Effect of Nursing Guidelines Regarding Prevention of Surgical Site Infection on the Performance of Surgical Nurses.

Abstract

Background: Surgical Site Infections (SSIs) remain one of the most prevalent healthcare-associated infections, affecting millions of patients worldwide and leading to increased morbidity, mortality, prolonged hospital stays, and financial burdens on healthcare systems. The role of healthcare professionals, particularly nurses, in preventing surgical site infections is well established in clinical research, with various studies emphasizing the importance of knowledge, practice in reducing infection rates.

The aim of this study was to assess the effect of nursing guidelines regarding prevention of surgical site infection on the performance of surgical nurses.
Design: A quasi-experimental design was utilized.
Setting: The study was performed at the general surgery department, surgical operating theater and Outpatient clinics in El Sheikh Fadl emergency hospital at El minia governorate.
Sample: A non-randomized purposive sample of 50 nurses from both genders involved in this study from the above mentioned setting. **Tools:** data were collected by three tools: tool I, Nurses 'structured interview questionnaire, tool II, Nurses' attitudes Likert scale, and tool III, Nurses' practice observational checklist.
Results: There was a lack in nurses' knowledge, attitude, and practice about nursing guidelines for prevention of SSI in the pre-intervention phase with mean±SD of 20.9±3.4, 18.6±4.1, and 22.6±3.2 respectively, which increased in post intervention phase with mean±SD of 25.4±2.6, 24.7±3.1, and 25.5±1.7 respectively, also there was a statistically significant difference and improvement in total nurses' knowledge, attitude and practice post-intervention ($p<0.001$), with a percentage of improvement equal 21%, 32.7 and 12.8% respectively.
Conclusion: Nursing guidelines implementation had improved nurses' knowledge that in turn had shaped their positive attitude, which results in improving nurses' practice of nursing guidelines for prevention of surgical site infection, as each one connected with the other**. Recommendations:** Nursing guidelines for prevention of surgical site infection should be incorporated into comprehensive surgical nursing quality improvement programs to improve patient safety.

Key words:-
Nursing guidelines, surgical site infection prevention, surgical nurses' Performance.

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Introduction:-

Surgical Site Infections (SSIs) remain one of the most prevalent healthcare-associated infections, affecting millions of patients worldwide and leading to increased morbidity, mortality, prolonged hospital stays, and financial burdens on healthcare systems. The role of healthcare professionals, particularly nurses, in preventing SSIs is well established in clinical research, with various studies emphasizing the importance of knowledge, attitude, and practice (KAP) in reducing infection rates. This literature review explores existing research on nurses' knowledge and adherence to SSI prevention measures, the impact of educational interventions on infection control, and the effectiveness of structured training programs in enhancing compliance with evidence-based practices **(Lin, et al., (2023).**

Increasing treatment costs and healthcare facility workloads. Among surgical patients, surgical site infections (SSIs) are one of the most commonly reported nosocomial infections, accounting for 16% to 38% of all such infections. SSIs can debilitate patients and dramatically increase healthcare costs. They are a leading cause of readmission, may lead to complications such as delayed wound healing and revision surgery, and with longer hospital stays, can render patients susceptible to infections from the hospital environment. The CDC definitions for the surveillance of surgical site infections consider three classes of wound infections: superficial, deep incisional SSI, and organ/space SSI **(Smyth, et al., (2020).**

Infections that develop more than 48 hours after admission are classified as Surgical Site Infections or hospital-acquired or Nosocomial infections. They are the sixth leading cause of death in the USA, accounting for 150,000 deaths per year, with an incidence ranging from 5-10%. Nosocomial infections are a significant cause of preventable morbidity and mortality, prolonging hospital stays by an average of eight days and substantially increasing treatment costs and healthcare facility workloads **(Cohen, et al., 2023).**

Understanding the current level of nurses' knowledge and their compliance with SSI prevention infection prevention, including institutional policies, resource availability, and workload constraints, the role of education and training remains paramount. Continuous professional development through structured educational interventions has been shown to enhance nurses' competency, improve compliance with infection control measures, and ultimately reduce SSI incidence **(Närhi-Ratkovskaja, (2023).**

Educational interventions have been recognized as effective strategies for addressing gaps in nurses' knowledge and improving infection prevention practices. Evidence suggests that well-designed training programs, incorporating theoretical instruction, hands-on simulation exercises, and real-world case studies, can enhance nurses' competency and confidence in SSI prevention. Moreover, continuous education through workshops, refresher courses, and institutional audits ensures sustained adherence to infection control protocols. However, the effectiveness of such educational interventions in different healthcare settings, particularly in diverse clinical environments with varying resource constraints, remains an area requiring further exploration (**Soleimani, et al., (2023).**

The prevention of SSIs is a critical component of patient safety and quality healthcare delivery, with nurses playing a pivotal role in implementing infection control measures before, during, and after surgical procedures. Given their frontline position in patient care, nurses' knowledge, attitudes, and practices (KAP) regarding SSI prevention are essential in minimizing infection risks and ensuring optimal postoperative outcomes. However, despite established guidelines and protocols, studies have shown that gaps in knowledge and inconsistent adherence to best practices persist, leading to preventable infections and complications (**Manan, et al., (2024).**

Nurses play a critical role in ensuring proper infection control before, during, and after surgery. Their knowledge and adherence to SSI prevention guidelines significantly impact patient outcomes, yet research indicates that gaps in knowledge and inconsistencies in practice persist across different healthcare settings. Nurse role in preventing SSIs is comprehensive and spans the continuum of care. Nurse plays a crucial part in executing or promoting implementation of evidence-based practices. For example, provide counseling and education during the initial preoperative visit, especially related to smoking cessation and glucose control in patients with diabetes. Encourage patients to report new rashes, breaks in skin integrity, and new-onset respiratory infections before surgery (**Chao, et al., (2025).**

Burden of the study:

A surgical site infection (SSI) is part of a group of iatrogenic infections known either as healthcare-associated infections (HCAI) or nosocomial infections. HCAI affect 7% of patients in developed countries and 10% in the developing world. They increase patient length of stay and morbidity, while increasing the use of antibiotics contributing to antimicrobial resistance. SSIs are the second most common HCAI, after catheter related infections **(Amer& Sultan 2025)**

In Egypt, a little nursing research has been done to assess the level of nurses' knowledge, attitude and practice regarding surgical site infection prevention guidelines and investigating the correlation among them, as well as, identifying the barriers facing the nurses to comply with guidelines of SSI. All over the world, the use of SSI

prevention guidelines is supported by scientific research. However, **In El Minia Governorate in Egypt,** the extent to which nurses implement these guidelines in surgical departments is still unclear. Therefore, there is a standing need to provide all **Minia** hospitals with written guidelines for nurses, patients and other health care employees to gain knowledge and practice regarding surgical site infection prevention (SSIs). Moreover, it might generate attention and motivation for further researches into this area.

SIGNIFICANCE OF STUDY:

Surgical Site Infections (SSIs) remain a significant challenge in healthcare settings, contributing to increased morbidity, prolonged hospital stays, and higher treatment costs. Nurses play a critical role in preventing SSIs through adherence to infection control measures, yet gaps in knowledge, attitudes, and practices (KAP) continue to hinder effective prevention strategies. Educational interventions have been recognized as essential tools for enhancing nurses' competencies in SSI prevention, improving adherence to best practices, and reducing infection rates. However, the effectiveness of such programs in improving nurses' KAP (knowledge, attitudes, and practices) requires further investigation to optimize infection control efforts **(Aziz, et al., (2025).**

AIM OF THE STUDY:

This study was aimed to assess the effect of nursing guidelines regarding prevention of surgical site infection on the performance of surgical nurses through the following objectives:-

a) Assess nurses' knowledge, attitude and practice of nursing guidelines regarding prevention of surgical site infection.
b) Design nursing guidelines regarding prevention of surgical site infection based on previously explored nurses' actual needs regarding prevention of surgical site infection.
c) Implement nursing guidelines regarding prevention of surgical site infection based on previously explored nurses' actual needs regarding prevention of surgical site infection.
d) Evaluate the effect of implemented nursing guidelines regarding prevention of surgical site infection on the surgical nurses' knowledge, attitude and practice of surgical site infection prevention**.**
e) Determine the statistical relation between nurses' knowledge, attitude and their practice of nursing guidelines regarding prevention of surgical site infection.

Research Hypothesis: The study was based on the following research hypothesis:

At the end of the study, the nurses whom will receive the nursing guidelines will have a high mean score of knowledge, attitude and practice regarding prevention of surgical site infection.

SUBJECTS AND METHODS:

I- Technical item:-

The technical item included Research design, setting, subjects and tools for data collection.

Research design:

Aquasi- experimental research design was utilized in this study.

Setting:

The study was performed at the general surgery department, surgical operating theater and Outpatient clinics in El Sheikh Fadl emergency hospital at El minia governorate.

Subjects:

A non-randomized purposive sample of 50 nurses from both genders involved in this study from the above mentioned setting on the following criteria

- **Inclusion Criteria: -** Nursesincluded from both genders who is working at the general surgery department, surgical operating theater and Outpatient clinics.
- **Exclusion Criteria**: Head Nurses and student nurses.

Tools for data collection:

Data for this study will be collected by using the following tools:

1st tool: Nurses' Structured Interview Questionnaire: This tool was adapted from**Moghazy et al., 2021) ;Mengesha et al., 2020) ;Mohsen et al., 2020) and Sickder et al., (2014)**and modified by the researchers based on SSI prevention guidelines of **WHO,(2019)** and an extensive review of pertinent literature **(MertBoga, 2019; Dubois et al., 2018)** To assess nurses' knowledge about surgical site infection and SSI preventive nursing guidelines, it included two parts:

Part 1: Demographic Data: This part contained information related to demographic characteristics of the studied nurses' regarding gender, age, marital status, level of education, years of experience in nursing field, and any previous attendance of training courses about SSI prevention

Part 2: Nurses' Knowledge of surgical site infection and nursing guidelines regarding prevention of SSI: It included 30 multiple-choice questions cover the SSI definition, signs, and symptoms, risk factors, diagnosis, laboratory investigation, proper preoperative shaving, appropriate preoperative skin disinfection and preparation, prophylactic antibiotic use (appropriate selection, the timing of the first dose, and discontinuation postoperatively), appropriate preoperative showering, the disinfectant agents, assessment and maintenance nutritional status, controlling of underlying medical conditions of surgical patients, hand washing, aseptic precautions of incision site care, the principles of wound assessment, wound dressing and wound dressing solution, etc..

Scoring System: each correct answer was given a score of one and the incorrect answer a score of zero.The total knowledge score = 30, knowledge was considered satisfactory if the percent score was ≥80% and unsatisfactory if <80% based on data entering and statistical analysis.

2nd tool: Nurses' attitudes Likert scale:

This tool was designed by the researchers after reviewing the related literatures **(Chisanga, 2017; Kolade et al., 2017)**; to assess nurses' attitudes toward SSI preventive nursing guidelines; It composed of ten statements that were positively worded.

Attitude scoring system: in which responses was answered in a 4- point Likert scale ranging from "strongly agrees to- strongly disagree", as the choice of strongly agree was given "three points", agree was given "two points", and disagree was given "one point", while strongly disagree was given "zero". The total attitude score = 30, the attitude was considered "positive" if the percent score was ≥80% and "negative" if <80% based on data entering and statistical analysis.

3rd tool:Nurses' practice observational checklist:-

This tool was used to assess the nurses' practice of SSI preventive nursing guidelines; it was adapted from**Moghazy et al., 2021); Mohsen et al., 2020) ; Getaneh et al., 2019) and Sickder et al., 2017)**, it was modified by the researchers based on Evidence-based clinical practice guidelines (CPG), and standards specific to prevention of SSIs that have been published and updated by World Health Organization **(WHO, 2019)**, and after reviewing of the related literature **(Albishi et al., 2019); Mengesha, (2018)**. It consisted of "30" steps that covered nurses' application for preoperative and postoperative measures of SSI prevention such as hand hygiene, preparation of the patient (pre- operative showering and appropriate hair removal at the surgical site), appropriately and timely administration of antibiotics, pre and post- operative glycemic control, nutritional status assessment, nutritional support, and postoperative incisional care (using aseptic technique, wound care).

Practice scoring system: each practice item observed to be done was scored "1" and the not-done "zero". The total knowledge score = 30, the practice was considered satisfactory if the percent score was ≥80% and unsatisfactory if <80% based on data entering and statistical analysis. This high cutoff-point was set due to the critical situation the nurse is dealing with, which necessitates a very high level of knowledge and practice.

II- Operational item:

The operational design includes preparatory phase, content validity and reliability, pilot study and field work.

A- Preparatory phase:

It was included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection. During this phase the researcher also visited the selected place to get acquainted with the personal and the study settings. The development of the tools was supervision guidance and experts' opinions were considered.

Validity*:*

Content validity refers to the degree to which an assessment instrument is relevant to, and representative of the targeted construct it is designed to measure **(Yusoff, 2019)**. Face validity is a subjective decision based on the researcher's feelings, thoughts, and intuition about the functioning of the measuring instrument. It is the simplest and least precise method of determining validity which relies entirely on the expertise and familiarity of the assessor concerning the subject matter **(Sürücü&Maslakçi, 2020)**.

Validity of the tools was done namely face validity and content validity. Tool was translated into Arabic and tested by a group of five experts specialized in Adult Health Nursing Department, from Helwan University 5 assistant professors through an opinionative sheet to measure validity of the tools and the necessary modifications were done accordingly Regarding face validity was conducted based on five expert's opinions which were regarding the tools layout, format and clarity of parts. Regarding content validity was done to determine the appropriateness of each item to be included in the questionnaire sheet. Necessary modifications were done based on five expert recommendations.

Reliability of the tools:

Testing reliability:

Reliability: is the consistency of the measuring instrument. It is a degree to which the used tools measure what were supposed to be measured with the same way each time & under the same condition with the same subjects.

Reliability for the utilized tools was tested to determine the extent to which the items of the tools were inter-correlated to each other. The Cronbach's alpha model is one of the most popular reliability statistics in use today and considered as a model of internal consistency that used to estimate of reliability of test scores. Internal consistency reliability of all items of the tools was assessed using a Chronbach's Alpha test; it was (0.80) for Nurses' Structured Interview Questionnaire, (0.70) for Nurses' practice observational checklist and (0.89) for Nurses' attitudes Likert scale.

B- Pilot study:

The pilot study was done on 10% of the sample to examine the clarity of questions and time needed to complete the study tools. Based on the results of the pilot study, necessary modifications were done according prior to data collection. Subjects included in the pilot study were excluded from the study and replaced by other patients.

C- Field Work:

- The data of the current study had collected from the middle of June 2024 to the middle of November 2024. The implementation of nursing guidelines had done over six months, as one month for the preparatory phase, one month for the theoretical part, and three months for the practical part, then collecting the post-protocol data that took one month.
- Through the preparatory phase, the researchers secured all necessary permissions from the Director of El Sheikh Fadl emergency hospital at El minia governorate. The researchers visited the study settings, met with the directors, explained to them the aim of the study as well as the process of data collection to maintain their cooperation during data collection and to set its schedule so that it does not interfere with nurses' work.
- The researchers then met with the nurses individually, explained to them the aim of the study and the process of collection of the data, and invited them to participate after being informed about their rights.

According to theoretical framework:-

The study conducted through the following phases:

Educational program phase:-

- **Preparatory phase:- Clarification of needs**

➢ The level of nurses' knowledge, attitude and practice assessed first using the tools (I, II, II) of data collection to obtain base line data. The educational guidelines developed by the researcher based on the primary assessment of nurse's knowledge, attitude and practice using the available recent resources and review of relevant literatures. Then, the filled forms were collected and revised for completeness. This took 20-30 minutes from each nurse.

- **The planning phase: - knowledge creation**

➢ Once the assessment phase was completed, the identified needs were translated to objectives; then the nursing guidelines was designed by the researchers according to previously assessed nurses' needs obtained from the assessment phase, objectives, and educational background of nurses. It was designed for improving and updating nurses' knowledge, attitude and practice regarding surgical site infection preventive nursing guidelines. It was designed as a booklet in a simple Arabic Language according to last published and updated guidelines specific to the prevention of SSIs that published by the World health organization (WHO, 2019) and other organization from the United Kingdom like National Insurance for Health and Care Excellence (NICE, 2019), the United States by Control of Disease Center (CDC, 2017), and Australia (Australian Wound Association, 2016), also based on experts' opinions and reviews of relevant literature (nursing textbooks, journals, and internet resources) about SSI preventive measures, then each participant nurse obtained a copy of it.

- **Action cycle: - implement the educational guidelines**

➢ The researcher scheduled with nurses the teaching sessions for both theoretical and practical parts of the nursing guidelines regardingSSI prevention. The nurses had divided into ten small groups; each group contained five nurses because it was difficult to gather all the nurses at one time. The researchers were available three days per week during the morning and afternoon shifts. the nursing guidelines regarding SSI prevention was conducted by researchers through "11" educational sessions (6 sessions for the theoretical part, and 5 for the practical part) as the following:

A. **The theoretical part:** covered three sections, the first section included A brief about surgical operations as types of surgical operations, General measures for surgical operations (as preparing for the day of surgery, a general measures at and after surgery day), and Postoperative complications. The second section included SSI (as Definition, Causes, Sources, Risk factors, Signs & symptoms, Types, Mode of transmission, Diagnosis, and Management of SSI). The third section included SSI Preventive measures (Pre-, Intra-, and Post-operative measures); each session had taken about 20-30 minutes.
B. **The practical part:** covered the nursing guidelines regarding SSI prevention as Hand washing procedure (Routine, Medical, and Surgical hand washing), Pre-operative showering technique, Appropriate hair removal technique at the surgical site, Donning and Doffing personal protective equipment procedure (Face shield, Goggles, Mask, Gown, and Gloves), Incisional care procedure, Medical, and Surgical instruments Cleaning, Disinfection, and Sterilization procedures, and Waste disposal; also, Glycemic control procedures as blood glucose monitoring and insulin injection procedure as a part of SSI preventive measures of surgical patients. Each session gets even 45 minutes and usually started with a summary of what has been taught during the preceding sessions and the objectives of the new one. Giving praise and/or recognition to the interested nurses was used for motivation during implementation of nursing guidelines.

➢ the nursing guidelines regarding SSI prevention was implemented through a presentation, group discussion, role play, demonstration, and re-demonstration of different previously practical aspect, various teaching aids were citified including a booklet, posters, colored handout, audiovisual materials, and real equipment such as face shield, goggles, mask, gown, gloves, overhead, overshoes, and real surgical instruments were used.

- **Evaluation phase:**

- To evaluate the effect of nursing guidelines on nurses' performance regarding prevention of SSI, the studied nurses' knowledge, attitude, and practice was evaluated before and after complete implementation of nursing guidelines; a post-test was done by using the same pretest self-administered questionnaire and an observational checklist **(Tool I, II, and Tool III)**. The effectiveness of nursing guidelines regarding prevention of surgical site infection was based on the finding of differences or no between the pre-intervention stage and post-intervention stage.

III- Administrative Item:

Approval to carry out this study was obtained from the dean of the Faculty of Nursing - Helwan University and from the directors of the El Sheikh Fadl emergency hospital at El minia governorate in which the study was being conducted.

Ethical Considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee in faculty of Nursing at Helwan University before starting the study. Participation in the study is voluntary and subjects were given complete full information about the study and their role before signing the informed consent. The ethical considerations was included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other party without taking permission of participants.

Ethics, values, culture and beliefs were respected

IV-Statistical Item:

The collected data were organized, categorized, tabulated, and statistically analyzed using the statistical package for social science (SPSS) version (20) to assess patients' level of knowledge, and practice. Data were presented in tables and graphs. The statistical analysis included; percentage (%), the arithmetic mean ($\overline{X}$), standard deviation (SD), and chi-square (X2&P-value).

- Statistical significance was considered at: Highly significant result when P-value < 0.001. Significant result when P-value < 0.05. Non- significant when P-value > 0.05.
- Standard deviation (SD) & arithmetic mean (X) for quantitative data: age, years of experience.
- Test of association: Chi-square test to compare two or more groups.

RESULTS:

Table (1): reveals that more than half of studied nurses 52% were between 30-40 years old, and more than two third of them 74% were married, 42% of them had Job experience years in the nursing field and more than half of them 54% had job experience at general surgery department >10 years, 1-5 years respectively. Moreover, about two-thirds of the studied nurses 60% hadn't attended previous training courses about SSI prevention, and 64 % of them have reported the presence of guidelines for SSI prevention in their ward.

Figure (1): illustrates that, more than two third of the studied nurses 74% were female and less than one third of them 26% were male.

Figure (2): reveals that, most of studied nurses 66% had unsatisfactory level of knowledge about surgical site infection and nursing guidelines for prevention of surgical site infection in the pre-intervention phase, while 80% of them had satisfactorylevel of knowledge in the post-intervention phase. Generally, there was a statistically significant difference and improvement in total nurses' knowledge post-application of nursing guidelines as compared to pre-application of nursing guidelines.

Figure (3): shows that only less than quarter of studied nurses 20% in a pre-intervention phase of the guidelines had a positive attitude regarding nursing guidelines for prevention of SSI, and more than three quarter of

them 80% had a negative attitude, while in the post-intervention phase of the guidelines, three quarter of studied nurses 76% had a positive attitude, and more than a quarter of them 24% had a negative attitude. Generally, there was a highly statistically significant difference and improvement in nurses' positive attitude post- application of the guidelines as compared to pre- application of it.

Figure (4): clarifies that, more than half of the studied nurses (52%) had an incompetent practice level of nursing guidelines for prevention of SSI in the pre-intervention phase of the guidelines, while the majority of them (92%) had competent practice level post-intervention phase of the guidelines, In addition to a highly statistically significant difference and improvement in nurses' practices of nursing guidelines for prevention of SSI post-intervention as compared to pre-intervention of it.

Table (2): illustrates that, there was a statistically significant positive correlation at the pre-intervention phase of nurses' knowledge score of nursing guidelines for prevention of SSI with nurses' attitude score (p=0.00) and nurses' practice score(p=0.00) . On the same line at the post-intervention phase; there was a statistically significant positive correlation of nurses' knowledge score of nursing guidelines for prevention of SSI with nurses' practice (p=0.00), and nurses' attitude score (p=0.00). Also, there was a statistically significant positive correlation between nurses' practice scores with nurses' attitude scores (p=0.00).

Table (1): Frequency and percentage distribution of the studied nurses according to their demographic data (n=50):-

Demographic data	No.	%
Age:		
20-30	19	38.0
31-40	26	**52.0**
41-50	5	10.0
Age mean ± SD = 32.51 ± 6.6		
Marital status:		
Single	6	12.0
Married	37	**74.0**
Divorced	7	14.0
Job experience years in the nursing field:		
<1	1	2.0
1-5	10	20.0
6-10	18	36.0
>10	21	**42.0**
Job experience years at general surgery department:		
<1	10	20.0
1-5	27	**54.0**
6-10	13	26.0
Attending previous training courses about SSI prevention:		
Yes	20	40.0
No	30	**60.0**
Presence of SSI prevention guidelines in the ward:		
Yes	32	**64.0**
No	18	36.0

Figure (1): Percentage distribution of the studied nurses regarding theirgender (n=50).

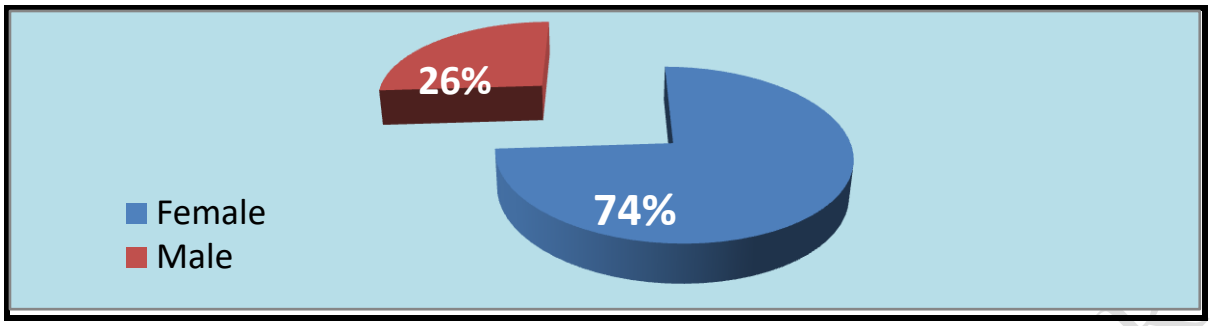

Figure (2): Comparison betweenpre and post application of nursing guidelines regarding total level of knowledge about surgical site infection and prevention of surgical site infection (SSI) (n=50):

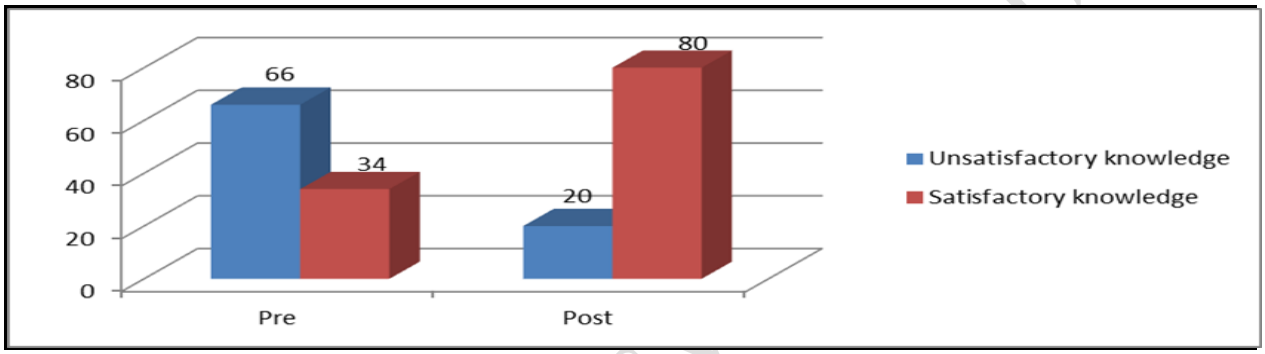

Figure (3): Comparison betweenpre and postapplication of nursing guidelines regarding total level of attitude about surgical site infection and prevention of surgical site infection(SSI) (n=50):

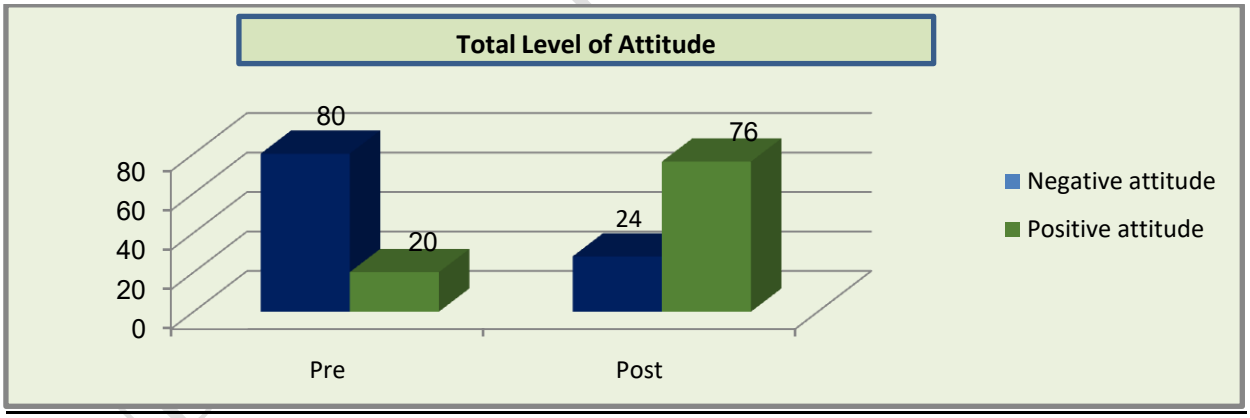

Figure (4): Comparison betweenpre and postapplication of nursing guidelines regarding total level of practice about prevention of surgical site infection (SSI) (n=50):

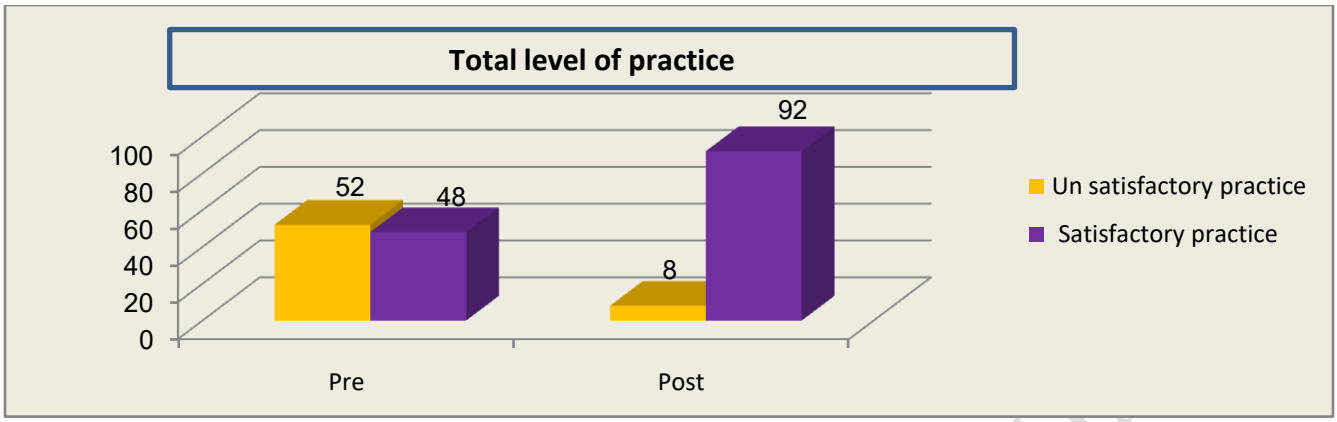

Table (2): Correlation between knowledge, practice and attitude score pre and post nurses guidelines (n=50):

Parameters	Pre- Intervention Phase			
	Knowledge score		Practice score	
	(r)	P	(r)	P
Practice score	0.38	0.00*	1	-
Attitude score	0.50	0.00*	0.05	0.72
	Post- Intervention Phase			
Practice score	0.37	0.00*		
Attitude score	0.86	0.00*	0.35	0.00*

Discussion:

Surgical Site Infections (SSIs) continue to pose a significant challenge in modern healthcare systems, contributing to increased patient morbidity, prolonged hospital stays, higher healthcare costs, and, in severe cases, mortality. SSIs account for a substantial percentage of healthcare-associated infections (HAIs) worldwide, despite advancements in surgical techniques, sterilization methods, and infection control protocols **(Manan et al., 2024).**

The prevention of surgical site infections (SSIs) and the promotion of optimal patient recovery are two of the most important responsibilities of perioperative nurses. Perioperative nurses play an important role in reducing the risk of infections and their complications by implementing evidence-based practices. These practices include adhering strictly to aseptic techniques, practicing proper surgical hand hygiene, performing antibiotic prophylaxis promptly, and effectively managing wound care **(Chellam Singh, and Arulappan, 2023).**

Nurses play a critical role in ensuring proper infection control before, during, and after surgery. Their knowledge and adherence to SSI prevention guidelines significantly impact patient outcomes, yet research indicates that gaps in knowledge and inconsistencies in practice **(Chao et al., 2025).**

Therefore**,** the present study aims to assess the effect of nursing guidelines regarding prevention of surgical site infection on the performance of surgical nurses

Regarding demographic characteristics of the studied subjectsthe present study showed that, more than half of studied nurses 52% were between 30-40 years old with mean age Mean ±SD: 32.51 ± 6.6. Based on the investigator's point of view, these findings could be due to that young age nurses works at inpatients units and operating rooms while older age women work at administrative positions. Also, may be due to increased age of the current study participant could be a risk factor for poor adherence to infection control intervention and precaution due to decreased knowledge about the appropriate practice.

The current study supported by **Mohamed, et al., (2024)** which research about"Nurses Performance Regarding Bundle of Care for Prevention of Wound Site Infection" who found that, more than two fifth of nurses aged between 30<40 years. These results were in the same line with **Said et al., (2023)** who studied "Effect of Pediatric Orthopedic Bundle guideline on Nurses' Performance Regarding Surgical Site Infections" and revealed that nearly three fifth of nurses aged from 30<40 years old with mean age Mean ±SD: 32 ± 2.3 and most of them were female. **Also**, **Mhana, et al., (2022)**which about " Nurses' performance regarding Infection Control Precautions in Primary Health Care Centers " found that that around one half of the studied nurses aged between 30 - 40 years. **Also,Talib, et al., (2025)**which about "Prevalence and Risk Factors of Surgical Site Infections in Tertiary Care Hospital of Lahore"found that, the majority falling in the 31-40 age groups.

On the other side **Moghazy, et al., (2021)** which about "Effect of Evidence-Based Measures protocol on Nurses' Performance regarding Prevention of Surgical Site Infection" revealed that, more than two-thirds of studied nurses were ≤ 30 years old. **AlsoAhmed, et al., (2025)** which about " Effect of Evidence-Based Care Bundle on Healthcare Providers' Practices and The Prevalence of Surgical Site Infections among Cardiac Surgery Patients " found that, more than half of the patients were over 40 years old.

Regarding marital status,the present study showed that more than two third of them 74% were marriedthe result comes because most of these age groups are the age of marriage, especially after the completion education and appointment in the nursing field. This result was in agreement with **Sham, et al., (2021)** which about "Nurses' Knowledge and Practice towards Prevention of Surgical Site Infection"found that Most of the nurses were female (84%) and married (83.7%). Also, this finding similar to the finding of **El-Sayed, et al., (2021)** which about "The effect of nursing care standards on staff nursing performance" reported that about half of the staff nurses were married (52.3%).

On the same line with**Amer& Sultan, (2025):**which entitled"Peri-Operative Nurses' Knowledge and Practice on Surgical Site Infection Prevention and Adherence to WHO Guidelines in Surgical Units at GISC" showed that two thirds of them (61.3%) were married. These findings were consistent with **Aziz, et al., (2025)** which a bout " **ASSESSING NURSES'KNOWLEDGE, ATTITUDES, AND PRACTICES ON SURGICAL SITE INFECTIONS: EVALUATING THE IMPACT OF AN EDUCATIONAL INTERVENTION PROGRAM** "found that 35% of the studied nurses were between the age of 31-40 years old and the majority of them were female.

Regarding to the Job experience yearsthe present study illustrated that, 42% of the studied nurses had Job experience years in the nursing field >10 years and more than half of them 54% had job experience at general surgery department 1-5 years. These findings agreed with**Moghazy, et al., (2021)** which reported that the majority of the studied nurses were married and had job experience > 5 years in the surgical department.On the same line **Nazir, et al., (2022)** which entitled" Effect of Educational Guidelines on Nurses' Knowledge and Practice Regarding Cesarean Section Site Infection in Tertiary Care Hospital Lahore " showed that More than half of the nurses (55.6%) had working experience between 1-5 years. This result was in agreement with **Abdelmoaty, et al., (2025)** which about "Nurses' Performance Regarding Prevention of Surgical Site Infection for Patients after Neurosurgery" revealed that; the distribution of nursing experience years indicates that 45% of the participants had more than 10 years of experience,

RegardingAttending previous training courses about SSI prevention and guidelines,the present study illustrated that, about two-thirds of the studied nurses 60% hadn't attended previous training courses about SSI prevention, and 64 % of them have reported the presence of guidelines for SSI prevention in their ward.Similar to previous results,**Moghazy, et al., (2021)** showed that about two-thirds of the studied nurses hadn't attended previous

training courses about SSI prevention and more than three-quarters of them were reported presence of guideline for SSI prevention in their ward.Also, **Aziz, et al., (2025)** indicated that a considerable number of nurses had not received prior formal training on SSI prevention.

Regarding to gender, all studied nurses included in this research were female. This can be interpreted that old perception that nursing profession is caring job that more suitable for females more than males, the higher proportion of the nurses in Egypt were females and may also be related to the nursing study in the Egyptian Universities was limited for females only till fifteen years ago. This finding is supported with**Abdelmoaty, et al., (2025)** which revealed that the majority of participants were female (82%), In terms of marital status, 71% of the nurses were married. **Also, Horgan, et al., (2023)** who studied "Healthcare professionals' knowledge and attitudes towards surgical site infection and surveillance" stated that more than two thirds of their studied nurses were female.

Similar to previous results**Mengesha, et al., (2020)** which about" Practice of and associated factors regarding prevention of surgical site infection among nurses working in the surgical units of public hospitals in Addis Ababa city, Ethiopia" found that, (60.4%) of them were females. The mean age score was 31.16 and the median was 30 years. Among the study participants, (54%) were married. Regarding work experience, 45.5% of the participants had more than 5 years of total work experience in health care settings, (54.8%) claim they have taken training regarding infection control methods. Also these findings were in consistent with **Rezian, et al., (2024)** in their study "Effect of An Educational Program on Improving Nurses Performance Regarding Infection Prevention and Control in Chest Disease Wards" revealed that more than three thirds (75.7%) of them were females & married.

On the contrary,Ahmed, et al., (2025) which about " Effect of Evidence-Based Care Bundle on Healthcare Providers' Practices and The Prevalence of Surgical Site Infections among Cardiac Surgery Patients " found that that more than half of the patients were male. Also t**his result was dissimilar to Amina et al., (2023) which about** " who showed that,half of studied sample were males (n=92; 51.1%) as compared with female (n=88; 48.9%).

In relation tothe nurses' total knowledge regarding surgical site infection and prevention of surgical site infection (SSI), the present study revealed that, most of studied nurses 66% had unsatisfactory level of knowledge about surgical site infection and nursing guidelines for prevention of surgical site infection in the pre-intervention phase, while 80% of them had satisfactory level of knowledge in the post-intervention phase. Generally, there was a statistically significant difference and improvement in total nurses' knowledge post- application of nursing guidelines as compared to pre- application of nursing guidelines.

From the researcher point of view, this result might be due to the positive effect of the training on nursing guidelines using suitable teaching methods. For example, the visual sense is responsible for 90% of brain stimulation and that vision and visual memory take up to two-thirds of the brain, which means that posters help in retaining information and remember the staff with any missing practical points .while during & post the program each nurse kept the illustrated colored booklet the provided by the researcher to act as a reference to them. This finding is on the same line with **Khalid, et al., (2023)** who inferred that the nurses in the study exhibited a commendable level of knowledge concerning preventing surgical site infection. These results indicate the effectiveness of the training and interventions implemented in our study and could serve as a model for improving patient outcomes in healthcare settings worldwide.

Regarding the distribution of nurses‘ total attitude about nursing guidelines for prevention of SSI, the current study reported that only less than quarter of studied nurses 20% in a pre-intervention phase of the guidelines had a positive attitude regarding nursing guidelines for prevention of SSI, and more than three quarter of them 80% had a negative attitude, while in the post-intervention phase of the guidelines, three quarter of studied nurses 76% had a positive attitude, and more than a quarter of them 24% had a negative attitude. Generally, there was a highly statistically significant difference and improvement in nurses' positive attitude post- application of the guidelines as compared to pre- application of it. From the researcher estimation, this result might be due to improve the attitude of nursing staff with patients that going to surgery). Also, might be as resulted of nursing staff's understood of the training program that affects positively on their attitudes. This result is consistent with, **Afsar, et al., (2024)** who

found that, moderate adherence to Surgical Site Infection (SSI) prevention guidelines among nurses, despite significant barriers like limitations, inadequate training, and staffing issues.

Relating to the distribution of nurses‘ total practice about nursing guidelines for prevention of SSI, the current study reported that more than half of the studied nurses (52%) had an incompetent practice level of nursing guidelines for prevention of SSI in the pre-intervention phase of the guidelines, while the majority of them (92%) had competent practice level post-intervention phase of the guidelines, In addition to a highly statistically significant difference and improvement in nurses' practices of nursing guidelines for prevention of SSI post-intervention as compared to pre-intervention of it. From the researcher point of view, this result (might be due to nursing staff had bad and poor practices before application of nursing guidelines for prevention of SSI.

This result was congruous with **Rezian, et al., (2024)** who found that, there was a significant difference between nurses' overall performance of infection prevention and control before and after the educational program. On the other side**, Mohsen, et al., (2020)** found that,Nurses working in the surgical related wards reported a low level of knowledge, practice and compliance regarding the prevention of surgical site infection guidelines.

Regarding the correlation between nurses‘ total knowledge, practice, and attitude scorespre and post nurses guidelines, the present study shows that, there was a statistically significant positive correlation at the pre-intervention phase of nurses' knowledge score of nursing guidelines for prevention of SSI with nurses' attitude score ($p=0.00$) and nurses' practice score($p=0.00$) . On the same line at the post-intervention phase; there was a statistically significant positive correlation of nurses' knowledge score of nursing guidelines for prevention of SSI with nurses' practice ($p=0.00$), and nurses' attitude score ($p=0.00$). Also, there was a statistically significant positive correlation between nurses' practice scores with nurses' attitude scores ($p=0.00$).

From the researcher point of view,this may be attributed to that knowledge is important in shaping the right attitude and the right attitude will result in improving SSI prevention practices, as each one associated with the other. This result was in the same line with **Amer& Sultan (2025)** indicated that there were highly significant between studied nurses’ knowledge and their practice with p- value (<0.001). This finding is in the same line with **Ibraheem et al., (2025)** which about"Assessment for Nurses’ Practices Regarding Pre and Postoperative Care for Patients with Total Knee Arthroplasty"who stated that there were highly significant between studied nurses’ knowledge and their practice regarding surgical site infection bundle of care.

On the same line,**Moghazy, et al., (2021)** who found that, at the post-intervention phase of protocol; there was a statistically significant positive correlation between nurses' knowledge score about evidence-based preventive measures of SSI with nurses' practice, and nurses' attitude score. Also, there was a statistically significant positive correlation of nurses' practice with their attitude toward evidence-based preventive measures of SSI. Also, these findings are further supported by **(Abdelgilil et al., 2020)** conducted research entitled "nurses performance regarding the care of patients undergoing laparoscopic cholecystectomy" who found that there was a positive correlation between knowledge scores and practice scores.

The current results were in agreement with **Mengesha et al., (2020)** which about "Practice of and associated factors regarding prevention of surgical site infection among nurses working in the surgical units of public hospitals in Addis Ababa city**"** who demonstrated that insufficient knowledge, inadequate resources to implement surgical safety checklists, insufficient performance monitoring systems, lack of surgical site infection assessment and preventive measure feedback systems, lack of training, and insufficient orientation programs during unit rotation were identified as factors affecting the nurse’s practice regarding prevention of SSIs. On the other hand, **Rezian, et al., (2024)** found that,there was a negative association between nurses' knowledge and performance on infection prevention and control assessments.

CONCLUSION:

Nursing guidelines implementation had improving nurses' knowledge about surgical site infection and prevention of SSI, that in turn had shaped their positive attitude, which results in improving nurses' practice of nursing guidelines for prevention of SSI, and this had ascertained by the Correlation matrix that had illustrated the presence of a statistically significant positive correlation of nurses' knowledge with their attitude and practice after the intervention of nursing guidelines for prevention of SSI, also had illustrated presence a statistically significant positive correlation of nurses' practice with their attitude toward application of nursing guidelines for prevention of SSI.

RECOMMENDATIONS:

Based on the results of the current study, the following recommendations were suggested.

1. Nursing guidelines for prevention of SSI should be incorporated into comprehensive surgical nursing quality improvement programs to maintain patient safety.

2. Routinely updating knowledge and practice of nurses through in-service continuing education programs associated with clinical training on the latest evidence-based practices of infection prevention especially SSI.

3. Develop a system for continuous, strict follow up for nurses during work, with a periodical evaluation of their attitudes and their adherence to evidence-based preventive measures for SSI.

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