Effect of Training Program on Nurses' Competence in Performing Primary Survey and Emergency First Aid for Patients with Severe Thermal Burn Injuries

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Abstract

Background*:* Thermal burns are the most common type burn due to exposure heat source in the form of scalds and flame and radioactivity or radiation. Primary survey and emergency first aid have effective role in patients' outcomes. **Study aim*:*** Evaluate the effect of training program on nurses' competence in performing primary survey and emergency first aid for patients with severe thermal burn injuries. **Design*:*** A quasi-experimental design. **Setting*:*** Institute of Burns in central Hehia hospital at Al Sharkia governorate of Egypt. **Subject*:*** A convenience sample of available nurses (50), who work in the previously mentioned setting. **Tools*:*** A self-administered questionnaire to assess demographic characteristics of nurses and their knowledge about burns and primary survey and emergency first aid; observational checklists to assess nurses' practice regarding primary survey and emergency first aid for severe thermal burn injuries. **Results*:*** All nurses' knowledge and practice dimensions were improved post implementing program with a statistically significant difference and improvement in total nurses' knowledge and practices, with the percent of improvement equal to 78.3% and 81.7%, post program respectively. **Conclusions*:*** The intervention program has a positive effect in improving nurses' performance (knowledge and practice) regarding primary survey and emergency first aid regarding severe thermal burn injuries. **Recommendations*:*** More research should be conducted with a large sample size and in different contexts to assess the impact of the program on nurses' performance and make generalizations.

Keywords: Training program, Nurses' competence, Primary Survey, Emergency First aid, Thermal Burn Injuries.

Introduction:

Burns are defined by the **World Health Organization (2018)** and **Sharma & Garg (2019)** as "an injury or damage to the skin or other organic tissue generally caused by heat exposure in the form of scalds and flame and radioactivity or radiation, electricity, friction, and chemical contacts." According to **Toppi, Cleland, and Gabbe (2019),** burn illness is a global health issue that has unwarranted social repercussions. Most hospital admissions due to burns are from thermal burns, which are brought on by exposure to heat sources like flames, scalds, or contact with hot items. In addition to the degree and depth of tissue damage, systemic complications such as shock, infection, and multi-organ dysfunction also affect how severe thermal burns are **(Pereira, Murphy, & Herndon, 2021).**

Thermal burns can result in capillary leakage, direct cellular damage, and a systemic inflammatory response that, if left untreated, can cause burn shock and hypovolemia **(Duarte, Ferreira & Santos, 2021).** The development of infection and ischemia in burn injuries highlights the significance of prompt therapies that prevent further tissue damage. In addition to having a higher chance of sepsis, carbon monoxide poisoning, and inhalation injury, patients with severe burns are also more likely to die young **(Galeiras, Lorente & Quintela, 2021).** Children and young adults are disproportionately affected; adults are more likely to sustain flame burns, while children are more likely to sustain scald injuries **(WHO, 2023).**

The severity of burns is determined by how much of the skin is affected. First-degree burns only damage the epidermis, the skin's outermost layer. A first-degree burn usually leaves the skin red and dry, but no blisters have formed. Burns of the second degree can be superficial, partial, or deep, and they affect the epidermis as well as a portion of the dermis, which is the layer of skin beneath the surface.

Some of the upper dermis is impacted by a partial-thickness second-degree burn, whereas the entire lower dermis is destroyed by a deep partial-thickness second-degree burn **(Joye, 2020).**

The first line of treatment for burns is first aid **(Fadeyibi et al., 2015**). In life-threatening situations, first aid refers to the initial, prompt, and temporary care provided to an injured or ill individual while taking effective action to keep them alive. According to **Raje et al. (2017)** and **Mathew et al. (2016),** a first aid giver should be able to handle life-threatening situations outside of a hospital's controlled setting and swiftly and calmly analyze the situation. First aid aims to avoid additional disease or damage, alleviate suffering, promote recovery, and preserve life **(Zidemana et al., 2021).** Having a basic grasp of first aid can help people give emergency care, perhaps saving lives and reducing injuries **(Ramesh et al., 2020).**

The standard primary survey (ABCDE) is used to assess the burned patient first. The airway must be protected at all costs. Patients' airways and respiratory conditions may be compromised by burns to the face, upper airway, or lower airway inhalation injury. Mechanical ventilation and endotracheal intubation may be required if resources allow. According to **Muir, Stafford, and Ozhathil (2023),** obtaining dependable vascular access is crucial and can be accomplished through intraosseous access, peripheral IV, or central venous catheter implantation. Mass burn victims will be given priority in emergency rooms, and those who have been burned will receive emergency care **(Lam, Huong & Tuan, 2018).**

The foundation of the initial nursing assessment for severe thermal burns is still the primary survey, which was modified from the trauma life support model. In order to prioritize life-threatening illnesses, nurses are essential in the systematic assessment of airway, breathing, circulation, disability, and exposure (ABCDE) **(Kramer, Leung, & McGovern, 2022).** When an inhalation injury is suspected, airway examination is particularly critical since prompt airway care can stop the condition from rapidly getting worse. Similarly, a nursing duty that has a direct influence on results is circulatory evaluation with fluid resuscitation based on total body surface area (TBSA) estimation **(Mehta, 2023).** In the hectic initial moments following an injury, the structured primary survey guarantees that no crucial component of care is missed.

Studies reveal variations in nurses' knowledge and adherence to optimal practices in burn emergency care, even in the face of international guidelines **(Abbas, El-Masry & Hassan, 2022).** Effective management is still hampered by deficiencies in TBSA estimate, fluid resuscitation, airway detection, and wound care. Competency-based checklists, simulation training, and educational interventions have all been shown to be successful in enhancing nurses' abilities and self-assurance when managing burn emergencies **(Ahuja & Bhattacharya, 2021).** To improve patient outcomes, lower complications, and guarantee adherence to updated standards of care, nurses must become more proficient in emergency first aid and the primary survey.

According to **Dulandas and Brysiewicz (2018),** emergency nurses are at the frontline of hospital service delivery and are frequently the first to engage with and tend to sick and injured patients. Along with having the requisite understanding of the physiological effects of burns, nurses who care for burn patients should be able to promptly assess and react to even the smallest changes in their patients' circumstances. Therapists could build a compassionate relationship with patients and their loved ones at the beginning of treatment. Nurses are important. The increase in survival rates can be attributed to advancements in a number of areas, including resuscitation, surgical and anaesthetic techniques, infection control, nutritional and metabolic support, and more **(Ignatavicius et al., 2021).**

The specialty of a burn care nurse is treating patients with burn injuries, many of whom have also suffered from other types of trauma. In addition to treating and keeping an eye on burn injuries, the burn care nurse is essential in evaluating the emotional and psychological stress that frequently follows a burn. A unique multidisciplinary approach is needed to provide the burn patient with the best

care possible. According to **Tirgari, Mirshekari, and Forouzi (2018),** the burn nurse is the coordinator of all patient care activities and is at the core of the burn care team. The team's makeup and tight communication among its members are critical to positive patient outcomes.

Nurses who care for burn patients should be sufficiently knowledgeable about the physiological effects of burning and be able to analyze and make decisions quickly when minor changes in the patient's condition occur **(Ghezeljeh et al., 2019).** Burn care nurses assist burn sufferers with post-trauma therapy, recuperation, and acute trauma treatment. In order to effectively manage burn patients, nurses working in burn units should have a great deal of knowledge and experience in burn care **(Ali & Abdel-Hakeim, 2018).**

Significance of the study:

Burn injuries are thought to be the cause of 180,000 deaths per year, making them a serious global public health concern. According to **Murray (2020), Thomson et al. (2020),** and **Odondi, Shitsinzi, and Emarah (2020),** burns rank as the fourth most common type of trauma globally and are a leading cause of death and disability in developing nations. About 90% of burns are caused by thermal injuries, which are common in adults and can result in complications from smoke inhalation. Usually requiring surgical intervention, they are deep (partial or complete thickness) **(Schaefer & Tannan, 2022).** Emergency nurses play a crucial part in first aid response, which is a crucial aspect of emergency healthcare. Therefore, in order to provide prompt and efficient care to individuals impacted by emergencies, training, skills, and dedication are crucial. Emergency nurses are frequently the first medical personnel on the scene and are essential in this case. They have to evaluate the situation fast, prioritize patients according to the extent of their injuries, and start life-saving measures. Emergency nurses must participate in training and education programs in order to remain equipped and skilled in managing the many facets of emergency response, such as burn management, infection control, mass casualty management, and triage. In addition to helping nurses keep up with the latest procedures and management best practices, these trainings and programs also guarantee that nurses are knowledgeable about these topics **(Olorunfemi & Adesunloye, 2024).**

Aim of the study:

The current study aimed to evaluate the effect of training program on nurses' competence in performing primary survey and emergency first aid for patients with severe thermal burn injuries through the following objectives:

- Assess nurses' baseline knowledge regarding primary survey and emergency first aid for patients with severe thermal burn injuries before implementation of the training program.
- Evaluate nurses' baseline skills in performing primary survey and emergency first aid for patients with severe thermal burn injuries.
- Design and implement a training program tailored to improve nurses' knowledge and skills related to primary survey and emergency first aid for severe thermal burns.
- Examine the effect of the training program on nurses' knowledge and skills competence concerning primary survey and emergency first aid for severe thermal burn injuries.

Research hypotheses:

The following research hypotheses were created to reach the study's objective:

H1: Nurses' knowledge scores regarding primary survey and emergency first aid for severe thermal burn injuries will significantly improve after implementation of the training program compared to their pre-intervention scores.

H2: Nurses' skills in performing primary survey and emergency first aid for patients with severe thermal burn injuries will significantly improve after implementation of the training program compared to their pre-intervention performance.

H3: Nurses' overall knowledge and skills competence in performing primary survey and emergency first aid for severe thermal burn

injuries will significantly improve after implementation of the training program.

Operational definitions:

- Training Program: a structured educational intervention (lectures, demonstrations, hands-on simulation, printed booklet and other materials) lasting 6 months over 15 sessions (practical and theoretical).

- Nurses' Competence: composite of practical skills and knowledge required to perform primary survey and emergency first aid for severe thermal burn injuries. It measured by: (a) knowledge questionnaire score, (b) observed clinical competence checklist score.

- Primary Survey: the rapid assessment sequence ABCDE (Airway, Breathing, Circulation, Disability, and Exposure) applied to burn patients.

- Severe Thermal Burn Injuries: burns classified as partial-thickness >20% TBSA (adult), any full-thickness burn, burns involving hands/face/perineum/major joints, inhalation injury, electrical/chemical burns.

Subjects and Methods:

Research design:

This study used a quasi-experimental research design with one group and testing before and after the intervention. The goal of a quasi-experimental study is to find a causal relationship between the independent and dependent variables. **Loewen and Plonsky, (2016)** state that the independent variable is the one that is influencing, while the dependent variable is the one that is impacted.

Setting:

The study was conducted in Institute of Burns in central Hehia hospital at Al Sharkia governorate of Egypt. The Specialized Institute of Burns is located in the central Hehia hospital; it about four floors. The first floor for first aid of burns with four beds and room for CPR; Second floor for male (10) beds with isolation room; Third floor for operations and economic department; Fourth floor for female (12) beds with isolation room.

Subjects:

A convenience sample included all available nurses (50) working in the above mentioned setting, provided direct patient care, work experience at least one year and acceptance to participate in the study.

Tools of data collection:

There were two tools used for data collection:

Tool I: Nurses' Self-Administered Questionnaire: It was designed in Arabic language. It was developed by the researchers based on pertinent literature review **(Burn and reconstructive centers of America, 2020; National Burn Centre Review Committee, 2020; Australian and New Zealand Burn Association, 2019; British Burn Association, 2016; Mehta, 2019; Shpichka et al., 2019; International Federation of Red Cross and Red Crescent Societies, 2011)**. It consists of 87 questions covered four parts as the following:

A. **Part 1. Demographic data of nurses:** Seven close ended questions that included data on the nurses' age, sex, marital status, qualification, years of experience burns department, attendance of training courses about burns and presence of guidelines or booklet about primary survey and first aid for severe thermal burns.

B. Part 2. Nurses' knowledge assessment questionnaire:

- **Section 1: Nurses' knowledge about skin and severe thermal burns:** This part was focused on assess nurses' knowledge regarding skin and burns. It was contained "30" multiple-choice questions (MCQ) such as anatomy and physiology of the skin, layers of skin, functions of skin, definition of burn, pathophysiology of burn, causes and types of burn, degrees of burn and clinical manifestation, complications of burns, factors affecting severity of burn, methods of assessing extent of burns, differentiate between first, second and third degrees of burns, the most dangerous burn areas, the most painful type of burn, precautions for blisters.

- **Section 2: Nurses' knowledge about primary survey and triage:** It included 20 multiple-choice questions (MCQ) concerned with assess nurses' knowledge regarding primary survey and triage for burns, as priority of burns

and triage for mass burn injuries, assess breathing and airway, assess circulation, neurological assessment, signs of airway obstruction /inhalation injury, signs of neurovascular compromise, pain assessment, assess the patient for signs of carbon monoxide (CO) poisoning, determine burn surface area or estimate TBSA by rule of nine.

- **Section 3: Nurses' knowledge about emergency first aid for severe thermal burn:** It included 30 multiple-choice questions (MCQ) concerned with assess nurses' knowledge regarding emergency first aid for severe thermal burn, as airway management, fluid replacement, maintain fluids and electrolyte balance, pain management and analgesics used, prevent infection, nutritional support, purpose of keeping nothing per oral (NPO) and insert nasogastric tube (NGT), signs and symptoms of hypovolemic shock and its management, investigations, measure urine output, contraindications, complications of immerse severe burns in cold water, prevent hypothermia, the initial step taken immediately after a burn injury, first aid for thermal, concept of the Parkland formula, appropriate methods of fluid resuscitation, normal urine output for fluid resuscitation of adult burned patient and indication for intubation.

Knowledge scoring system: Each knowledge item consisted of multiple-choice questions with four possible answers. "One" represented the point value for every correct response, while "Zero" represented the score value for every incorrect response. The area's mean score was calculated by adding up all of the item scores, dividing that sum by the number of items, and converting the results into percentage scores. Statistical analysis and data entry revealed that the test's total knowledge score was 70. Any percent score above 70% indicated that the nurse's knowledge was satisfactory, and any score below 70% indicated that the nurse's knowledge was unsatisfactory.

Tool II: Nurses' clinical competence observational checklists:

Eight observational checklists in form of Primary survey and First aid (ABCDEF) steps were used to assess the satisfactory of nurse's practical skills toward primary survey and emergency first aid regarding severe thermal burn injuries which included: A. Airway maintenance with cervical spine control (3 steps), B. Breathing and ventilation (9 steps), C. Circulation with haemorrhage control (5 steps), D. Disability: neurological status assessment (3 steps), E. Exposure, environmental control and estimate burn size (7 steps), F. Fluid resuscitation (10 steps), N. Nutrition (2 steps) and P. Pain relief and prevent infection (3 steps). They adopted from **(ACI Statewide Burn Injury Service, 2019; British Burn Association, 2018; European Burns Association, 2017; Australian and New Zealand Committee 2016; Indian Red Cross Society National Head quaters, 2016& State Disaster Management Authority, 2014).**

Practice scoring system: was done by giving a "One" to each practice step that was seen to be completed correctly and a "Zero" to those that weren't. The item scores for each practice area were added up and divided by the total number of items to determine the area's mean score. Percentage scores were generated from these scores. Data entry and statistical analysis were used to determine if a practice's percent score was satisfactory if it was above or equal to 80% and unsatisfactory if it was below 80%. Given the crucial situation the nurse is in, which calls for a very high level of knowledge and expertise, a high threshold was established.

Primary survey and emergency first aid training program:

It was made by the researchers when conducting the assessment. It was created to improve nurses' practice competency for severe thermal burn injuries while also updating and renewing their knowledge of primary survey and emergency first aid. Based on professional opinions and an analysis of relevant material (nursing textbooks, journals, and internet sources), a booklet in Arabic is produced about emergency first aid and primary survey for severe thermal burn injuries. Nurses' knowledge and practice before and after the intervention program were compared in order to assess the training program's efficacy.

Tools validity and reliability:

Five experts from various medical and nursing specialists were consulted before the data collection tool's content validity was

assessed. There were two professors of medical-surgical nursing, one professor of critical nursing, and two burn specialists from Zagazig University Hospital on the panel. The tools' relevance, completeness, clarity, and convenience of administration were evaluated by these specialists. Small changes were made in response to the expert's recommendations. Each tool's items were assessed for internal consistency reliability using the Cronbach's Alpha test. It was 0.80 for the first tool, which assessed nurses' knowledge, and 0.92 for the second, which assessed nurses' practice in handling severe thermal burn injuries using emergency first aid and primary surveys.

Ethical consideration:

Written consent was obtained from the dean of the faculty and the Zagazig University Faculty of Nursing's Research Ethics Committee (REC) (ID/ ZU. Nur. REC://308-12/1/2025) before the study began. For official approval, the directors of the study settings were also consulted. To achieve the highest level of participation and to get ready for the participants' presence, an oral agreement was also obtained prior to data collection after educating participating nurses about the study's nature, goal, and methodology. It was also explained to the participants that they might leave the study at any moment. Strict confidentiality guidelines were followed during the trial, and all nurses received assurances that their information would only be utilized for research.

Pilot study:

A pilot study using 10% (five) of the total study sample was performed to test the tools' applicability, comprehensiveness, clarity, relevance, comprehension, and simplicity of use. Estimating the time required to finish these forms was another goal. Due to revisions made in accordance with the advice of experts, nurses who participated in the pilot study were not included in the main study sample.

Field work:

Three stages were used to perform the study as the following:

(1) The preparatory stage:

- Data for the current study was gathered between February 1st, 2025, and July 31st, 2025. The training program required six months to complete, which included one month for the pre-program phase, one month for the theoretical component, three months for the practical component, and one month for the collection of post-program data. The directors of the study setting (Institute of burn) and central Hehia hospital granted the researchers all the licenses they needed during the preparation phase.

- In order to keep the directors' cooperation throughout the data collection process and to schedule the study so that it does not interfere with the nurses' work, the researchers visited the study settings, talked with the directors, and explained the purpose of the study and the information gathering process. Prior to inviting each nurse to participate, the researchers had informed them of their rights and gone over the purpose of the study and the data gathering process with them.

- The nurses who consented were instructed on how to fill out the self-administered questionnaire, which was intended to determine the nurses' actual comprehension of emergency first aid and main survey in relation to severe thermal burn injuries. The researchers were always available to address any questions or provide clarification. The completed forms were then gathered and their accuracy confirmed. Each nurse needed fifteen to twenty-five minutes doing this. Each nurse was watched doing their routine patient care tasks, and eight observational checklists were utilized to evaluate the nurses' primary survey and emergency first aid procedures with reference to severe thermal burn injuries.

(2) The implementation stage:

- The researchers turned the needs they had identified into goals after the assessment phase, and they then created the training program based on the study's objectives, the nurses' educational backgrounds, and their previously evaluated proficiency. Improving and updating nurses' knowledge of and approach to emergency first aid and primary survey in relation to severe thermal burn injuries was its main goal.

- Every study participant received a copy of the training program, which was created as a booklet in an easy-to-understand Arabic language in accordance with the most recent and updated guidelines for primary survey and emergency first aid regarding severe thermal burn injuries published by the **Ministry of Health & Family Welfare Government of India, (2022); the American Burn Association, (2019); and the NSW Agency for Clinical Innovation, (2019).** Expert recommendations, evaluations, and reviews of pertinent literature (nursing books, publications, and online resources) were also taken into consideration.

- The program's training sessions' theoretical and practical components were planned in collaboration with nurses by the researchers. Since they couldn't be gathered all at once, the nurses were split up into ten groups, each with five nurses. In the morning and afternoon shifts, the researchers were accessible three days a week. Over the course of "13" educational sessions, researchers conducted the following training program (five for the theoretical portion and eight for the practical portion), as follows:

A. ***The theoretical part*** was carried out over the five sessions, which covering three sections:

- ***The first section*** covered skin and burn (introduction about anatomy and physiology of the skin, layers of skin, functions of skin, definition of burn, pathophysiology of burn, causes and types of burn, degrees of burn and, clinical manifestation, complications and factors affecting severity of burn, methods of assessing extent of burns, differentiate between first, second and third degrees of burns, inhalation burn, blisters);

- ***The second section*** covered primary survey and triage (primary assessment, priority of burns and triage for mass burn injuries, the most dangerous burn areas, assess airway and breathing, assess circulation, neurological assessment, signs of airway obstruction /inhalation injury, signs of neurovascular compromise, pain assessment, carbon monoxide (CO) poisoning, estimate TBSA by rule of nine);

- ***The third section*** covered emergency first aid for severe burn injuries **(** airway management, fluid replacement and equation, maintain fluids and electrolyte balance, pain management and analgesics used, prevent infection**,** nutritional support, Hypovolemic shock management, investigations, measure urine output, contraindications, prevent hypothermia, the initial step taken immediately after a burn injury**,** first aid for thermal, Parkland formula, appropriate methods of fluid resuscitation , normal urine output for fluid resuscitation and indication for intubation) .The duration of each session ranged from 35 to 45 minute.

B. ***The practical part*** was applicated over the eight sessions, which contained the A. Airway maintenance with cervical spine control, B. Breathing and ventilation, C. Circulation with haemorrhage control, D. Disability: neurological status, E. Exposure, environmental control and estimate burn size, F. Fluid resuscitation, N. Nutrition and P. Pain relief and Prevent infection. Each practical session is 60 minutes long and often begins with an overview of the subjects covered in the previous sessions as well as the goals of the one that will follow. One strategy to motivate the interested nurses during the training program's implementation was to acknowledge and/or praise them.

- The training program was delivered through a presentation, group discussions, role-playing, and the re-demonstration of numerous previous practical skills. To help illustrate the program's practical component, a range of educational materials were provided, such as posters, brochures, coloured handouts, audiovisual materials, and actual equipment.

(3) The evaluation stage:

The effect of the training program on nurses' proficiency in performing emergency first aid and primary survey in relation to severe thermal burn injuries was assessed by a post-test that was given using the same pretest forms or instruments. The success or efficacy of a training program was evaluated by comparing the pre-intervention (assessment) and post-intervention phases.

Statistical analysis of the data:

The statistical analysis, tabulation, and collection of all data were conducted using SPSS 23.0 for Windows (SPSS Inc., Chicago,

IL, USA). Using the Shapiro-Wilk test, quantitative data was analysed for normal distribution. Data with a normal distribution is represented by the mean ± SD. Data that is not normally distributed and represented by the median and range. Relative frequencies (%) and absolute frequencies (number) were used to express the qualitative data. To compare two variables that are regularly distributed, the paired t test was employed. Pairwise variables that were not normally distributed were compared using the Wilcoxon Signed Ranks Test. The percentage of categorical variables were compared using Fisher's exact test, which measures the association between two categorical, binary variables for small sample sizes or when one or more cell value counts in the contingency table are small (< 5). It is comparable to the Chi-square test. To evaluate the relationship between two variables, the Pearson correlation coefficient was computed. Every test was two-sided, and a p-value of less than 0.05 was deemed statistically significant, while a p-value of more than 0.05 was deemed statistically insignificant (NS).

Results:

Table 1 clarifies that 52.0% of studied nurses their age ≥35 years old, 86.0% were female and married. Regarding qualification, 70% of nurses had technical institute and 66.0% having experience ≥10 years. 100% of studied nurses neither attend training courses about first aid for severe thermal burn nor have guidelines about it.

Table 2 indicates that all nurses' knowledge domains regarding emergency of first aid about severe thermal burn were improved after intervention program as nurses' knowledge about skin and thermal burn raised from 12.12±3.7 to 22.6±2.2 with percent of improvement equal 86.5% as well as nurses' knowledge about primary Survey and triage raised from 10.7±2.5 to 16.74±1.9 with percent of improvement equal 56.4%. Also, nurses' knowledge about emergency first aid rose from 12.46±2.97 to 23.56±2.2 with percent of improvement equal 89.1%. Total knowledge score rose from 35.28±7.3 to 62.9±4.9 with percent of improvement equal 78.3%. This improvement was statistically significant ($p<0.0001$)

Concerning satisfactory nurses' knowledge regarding first aid for severe thermal burn, **figure 1** shows that only 6% of studied nurses had satisfactory knowledge about skin and thermal burn before intervention program, this raised up after program to be 84.0%. Also, 24% of them had satisfactory knowledge about primary survey and triage before intervention program, which rose up after program to be 88%. Only 2% of them had satisfactory knowledge about emergency first aid before intervention program, which rose up after program to be 86%. Only 6% of studied nurses had satisfactory total knowledge before intervention program, which rose up after program to be 90.0%.

Table 3 illustrates that all domains of nurses' practice regarding emergency first aid for severe thermal burn were improved after intervention program. The highest percentage of improvement (89.0%) related to pain relief and prevents infection followed by circulation assessment with hemorrhage control and disability; neurological status assessment (86.3%) then breathing and ventilation assessment (84.2%) and airway maintenance with cervical spine control (82.1%) while the lowest percentage of improvement related to nutrition maintenance (58.1%). Total practice score was improved from 19.72±7.9 to 35.84±3.5 with a percent of improvement equal is 81.7% with statistically significant difference ($p<0.0001$).

Figure 2 demonstrates that only 6% of the studied nurses had a total satisfactory practice regarding emergency first aid for severe thermal burn before intervention, while 80.0% of nurses become had satisfactory practice after intervention program. All studied nurses had satisfactory practice level post intervention regarding nutrition, exposure, environmental control and estimate burn size, airway maintenance with cervical spine control, circulation with hemorrhage control, pain relief and prevent infection, disability: neurological status assessment, fluid resuscitation, breathing and ventilation with percentage equal (96%, 88%, 84%, 84%, 76%, 72%, 66%, 64%) respectively.

Table 4 reveals that there was statistically significant relation between satisfactory nurses' total knowledge level about emergency first aid for severe thermal burn

injuries and marital status (p=0.002) and years of experience (p=0.035) pre intervention program.

Table 5 presents that there was no statistically significant relation between satisfactory nurses' total knowledge about emergency first aid for severe thermal burn injuries and their demographic characteristics post intervention program.

Table 6 exhibits that there was statistically significant relation between satisfactory nurses' total practice and their sex and marital status (p=0.048) pre intervention program.

According to **Table 7**, there was a statistically significant relation between nurses' total practice level and their experience years (p=0.01) after intervention program

In the light of **Table 8;** there is a positive significant correlation between knowledge score and practice score throughout study phases.

Table (1): Frequency and Percentage Distribution of Demographic Characteristics of Studied Nurses (n=50):

Variables	No.	%
Age		
<35 years	24	48.0
≥35 years	26	52.0
Mean ±SD	33.4±6.3	
median(range)	35(22-45)	
Sex		
Male	7	14.0
Female	43	86.0
Marital status		
Single	7	14.0
Married	43	86.0
Qualification		
Technical institute	35	70.0
Bachelors	15	30.0
Experience years		
<10 years	17	34.0
≥10 years	33	66.0
Mean ±SD	12.66±6.3	
median(range)	12(2-25)	
Training about primary survey& emergency first aid: No.	50	100.0
Guidelines about primary survey& emergency first aid: No.	50	100.0

Table (2): Nurses' Knowledge Means Scores about Primary Survey and Emergency First Aid for Severe Thermal Burn Pre and Post Training Program (n=50):

Nurses' knowledge domains	Pre intervention	Post intervention	Test of sig	p-value	% of improvement
The knowledge about skin and burn	12.12±3.7 11(8-21)	22.6±2.2 23(18-26)	19.46	0.0001*	86.5
The knowledge about Primary Survey and triage	10.7±2.5 10(8-15)	16.74±1.9 17(12-20)	13.88	0.0001*	56.4
The knowledge about emergency First aid	12.46±2.97 12(10-22)	23.56±2.2 24(17-27)	22.24	0.0001*	89.1
Total knowledge score	35.28±7.3 33(27-57)	62.9±4.9 64(50-70)	24.47	0.0001*	78.3

Paired t test, data expressed by Mean ±SD, median (range), p<0.05: significant

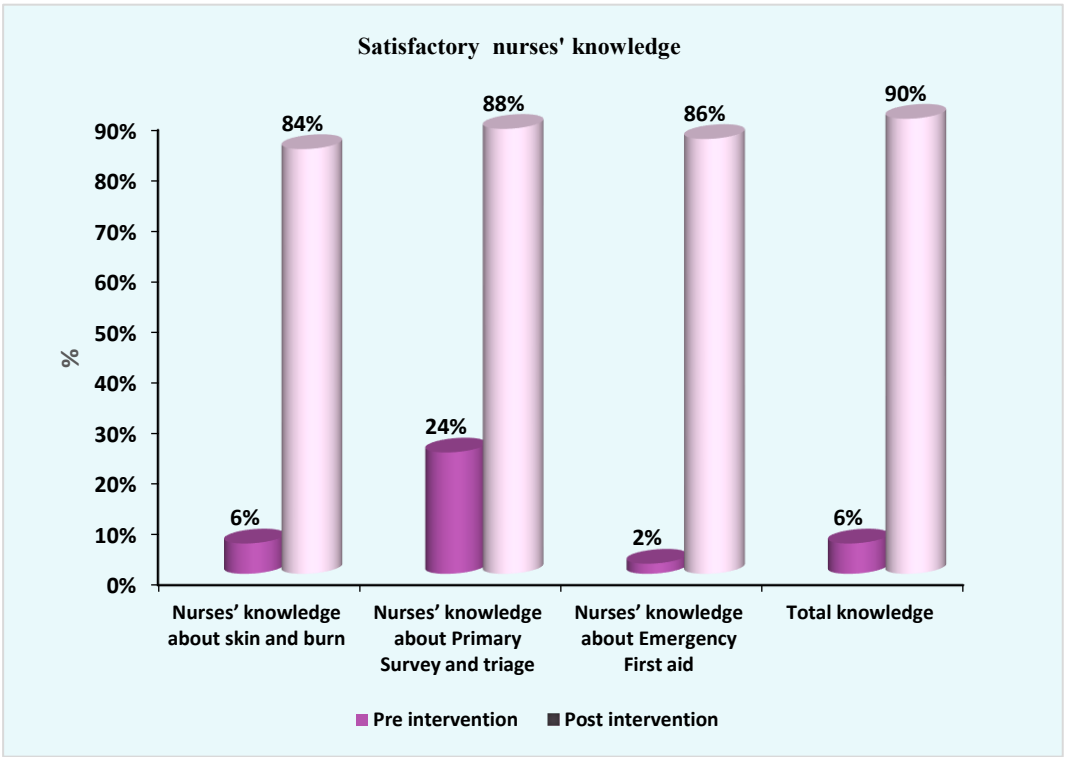

Figure (1): Satisfactory Level of Nurses' Knowledge about Primary Survey and Emergency First Aid for Severe Thermal Burn Pre and Post Training Program (n=50)

Table (3): Nurses' Practice Mean Scores about Primary Survey and Emergency First Aid for Severe Thermal Burn Pre and Post Training Program (n=50):

Nurses' knowledge domains	Pre intervention	Post intervention	Test of sig	p-value	% of improvement
Airway maintenance with cervical spine control	1.56±0.67 1(1-3)	2.84±0.37 3(2-3)	5.66	0.0001*	82.1
Breathing and ventilation	4.04±1.9 4(2-8)	7.44±1.2 8(4-9)	5.53	0.0001*	84.2
Circulation with hemorrhage control	2.04±1.2 1(1-4)	3.8±0.4 4(3-5)	5.58	0.0001*	86.3
Disability: neurological status assessment	1.46±0.68 1(1-3)	2.72±0.45 3(2-3)	5.60	0.0001*	86.3
Exposure, environmental control and estimate burn size	3.34±1.6 2(1-6)	6.04±0.5 6(5-7)	5.76	0.0001*	80.8
Fluid resuscitation	4.38±2.4 3(2-8)	7.92±1.1 8(5-9)	5.59	0.0001*	80.8
Nutrition	1.24±0.4 1(1-2)	1.96±0.2 2(1-2)	5.84	0.0001*	58.1
Pain relief and Prevent infection	1.46±0.6 1(1-3)	2.76±0.43 3(2-3)	5.77	0.0001*	89.0
Total practice score	19.72±7.9 15.5(11-36)	35.84±3.5 37(26-40)	12.27	0.0001*	81.7

Paired t test, Wilcoxon Signed Ranks Test, data expressed by Mean ±SD, median (range), p<0.05: significant

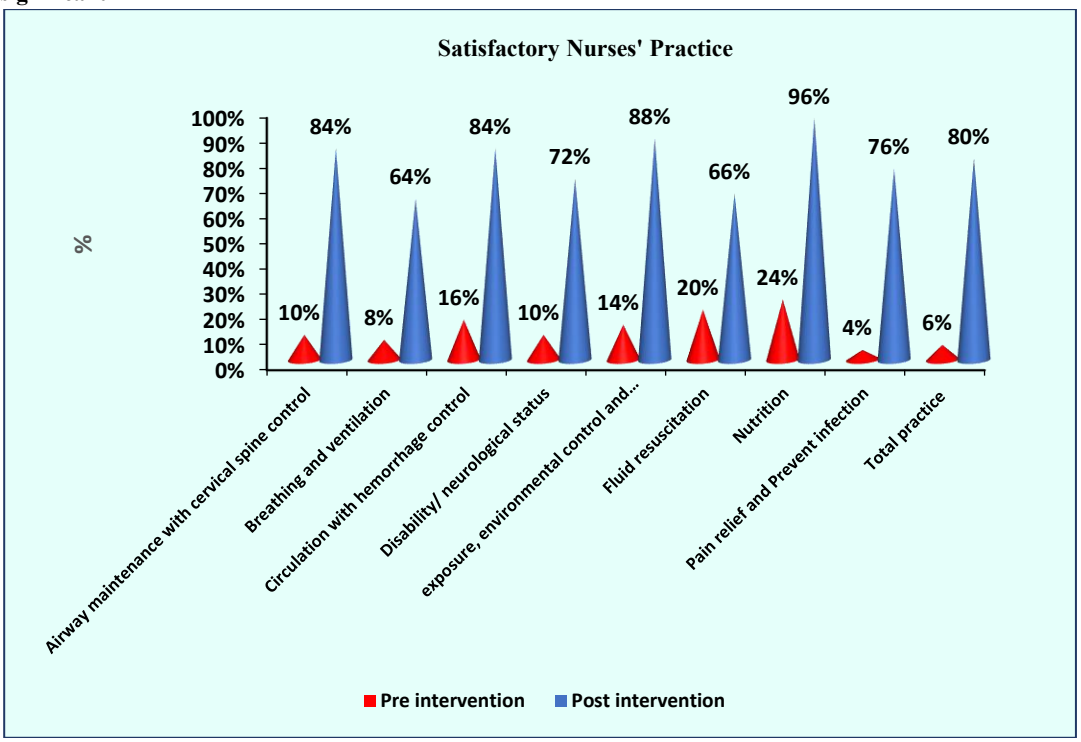

Figure (2): Satisfactory Level of Nurses' Practice about Primary Survey and Emergency First Aid for Severe Thermal Burn Pre and Post Training Program (n=50)

Table (4): Relation between Studied Nurses' Total Knowledge Regarding Primary Survey and Emergency First Aid for Severe Thermal Burn and their Demographic Characters Pre Training Program (n=50):

Variables	Pre intervention nurses' knowledge				n.	p-value
	Satisfactory (n.3)		Unsatisfactory (n.47)			
	No.	%	No.	%		
Age years						
<35 years	3	12.5	21	87.5	24	0103
≥35 years	0	.0	26	100.0	26	
Sex						
Male	1	14.3	6	85.7	7	0.37
Female	2	4.7	41	95.3	43	
Marital status						
Single	3	42.9	4	57.1	7	0.002*
Married	0	.0	43	100.0	43	
Qualification						
Technical institute	2	5.7	33	94.3	35	0.99
Bachelors	1	6.7	14	93.3	15	
Experience						
<10 years	3	17.6	14	82.4	17	0.035*
≥10 years	0	.0	33	100.0	33	

f: Fisher Exact test ,p>0.05= no statistically significant, *p<0.05= statistically significant

Table (5): Relation between Studied Nurses' Total Knowledge Regarding Primary Survey and Emergency First Aid for Severe Thermal Burn and their Demographic Characters Post Training Program (n=50):

Variables	Post intervention nurses' knowledge				n.	p-value
	Satisfactory (n.45)		Unsatisfactory (n.5)			
	No.	%	No.	%		
Age						
<35 years	20	83.3	4	16.7	24	0.182
≥35 years	25	96.2	1	3.8	26	
Sex						
Male	5	71.4	2	28.6	7	0.138
Female	40	93.0	3	7.0	43	
Marital status						
Single	5	71.4	2	28.6	7	0.138
Married	40	93.0	3	7.0	43	
Qualification						
technical institute	30	85.7	5	14.3	35	0.305
Bachelors	15	100.0	0	.0	15	
Experience						
<10 years	15	88.2	2	11.8	17	0.990
≥10 years	30	90.9	3	9.1	33	

f: Fisher Exact test ,p>0.05= no statistically significant, *p<0.05= statistically significant

Table (6): Relation between Studied Nurses' Total Practice Regarding Primary Survey and Emergency First Aid for Severe Thermal Burn and their Demographic Characters Pre Training Program (n=50):

Variables	Pre intervention nurses' practice				n.	p-value
	Satisfactory (n.3)		Unsatisfactory (n.47)			
	No.	%	No.	%		
Age						
<35 years	3	12.5	21	87.5	24	0.103
≥35 years	0	.0	26	100.0	26	
Sex						
Male	2	28.6	5	71.4	7	0.048*
Female	1	2.3	42	97.7	43	
Marital status						
Single	2	28.6	5	71.4	7	0.048*
Married	1	2.3	42	97.7	43	
Qualification						
technical institute	2	5.7	33	94.3	35	0.99
Bachelors	1	6.7	14	93.3	15	
Experience						
<10 years	1	5.9	16	94.1	17	0.99
≥10 years	2	6.1	31	93.9	33	

f: Fisher Exact test, p>0.05= no statistically significant, *p<0.05= statistically significant

Table (7): Relation between Studied Nurses' Total Practice Regarding Primary Survey and Emergency First Aid for Severe Thermal Burn and their Demographic Characters Post Training Program (n=50):

Variables	Post intervention nurses' practice				n.	p-value
	Satisfactory (n.40)		Unsatisfactory (n.10)			
	No.	%	No.	%		
Age						
<35 years	22	91.7	2	8.3	24	0.077
≥35 years	18	69.2	8	30.8	26	
Sex						
Male	5	71.4	2	28.6	7	0.616
Female	35	81.4	8	18.6	43	
Marital status						
Single	6	85.7	1	14.3	7	0.99
Married	34	79.1	9	20.9	43	
Qualification						
technical institute	26	74.3	9	25.7	35	0.246
Bachelors	14	93.3	1	6.7	15	
Experience years						
<10 years	17	100.0	0	.0	17	0.01*
≥10 years	23	69.7	10	30.3	33	

f: Fisher Exact test, p>0.05= no statistically significant, *p<0.05= statistically significant

Table (8): Correlation between Nurses' Total Knowledge and Practice Score about Primary Survey and Emergency First Aid for Severe Thermal Burn throughout Study Phases (n=50):

Pre intervention	**Knowledge score**	
	R	**P**
Practice score	0.344	0.015*
Post intervention	**Knowledge score**	
	R	**P**
Practice score	0.575	0.0001*

Pearson'(r) correlation coefficient * Correlation is significant p< 0.05

Discussion:

Nurses has important role in the treatment of burn victims **(Tetteh et al., 2021)**. It is imperative to determine nurses' level of knowledge about first aid of burn because they are one of the key pillars in the burns management. First management of burns injury is paramount for the survival of burned victims. Effective first aid and early treatment can greatly decrease the severity of burn and improve the survival rates **(Mortada, Malatani & Aljaaly, 2020).** Providing first aid is essential for predicting the course and severity of co-morbidity and complications. To minimize tissue damage and lower the requirement for procedures like surgery, prompt response can be beneficial **(Denekew et al., 2021).** Good burn care improves results by lessening the extent and severity of tissue damage **(Gibwa & Babirye, 2023).** Thus, the aim of this study was to evaluate the effect of training program on nurses' competence in performing primary survey and emergency first aid for patients with severe thermal burn injuries. Four main items will be discussed of the existing findings, in the following order:

Firstly, the Demographic characteristics of studied nurses:

According to the current study's analysis of the demographic characteristics of the nurses under study, clarifies that more than half of studied nurses their age ≥35 years old, majority of them were female and married. Regarding qualification, slightly less than three quarter of them had technical institute and about two thirds of them having experience ≥10 years. All of studied nurses neither attend training courses about emergency first aid for severe thermal burn nor did have guidelines about it. This may be due to majority of the nurses graduated from technical institutes and high qualified nurses were usually assigned for administrative roles and the percentage of graduated female are higher than male (nursing is a feminine profession) and our culture encouraged early marriage.

This result was supported by **Gete et al., (2022)** they showed that in their study about "Knowledge, attitude, and practice towards burn first aid and its associated factors among caregivers attending burn units in Addis Ababa, Ethiopia" that the majority of caregivers were females. More than quarter of them was in the age range of 33–37 years. Most caregivers were married and the majority of respondents did not take any form of burn first aid training

Also, these findings are agree with **Mohammed, Hassan& Mohammed, (2021)** they mentioned in their study about " Nurses' Knowledge, Practice, and Attitude Regarding Burn Injury Management " that majority of them were female. Half of the studied nurses were graduated from technical nursing institute and more than half among them had more than ten years of experience.

Moreover, this study was agreement with **Melo & Lima, (2017)** they conducted study about "Cost of nursing most frequent procedures performed on severely burned patients" and found majority of nurses were female, and more than half of them were graduated from technical nursing institute. On the same hand, **Ardebili et al., (2017)** they conducted study entitled "Effect of multimedia self-care education on quality of life in burn patients" and found that majority of nurses had 30 to<40years old, and more than three quarter had more than ten years of experience.

While this result differed from study conducted by **Bajracharya & Mishra, (2023)** also contradicted this result in a study under title

"Burn first aid knowledge, attitude, and practice among medical interns of a tertiary care center: A descriptive cross-sectional study" they found that two thirds of study subjects their ages less than thirty years and male while only one third of them had received formal training in burn first-aid. Also, this result was contrasted with a study carried out by **Qtait, (2022)** about "Nurses' knowledge in nursing care and treatment of burns." Who clarified that males present more than half of the population. According to the level of education, most of the participants have bachelor's degrees, years of experience five to ten years. Only slightly more than quarter of nurses has previously received burn care training.

Secondly, nurses' knowledge regarding primary survey and emergency first aid for severe thermal burn throughout the training program intervention phases:

Farzan et al., (2023) mentioned that nurses' knowledge of first aid is essential because it is well known that providing the right immediate first aid can greatly improve burn outcomes and decrease pain. Increasing knowledge and awareness towards first-aid measures in burns plays a crucial role in improving outcome (**Al Dhafiri et al., 2022).** Good knowledge about first aid of burn reduces the impact of the injury (**Gete et al., 2022).**

Training programs improve the nurses' knowledge and that has been confirmed in previous research **(Kadhim & Hamza, 2020; Burns et al., 2022).** Due to most of the nurses' lack of knowledge and poor practice toward burn patients, **Mohammed, Hassan& Mohammed, (2021)** recommended that continual training and updating be provided for nurses regarding evidence-based nursing practices. In a study in Saudi Arabia about "Knowledge & awareness of burn first aid among health-care workers in Saudi Arabia: Are health-care workers in need for an effective educational program?" carried out by **Mortada, Malatani & Aljaaly, (2020)** they confirmed the need for an effective educational program among healthcare workers.

Based on the above-mentioned facts, the present study indicated that all nurses' knowledge domains regarding primary survey and emergency first aid about severe thermal burn were improved after intervention program as the highest percentage of improvement related to nurses' knowledge about emergency first aid of severe thermal burn injuries followed by nurses' knowledge about skin and burn then nurses' knowledge about primary survey and triage. Total knowledge score improved with percent of improvement equal Seventy-eight-point three percent. This improvement was statistically significant ($p<0.0001$). These results may reflect the effect of the program, which was created with nurses' skill levels in mind and was clear, easy to understand, and frequently repeated to help nurses retain what they had learnt.

This result of study is consistent with **Cetinkaya & Odabasi, (2021)** they revealed in their study "The Effect of the Training on Parents' Knowledge Level Regarding First Aid in Pediatric Burns." that the total score of the correct answer of the participants regarding first aid knowledge was statistically significant post-intervention than pre-intervention ($p = 0.000$).

Furthermore, this result is supported by **Riaz et al., (2020)** in their study about "Survey on Knowledge of First Aid Management of Burns Amongst Medical and Non-medical Students in Karachi, Pakistan: Need for an Educational Intervention?" they reported that the students who had received some form of formal training scored a higher and better mean knowledge score than the majority of the students with no training (6.4 ± 1.5 and 4.4 ± 1.8, respectively; $P < 0.01$).

Alsayali et al., (2019) agree with this result in a study about "Awareness, knowledge, attitudes and practices of first aid skills among medical and non-medical students at Taif University." They clarified that there were improvement in knowledge and awareness among participants who attended first aid training, and this was statistically significant. Good knowledge regarding different techniques, materials used in first aid and basic life support (BLS) play a crucial role in effective management of victims in emergency. Organizations should give priority to first aid and BLS skills of their students by conducting courses on a regular basis.

Also this result is harmony with a study showed that in Vietnam conducted by **Lam, Huong& Tuan, (2018)** about "Nurses' knowledge of emergency management for burn and mass burn injuries." They found that training

courses on first aid can have a positive effect on their knowledge. A significantly higher knowledge level was found among nurses who had attended training courses in the past (54.8 ± 10.5% vs. 38 ± 9.7% respectively; p <.001). To enhance the burn emergency management of nurses, further and continuing training is highly recommended.

This in the same line with **AL-Sudani & Ali (2017)** they found in their study "Effectiveness of an educational program on the nurses' knowledge for children with burn injuries attending the Burns Specialist Hospital in Baghdad City" that nurses could significantly improve their knowledge from less than 10% to 100% after attending a training program. The study also proved that attended training courses is an independent factor affecting knowledge level. These results confirmed the importance of attending continual training programs for healthcare providers.

In **2016**, a cohort study by **Kua Phec Hui et al**. at the children's emergency department in Singapore showed a statistically significant increase in knowledge immediately after training program (22.9% vs. 78.3%). Also, **Ahmed & Mohamed (2016)** compared nurses' knowledge and performance with burned children at the pediatric burn unit before and after the educational program. After the implementation of the program, more than 90% of nurses showed improved in both knowledge and performance in paediatric burns management.

Thirdly, nurses' practices regarding primary survey and emergency first aid for severe thermal burn throughout the training program phases:

It is clear from the results of the present study that all domains of nurses' practice regarding primary survey and emergency first aid for severe thermal burn were improved after intervention program. The highest percentage of improvement related to pain relief and prevents infection followed by circulation with hemorrhage control and disability; neurological status then breathing and ventilation and airway maintenance while the lowest percentage of improvement related to nutrition. Total practice score improvement is eighty-one-point seven percent with statistically significant difference (p<0.0001). In our opinions this improvement may be due to the positive effect of training program on the studied nurses' practices, effect demonstration and re demonstration of training program procedures, available of guideline booklet, the studied nurses were old enough to understand, and they have good attitude toward the patients' outcome and emphasized the importance of training program for them.

From the previous point of view, **Mohammed, Hassan& Mohammed, (2021)** they found that majority of nurses lacked adequate knowledge, poor practice and, negative attitude as result of lack of educational program and training and, no update to nurse's performances so, the study recommended that importance of provide ongoing education and update for nurses regarding evidence based nursing practices about burn patients and, provide sufficient supplies and equipment for nurses to perform practice in a high quality, safe and in efficient manner. **Mathew et al., (2016)** emphasizes the need for mandatory first aid training program with practical workshop.

The current study in the same context with **Gete et al., (2022)** in their study "Knowledge, attitude, and practice towards burn first aid and its associated factors among caregivers attending burn units in Addis Ababa, Ethiopia. A cross-sectional study" they reported that one of the most significant results of the study was the impact of previous burn first aid training on the mean practice scores of the study participants. Caregivers who received some form of burn first aid training obtained higher mean practice scores. Previous burn first aid training was also found to be significantly associated with the caregiver's level of practice towards first aid for a burn.

Likely, **Abdel Ghany et al., (2022)** conducted a study about "Effect of Nursing Intervention Program on Management of Burn in Children." They revealed that there was a statistically significant improvement in nurses' practices post program intervention compared to pre program intervention regarding management of burn. The study concluded that, the nursing intervention program improved positively the studied nurses' practices regarding management of burn. Thus, the study recommended that continuous training program for nurses to update their knowledge and practice toward management of burns.

This in the same line with **Kamei, Rongmei & Kumar, (2022)** they carried out a study about "Effectiveness of Planed Teaching Program on knowledge regarding First Aid Management and emergency care of burn among the staff nurses working in selected hospital in Azamgarh, Uttar Pradesh, India." they declared that there was statistical improvement seen post planned teaching. Nurses attend training program displayed to be improvement in total practice score after program. Thus, the study recommended that distinct educational sessions regarding emergency first aid of burn will be effective to enhance the knowledge and skills of nurses regarding first aid of burns.

Similar findings were found by **Joys et al., (2022)** in a study about "Effectiveness of structured teaching programme on knowledge and practice regarding first aid management of selected minor injuries among adolescents." they found that significant improvement in post- test practice scores on first aid compared to the pretest scores. Also, in Pakistan **Riaz et al., (2020)** reported that caregivers who received some form of burn first aid training acquired higher mean practice scores.

The finding goes in the same line with **Kumari et al., (2020)** in a study titled "Effectiveness of first aid training programme: An interventional study." they showed improvement in the practices after the training program. The participants have provided positive feedback regarding the sessions and expressed their desire to attend such more training program. It leads to an improvement for patient safety and emergency management. Furthermore, researchers should examine how concurrent clinical supervision affects the transfer of procedural skills from a simulated environment into clinical practice.

On the same hand, **Mohamed et al., (2019)** conducted a study under title of "Effect of Educational Program on Nurses Knowledge and Practice Related to Care for Children with Moderate Burn Degree" they mentioned that nurses attend training program exhibited to be improvement in total practice score after program. **Alsayali et al., (2019),** also found that those who had learned about first aid from different ways had better practice than from a single manner.

Fourthly, the relations and correlation between the study variables:

Regarding the relation between studied nurses' total knowledge about primary survey and emergency first aid regarding severe thermal burn injuries and their demographic characteristics after training program intervention, the present study showed that there was no statistically significant relation between satisfactory nurses' total knowledge about emergency first aid for severe thermal burn injuries and their demographic characteristics after intervention program. This relates back to the fact that the program is easily accessible and appropriate for enhancing the knowledge of all nurses, regardless of sociodemographic factors like sex, age, qualifications, or experience.

The present study agrees with **Mrs. Ritu, (2023),** in a study "Assess Knowledge and Attitude Regarding First Aid of Common Emergencies (Face) among the Nonmedical Students" found that there is no significant association between knowledge and demographic data. **Mohammed, Hassan& Mohammed, (2021),** stated that there is no statistically significant relation between nurse's knowledge and their sex and age. Also, this study was accordance with **Ou et al., (2021)** they conducted study entitled "Clinical Performance of Hydrogel-based Dressing in Facial Burn Wounds" and found that there is no statistically significant relation between nurse's knowledge and their sex.

Conversely, this finding was disagreement with **Yarali et al., (2023)** in a study "A systematic review of health care workers' knowledge and related factors towards burn first aid." they found that variables such as gender, nationality, marital status, and job title had a significant relationship with the knowledge of health care workers about first aid of burns. Also, **AlMarzooq A.M., (2020)** conducted study "Emergency Department Nurses' Knowledge Regarding Triage" show that the qualification demonstrated a very high statistical significance difference ($P < 0.001$).

Furthermore, **Mamashli et al., (2019)** who conducted study entitled "The effect of self-care compact disk-based instruction program on physical performance and quality of life of patients with burn at-dismissal" and found that there is a statistically significant relation between

nurse's knowledge and their gender, qualifications, and marital status. In addition, **Lam, Huong & Tuan, (2018)** illustrated that there is a statistically significant relation between nurse's knowledge and their qualifications, and age, gender, nationality, marital status, job position and training on burn care in a study "Nurse Knowledge of emergency management for burn and mass burn injuries".

Concerning the relation between studied nurses' total practice about primary survey and emergency first aid regarding severe thermal burn injuries and their demographic characteristics after training program intervention, the current study reported that there was a statistically significant relation between nurses' total practice level and their experience years post intervention program, it seems that nurses who were less than 10 years of experiences had a good level of practice after program intervention.

This study was congruence with **Mohammed, Hassan& Mohammed, (2021)**, they showed that there is a statistically significant relation between nurse's practice and their qualifications, experiences years, and training about burn care. Moreover, **Abd Elalem, Shehata & Shattla, (2018)** conducted study entitled "The effect of self-care nursing intervention model on self-esteem and quality of life among burn patients" found that there is a statistically significant relation between nurse's practice and their ages, experiences years, and training about burn care.

Regarding the correlation between nurses' total knowledge and practice score about primary survey and emergency first aid regarding severe thermal burn injuries through training program intervention phases, this study illustrated that there is a positive significant correlation between knowledge score and practice score throughout study phases. From the researchers' point of view, this could be because practice requires knowledge, and improve the knowledge affect the practice level which highlights the necessity for ongoing supportive education training program.

The current result supported by **Kamei, Rongmei & Kumar, (2022),** found correlation between nurses' score of knowledge and their score of practice. It was apparent that positive correlation between nurses' knowledge score and their practice score pre, immediately and post the educational program with statistically significant different (P= 0.001). Also, **Mohammed, Hassan& Mohammed, (2021),** showed that there is a positive correlation between nurses' total knowledge, practice and attitude scores.

Too, **Devi & Khagta, (2019)** in a study "Effectiveness of an interventional programme on knowledge and skills regarding selected first aid measures" they found that a significant positive correlation between nurses' knowledge score and their practice score after intervention program and **Mohamed et al., (2019)**, exhibited that the correlation relationship between the post test knowledge and post test skills were highly correlated it means that the correlation is in a positive direction and when knowledge increases skills also increases.

The same result was found by **Alsayali et al., (2019)** they concluded that there was a statistically significant relationship observed between knowledge, and practices scores. **Melo, & Lima, (2017)** who conducted study entitled "Cost of nursing most frequent procedures performed on severely burned patients" found that there is a positive correlation between nurses' total knowledge and their practice.

Conclusion:

Based on the results of this research, all nurses' knowledge and practice dimensions about primary survey and emergency first aid for severe thermal burn injuries were improved after training program intervention with a statistical significant difference, which reflects the positive effect of training program in improving nurses' competence in terms of knowledge and skills in performing primary survey and providing emergency first aid for patients with severe thermal burn injuries which supports the study hypotheses.

Recommendation:

According to the results of the present study the following recommendations are suggested:

- A specific booklets and information materials about emergency first aid for severe thermal burn injuries in Arabic language should be available.

- Periodic training and intervention programs regarding emergency first aid for severe thermal burn injuries to refreshing and enhance knowledge and practice of nurses.

- Continuous assessment of nurses' knowledge and practice with apply the principle of reward and punishment

- More research should be conducted with a large sample size and in different contexts to assess the impact of the program on nurses' performance and make generalizations.

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