



## Factors Affecting Wound Healing Post Major Surgeries in Intensive Care Units

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### Abstract

**Background:** Wound healing following major surgery represents a critical challenge in intensive care units. Despite advances in surgical techniques and infection control, critically ill patients remain at high risk of delayed wound healing due to systemic, patient-related, nurse-related, and environmental factors. Understanding these factors is essential to improve recovery and prevent complications. **Study aim:** .Assess factors affecting wound healing post major surgery among patients admitted to intensive care units. **Design:** A descriptive design was used to meet the aim of this study. **Setting:** The present study was conducted at surgical intensive care unit at Zagazig university hospitals, Sharkia governorate, Egypt. **Study subjects:** A convenience sample of 43 nurses who work in above-mentioned setting and a purposive sample of 120 patients who fulfilled the inclusion criteria. **Tool of data collection:** Three tools were used for collecting data. **Tool I:** A self-administrated questionnaire to assess studied nurses' knowledge . **Tool II:** An observational checklist to assess nurses' practice regarding wound care . **Tool III:** An interview questionnaire for patients . **Results:** The current study revealed that 53.3% of the studied nurses had unsatisfactory overall knowledge regarding wound healing and factors affecting on healing and 58.1% had unsatisfactory practical levels regarding wound care. Also, there was a statistical significance between patients' age, occupation, education, income, clinical data and wound healing. **Conclusion:** More than half of the studied nurses have an unsatisfactory overall knowledge level as well as about two third of nurses had unsatisfactory overall practice levels. Also, patients' age, education, occupation, income and clinical data had impact on wound healing. **Recommendation:** Continuous training programs, adequate staffing, resource availability, and implementation of evidence-based wound care protocols are highly recommended enhancing nursing performance and improving wound healing outcomes in ICU patient.

**Keywords:** Factors affecting Wound healing, intensive care unit, major surgery, wound healing

### Introduction

The skin is the first line defense of the body system, protecting the underlying structure from invasion by a microorganism that can be achieved by maintaining an intact skin surface. It is important to prevent skin breakdown or disruption of its integrity, which might be potentially dangerous, and life-threatening if infected (Swaney & Kalan, 2021).

The presence of a wound imposes a significant burden, not only in terms of economic cost to the healthcare system but also in relation to patients' quality of life and the demands placed on social care providers. When a wound requires prolonged treatment, it can negatively affect the patient's emotional well-being, body image, self-confidence, and financial and physical health status (Díaz-Herrera et al.,



2025).

Major surgeries have long been a subject of debate since the early days of surgical practice. As early as 1917, Dr. R. Earl expressed concern over the absence of a clear and unified definition, highlighting its implications for the surgical profession. At that time, osteopaths were permitted to perform what was classified as ‘minor surgery’, which intensified the need to distinguish between minor and major operations. According to Earl, major surgery includes all procedures that require general anesthesia, involve openings into the major body cavities (e.g., thoracic, abdominal, cranial), carry a significant risk of hemorrhage, involve conditions in which the patient’s life is at risk, and require specialized anatomical knowledge and technical skill for their safe and effective execution (**Martin et al., 2020**).

A surgical wound refers to a deliberate incision or loss of continuity of the skin epithelium, often extending to the underlying soft tissue structures. These wounds are created intentionally during surgical procedures and differ from traumatic wounds in their controlled nature. Surgical wounds are typically performed in a sterile environment, where aseptic techniques are strictly maintained to prevent infection and promote optimal healing (**Bywater et al., 2024**).

Surgical wounds can be either acute or chronic. Acute wounds—such as surgical incisions and burns—typically progress through the orderly stages of wound healing, including hemostasis, inflammation, proliferation, and remodeling, within a predictable timeframe. In contrast, chronic wounds—such as diabetic foot ulcers and pressure ulcers—often fail to advance beyond the inflammatory phase and may remain stalled due to underlying systemic conditions, impaired vascularization, or persistent infection (**Raissi-Dehkordi et al., 2025**).

Wound healing is a process the skin attempts to repair itself after injury. The wound repair process can be broadly divided into four phases: hemostasis, inflammatory, proliferative and maturation (**Vardakostas et al., 2025**). Most surgical wounds heal by primary intention, where skin edges are approximated with sutures or staples to allow fast healing and minimal scarring. When this fails—due to infection, dehiscence, or tissue loss—the wound heals by secondary intention, remaining open and closing gradually through granulation and contraction, a slower process with higher complication risks (**Chetter et al., 2020**).

Wound healing is a complex dynamic, an intricate and tightly regulated process that is critical to maintaining the barrier function of skin along with preserving all other skin functions (**Almadani et al., 2021**). Wound healing may be impaired by interconnected factors across three domains. Patient-related factors, such as advanced age, obesity, and medications like corticosteroids, can delay inflammation resolution and collagen synthesis (**Uberoi et al., 2024**).

Nurse-related factors, particularly nurses’ compliance with infection control practices—including hand hygiene, sterile dressing techniques, and timely administration of prophylactic antibiotics—are strongly associated with lower surgical site infection rates and enhanced wound healing outcomes (**Harb et al., 2025**). Environment-related factors, such as poor sanitation and insufficient ventilation in intensive care units, promote microbial contamination and compromise wound healing outcomes (**Swoboda et al., 2025**).

Intensive care units (ICUs) are specialized hospital facilities where critically ill patients with high mortality and morbidity risks are treated; particularly postoperative patient with surgical wound (**Bolgeo et al., 2023**). Post-surgical recovery is a critical period for patients and health care providers alike, as effective management of this phase significantly reduces complications, shortens hospital stays, and improves patient satisfaction (**Woudneh, 2025**).

Nurses working in intensive care units (ICUs) are uniquely positioned to lead and implement strategies aimed at preventing wound complications and promoting healing. Their continuous presence at the bedside allows them to apply infection control practices effectively and educate patients, making them central to improving postoperative outcomes (**Paden et al., 2024**). According to **Mengesha et al. (2020)**, nurses play a fundamental role in preventing surgical site infections (SSIs) through adherence to infection prevention protocols. The study identified poor hand hygiene, improper antibiotic prophylaxis



timing, inadequate use of personal protective equipment, and poor skin preparation as common barriers contributing to suboptimal surgical wound care.

### **Significance of the study:**

Surgical site infections (SSIs) and impaired wound healing represent major clinical challenges following major surgeries, especially in ICU settings. These complications are associated with prolonged hospital stays, increased healthcare costs, and elevated rates of morbidity and mortality. According to recent global estimates, SSIs remain among the most common healthcare-associated infections, particularly in low- and middle-income countries (Bhangu et al., 2018).

Additionally, the burden of surgical complications disproportionately affects patients with comorbidities such as diabetes and cardiovascular diseases, further complicating recovery (Mengistu et al., 2023).

Critically ill patients in ICUs recovering from major surgery confront multiple risk factors that impede wound healing, including immune suppression, advanced age, malnutrition, comorbidities like diabetes, and the use of invasive medical devices (Zabaglo & Sharman, 2023). Environmental aspects, including poor air circulation or high microbial load in ICUs, can increase the risk of infection and impair healing (De Waele et al., 2024). ICU nurses have a unique role in reducing these risks through strict adherence to evidence-based wound care protocols, infection prevention practices, and timely interventions, nurses ability to detect early signs of wound deterioration and apply targeted care directly impacts outcomes (Alshahrani et al., 2023).

**Aim of the study:** Was to assess factors affecting wound healing post major surgeries in intensive care units

### **Research Question:**

- What is the level of nurses' knowledge regarding wound healing post major surgeries?
- What is the level of nurses' practice regarding wound care post major surgeries?
- What are the factors affecting wound healing post major surgeries?

**Research design:** A descriptive research design was utilized in this study.

**Setting:** The study was carried out in Surgical ICU at Zagazig University Hospital, Sharqia Governate, Egypt.

### **Subjects and methods**

**Subjects:** A convenience sample of (43) nurses working at the previous mentioned setting and a purposive sample of (120) patients who fulfilling inclusion criteria at Zagazig university hospitals, Zagazig Governate, Egypt.

### **Inclusion criteria for patients:**

Both sexes, age between 20-60years old, and Post major surgery with in the last week.

### **Exclusion criteria for patients:**

Patients with previous surgery, low immunity patients, and Patients with chronic diseases as chronic kidney disease.

### **Tools of data collection:**

**Tool I: Self-administered questionnaire of nurses:** Composed of three parts:

**Part I:** Used to assess demographic characteristics ,This part composed of eight items involved age, sex, qualification, social status, , residence, experience years in nursing field and ICU, attendance training courses about wound care .

**Part II:** Used to assess nurses' knowledge regarding major surgeries and factors affecting wound healing post major surgeries including 37 multiple choice questions covering two sections, nurses' knowledge about major surgeries, nurses' knowledge factors affecting wound healing . ((Hassan, 2014) ).

**Scoring system:** The total score for the knowledge was 37 grades (100%). Each correct answer scored one grade, zero for incorrect answer. For each area of knowledge, the score of the items was summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. Knowledge was considered satisfactory if the percent score was equal or above 80% and unsatisfactory if less than 80% based on statistical analysis.



**Tool II: Observational checklists for nurses:** It was used to assess nurses' practices regarding wound care post major surgeries, ((ARUNA, 2010) ). It consists of five parts.

**Part I: wound dressing checklist :**It is composed of 22 items covering wound dressing practice.

**Part II: Handling drainage system Checklist:** It is composed of 10 item covering the part.

**Part III: care of central line checklist:** It is composed of 8 items covering the part .

**Part IV: positioning checklist:** It is composed of 8 items covering the part .

**Part V: monitoring surgical site checklist:** composed of 7 items covering the part .

**Scoring system:-**

Each practice item observed to be done correctly was scored one and the not done scored zero. For each area of practice, the scores of the items were summed up and the total divided into two categories: - Adequate if score  $\geq 80\%$ . (44-55 grades), and inadequate if score from  $<80\%$ . (0- 43grades).

**Tool III: Interview Assessment Questionnaire for Patients:** This questionnaire divided into three parts:

**Part I: Demographic characteristics of the studied patients:** This part composed of seven items which concerned with assessing the demographic characteristics of patients involved in the study such as age, sex, qualification, social status, residence, occupation and family income .

**Part II: A questionnaire to assess clinical data of patients:** This part composed of 12 items which concerned with clinical data of the patients as past medical history, previous hospitalization, nutritional status, smoking habits, alcohol or drugs.

**Part III: Wound Healing Assessment:** This part included items designed to evaluate the clinical condition of the surgical wound postoperatively. It contains wound-specific indicators such as the presence of inflammation, discharge, erythema, infection, or wound separation. Wound assessment was conducted twice on postoperative day 7<sup>th</sup> and 14<sup>th</sup> to evaluate the healing status and detect any potential complications. The tool was adapted and modified from the original Southampton Wound Assessment Scale developed by (Bailey et al, 1992) to suit the current research objectives.

**Pilot study:**

Was carried out in order to check and ensure the clarity, applicability, relevance and feasibility of the tools. For this study, the researcher selected five nurses and four patients (10%) randomly to participate in the pilot testing of the questionnaire and checklist from accidents intensive care unit and not excluded from the study sample because of no modifications were done in the tools.

**Administrative and ethical consideration:**

The necessary approvals were obtained from the dean of the Faculty of Nursing and submitted to general director of Zagazig University Hospitals. Then Permission to carry out the study was obtained from the head of mentioned setting after explaining the purpose of the study.

At the initial interview, each potential subject was informed about the nature, purpose, benefits of the study, and informed that his/her participation is voluntary. Confidentiality and anonymity of the subjects were also assured through coding of all data.

The researcher assured that the data collected, and information will be confidential and would be used only for the purpose of the study and there was no risk for study subject during application of the research.

Additionally, an informed consent was obtained from each participant prior to inclusion into the study and after a full explanation of its aim and procedures. They were informed about their rights to refuse or withdraw from the study at any time with no reason to be given or consequences.

**Field work:**

The researcher used to go to the study setting for interviewing the study subjects, each nurse was met individually, got a full explanation about the aim of the study and was invited to participate. The nurse who gave his/her verbal informed consent to participate was handed the self-administered questionnaire and was instructed during the filling. The same was done with patients. The time needed to complete the checklist varies between 30-45 minute. Once the approval was granted to progress in the study, the



researcher started to organize a schedule for collecting the data. The researcher visited study setting to be familiar with work process, time of work and observe study subjects attending the study settings to a set schedule for data collection. The data were collected two days a week (Saturday, Sunday, Monday, and Wednesday) in the morning and afternoon shifts, lasted for 6 months during the period from the beginning of october2024 to the end of march 2025.

#### **Content validity& Reliability:**

The tools were revised by a panel of five experts from different specialties including, professors of neurology from faculty of medicine and medical surgical nursing from faculty of nursing Zagazig university reviewed the tool's content for clarity, relevance, comprehensiveness, applicability, understanding, and ease for implementation. All recommended modifications were done. Cronbach's Alpha that used to measure the internal consistency (reliability of used tool) was 0.885 for nurses' knowledge, 0.991 for nurses' practice.

#### **Statistical analysis:**

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 20. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test (X) 2, P-value to test association between two variables, degrees of significance of results were considered as P-value > 0.05 Not significant (NS), P-value ≤ 0.05 Significant (S), P-value ≤ 0.01 Highly Significant (HS).

#### **Results:**

**Table 1:** Shows demographic characteristic of studied nurses. The age of studied nurses ranged from 22 to 40 years with Mean ± SD=26.7±4.4, two fifths of studied nurses (40%) had their age more than 25 years, more than half of studied nurses(55%) were females and married. Regarding nurses qualification 5.0% had nursing diploma, (70.0%) had technical institute, 25.0% had bachelor of nursing, more than three quarters had hospital experience equal or less than five years ≤ 5 years(77.5%).more than half (55.0%) had insufficient monthly income. Nearly three quarters (72.5%) were living in rural area. Furthermore; about two thirds (67.5%) of studied nurses hadn't attended training courses regarding wound healing.

**Table 2:** Clarifies that the majority of studied nurses (53.3%) had unsatisfactory total knowledge regarding factors affecting wound healing post major surgeries.

**Table 3:** Showed that more than half (58.1%) of studied nurses had unsatisfactory total practice level regarding wound care post major surgeries , with allover mean± SD 74.2±20.8 and range from 32 score to 100.

**Table 4:** Reports that more than two thirds (67.5%) of studied patients had age ≤ 50 years with the mean age 43.6±11.94, more than two thirds (67.5%) were males, majority (85.0 %) were married, regarding their educational level , 82.5% were educated, three fifths )60,0%( were working ,more than half (55.0%) had insufficient monthly income , Additionally less than two thirds were living in urban area.

**Table 5:** Demonstrates that there was a statistical significance between patients' age, occupation, education, income, clinical data and wound healing.

**Table 6:** Showed that there was a highly statistically positive significant correlation between studied nurses' total knowledge regarding factors affecting wound healing with total nurses' practice with p-value was 0.0001. On the same line there was a highly statistically significant and direct correlation between total nurses practice with patients wound healing outcomes with p-value was 0.0001.

**Table 1:** Demographic Data of The Studied Nurses n=43.

Demographic Data	No	%
Age (Years)		
20-<25	12	27.9
25-<30	19	44.2
30-<35	7	16.3
35-40	5	11.6
Min-Max	20-40	
Mean $\pm$ SD	28.46 $\pm$ 5.23	
Gender		
Male	18	41.9
Female	25	58.1
Marital Status		
Single	22	51.2
Married	21	48.8
Educational Level		
Nursing Diploma	4	9.3
Nursing Institute	24	55.8
Bachelor's Degree	15	34.9
Residence		
Urban	19	44.2
Rural	24	55.8
Years of experience in the nursing field		
<5	13	30.2
5-<10	22	51.2
$\geq$ 10	8	18.6
Min-Max	1-15	
Mean $\pm$ SD	6.76 $\pm$ 4.13	
Years of experience in ICU		
<5	21	48.8
5-<10	14	32.6
$\geq$ 10	8	18.6
Min-Max	1-13	
Mean $\pm$ SD	5.74 $\pm$ 3.51	
Attendance training courses related to patient care after major surgery		
Yes	19	44.2
No	24	55.8

Notes: SD: Standard deviation.



**Table 2:** Levels of Total Nurses' Knowledge regarding Major Surgery and Factors Affecting Wound Healing Post Major Surgery in Intensive Care Units **n=43**.

Knowledge subscales	Satisfactory ≥ 80%		Unsatisfactory <80%		Mean ± SD	Mean (%)	Ranking
	No.	%	No.	%			
	Knowledge regarding major surgery	25	58.1	18			
Knowledge regarding factors affecting wound healing related to patient	18	41.9	25	58.1	6.48±2.8	58.9	3
Knowledge regarding factors affecting wound healing related to environment	16	37.2	27	62.8	4.02±1.8	57.4	4
Knowledge regarding factors affecting wound healing related to nursing	21	48.8	22	51.2	5.34±1.7	66.7	1
Total knowledge score	20	46.5	23	53.5	22.95±7.6	62.0	—

Notes: SD: Standard deviation.

**Table 3:** Levels of Total Nurses' Practices Regarding Post-Operative Wound Care **n=43**.

Practices subscales	Adequate ≥ 80%		Inadequate <80%		Mean ± SD	Mean (%)	Ranking
	n	%	N	%			
	Wound dressing care	19	44.2	24			
Handling drainage systems	16	37.2	27	62.8	5.88±2.1	58.8	4
Central line care	18	41.9	25	58.1	5.34±1.6	66.7	2
Positioning	15	34.9	28	65.1	4.30±2.1	53.7	5
Monitoring surgical site	23	53.5	20	46.5	4.72±1.5	67.4	1
Total practices score	18	41.9	25	58.1	33.9±10.6	61.6	—

Notes: SD: Standard deviation.

**Table4:** Demographic Data of the Studied Patients n=120.

Demographic Data	No	%
Age (Years)		
20-<30	12	10.0
30-<40	28	23.3
40-<50	53	44.2
50-60	27	22.5
Min-Max	22-55	
Mean ± SD	42.48±8.06	
Gender		
Male	88	73.3
Female	32	26.7
Marital Status		
Married	82	68.3
Unmarried	38	31.7
Educational Level		
Illiterate	7	5.8
Read and write	16	13.3
Basic education	23	19.2
Secondary education	59	49.2
High education	15	12.5
Residence		
Urban	46	38.3
Rural	74	61.7
Occupation		
Unemployed / Housewife	30	25.0
Employee	53	44.2
Craftsman	14	11.7
Freelance work	15	12.5
Retired	8	6.7
Family income		
Enough	40	33.3
Not enough	80	66.7



**Table 5:** Relation Between Demographic Data of The Studied Patients and their Clinical Wound Description n=120.

Demographic Data		Clinical Wound Description at 7 day						Clinical Wound Description at 14 day					
		Normal healing (n=50)		Early signs of local inflammation (n=57)		Infection or wound breakdown (n=13)		Normal healing (n=75)		Early signs of local inflammation (n=37)		Infection or wound breakdown (n=8)	
		n	%	n	%	n	%	n	%	n	%	n	%
Age (Years)	20-<30	12	24.0	0	0.0	0	0.0	12	16.0	0	0.0	0	0.0
	30-<40	27	54.0	1	1.8	0	0.0	28	37.3	0	0.0	0	0.0
	40-<05	10	20.0	39	68.4	4	30.8	26	34.7	26	70.3	1	12.5
	50-60	1	2.0	17	29.8	9	69.2	9	12.0	11	29.7	7	87.5
Test of significance		X <sup>2</sup> = 89.40 p=0.000**						X <sup>2</sup> =52.61 p=0.000**					
Gender	Male	41	82.0	36	63.2	11	84.6	57	76.0	25	67.6	6	75.0
	Female	9	18.0	21	36.8	2	15.4	18	24.0	12	32.4	2	25.0
Test of significance		X <sup>2</sup> = 5.785 p=0.055						X <sup>2</sup> =0.913 p=0.633					
Marital Status	Married	38	76.0	35	61.4	9	69.2	52	69.3	25	67.6	5	62.5
	Unmarried	12	24.0	22	38.6	4	30.8	23	30.7	12	32.4	3	37.5
Test of significance		X <sup>2</sup> =2.628 p=0.269						X <sup>2</sup> =0.170 p=0.918					
Educational Level	Illiterate	1	2.0	3	5.3	3	23.1	3	4.0	2	5.4	2	25.0
	Read and write	4	8.0	11	19.3	1	7.1	8	10.7	7	18.9	1	12.5
	Basic education	6	12.0	15	26.3	2	15.4	12	16.0	11	29.7	0	0.0
	Secondary education	30	60.0	25	43.9	4	30.8	42	56.0	14	37.8	3	37.5
	High education	9	18.0	3	5.3	3	23.1	10	13.3	3	8.1	2	25.0
Test of significance		X <sup>2</sup> =20.94 p=0.007**						X <sup>2</sup> = 14.34 p=0.009**					
Residence	Urban	17	34.0	26	45.6	3	23.1	30	40.0	14	37.8	2	25.0
	Rural	33	66.0	31	54.4	10	76.9	45	60.0	23	62.2	6	75.0
Test of significance		X <sup>2</sup> =2.955 p=0.228						X <sup>2</sup> =0.694 p=0.707					
Occupation	Unemployed / Housewife	8	16.0	22	36.8	0	0.0	16	21.3	14	37.8	0	0.0
	Employee	16	32.0	29	50.9	8	61.5	29	38.7	20	54.1	4	50.0
	Craftsman	12	24.0	2	3.5	0	0.0	13	17.3	1	2.7	0	0.0
	Freelance work	4	28.0	1	1.8	0	0.0	15	20.0	0	0.0	0	0.0
	Retired	0	0.0	3	5.3	8	38.5	2	2.7	2	5.4	4	50.0
Test of significance		X <sup>2</sup> =63.23 p=0.000**						X <sup>2</sup> =45.20 p=0.000**					
Family income	Enough	27	54.0	12	21.1	1	7.7	32	42.7	7	18.9	1	12.5
	Not enough	23	46.0	45	78.9	12	92.3	43	57.3	30	81.1	7	87.5
Test of significance		X <sup>2</sup> =17.32 p=0.000**						X <sup>2</sup> =12.962 p=0.009**					



**Table 6:** Correlation Matrix Between Factors Affecting Wound Healing, Nurses' Knowledge and Nurses' Practice n=43.

Variables	Wound Healing	
	r	p-value
Age	0.753	0.000**
Gender	0.166	0.071
Marital Status	0.139	0.129
Educational Level	-0.287-	0.001**
Residence	0.075	0.414
Occupation	-0.293-	0.001**
Family income	0.371	0.000**
History from chronic illness	0.531	0.000**
Family history from chronic illness	0.408	0.000**
History from hospitalization	0.124	0.178
History from allergies	0.308	0.001**
Currently taking any prescription or over-the-counter medications	0.282	0.002**
Follow a specific diet	-0.007-	0.937
Digestive/appetite issues	0.418	0.000**
Significant weight changes	0.394	0.000**
Smoking	0.357	0.000**
Alcohol consumption	0.157	0.087
Regular physical activity	-0.335-	0.000**
Type of surgery	0.238	0.009**
Wound site	0.278	0.002**
Nurses Knowledge	-0.510-	0.001**
Nurses Practice	-0.581-	0.000**

### Discussion:

Regarding to the age of studied nurses, the result of present study showed that more than two-fifths of the studied nurses' ages between 25 to 30 years. This finding is consistent with **Sheta, (2020)** who mentioned in study titled " Effect of educational program on nurses' knowledge and practice regarding negative pressure wound therapy among patients

As regard to gender, , the current study revealed that nearly three fifth of studied nurses were Females. This finding is in harmony with **Chuang et al., (2023)** who mentioned in study entitled " Knowledge, attitude, perceived barriers of hard-to-healed wound care and the association with confidence: A cross-sectional study among community nurses" that the most of nurses under study were Females. From the researcher' point of view, From the researcher point of view this may be due to that nursing being a female-dominated profession, as admission of males students in nursing schools only dates less than two decades, so that the nursing workforce is still more feminine .

Regarding the social status, the present study found that more than half of studied nurses were single. This finding is in harmony with **Gizaw et al., (2022)** who showed in study entitled "Knowledge, practice, and associated factors towards postoperative wound care among nurses" that more than half studied nurses were single. While, this finding was contradicted **Fasil Tegegn et al.,(2023)** who clarified in study entitled " Multicenter cross-sectional study describing postoperative wound care practice in Northeast Ethiopia" the more than half of studied nurses were married.

Regarding to qualification, the current study revealed that more than half of studied nurses their qualification technical institute, while the lowest percentage was diploma in nursing. This is agree with



**Balla et al., (2017)** who showed in study entitled " Nurses' perception regarding diabetic wound care at primary health care level" that the most of nurses were technical institute

As regard to years of experience in surgical intensive care unit , current study revealed that nearly half of studied of nurses had less than five years of experience in ICU. This finding line up with **Khurshid et al., (2023)** who mentioned in study entitled " Perceived barriers among intensive care unit (ICU) nurses in the delivery of nursing care to ICU patients" that nearly half of studied nurses had less than five years of experience in ICU.

As regard to previous training courses, this study reported that more than half of studied nurses didn't attended training courses related to patient care after major surgery. This finding align with **Najm&Hussein.,(2018)** who mentioned in study entitled " Assessment of wound dressing practices among nurses at the emergency hospitals in Erbil city" that more than two third of studied nurses didn't attend training courses related to patient care after major surgeries .

As regards to nurses' knowledge regarding factors affecting wound healing, the current study showed that more than two fifth of the studied nurses had an unsatisfactory overall. this finding is agree with **El-soudany, (2018)**, the study revealed that in his study entitled " Effect of Training Program on Nurses' Performance Regarding Infection Control Measures in Caring For Patient with Post-Operative Wound" The majority of the studied nurses had insufficient levels of knowledge about wound healing. While, this result is in contrast to **Desta et al ., (2020)** who found that about two fifth of studied nurses had sufficient overall knowledge regarding wound healing .the current study showed that more than two fifth of the studied nurses had an unsatisfactory overall. this finding is agree with **El-soudany, (2018)**, the study revealed that in his study entitled " Effect of Training Program on Nurses' Performance Regarding Infection Control Measures in Caring For Patient with Post-Operative Wound" The majority of the studied nurses had insufficient levels of knowledge about wound healing. While, this result is in contrast to **Desta et al ., (2020)** who found that about two fifth of studied nurses had sufficient overall knowledge regarding wound healing .

Regarding the total level of practice, the present result showed that more than half of the nurses' under study had unsatisfactory level of practice regarding wound care. This finding was in the same line with **Ahmed et al., (2021)**, who showed that more than two thirds of studied nurses had unsatisfactory level of practice. Also, This finding was in the same line with **Shehade et al., (2023)**,who showed that more than two thirds of studied nurses had unsatisfactory level of practice.

Regarding to the age of studied patients, ; more than two fifth of the studied patients ages between 40 to 50 years . This finding is consistent with **Mohamed et al., (2022)** who mentioned in study titled "Effect of applying perioperative oxygen therapy guidelines on postoperative health outcomes" that more than two fifth of patients' ages between 40 to 49 years.

the current study revealed that more than three fifth of studied patients were males. This finding of the present study is agree **Chibante et al., (2017)** who mentioned in study titled "Knowledge and practices in care focused on individuals with wounds" that the more than two third of patients' sex was male .While these findings disagreed with **Buhalim et al ., (2023)** who mentioned in study entitled "People's knowledge and attitudes about factors that can impact wound healing in the Eastern Province, Saudi Arabia" that more than three fifth of studied patients were female .

As regard to marital status, the present study found that two third of studied patients were married. This finding is in harmony with **Teklemariam et al., (2020)** who showed in study entitled " Malnutrition and associated factors in admitted adult surgical patients ” that more than three fifth studied nurses were married . While, this finding was contradicted with **Tariq et al.,(2023)** who clarified in study entitled " Effect of Nursing Care Regarding Postoperative Complications among Diabetic Patients after Hip Replacement Surgery" that near to half of studied patient were widow .

As regard to residence, the present study found that more than three fifth of studied patients were residing in rural area . This finding is agree with **Teklemariam et al., (2020)** who showed in study entitled " Malnutrition and associated factors in admitted adult surgical patients" that near to than three



fifth studied patients were residing in rural area. While this finding was disagreed with **Elsaed et al., (2020)** who found in her study about " Factors affecting post open-heart surgery outcomes for hospitalized patients " that three fifth of studied patient were live in urban area.

As regards to educational status, , the present study found that nearly more than half of studied patients had had complete secondary education,. This finding is agree with **Chibante et al., (2017)** who mentioned in study titled "Knowledge and practices in care focused on individuals with wounds" that less than one third of patients' had complete secondary education.

As regards to monthly income, the current study revealed that two third of studied patients had insufficient family income . This finding line up with **Eadet al ., (2019)** who mentioned in study entitled "Factors affecting healing process of patients with diabetic foot ulcer" that nearly two third of studied patients had insufficient income . while, this finding inconsistent with **Gomaa et al .,(2019)** that more than half of studied patient had sufficient income .

Concerning the Relation Between Demographic Data of The Studied Patients and their Clinical Wound Description , the finding of the present study revealed that there was statistically significant associations were detected between wound healing status and factors such as age, educational level, occupation and family income While, other variables, including gender, marital status, and residence, showed no significant effect on wound healing outcomes .this result align with **Mashbari et al ., (2023)** who mentioned in study entitled "Knowledge, attitude and practices towards surgical wound care and healing among the public in the Jazan Region, Saudi Arabia" that there was statistically significant relation between wound healing and patients age and educational level .

As regards to correlation between the total knowledge and total practice ,there was a highly statistically significant positive correlation between the total knowledge and total practice scores of the studied nurses . This finding agree with **Wolny et al .,(2024)** who mentioned in study titled "Risk Factors for Non-Healing Wounds—A Single-Centre Study" that there was a significant association between age and wound healing .Also, This finding align with **Lia et al.,(2019)** who mentioned in study titled titled "Clinical parameters of wound healing in patients" that the wound healing was significantly positively correlated with age .

### **Conclusion:**

Based on the findings of the present study, it can be concluded that, there is lack of nurses' knowledge and practice regarding wound care post major surgeries. More than half of studied nurses had unsatisfactory total knowledge, more than half of nurses had unsatisfactory total practice regarding wound care. There was statistical significance between patients' age, occupation, education, income, clinical data and wound healing. There was highly statistically significant positive correlation between total nurses' knowledge, total nurses' practice.

### **Recommendations:**

In view of the main results of the study the following recommendations were derived and suggested, training program are highly recommended to improve nurses performance regarding care of patients with spinal cord injuries, study should be replicated on large sample and in different setting in order to generalize the result.



## References

1. **Almadani, Y. H., Vorstenbosch, J., Davison, P., & Murphy, A. M. (2021).** Wound Healing: Skin and Scars. In StatPearls. StatPearls Publishing.
2. **Alshahrani, A. M., Alshehri, M. A., Alasmre, F. A., & Saba, I. (2023).** Nurse-Related Factors in the Prevention and Management of Surgical Site Infection: A Multicenter Cross-Sectional Study in Saudi Arabia. *Journal of Multidisciplinary Healthcare*, 16, 3421-3430.
3. **Bhangu, A., Ademuyiwa, A. O., Aguilera, M. L., Alexander, P., Al-Saqqa, S. W., Borda-Luque, G., ... & GlobalSurg Collaborative. (2018).** Surgical site infection after gastrointestinal surgery in high-income, middle-income, and low-income countries: a prospective international cohort study. *The Lancet Infectious Diseases*, 18(5), 516-525.
4. **Bolgeo, T., Di Matteo, R., Aiello, A., Dal Molin, A., Gatti, D., Gambalunga, F., ... & Maconi, A. (2023).** The intensive care unit diary as a sharing platform: A nurse-patient-family experience report. *Nursing Reports*, 13(2), 571-577.
5. **Bywater, S. L., Browning, L., Shaw, R., McLatchie, L., Taylor, R., & Monk, M. C. (2024).** A protocol for a scoping review of the role of guidelines in the surgical wound infection prevention literature. *British Journal of Nursing*, 33(2), S20-S25.
6. **Calvo-López, R., Hernández-Fernández, A., Martínez-Martín, J., Díez-Ulloa, M. A., & de la Torre-González, C. (2024).** Surgical site infection in trauma surgery of extremities: a latent class analysis for bimodality. *Archives of Orthopaedic and Trauma Surgery*, 144(1), 347-357.
7. **Chetter, I., Arundel, C., Bell, K., Buckley, H., Claxton, K., Corbacho Martin, B., ... & Welch, C. (2020).** Surgical wounds healing by secondary intention: characterising and quantifying wound trajectories and predictive modelling of healing assessed by simple blinded endpoint (beheal study). *Trials*, 21(1), 1-16.
8. **De Waele, J. J., Girardis, M., & Martin-Loeches, I. (2024).** Source control in the management of sepsis and septic shock. *Intensive Care Medicine*, 50(1), 1-12.
9. **Díaz-Herrera, S., Choi, A., Sanz-Barbero, B., & San Sebastián, M. (2025).** The burden of disease of three sexually transmitted infections in relation to sustainable development goals in Ecuador: a population-based analysis by ethnicity, geographical region, and time period. *The Lancet Regional Health–Americas*, 41, 100930.
10. **Harb, A. M., Soliman, A. S., Elsilimy, A., & Mohamed, S. (2025).** Factors Affecting Surgical Site Infection in Patients Undergoing Elective and Emergency Surgery in Suez Canal University Hospital. *The Egyptian Journal of Hospital Medicine*, 98(1), 115-120.
11. **He, L., & Hai, Y. (2024).** Prevention and Treatment of Surgical Site Infection after Lumbar Spine Surgery: A Narrative Review. *Orthopaedic Surgery*, 16(1), 3-15.
12. **Heard, M. (2025).** Surgical Site Infections (SSIs). In StatPearls. StatPearls Publishing.
13. **Klaas, C., & Serebro, K. (2024).** The role of the ICU nurse in preventing and managing wound infections. *South African Medical Journal*, 114(2), e1751.
14. **Martin, K., McCallum, I., Macfie, J., McCue, J. L., & Metcalfe, M. (2020).** Major and minor surgery: Terms used by medical students but not defined by surgeons—A qualitative study. *Surgery Open Science*, 2(3), 103-106.
15. **Mathenge, N. (2020).** The Role of Perioperative Nursing in Enhancing Patient Outcomes. *Journal of Perioperative Nursing*, 33(2), 45-52.
16. **Mengesha, A., Aged, T., & Tazeze, H. (2020).** Surgical Site Infection and Its Associated Factors Following Cesarean Section in Ethiopia: A Cross-Sectional Study. *Journal of Multidisciplinary Healthcare*, 13, 315-322.
17. **Mengistu, D. A., Zewdie, O., & Tantu, T. (2023).** Surgical site infection following cesarean section and its associated factors in Ethiopia: A systematic review and meta-analysis. *PLoS One*, 18(2), e0281649.
18. **Paden, L., McEwen, S., Tsai, S., Gjoni, S., Anagnostopoulos, A., Harbarth, S., ... & Abbas, M. (2024).** Interprofessional collaboration to reduce surgical site infections after cesarean delivery. *Antimicrobial Stewardship & Healthcare Epidemiology*, 4(1), e2.
19. **Raissi-Dehkordi, N., Raissi-Dehkordi, F., & Baradaran, H. R. (2025).** Chronic wounds in diabetic patients: A review of risk factors, prevention, and management strategies. *Journal of Diabetes & Metabolic Disorders*, 24(1), 1-10.
20. **Swaney, P., & Kalan, L. R. (2021).** Living in your skin: bacteria, molecules, and mechanisms. *Infection and Immunity*, 89(4), e00695-20.
21. **Swoboda, L., & Vaidya, D. (2025).** Factors Influencing Wound Healing in ICU Settings. *Critical Care Nursing Quarterly*,



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48(1), 45-56.

22. **Tesfaye, B., Central, E., Eliso, M. C., & Yismaw, M. B. (2022).** Surgical site infection following cesarean section and its predictors in Ethiopia: A systematic review and meta-analysis. *Frontiers in Medicine*, 9, 1077600.
23. **Uberoi, A., McCarty, E., Van Twisk, P., Gibson, K., Emechebe, D., McCosker, S., ... & Jarbrink, K. (2024).** Factors associated with healing failure after early repair of acute, trauma-related rotator cuff tears. *Journal of Shoulder and Elbow Surgery*, 33(1), 28-36.
24. **Vardakostas, D., Mylonas, K. S., Papachristos, I. C., & Zarras, K. (2025).** Wound Healing: A Comprehensive Review of Current Knowledge and Future Directions. *Cureus*, 17(1), e51862.
25. **Woudneh, A. (2025).** Post-Surgical Recovery Management in ICUs. *Ethiopian Journal of Health Sciences*, 35(1), 45-53.
26. **Zabaglo, M., & Sharman, T. (2023).** Postoperative Wound Infection. In *StatPearls*. StatPearls Publishing.