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Nurses' Knowledge and Practice Regarding the Care of Critical Patient with Burn

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ABSTRACT

Background*: Background:** Burn considered one of the most devastating forms of trauma and remain a major public health problem worldwide. Critically burned patients require comprehensive and specialized nursing care because critical burn affect nearly all body systems and may lead to severe complications. ***The study aimed to evaluate nurses' knowledge and practice regarding the care of critical patient with burn. ***Research design*:** A descriptive design was used. ***Setting*:** The present study was conducted in hehia hospital, at Zagazig city, sharkia governate, Egypt. ***Tool of data collection*:** Two tools were used for collecting data: structured self-administered questionnaire that includes two parts: (personal characteristics of nurses, and nurse's knowledge assessment questionnaire), and nurses' observational checklists procedure. ***Study subjects*:** A convenience sample of available nurses (40) nurses. ***Results*:** More than two thirds of studied nurses' age (70%) were ≥30 years, most of them (85%) were females, less than half of them (45%) had nursing technical institute, nearly two thirds of them (67.5%) had years of experience in critical burns department unit <10 years ,more than half (55%) did not attain any training course related to critical burns management .less than quarter (22.5%) of study nurses had satisfactory knowledge level regarding care of critical burn in preprogram phase improved to majority (85.0%) post program phase. A quarter of study nurses (25.0%) had competent practice level regarding care of critical burn in the preprogram phase increased post program phase. There was a statistically significant relation between total nurses' knowledge and total nurses' practice in before and after the program. **Conclusion:** satisfactory knowledge level, and competent practice in preprogram improved post program and flow up phase. **Recommendation:** Identify barriers that hinder optimal nurse performance and facilitators that can enhance the quality of care of critical burn.

Keywords: Key words: Burn, Care of critical patient, Nurses' knowledge, Practice

INTRODUCTION

Critical burns are defined as first- or second-degree burns that cover more than 25% of an adult's body or more than 20% of a child's body, or a third-degree burn of more than 10% of body skin area. Critical burn also includes full-thickness burn involving hands, feet, face, upper airway, genitalia, or circumferential burns of other areas, electrical and deep chemical burn, and burn associated with respiratory injury **(Mason et al., 2023).**

A critical burn is the most serious and should be treated in a specialized burn unit of a hospital and require immediate medical attention. These burns are potentially life threatening, disfiguring, and disabling. Even superficial burns can be critical if they affect a large area or certain body parts. You cannot judge a burn's severity by the person's level of pain because nerve endings may be destroyed **(Edger-Lacoursière et al., 2023).**

Nurses play a central role in the survival and recovery of critically burned patients. Critical burn injuries are complex and can rapidly deteriorate due to fluid loss, infection, and organ dysfunction. Therefore, the quality of nursing performance directly influences patient outcomes. Nurses' performance is a critical determinant of outcomes in critical burned patients, evidence shows that nurses' performance directly influences mortality, infection rates, wound healing, pain management, improve survival, healing, psychological health, long-term function. and rehabilitation **(Aydin et al., 2020).**

A critical burn care nurse is trained to care for patients who have suffered critical burn injuries and, in numerous cases, have also suffered other types of traumas. The burn care nurse is responsible for treating and monitoring critical burn wounds, as well as plays important role in assessing the emotional and psychological stress that commonly follows a burn injury. The best care for a burn patient necessitates a unique multidisciplinary approach. The burn care team's makeup and tight communication among its members are critical to positive patient outcomes. At the center of this team is the critical burn nurse, who coordinates all patient care practices **(Chen et al., 2023).**

An immediate primary survey of critical burn patient is carried out to assess the ABCDEs: airway (A) with consideration given to protecting the cervical spine, gas exchange or breathing (B), circulatory and cardiac status (C), disability (D) including neurological deficit and expose and examine (E) while maintaining a warm environment. The secondary survey focuses on obtaining a history, the completion of the total body system assessment, initial fluid resuscitation and provision of psychosocial support of the conscious patient **(Potter et al., 2023).**

Quality and safety nursing alert during emergent /resuscitative phase include airway patency and breathing must be assessed during the initial minutes of emergency care. Immediate therapy is directed towards establishing an airway and administering humidified 100% oxygen. If qualified personnel and equipment are available and if the patient has severe respiratory distress and/or airway oedema, the rescuers can insert an endotracheal tube and initiate manual ventilation. No food or fluid is given by mouth, and the patient is placed in a position that will prevent aspiration of vomitus because nausea and vomiting typically occur due to paralytic ileus resulting from the stress of injury **(Korkmaz et al., 2023).**

The acute or intermediate phase of critical burn care follows the initial resuscitation phase and begins 48 to 72 hours after critical burn injury. During this phase, continued assessment and maintenance of respiratory and circulatory status, fluid and electrolyte balance and gastrointestinal function is paramount. Infection prevention, critical burn wound care (i.e., wound cleaning, topical antimicrobial therapy, wound dressing changes, wound debridement, and wound grafting), pain management and nutritional support are priorities at this stage **(Ahmed et al., 2020).**

Rehabilitation phase begins immediately after critical burn has occurred and often extends for years after injury. For nurses who care for patients with critical burns, this can be one of the more physically demanding and challenging phases. One important focus of the burn team is to evaluate the patient carefully for late complications related to critical burn injuries **(Martin et al., 2023).**

The nurse in rehabilitation phase maintaining range of motion (ROM), preventing contractures through splinting techniques, decreasing oedema, and preventing skin breakdown through proper positioning. As the acute phase ends, patients become more aware of their injuries and the challenges they face. The goals are functional and aimed at activities of daily living such as ambulation and participation in self-care as well as scar management and returning to work or school Physiotherapists and occupational therapists are essential to optimizing patient goals and outcomes **(Parvizi et al.,2023).**

Significance of the study:

Burn is considered one of the most serious forms of trauma and represent a major public health problem worldwide due to their high rates of morbidity, mortality, prolonged hospitalization, and physical and psychological complications. Critically burned patients require highly specialized nursing care to reduce complications and improve recovery. Nurses are the frontline healthcare providers in burn units; therefore, assessing their knowledge and practice is essential to identify deficiencies and educational needs **(American nurse association.,2024).**

Aim of the study: Was to evaluate nurses' knowledge and practice regarding the care of critical patient with burn. Through the following objectives:

- Assess nurses' level of knowledge regarding care of patients with critical burn.

- Determine of nurses' practice levels regarding care of patients with critical burn.

Research Question:

-What is the level of nurses` knowledge regarding the care of critical patient with burn?

-What is the level of nurses` practice regarding the care of critical patient with burn?

-Is there is a correlation between nurses` knowledge and their practice.

Research design:

A descriptive research design was conducted to achieve the aim of the study.

Setting:

The present study was conducted in Hehia hospital, at Zagazig city, Sharkia governate, Egypt. (Burn, surgery, and emergency units).

Subjects:

A Convenience sample of available nurses (40) working in the setting mentioned above.

Tools of data collection:

Tool I: Structured Self-Administered Questionnaire: adapted from **(Mohammed et al., 2021)**,

It included two parts:

Part I; Assess personal characteristics of nurse, five close ended questions such as (age, gender, qualification, years of experience, and attended courses on critical burn)

Part II; Nurse's Knowledge assessment Questionnaire:

To evaluate nurses' knowledge regarding critical burn injury and care provided to critical burned patients, it covered 78 multiple choice question consist of:

A- Information about the skin and burns covered 29 questions.

B- Information on nursing care for critical burn during the emergency phase covered 15 questions.

C- Information on nursing care for critical burn patients in the acute phase covered 34 questions.

Scoring system: items total global score of 78 for 78 items, was rated on (correct choice or incorrect choice) with scoring (correct choice =1, incorrect choice= 0). The total score of this questioner classified into two results based on statistical analysis:

- Satisfactory ≥75% this mean (57 grade)
- Unsatisfactory < 75% this mean (<57 grade)

Tool II-: Observational checklists for nurses: adapted from **(word health organization,2024)**, it consists of three parts:

1- **Critical burn wound dressing procedure**: it was included 34 steps: preparation of patient and environment (fife steps), assessment (two steps), pre dressing medication/ pain relief (four steps), and critical burns wound care steps (23 steps) classified as: remove of previous dressing (nine steps), clean hydrotherapy (six steps), apply new dressing (eight steps).

2-**Scar management procedure**: it was included 17 steps: Massage (six steps), splints and stretching (fife steps) and, pressure garments (six steps)

3-**Rehabilitations exercises** according to their critical burn site: it was included 42 steps: stretching exercises (two steps), aerobic walk exercises(four steps), muscles strengthening exercises(two steps) and stretching exercises to help with tightness: face (fife steps), neck (four steps), chest (four steps), shoulders (two steps), elbows(one step), hands and arms (10 steps), knee and legs (fife steps), ankles (two steps) and, toes (one step).

Scoring system: all nursing practice checklist procedure were rated on (done or not done) with scoring (done =1, not done= 0), a total global score of steps 100 for 100 steps, total score classified into two results based on statistical analysis:

- Satisfactory ≥75% this mean (75/100 scores)
- Un Satisfactory < 75% this mean (< 75/100 scores)

Pilot study:

A pilot study was carried out on four nurses (10%) of the total study sample to test clarity, applicability, relevance, and feasibility of the tools and to estimate the required time to fill in each form. Necessary modification was done according to the pilot study results. Pilot subjects were later excluded from the main study sample.

Field work*:*

After an official permission was taken from the dean of the faculty of nursing, and from the manager of Hehia Hospitals, the field work was lasted over a period of 12 month, starting from beginning of January 2025 to the end of December 2025. 2 months for pre-test from (beginning of January 2025 to end of February 2025), 7 months for implementation the program and immediately post-test from (beginning of March 2025 to the end of September 2025), 3 months after post-test follow up test was done from (beginning of October 2025 to the end of December 2025.The study was conducted in assessment, planning, implementation, and evaluation phases.

Assessment phase: The researcher visited the study setting, met with the directors and head nurses to explain the study aim and procedures, and to gain their approval and cooperation. This phase aimed to assess nurses' knowledge and practices regarding critical burn. It was conducted through one session (pretest). The information obtained served as baseline data and guided the researcher in the preparation of the educational program. Then, the researcher met with the nurses who fulfilled the eligibility criteria, explained to them the purpose of the study and its procedures as well as their rights, and invited them to participate. The interviews were done four days per week (Monday, Tuesday, Wednesday, and Thursday) during the morning and afternoon shifts from 9:00 am to 5:00 PM.

Planning phase: During this phase, the researcher designed the program based on review of the most recent and relevant literature, and under the guidance of the supervisors. The content of the program was developed based on this general aim in addition to specific objectives. It consisted of two main parts. The first part was theoretical, concerning critical burn care, knowledge include (skin anatomy and physiology of the skin and, skin functions) critical burn (definition of burn, causes of burn, pathophysiology of burn, classification of burn by depth and TBSA, phases of critical burn management (medical and nursing), and complication of critical burn). The second part was mainly practical. It involved critical burn wound dressing procedure, scar management procedure, rehabilitations exercise for critical burn patient, infection control and general nursing care.

Implementation phase:

The developed program was implemented in the form of sessions including theoretical, practical content, carried out in burn, surgery, and emergency units in Hehia hospital for nurses regarding care of critical burn. Each session started by a summary of the previous session, and objectives of the new one. Taking into consideration, the use of Arabic language that suits the level of the nurses. Emphasizing and reinforcement during session were used to enhance motivation.

The content of the program was distributed over 15 sessions. The first session was for orientation to clarify aim and contents of the program, its general objectives, the teaching methods, learner's activities, and evaluation methods as well as, number and time of theoretical and practical sessions, whereas the remaining sessions divided as follows: A total of nine sessions for the theoretical part, and 5 sessions for the practical part.

The first part: Theoretical part included: critical burn care, knowledge include (skin anatomy and physiology of the skin and, skin functions) critical burn (definition of burn, causes of burn, pathophysiology of burn, classification of burn by depth and TBSA, phases of critical burn management (medical and nursing), and complication of critical burn).

The second part: Practical part included:

1- Perform critical burn wound dressing procedure
2- Perform scar management procedure
3- Apply rehabilitation exercises
4- Know infection control measures.
5- Perform general nursing intervention for critical burn patient.

These sessions were conducted during the morning and afternoon shifts. Each session lasted one hour and started by a summary of the previous session and objectives of the new one. Nurses were divided into groups according to their shift and load of work, with average was attended 3-4 nurses in every class. The researcher used simple language to suit nurses' level, with motivation and reinforcement during sessions to enhance nurses' learning. The booklet was provided to each nurse on the first day of program implementation to use it as a future reference.

The researcher used various teaching methods which included lectures, group discussion, brainstorming, demonstration, and re-demonstration to attract nurses' attention and motivate them to participate. Various teaching media were used as photo, video-films, colored posters, illustrative pictures, and booklet. The researcher used observational checklists for patients' re-demonstration of each technique.

Nurses were allowed to ask any questions and encouraged to participate in the group discussion. The investigator was available all time to answer any questions and respond to any needs from nurses.

Evaluation phase:

After completing all sessions and ensure their competence, immediately post test to evaluate nurses' knowledge and practice regarding the care of critical patient with burn, then follow up after 3 months, to identify differences, similarities, and areas of improvement, as well as defects. The program evaluation was applied two times one before the program, the second immediately after the program.

Content validity& Reliability:

Testing validity: The researcher prepared the data collection tools in their preliminary form. They were then presented to a panel of five experts for face and content validation. These included five (assistant prof) in Medical Surgical Nursing from Faculty of Nursing, Zagazig University. They reviewed the tools for clarity, relevance, comprehensiveness, feasibility, and ease of implementation. All recommended modifications were made.

Testing reliability: The reliability of the tools was tested by using the internal consistency method. It was found that Cronbach's alpha reliability coefficient was above 0.86, which indicates the high tool internal consistency of the used tool

Statistical analysis:

The collected data organized, tabulated, and statistically analyzed using Statistical Package for Social Science (SPSS) version 25 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g., frequency, percentages, mean and standard deviation). Test of significance, qualitative variables were compared using Chi square test, quantitative variables were compared using paired t test and independent samples T test. Correlation coefficient test (r) was used to test the correlation between studied variables. Reliability of the study tools was done using Cronbach's Alpha. A significant level value was considered when $p < 0.05$ and a highly significant level value was considered when $p < 0.01$. No statistical significance difference was considered when $p \geq 0.05$.

Results:

Table 1: displays frequency and percentage distribution of the studied nurses according to their demographic characteristics. It was found that more than two thirds (70%) of studied nurses' age was ≥30 years with the mean age 32.62± 4.78 and the majority (85%) of studied nurses were females. Regarding to studied nurses' qualification less than half (45%) had nursing technical institute and less than quarter (20%) bachelor's degree. Also, nearly two thirds (67.5%) had years of experience critical burns department unit <10 years and / more than half (55.0%) did not attain any training course related to critical burns management.

Table 2: displays frequency and percentage distribution between pre, post and follow up program phases according to total knowledge of studied nurses regarding critical burn injury. It was found that less than quarter (22.5%) of study nurses had satisfactory total knowledge level in preprogram phase with Mean± SD =45.85±11.26, while increased to the majority (85.0%) in post program phase with Mean± SD =64.27±6.50 and 82.5% in follow-up phase had satisfactory knowledge level with Mean± SD =63.27±5.85. Also, this table confirms that, there was a high statistically significant difference between pre/post and pre/follow up program phase as regarding to the total nurses' knowledge about care of critical burn with p value 0.001.

Table 3: displays frequency distribution of nurses' total level of practice regarding critical burn care throughout study phases. It was found that in preprogram phase less than one third (30.0 %) of study nurses had competent practice level regarding critical burn wound dressing increased post program phase to the most (95.0 %) and decelerated to the majority (87.5 %) of the studied nurses in follow up phase. Also, in preprogram phase less than quarter (27.5 %) of study nurses had competent practice level regarding critical burn scare management increased post program phase to the most (95.0 %) and decreased to the majority (82.5 %) of the studied nurses in follow up phase. Moreover, this table shows that, in preprogram phase less than quarter (20.0%) of study nurses had competent practice level regarding critical burn rehabilitation exercise increased to the most (95.0 %) post program phase and slightly decelerated to the majority (87.5 %) of the studied nurses in follow up phase. Also, this table confirmed that, there was a highly statistically significant difference between pre / post and pre / follow up program phase regarding to the total score for nurses' practice (critical burn wound dressing, burn scare management and rehabilitation exercise) with p value 0.000.

Table 4: displays percentage distribution of studied nurses'

level of total practice regarding critical burn care throughout study phases. It was found that in preprogram phase one quarter (25.0%) of study nurses had competent practice level. While increased post program phase to most (92.5%) and decreased to 80.0% in follow up phase. Also, there were high statistically significant differences between pre / post and pre / follow up program phase regarding to the total score for nurses' practice about critical burn care with p value 0.000.

Table 5: displays relation between demographic characteristics of studied nurse's and their total knowledge score throughout study phases. It was found that there was high a statistically significant relations between the studied subjects' knowledge and their age in post and follow up program phases ($p < 0.001$). Also, there were statistically significant relations between the studied subjects' knowledge and their qualification in post program phase of ($p < 0.05$). Moreover, there were high statistically significant relations between the studied subjects' knowledge and their qualification in pre and follow up program phases of ($p < 0.001$). Finally, there were statistically significant relations between the studied subjects' knowledge and training courses in post program phases of ($p < 0.05$)**.**

Table 6: shows relation between characteristics data of studied nurse's and their total practice score throughout study phases. It was found that there was statistically significant relation between age of studied nurse's and their total practice score in post program study phase. ($p = 0.012$). In the other hand there was a highly statistically significant difference between nurses' attitude and training course in preprogram study phase at $p<0.001$.

Discussion:

Critical burns are typically defined as those involving more than 20–30% of the total body surface area (TBSA), inhalation injuries, or burns in vital areas such as the face, hands, and perineum. The incidence of critical burns remains a significant public health concern worldwide, with high morbidity and mortality rates, especially in low- and middle-income countries **(AL Harthi ., 2025).**

Nurses are responsible for early assessment, fluid resuscitation, wound care, pain management, infection prevention, and psychological support. Evidence shows that effective nursing knowledge and practice reduce patients' complications such as sepsis, organ failure, contractures, decreased mortality and shorter hospital stays among critically burned patients, and enhance patient outcomes **(Ali et al., 2021) & (Mohamed & Elsayed, 2023).**

Regarding personal characteristics of studied nurses, the present study showed that more than two thirds of studied nurses' age was ≥30 years and most of them were females. Regarding to studied nurses' qualification, less than half had nursing technical institute and less than quarter had bachelor's degree. Also, nearly two thirds had years of experience in critical burns department unit <10 years and more than half of did not attain any training course related to critical burns management.

This study was agreement with **(Abd El-Moneim et al., 2020)** who found that the majority of nurses were female, and approximately 70 of them were graduated from the technical nursing institute, this study was agreement with **(Aiken et al.,2021),** who found that less than half of study had nursing technical institute and higher educational preparation among nurses is strongly linked to improved patient outcomes, Also this study was agreement with **(Kumar et al.,2019),** who found that two third of nurses had years of experience in critical burns department unit <10 years and limited experience may affect nurses' confidence and competency in managing critical burn patients particularly in emergency situations, also this study was disagreement with **(Mohamed & Ahmed ,2022)** , who found that two third of studied nurse didn't attain any training course related to critical burn management .

Concerning percentage distribution total knowledge of studied nurses regarding critical burn injury, the current study showed that less than quarter of studied nurse had satisfactory total knowledge level in preprogram phase, while the majority of them in post and follow-up program phase had satisfactory knowledge level. Also, this study confirms that, there was a high statistically significant difference between pre/post and pre/follow up program phase as regarding to the total nurses' knowledge about care of critical burn.

This study was in agree with **(Abd El-Moneim et al., 2020**), who showed that reported a significant improvement in total nurses' knowledge and skills following the implementation of a structured critical burn care training program.

Concerning the distribution of nurses' total level of practice regarding critical burn care, the current study reported that study nurses in preprogram phase had competent practice level regarding critical burn wound dressing, critical burn scare management, and critical burn rehabilitation exercise while increased post and follow up phase. Also, current study confirmed that, there was a highly statistically significant difference between pre / post and pre / follow up program phase regarding to the total score for nurses' practice (critical burn wound dressing, burn scare management and rehabilitation exercise).

This study was congruence with **(Ali et al.,2019),** who

revealed that the educational or training interventions implemented had a positive impact on improving nursing practices regarding burn wound dressing, critical burn scare management, and critical burn rehabilitation exercise.

Concerning the distribution of studied nurses' level of total practice regarding critical burn care, the present study revealed that study nurses in preprogram phase had competent practice level while increased post and follow up phase. Also, current study confirmed that there were high statistically significant differences between pre / post and pre / follow up program phase.

This study was in correspondence with **(El-Sayed et al., 2021)**, who stated that marked improvements in nurses' practice regarding care of critical burn.

Concerning the relation between demographic characteristics of studied nurse's and their total knowledge score, the current study reported that there were high a statistical significant relations between the studied subjects' knowledge and their age in post and follow up program phases, there were statistically significant relations between the studied subjects' knowledge and their qualification in post program phase , there were high statistically significant relations between the studied subjects' knowledge and their qualification in pre and follow up program phases .Also the study show that there were statistically significant relations between the studied subjects' knowledge and training courses in post program phases.

This study was congruence with **(Kaddoura 2013**), who reported that significant relationships between nurses' demographic characteristics (such as age, qualification, and training) and their knowledge.

Concerning the relation between characteristics data of studied nurse's and their total practice score, the current study reported that there was statistically significant relation between age of studied nurse's and their total attitude score in post program study phase. Also, the study shows that there was a highly statistically significant difference between nurses' attitude and training course in preprogram study phase.

This study was supported by **(Radzikowska-Büchner et al., 2023**), who reported that there was statistically significant relation between age of studied nurse's and their total attitude score in pre and post program study phase.

Conclusion:

Based on the findings of the present study it can be concluded that, less than quarter of study nurses had satisfactory knowledge level regarding care of critical burn in preprogram phase increased to majority of them in post program phase. A quarter of study nurses had competent practice level regarding care of critical burn in the preprogram phase, increased to the most in post program and follow up phase. There was a statistically significant relation between total nurses' knowledge and total nurses' practice in before and after the program. Therefore, it can be concluded that improving nurses' knowledge and practice regarding the care of critical patient with burn.

Recommendation:

1- Develop or upgrade a dedicated critical burn unit equipped with modern technology, isolation rooms, and intensive monitoring systems. Ensure availability of telemedicine consultation for rural or non-specialized centers.

2- Ensure the unit includes multidisciplinary teams (critical burn surgeons, nurses, anesthetists, physiotherapists, nutritionists, and psychologists).

Suggestion for further studies:

Further studies are needed to identify barriers that hinder optimal nurse performance and facilitators that can enhance the quality of care of critical burn

Table 1: Frequency and percentage distribution of the studied nurses according to their demographic characteristics (n=40).

Demographic Characteristics	No.	%
Age		
<30	12	30.0
≥30	28	70.0
Range	25.0 – 41.0	
Mean ± SD.	32.62± 4.78	
Gender		
Male	6	15.0
Female	34	85.0
Qualification		
Nursing Diploma	14	35.0
Nursing Technical Institute	18	45.0
Bachelor's Degree in Nursing	8	20.0
Years of experience critical burns department unit		
<10	27	67.5
≥10	13	32.5
Range	4.0 – 20.0	
Mean ± SD.	9.85± 5.08	
Training course		
Yes	18	45.0
No	22	55.0

Table 2: Frequency and percentage distribution between pre, post and follow up program phases according to total knowledge of studied nurses regarding critical burn injury (n=40)

Total knowledge	**Pre**		**Post**		**Follow up**		**χ2 (P- value) Pre/post**	**χ2 (P value) Pre/FU**
	No	**%**	**No**	**%**	**No**	**%**		
Satisfactory ≥ 75 %	9	22.5	34	85.0	33	82.5	31.427 (<0.001*)	28.872 (<0.001*)
Unsatisfactory <75	31	77.5	6	15.0	7	17.5		
Mean± SD	45.85±11.26		64.27±6.50		63.27±5.85		H=53.896	(<0.001*)

*** Statistically significant at p ≤ 0.05; (H) Kruskal Wallis test (χ2) chi square test**

Table 3: **Frequency distribution of nurses' total level of practice regarding critical burn care throughout study phases (n=40)**.

Items nurses' total level of practice	Total competent practice ≥ 75%						χ2 (P- value) Pre/post	χ2 (P value) Pre/FU
	Pre		Post		Follow up			
	No.	%	No.	%	No.	%		
Wound Dressing	12	30.0	38	95.0	35	87.5	36.053 (<0.001*)	27.286 (0.018*)
Mean± SD	25.05±8.02		35.35±4.41		32.55±3.68		H=43.884	(<0.001*)
Burn Scare Management	11	27.5	38	95.0	33	82.5	38.394 (<0.001*)	24.444 (<0.001*)
Mean± SD	9.80±3.14		14.02±1.36		12.97±2.39		H=36.720	(<0.001*)
Rehabilitation Exercise	8	20.0	38	95.0	35	87.5	46.036 (<0.001*)	36.656 (<0.001*)
Mean± SD	26.30±7.37		36.42±3.79		33.12±3.3		H=45.762	(<0.001*)

*** Statistically significant at p ≤ 0.05; (H) Kruskal Wallis test (χ2) chi square test**

Table 4: percentage distribution of studied nurses' level of total practice regarding critical burn care throughout study phases (n=40).

Total Practice	Pre		Post		Follow up		χ2 (P- value) Pre/post	χ2 (P value) Pre/FU
	No.	%	No.	%	No.	%		
Satisfactory ≥ 75%	10	25.0	37	92.5	32	80.0	37.602 (<0.001*)	24.261 (<0.001*)
Un Satisfactory <75%	30	75.0	3	7.5	8	20.0		
Mean± SD	61.15±16.60		85.80±8.21		78.65±6.97		H=51.454	(<0.001*)

*** Statistically significant at p ≤ 0.05 (H) Kruskal Wallis test (χ2) chi square test**

Table 5: Relation between demographic characteristics of studied nurse's and their total knowledge score throughout study phases (n=40).

Demographic characteristics	Pre				Post				Follow up			
	Satisfactory		Un-Satisfactory		Satisfactory		Un-Satisfactory		Satisfactory		Un-Satisfactory	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (year)												
<30	1	2.5	11	27.5	7	20.0	5	10.0	6	15.0	6	15.0
≥30	8	20.0	20	50.0	27	67.5	1	2.5	27	67.5	1	2.5
$\chi 2$(p)	1.937(0.233)				9.561(0.006*)				12.542 (0.001*)			
Gender												
Male	1	2.5	5	12.5	4	10.0	2	5.0	6	15.0	0	0.0
Female	8	20.0	26	65.0	30	75.0	4	10.0	27	67.5	7	17.5
$\chi 2$(p)	0.138 (0.590)				1.861 (0. 215)				1.497(3.43)			
Qualification												
Nursing Diploma	1	2.5	13	32.5	9	22.5	5	12.5	7	17.5	7	17.5
Nursing Technical Institute	3	7.5	15	37.5	17	42.5	1	2.5	18	45.0	0	0.0
Bachelor's Degree in Nursing	5	12.5	3	7.5	8	20.0	0	0.0	8	20.0	0	0.0
$\chi 2$(p)	9.585(0.007*)				7.383(0.028*)				15.758(<0.001*)			
Years of experience critical burns department unit												
<10	4	10.0	23	57.5	22	55.0	5	12.5	20	50.0	7	17.5
≥10	5	12.5	8	20.0	12	30.0	1	2.5	13	32.5	0	0.0
$\chi 2$(p)	2.814 (0.120)				0.807 (0.643)				4.085(0.074)			
Training course												
Yes	6	15.0	12	30.0	18	45.0	0	0.0	17	42.5	1	2.5
No	3	7.5	19	47.5	16	40.0	6	12.5	16	40.0	6	15.0
$\chi 2$(p)	2.203(0.253)				5.775(0.024*)				3.234 (0.105)			

Statistically significant at p ≤ 0.05 **($\chi 2$) chi square test**

Table 6: Relation between characteristics data of studied nurse's and their total practice score throughout study phases (n=40).

Demographic characteristics	Pre				Post				Follow up			
	Competence		In-competence		Competence		In-competence		Competence		In-competence	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age (year)												
< 30	4	10.0	8	20.0	9	22.5	3	7.5	9	22.5	3	7.5
>30	6	15.0	22	55.0	28	70.0	0	0.0	23	57.5	5	12.5
$\chi 2$(p)	0.635 (0.693)				7.568 (0.022*)				0.268 (0.677)			
Gender												
Male	0	0.0	6	15.0	5	12.5	1	2.5	3	7.5	3	7.5
Female	10	25.0	24	60.0	32	80.0	2	5.0	29	72.5	5	12.5
$\chi 2$(p)	2.353 (0.307)				0.855 (0.394)				3.971 (0.082)			
Qualification												
Nursing Diploma	4	10.0	10	25.0	14	35.0	0	0.0	13	32.5	1	2.5
Nursing Technical Institute	5	12.5	13	32.5	16	40.0	2	5.0	14	35.0	4	10.0
Bachelor's Degree Nursing	1	2.5	7	17.5	7	17.5	1	2.5	5	12.5	3	7.5
$\chi 2$(p)	0.836 (0.769)				1.762 (0.424)				3.033 (0.238)			
Years of experience critical burns department unit												
<10	7	17.5	20	50.0	24	60.0	3	7.5	20	50.0	7	17.5
≥10	3	7.5	10	25.0	13	32.5	0	0.0	12	30.0	1	2.5
$\chi 2$(p)	0.038 (1.00)				1.562 (0.538)				1.823 (0.263)			
Training course												
Yes	4	10.0	14	35.0	16	40.0	2	5.0	13	32.5	5	12.5
No	6	15.0	16	40.0	21	52.5	1	2.5	19	47.5	3	7.5
$\chi 2$(p)	0.135(0.714)				0.615(0.579)				1.237(0.430)			

Statistically significant at $p \leq 0.05$ **($\chi 2$) chi square test**

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