Yamada, et al., (2018)** who founded that, more than one thirds of nurses had satisfied level of total practice about surgical care bundle. The researcher clarified this point as, these results might be due to lack of presence of guidelines about surgical care bundle and lack of nurses' awareness about how to apply them.

Part IV: nurses' attitude regarding surgical care bundle for general surgery patients:

Regarding nurses' attitudes toward the surgical care bundle, the study demonstrated a significant improvement in positive attitudes post-program implementation, with the majority of nurses expressing positivity compared to only more than two-fifths pre-program. This finding is consistent with **Vicente-Sánchez, et al., (2022),** in their thesis "Effect of the implementation of a surgical care bundle in the incidence of surgical site infection in spine surgery: a quasi-experimental study", who reported that training programs significantly enhanced healthcare providers' attitudes toward evidence-based protocols by increasing their knowledge and confidence in application.

Conversely, it contrasts with the findings of **Zarain-Obrador, et al., (2021),** who observed minimal attitude changes despite training, attributing this to organizational resistance and lack of motivation among staff. The present study's positive outcomes may be explained by the structured and interactive nature of the program, which likely improved nurses' engagement and understanding. This emphasizes the need for well-designed programs that not only educate but also address potential resistance to change in clinical settings.

Part IV: correlation between nurses' level of knowledge practice and their level of attitude pre & post program intervention:

Regarding the study's findings on the correlations between the studied nurses' knowledge, practice, and attitude scores. Before the intervention, the significant positive correlation between knowledge and practice scores indicates that nurses with greater understanding were more likely to apply effective practices, consistent with studies such as **Ferraz, et al., (2019),** which highlighted the pivotal role of knowledge in shaping clinical behaviors. The positive correlation between attitudes and both knowledge and practice scores further supports the notion that a favorable mindset enhances learning and performance. After the intervention, these correlations became stronger, reflecting the success of the program in reinforcing the relationship between these variables. This is in line with findings by **Lutfiyya, et al., (2021)** in their thesis "A colorectal

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care bundle to reduce surgical site infections in colorectal surgeries: a single-center experience", who reported that training interventions significantly strengthened the synergy between knowledge, attitudes, and practices. The stronger post-intervention correlations suggest that addressing gaps in one area—such as knowledge—can have cascading benefits for attitudes and practices. These results underscore the importance of holistic training approaches that simultaneously target knowledge, attitudes, and practice to optimize clinical outcomes.

Part V: impact of an educational training program on SSI occurrence among general surgery patients:

Concerning the comparison of the Southampton Surgical Site Infection Grading System results between the control and study groups revealed significantly better outcomes for the study group, with more than two-thirds achieving normal healing with no surgical site infection (SSI), compared to only two-fifths in the control group. The highly significant difference highlights the effectiveness of the intervention applied in the study group. These findings are consistent with research by **Calderwood, et al., (2023),** which demonstrated that implementing structured surgical care protocols leads to improved wound healing and reduced SSI rates. In contrast, studies like **Nayak, et al., (2022)** reported less pronounced differences, potentially due to variations in adherence to guidelines or patient demographics. The present study underscores the importance of comprehensive and consistently applied interventions in achieving superior postoperative outcomes, as reflected in the significant improvement in the study group.

According to correlations between knowledge, practice, and attitude scores of the studied nurses and the Southampton Surgical Site Infection Grading System both before and after the intervention. Before the intervention, there was a highly significant negative correlation between knowledge and attitude scores and the grading system, indicating that higher knowledge and positive attitudes were associated with better surgical site infection (SSI) outcomes. Practice scores also exhibited a significant negative correlation, suggesting that improved practices contributed to better infection grading. These findings align with research by **Magat, & De Leon, (2023),** which highlighted the interconnected impact of knowledge, attitudes, and practices on clinical outcomes.

Additionally in post-intervention, the correlations strengthened, with knowledge scores maintaining a significant negative correlation with infection grading, and practice and attitude scores demonstrating a highly significant negative correlation. This aligns with studies like **Vicente-Sánchez, et al., (2022)** in their thesis "Effect of the implementation of a surgical care bundle in the incidence of surgical site infection in spine surgery: a quasi-experimental study", which reported enhanced correlations between educational interventions and clinical outcomes due to increased adherence to evidence-based practices. Stronger post-intervention correlations suggest that the program was effective in reinforcing the interplay between knowledge, attitudes, and practices, ultimately contributing to improved SSI outcomes. These findings emphasize the importance of integrated educational programs that address multiple aspects of nursing competency to enhance patient care quality.

5. RECOMMENDATION

Based on the findings of the current study, the following recommendations can be suggested:

1. Development of a training program should be conducted periodically with various teaching methods for nursing staff in surgical ward and OR to improve their knowledge and practice regarding surgical care bundle.
2. Guideline protocol should be organized and available for the nurses in the Arabic language to guide them in dealing with general surgery patients regarding prevention of surgical site infection.
3. Emphasizing the importance of implementing designed guidelines for nurses about caring for general surgery patients to reduce the occurrence of surgical site infection.
4. OR and surgical ward nurses to be included in workshops and regular conferences, locally, regionally and internationally, to be aware of updates in surgical care bundle.
5. Further studies should be conducted to replicate the study into a larger sample and multiple settings like specialized surgical wards and ORs including neurosurgery and orthopedic surgery for generalization of results.

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REFERENCES

[1] Abou-Taleb, H. A., Farghaly, R. M., Abdelhafez, A. M., Taha, N., Aref, A. F., Twaisy, A. O., & Abdel-Kawi, A. F, (2024). Effect of Bundled Interventions to Reduce Surgical Site Infection after Gynecologic Cancer Surgery: A Randomized Clinical Trial. The Egyptian Journal of Hospital Medicine (January 2024), 94, 899-905.

[2] Abu-Sheasha, G. A., Yassine, O. G., Anwar, M. M., & Bedwani, R. N. (2018): Cost of surgical site infection in Egyptian University Hospital: Informing a decision to implement an infection control program using simulation. Operations Research for Health Care, 18, 26-32.

[3] Ahmed Mohamed, S., Hussein Nasr, M., & Adel Ebada, R. (2024). Nurses Performance Regarding Bundle of Care for Prevention of Wound Site Infection. Egyptian Journal of Health Care, 15(4), 62-73

[4] Aiken, L. H., Sloane, D. M., & Griffiths, P. (2014). Patient safety, systematic quality improvement, and nurse staffing in hospitals. Medical Care, 52(10), 884–891.

[5] Albishi W, Albeshri MA, Mortada HH, Alzahrani K, Alharbi R, et al., (2019): Awareness and level of knowledge about surgical site infections and risks of wound infection among medical physicians in King Abdulaziz University Hospital: cross-sectional study. Interact J Med Res; Vol. 8(1): pp.12769. Available at: https://doi.org/10.2196/12769. Accessed 2022 July 22

[6] Bailey, I. S., Karran, S. E., Toyn, K., Brough, P., Ranaboldo, C., & Karran, S. J. (1992): Community surveillance of complications after hernia surgery. British Medical Journal, 304(6825), 469-471.

[7] Calderwood, M. S., Anderson, D. J., Bratzler, D. W., Dellinger, E. P., Garcia-Houchins, S., Maragakis, L. L., & Kaye, K. S. (2023). Strategies to prevent surgical site infections in acute-care hospitals: 2022 Update. Infection Control & Hospital Epidemiology, 44(5), 695-720

[8] Chisanga C, (2017): Knowledge, Attitudes and Practices of Nurses in Infection Prevention and Control Within a Tertiary Hospital in Zambia, Master Thesis, Faculty of Medicine and Health Sciences, Stellenbosch University. p.132.

[9] Dubois J, (2018): Canadian Association of Wound Care (CAWC). Best practice recommendations for the prevention and management of surgical wound complications. Canadian Association of Wound Care. Available at: https://www. woundscanada.ca/ health-care. Accessed 2022 July 22.

[10] Ferraz, Á. A. B., Vasconcelos, C. F. D. M., Santa-Cruz, F., Aquino, M. A. R., Buenos-Aires, V. G., & Siqueira, L. T. D. (2019). Surgical site infection in bariatric surgery: results of a care bundle. Revista do Colégio Brasileiro de Cirurgiões, 46, e2252.

[11] Getaneh, T., Negesse, A., & Dessie, G. (2020). Prevalence of surgical site infection and its associated factors after cesarean section in Ethiopia: systematic review and meta-analysis. BMC pregnancy and childbirth, 20, 1-11.

[12] Hassan, A. M. A., Belal, S., & Mohammed, E. M. A. (2021): Effect of Nursing Care Bundle on Patients Undergoing Prostatic Surgery Outcomes. Published Master Thesis, Faculty of Nursing, Suez Canal University.

[13] Johnson, L. M., Smith, K. J., & Roberts, A. P. (2019). The impact of educational programs on knowledge, attitude, and practice regarding surgical care bundles among operating room nurses. Journal of Clinical Nursing Practice, 28(5), 789–798.

[14] Koek, M. B., Hopmans, T. E., Soetens, L. C., Wille, J. C., Geerlings, S. E., Vos, M. C., & de Greeff, S. C. (2017). Adhering to a national surgical care bundle reduces the risk of surgical site infections. PLoS One, 12(9), e0184200.

[15] Kolade OA, Abubakar S, Adejumoke S, Funmilayo H.V, Tijani A, (2017): Knowledge, attitude and practice of surgical site infection prevention among post-operative nurses in a tertiary health institution in north-central Nigeria. International Journal of Nursing & Midwifery; Vol. 9(6), pp. 65-69.

International Journal of Novel Research in Healthcare and Nursing
Vol. 12, Issue 1, pp: (96-110), Month: January - April 2025, Available at: www.noveltyjournals.com

[16] Lavu, H., Klinge, M. J., Nowcid, L. J., Cohn, H. E., Grenda, D. R., Sauter, P. K., & Yeo, C. J. (2012). Perioperative surgical care bundle reduces pancreaticoduodenectomy wound infections. Journal of Surgical Research, 174(2), 215-221.

[17] Li, L., Zhou, J., Luo, L., Chen, X., & Li, Y. (2021). Application of the care bundle in perioperative nursing care of the type A aortic dissection. International Journal of General Medicine, 5949-5958.

[18] Lutfiyya, W., Parsons, D., & Breen, J. (2021). A colorectal care bundle to reduce surgical site infections in colorectal surgeries: a single-center experience. The Permanente Journal, 16(3), 10.

[19] Magat, E. L. R., & De Leon, J. M. (2023). Preventing surgical site infection using operating room bundle of care in patients undergoing elective exploratory laparotomy cholecystectomy surgery. Frontiers of Nursing, 10(3), 335-345.

[20] Maloney, S. R., Reinke, C. E., Nimeri, A. A., Ayuso, S. A., Christmas, A. B., Hetherington, T., & Ross, S. W. (2022). The obesity paradox in emergency general surgery patients. The American Surgeon, 88(5), 852-858.

[21] Maurya A & Mendhe S, (2014): Prevention of postoperative wound infection in accordance with evidence based practice. International Journal of Science and Research (IJSR); Vol.3 (7): pp.1173-1177.

[22] Mengesha A, (2018): knowledge and practice of nurses and associated factors regarding prevention of surgical site infection among those who are working in the surgical units of public hospitals in Addis Ababa city, Ethiopia, Published Master Thesis , College of health sciences, Addis Ababa University.pp.45-47.

[23] Mert Boga S, (2019): Nursing practices in the prevention of post operative wound infection in accordance with evidence-based approach, International Journal of Caring Sciences; Vol.12 (2):p.1229

[24] Mohammed Ali Hassan, A., Belal, S., & Mohammed Ahmed Mohammed, E. (2021). Effect of Nursing Care Bundle on Patients Undergoing Prostatic Surgery Outcomes. Egyptian Journal of Health Care, 12(3), 1157-1169

[25] Naeem I. S., Mohamed M. A., Mohamed H. A., & Mahmoud S. F. (2020): Nurses' Performance Regarding Care of Patients with Tracheostomy. Master Thesis, Faculty of Nursing, Ain Shams University.

[26] Nayak, P. S., Pai, G., Ranjith, K. B., & Gupta, S. (2022). Effectiveness of sterile glove and instrument change at the time of abdominal wound closure to prevent surgical site infection. Emergency, 103(60.2), 116.

[27] Park, C. M., Ha, T. S., Lee, W. Y., Chung, D. R., Park, Y. A., Choi, J. R., & Jeong, N. Y. (2020). Implementing a multidisciplinary care bundle to reduce colon surgical site infections. Annals of Surgical Treatment and Research, 99(5), 285-293.

[28] Phelan, L., Dilworth, M. P., Bhangu, A., Limbrick, J. W., King, S., Bowley, D. M., & Hardy, K. (2020). Evaluation of a bundle of care to reduce incisional surgical site infection after gastrointestinal surgery. Journal of infection prevention, 21(2), 52-59.

[29] Pop-Vicas, A., Zimbric, M., Schmitz, M., Hatas, G., & Safdar, N. (2024). Bundle Implementation to Prevent Surgical Site Infections-A Study of SRN Hospitals. Antimicrobial Stewardship & Healthcare Epidemiology, 4(S1), s143-s144.

[30] Seidelman, J. L., Mantyh, C. R., & Anderson, D. J. (2023). Surgical site infection prevention: a review. Jama, 329(3), 244-252.

[31] Sickder H K, Sae-Sia W & Petpichetchian W, (2014): Nurses' Knowledge and Practice Regarding Prevention of Surgical Site Infection in Bangladesh. The 2nd International Conference on Humanities and Social Sciences, Faculty of Liberal Arts, Prince of Songkla University Diseases – Palliative Care_005.

[32] Tanner, J., Padley, W., Assadian, O., Leaper, D., Kiernan, M., & Edmiston, C. (2015). Do surgical care bundles reduce the risk of surgical site infections in patients undergoing colorectal surgery? A systematic review and cohort meta-analysis of 8, 515 patients. Surgery, 158(1), 66-77.

[33] Van der Slegt, J., van der Laan, L., Veen, E. J., Hendriks, Y., Romme, J., & Kluytmans, J. (2013). Implementation of a bundle of care to reduce surgical site infections in patients undergoing vascular surgery. PloS one, 8(8), e71566.

International Journal of Novel Research in Healthcare and Nursing
Vol. 12, Issue 1, pp: (96-110), Month: January - April 2025, Available at: www.noveltyjournals.com

[34] Vicente-Sánchez, G., Alonso-García, M., Hijas-Gómez, A. I., González-Díaz, R., Martinez-Martín, J., Fahandezh-Saddi, H., & Rodríguez-Caravaca, G. (2022). Effect of the Implementation of a Surgical Care Bundle in the Incidence of Surgical Site Infection in Spine Surgery: A Quasi-Experimental Study. Spine, 47(8), 615-623.

[35] Weiser, M. R., Gonen, M., Usiak, S., Pottinger, T., Samedy, P., Patel, D., & Yeung, K. (2018). Effectiveness of a multidisciplinary patient care bundle for reducing surgical-site infections. Journal of British Surgery, 105(12), 1680-1687.

[36] World Health Organization (2019): Global guidelines for the prevention of surgical site infection. Available at: http:||apps.who.int.|iris|bitstream|handle|10665|250680. Accessed 2022 July 22

[37] Yamada, K., Abe, H., Higashikawa, A., Tonosu, J., Kuniya, T., Nakajima, K., & Okazaki, H. (2018). Evidence-based care bundles for preventing surgical site infections in spinal instrumentation surgery. Spine, 43(24), 1765-1773.

[38] Zarain-Obrador, L., Alonso-García, M., Gil-Yonte, P., Hijas-Gómez, A. I., Rodríguez-Villar, D., Martínez-Amores, B., & Durán-Poveda, M. (2021). Effect of a surgical care bundle on the incidence of surgical site infection in colorectal surgery: a quasi-experimental intervention. Revista de investigación clínica, 73(4), 251-258.