Effect of an Educational Program on Nurse's Performance Regard Monitoring Fluid and Electrolyte Replacement for Burned Patients

Mansoura Ouda Awad [(1)], Sabah Said Mohamed[(2)] & Safaa Mohamed Hamed [(3)]

(1) Specialist In Teaching Nursing science - Embaba Technical Health Institute
(2) Assistant Professor of Medical -Surgical Nursing -Faculty of Nursing - Benha University
(3) Lecturer of Medical -Surgical Nursing- Faculty of Nursing- Benha University

Abstract

Background; monitoring of fluid balance activities is guides nursing interventions to achieve physiological stability. **Aim;** this study aims to evaluate the effect of an educational program on nurse performance regard monitoring fluid and electrolyte replacement for burned patients. **Research Design:** A quasi-experimental research design will be conducted to achieve the stated aim. **Setting:** The study will be conducted in burn department at Benha Teaching Hospital. **Subjects:** all nurses in mentioned sitting during the period from the beginning of July 2018 to December 2019. **Result**: the result of this study showed that nearly half of nurses aged between 30≥ 40 years old, more than half of them had more than 10 years of experience and didn't receive previous training about fluids and electrolytes replacement, the minority of nurses had good total knowledge score regarding monitoring fluid and electrolyte replacement therapy for burn patient preprogram, then increased to majority post program implementation , less than half of nurses had satisfactory practices score regarding monitoring fluids and electrolytes replacement therapy for burn patient preprogram, while increased to majority post program implementation. Also there are positive correlation between nurse's knowledge and practice regard monitoring fluid and electrolyte replacement therapy for burned patient post program **Conclusion**; the current study concluded that implementation of health education program has a positive effect on improvement of the nurses' knowledge and practices practice regard monitoring fluid and electrolyte replacement therapy for burned patient post program than preprogram. **Recommendations:** This study recommended that emphasize the importance of a continuous in-service educational program regard monitoring fluid and electrolyte replacement therapy for burned patient**,** Further study with replication of the current study on a larger probability sample is recommended to achieve generalization of the results and wider utilization of the designed educational program

Key words: Burned patient, Fluids and electrolytes replacement, Nurses' performance, educational program

Introduction

Mortality rates from severe burn injuries have steadily declined over the last 30 years attributed in part to a multidisciplinary approach and specialized care delivered in burn centers. Most burns are the result of fire or scalding and involve less than 10% of the total body surface area (TBSA) with a mortality of close to 0.5%. Patients with major burns (≥ 25% BSA) require management in an intensive care unit. Care of the severely burned patient requires prompt resuscitation to reduce morbidity and mortality. This approach is multidisciplinary and involves skilled

nursing teams ***(Kasten ,Makley, & Kagan, 2019)*** .

Nurses who working in burn unit frequently encounter in situation where patient has a need to receive fluid and electrolytes. To overcome with dehydration, adequate balance of the circulatory fluid volume, prevent inadequate tissue perfusion, even to administer the medication and the administration of the IV fluid is high in practice. The registered nurse who practices intravenous therapy must possess a thorough and up-to-date working knowledge and practice of the fluid and electrolytes replacement. This is very crucial to maintain safe nursing practice as well as for the excellent quality patient care. Nowadays different types of fluid and electrolytes are available in the market hence it is very important for the nurses to be entirely familiar with each product ***(Sharp& Corp 2019).***

The initial management for burned patients is triage and acute resuscitation in the first 24 to 48 hours. Estimating the total burned body surface area (BSA) is a key component or resuscitation. Fluid resuscitation by formula is recommended if the BSA is more than 15%. All current formulas and methods or resuscitation in burned patients are based on body weight and the percentage of BSA burned. The initial history and physical exam should also include the body weight and an estimate of the second and third degree burn areas used to calculate resuscitation ***(Ipaktchi & Arbabi 2018).***

Burns are usually the immediate cause of hypervolemia, however, bleeding from other injuries should also be ruled out. Fluid resuscitation should be individualized based on age, comorbidities, organ function, burn area and hemodynamics. Fluid resuscitation guidelines are based on the parkland burn formula the main focus on resuscitation strategies is to minimize resuscitation complications o under or over resuscitation. Protocols unique to the burned patient take into account fluid losses via the skin .two large-bore peripheral intravenous catheters should be inserted through unburned skin if possible and baseline laboratories sent. Frequently unusual peripheral venous sites or central venous access is required, the groins are often spared; so femoral venous cannulation is usually possible ***(Endor& Ahrenholz 2019).***

Continuing fluid administration may be based on the formula 0.3 to 0.5 mL/kg × % burn area over 24 hours, but fluid resuscitation must be modified depending on organ function and hemodynamics. In adults, a urine output for at least 30 to 50 mL/h is commonly targeted. Under resuscitation results in reduced cardiac output (CO), inadequate tissue/organ perfusion, oliguria and increasing lactate trends; over resuscitation can result in a constellation of complications including worsening upper airway edema, pulmonary edema, prolongation mechanical ventilation, cerebral edema and compartment syndromes (CS) (abdomen, extremi-ties, ocular).elevated lactate appears to be a bio-marker or increased mortality in burn patients but a normal lactate alone does not mean that fluid resuscitation is adequate. Fluid resuscitation with hypertonic saline (eg, 7.5% NaCl) or

colloids (eg, albumin) has not been demonstrated to improve outcomes, although as expected the total resuscitation volume is usually less with colloid administration ***(Coca et al., 2018).***

Significance of the study:

Burn are global public health problem accounting for an estimated180 000 deaths annually common in low and middle income countries . Also death rate from burns in low and middle income is currently over 7 time more than in high income countries. On other side non fetal burns are a leading cause of morbidity, prolonged hospitalization, disability, also with resulting stigma and rejection. Often burns management causing costs for hospital, in direct costs such as lost wages ,prolonged care for deformities, emotional trauma and commitment of family resources also contribute to the socioeconomic impact ***(WHO 2018).*** The number of patient admitted to burn department at Benha Teaching Hospital were 250 in 2018 ***(Benha teaching hospital statistical office.2018)***

Fluid balance monitoring is an essential part of the process of care of burned patients. Fluid Balance is the balancing of intake and output of fluid to permit metabolic processes to function correctly. Maintaining fluid balance plays an important role in managing burned patients. The accurate monitoring of fluid balance activities is guides nursing interventions to achieve physiological stability Therefore, fluid balance should be monitored and recorded accurately for burned patients . A 24-h period of a day fluid balance is among important measures recorded in patients‟ daily observation sheet, which are nursing interventions, vital signs, medical procedures ***(Abd El Hamid, 2016).***

Aim of the study:

This study aimed to evaluate the effect of an educational program on nurse performance regard monitoring fluid and electrolyte replacement for burned patients. This aim achieve through the following:

1- Assessed the nurse knowledge and the practice regard monitoring fluid and electrolyte replacement therapy for burned patient .

2- Designed the educational program regard monitoring fluid and electrolyte replacement therapy for burned patient.

3- Evaluated the effect of implementing program on nursing knowledge and practice regard monitoring fluid and electrolyte replacement therapy for burned patient.

Research hypothesis:

To achieve the aim of this study the following research hypothesis is formulated:

H1 –Nurse's knowledge and practice regard monitoring fluid and electrolyte replacement therapy for burned patient will be improved post program than preprogram.

H2- There are positive correlation between nurse's knowledge and practice regard monitoring fluid and

electrolyte replacement therapy for burned patient post program.

Research Design:

- A quasi-experimental research design was utilized to conduct this study.

Setting:

The study was conducted at Benha Teaching Hospital in Burn Department. The burn department was composed of six rooms (two ICU rooms each room contained four beds, two rooms (ward) each room contained four beds, one emergency room contained two beds, and pediatric room contained two beds). The mentioned settings were located at Benha city, qualubia Governorate.

Subjects:

convenience sample from nurses (35) in burn department in the mention setting, where 16 of them aged 31 - ≥ 40 years old , 11 aged 41 -≥ 50 years old, 7 aged 20 - ≥ 30 years old, and one aged more than 51 years old, and 34 of them were female ,1 male.

Tools of data collection:

There are two tool used to collect the data of this study to collect the data by the researcher:

Tool I: Structured interviewing questionnaire:

This questionnaire was developed by the researchers after reviewing the related literature to assess nurses' knowledge regard monitoring fluid and electrolyte replacement for burned patients. It was presented in simple Arabic structure items, it includes:

Part one: *Nurse's demographic data***;** this part was concerned to identify of nurse's demographic characteristics and included eight items related to age, gender, marital status, education level, years of experience in nursing, years of experience in burn unit, previous training courses or workshops about burns and training courses about monitoring fluids and electrolytes replacement for burned patient.

Part two*: Nurses' knowledge (pre / posttest):*-about monitoring fluid and electrolyte replacement therapy for burned patient, it include knowledge about burn (19 questions), complications of burn (4 questions), nursing care for burn (4 questions), nutrition for burned patient (3 questions), fluid and electrolytes balance (12 questions) and nursing care for monitoring fluid and electrolytes replacement for burned patient (8 questions).

Scoring system:

Knowledge obtained from nurses were scored and calculated according to answers, it was evaluated using the model key answer sheet prepared by the researcher. Each question was ranged from (0-2 score), whereas, (2) score for each correct complete answer, (1) score for each correct incomplete answer, while zero for incorrect or unknown answer. The total score ranged from 0-100 these score were summed-up and converted to a percent. Then categorized as the following:

- Knowledge scores > 75% considered good knowledge.

- Knowledge score 50≥75% considered average knowledge.
- Knowledge score <50% considered poor knowledge

Tool II: Observational Checklist (pre / post-test): This tool developed by the researcher after reviewing related literature to assess the practice regard monitoring fluid and electrolyte replacement therapy for burned patients , it included four parts; *Part I*; nurses' practice regarding to the measurements of the patients' intake (10 steps), *part II;* nurses' practice regarding to the measurements of the patients' output(12 steps), *part III;* nurses' practice regarding to fluid and electrolyte replacement therapy for burned patients(10 steps) and *part IV;* nurses' practice regarding to administering a blood or plasma transfusion (24 steps).

Scoring system:

Practice score for each step was given as follows:

1 = Done

0 = Not done

Total scores of practices = 56

The total practices were considered satisfactory if the score of the total practices ≥ 75%, and considered unsatisfactory if it is less than75%.

2- Content validity and reliability:

Face and content validation of the studied tools were according to opinions of the experts to check the relevancy, clarity, comprehensiveness, and applicability of the questions. A five profession & experts of medical surgical nursing read it; in the faculty of nursing, Benha University. According to their opinions, minor modifications were done and the final form was developed.

Testing reliability of the tools was done by using Cronbach's Alpha coefficient test which revealed that each of the two tools consisted of relatively homogenous items as indicated by the moderate to high reliability of each tool. The internal consistency of knowledge was 0.81 and 0.97 for practices.

Ethical consideration:

All ethical issues were taken into considerations during all phases of the study .It included:

- The aim of this study was explained to nurses and they were reassured that all information was confidential and it were used only for their benefit and for research propose.
- Nurses were informed that they are allowed to choose to participate or not in the study and they have the right to withdraw from the study at any time.
- Nurses were informed about the privacy of their information, nature of the study and the confidentiality of the subject data.

Pilot study

The pilot study was carried out on 10 % (four) nurses to test the practicability, applicability and timing of data collection. No modifications were done to the questionnaire. Therefore, the sample of the pilot study was included in the total study sample.

Field work:

The study was conducted after permission to carry out from responsible authorities in the faculty of nursing at Benha University, director of Benha Teaching Hospital and Head of burn department after explanation of the purpose of the study was obtained. The study was conducted over a period of 6 months which started from July 2018 to December 2019; data were collected by interviewing the nurses in burn unit. The researchers were attended by rotation for three days/week at morning and afternoon shifts, the work included four phases:-

Phase I: Assessment phase:

- In the first the researchers observed nurses' practices regarding monitoring fluid and electrolyte replacement for burned patients, using observational checklist (pretest) to assess nurses' practice pre implementation, it took 20-30 minutes each nurse was evaluated 3 times and the mean calculated. Then the questionnaire sheets were used to assess nurses' knowledge, it took 20-30 minutes.
- Structured interview was conducted individually for nurses. This phase took one month, and then based on the results obtained from the interviewing questionnaire and observational checklists as well as the education program developed by the researchers.

Phase II: Designing the education program:

A designed education program was developed by researchers based on nurses' need assessment, literature review, researchers' experience, and opinions of experts. The researchers designed a booklet. It was written in the Arabic language with illustrations, involving theoretical and practical parts.

The theoretical part included information about anatomy and physiology of the skin, burn definition, causes, degrees , signs of burn and burn depth, burn calculation methods, first aid for burns, complication, phases of burn, nursing care for burned patients in emergency, rehabilitative phase , patients' nutrition, fluids and electrolytes balance and its importance, types of electrolytes and normal ranges of them, types of fluids and electrolytes imbalance that occur during burn, the equation used during burn for fluid replacement , nursing care for fluids and electrolytes imbalance, the importance of fluid balance chart. The practical part contained correct steps for monitoring intake and output, monitoring fluid and electrolyte replacement therapy for burned patient and steps followed in measuring or administering a blood or plasma Transfusion

The teaching methods:

All the nurses received the same educational content using the same teaching methods which included the following; lectures / group discussion**,** demonstration / re-demonstration and practical training.

Phase III: Implementation of the education program: -

- The researchers were attended by rotation for three days/week at morning and afternoon shifts.

- The number of sessions was five (5) sessions of five (5) hours (2 hours theoretical and 3 hours practical). The duration of each session was (20-35) minutes, including the periods of discussion. Nurses divided into six groups each group consisted from five to six nurses, it took about two months. At the beginning of the first session, nurses were oriented regarding the program contents, its purpose and its impact on their practices. Nurses were informed about the time of the next session at the end of the sitting.

The first session was carried out during the assessment phase, which involved anatomy and physiology of the skin ,burn definition, causes degrees and signs of burn .The second session involved burn calculation methods, first aid for burns, complication, phases of burn, nursing care for burned patient in emergency, acute and rehabilitative phase and patients' nutrition. While the third session involved fluids and electrolytes balance and its importance, types of electrolytes and normal ranges of them, types of fluids and electrolytes imbalance that occur during burn ,the equation used during burn, nursing care for fluids and electrolytes imbalance and the importance of fluid balance chart.The fourth session involved demonstration to nurse regarding correct steps for monitoring intake and output, monitoring fluid and electrolyte replacement therapy for burned patient. The fifth session involved demonstration to nurse regarding steps followed in measuring or administering a blood or plasma transfusion.

- Each of session was started by a summary about what has been discussed in the previous session and the objectives of the new session, using simple Arabic language, also, the session ended by a summary of its contents and feedback from the nurses were obtained to ensure that he/ she got the maximum benefit.

At the end of the program take feedback from nurses, thanks them for cooperative with me, and ask them about their opinion about the program and their benefits from the subject then distributed the questionnaire to make a post test.

Evaluation Phase:

Evaluation of the education program was done immediately at the end of it by using the same pre/post tools to evaluate the degree of improvement in the studied nurses' knowledge and practices regarding monitoring fluids and electrolytes replacement for burned patient, it took one month.

Administrative design:

An Approval to carry out this study was obtained from the dean of faculty of nursing and the director of burn care unit at Benha Teaching Hospital.

Statistical design

Statistical analysis was done by using Statistical Package for Social Sciences (SPSS) version 20. Data were collected, revised, coded, organized, tabulated, and analyzed using frequencies, number, percentage, mean

scores, standard deviation and correlation coefficient. Data were presented in the form of tables and figures. Quantitative data was presented by mean ($\overline{X}$) and standard deviation (SD). Qualitative data was presented in the form of frequency distribution tables, number and percent. It was analyzed by Chi- square test (X^2) & correlation to detect the relation between the variables of the study (P-value).

Statistical significance was considered as follows:

- P- value > 0.05 Not significant
- P- value < 0. 05 Significant
- P- value < 0.001 Highly significant

Limitations of the study:

- There was the limited number of researches that discuss this topic in Egypt.

Result:

Table (1): this table shows Frequency distribution of the studied nurses according to their socio-demographic characteristics. It illustrated that there were 45.7% of the studied nurses aged between 30≥ 40 years old with mean ± SD is 32.6 ± 10.4, In additional 97.1 % of them were females, 42.9% had nursing diploma, and 82.9 % of them were married. As regard years of experience in nursing, 57.1% of the studied nurses had more than 10 years of experience with mean and standard deviation of 6.51 ± 2.83, and 54.3 % of them had more than 10 years of experience in burn unit with mean and standard deviation of 5.62 ± 2.82. Concerning training courses about fluids and electrolytes follow up for burn patient, 54.3% of them didn't receive training courses.

Table (3): This table illustrates that distribution of the studied nurses regarding their knowledge about fluids and electrolytes balance for burn patients pre and post program implementation, This table represents that there were highly statistically significant differences in all items related to the studied nurses' knowledge about fluids and electrolytes balance for burn patients between pre, and post program implementation (P < 0.001).

Table (4): This table denotes that distribution of the studied nurses regarding their knowledge about monitoring fluids and electrolytes replacement therapy for burned patient pre and post program implementation ; there were 28.6% of the studied nurses had complete answer regarding the body systems that should be monitored to assess the fluid balance preprogram implementation compared with 62.9% post program implementation, while 31.4% of them had complete answer regarding the equation used in fluid replacement (Parkland formula) which increased to 68.6% post program implementation. This table also represents that there were highly statistically significant differences in all items related to the studied nurses' knowledge regarding monitoring fluids and electrolytes replacement therapy between pre, and post program implementation (P < 0.001).

Figure (1): This figure distribution of the studied nurses' total knowledge score

regard monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation. This figure demonstrates that 17.1% of the studied nurses had good total knowledge score regard monitoring fluid and electrolytes replacement therapy for burn patient preprogram implementation, then this percentage increased to 65.7% post program implementation .There were highly statistically significance differences in total knowledge score between pre and post program implementation (X2= 45.028 & P-value= 0.001).

Table (5): This table indicates that distribution of the studied nurses' practices towards monitoring fluids and electrolytes replacement therapy for burned patient pre and post program implementation, it showed that 54.3% of the nurses had correctly document the prescribed fluid on chart preprogram implementation which increased to 85.7% post program implementation .while, 37.1% of them (correctly mentioning the amount of fluid infused and documents the additives which added to the fluid) Preprogram implementation which increased to 77.1% post program implementation. This table also describes that there were highly statistically significant differences in all items related to the studied nurses' practices towards fluid and electrolyte replacement therapy for burn patient between pre, and post program implementation (P < 0.001).

Figure (2): This figure distribution of nurses' total practices score regarding monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation. This figure describes that, 31.4% of nurses had satisfactory practices score regarding monitoring fluids and electrolytes replacement therapy for burn patient preprogram, while increased to 80.0% post program implementation (X2= 20.696, P-value= 0.001).

Table (6): This table shows that correlation between the studied nurses' total knowledge and total practices pre and post program implementation. It indicates that there were highly statistically significant positive correlations between the studied nurses' total knowledge and total practices regarding monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation (P<0.001).

Table (1): Frequency distribution of the studied nurses according to their socio-demographic characteristics

Socio-demographic characteristics (n = 35).	**No.**	**%**
Age (Years):		
20 - ≥ 30	7	20.0
31 - ≥ 40	16	**45.7**
41 -≥ 50	11	31.4
51+	1	2.9
$\overline{X}$ ± SD 32.6 ± 10.4		
Gender:		
Male	1	2.9
Female	34	**97.1**
Marital status:		
Single	6	17.1
Married	29	**82.9**
Level of education		
Bachelor of nursing	15	**42.9**
Diploma of technical health institution of nursing	8	**22.8**
Nursing diploma		
Years of experience in nursing: **$\overline{X}$ ± SD** 6.51 ± 2.83		
1 – ≥ 5	15	42.9
6– ≥ 10	0	0.0
١٠+	20	**57.1**
Years of experience in burn unit: **$\overline{X}$ ± SD** 5.62 ± 2.82		
1 – ≥ 5	16	45.7
6 – ≥ 10	0	0.0
+10	19	**54.3**
Previous training about fluids and electrolytes follow up for burn patient:		
Yes	16	45.7
No	19	**54.3**

Table (2): Distribution of the studied nurses regarding their knowledge about fluids and electrolytes balance for burn patients pre and post program implementation, (n = 35).

The nurses' knowledge	Pre program						Post program						Significance test	
	Complete answer		Incomplete answer		Incorrect Answer		Complete answer		Incomplete answer		Incorrect answer			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	X^2	P-value
The normal range of body fluids in adults	20	57.1	0	0.0	15	42.9	28	80.0	0	0.0	7	20.0	10.57	0.001
The amount of fluids that an adult loses per day	18	**51.4**	0	0.0	17	48.6	29	**82.9**	0	0.0	6	17.1	19.00	0.001
The amount of fluids that an adult needs per day	17	48.6	0	0.0	18	51.4	26	74.3	0	0.0	9	25.7	17.48	0.001
The normal range of sodium in blood	16	45.7	0	0.0	19	54.3	26	74.3	0	0.0	9	**25.7**	33.68	0.001
The function of sodium	14	40.0	9	25.7	12	34.3	20	57.1	11	31.4	4	11.4	10.52	0.001
Nursing care for sodium deficiency	12	**34.3**	12	34.3	11	31.4	20	**57.1**	9	25.7	6	17.1	10.33	0.001
The normal range of potassium in blood	19	54.3	0	0.0	16	45.7	29	82.9	0	0.0	6	17.1	23.09	0.001
The function of potassium	14	40.0	11	31.4	10	28.6	20	57.1	10	28.6	5	14.3	16.08	0.001
Nursing care for potassium deficiency	15	**42.9**	11	31.4	9	25.7	21	**60.0**	12	34.3	2	5.7	18.29	0.001
The normal range of magnesium in blood	18	51.4	0	0.0	17	48.6	30	85.7	0	0.0	5	14.3	15.73	0.001
The function of magnesium	15	42.9	10	28.6	10	28.6	22	62.9	10	28.6	3	8.6	20.48	0.001
Nursing care for magnesium deficiency	14	40.0	13	37.1	8	22.9	26	74.3	8	22.9	1	2.9	11.11	0.001

Table (3): Distribution of the studied nurses regarding their knowledge about monitoring fluids and electrolytes replacement therapy for burned patient pre and post program implementation ,(n = 35).

The nurses' knowledge	Pre program						Post program						Significance test	
	Complete answer		Incomplete answer		Incorrect answer		Complete answer		Incomplete answer		Incorrect answer			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	X^2	P-value
Meaning of fluids balance in body	15	42.9	13	37.1	7	20.0	25	71.4	8	22.9	2	5.7	17.97	0.001
Body systems should be monitored to assess the fluid balance	10	**28.6**	16	45.7	9	25.7	22	**62.9**	9	25.7	4	11.4	21.79	0.001
Nurse role in assessing the urinary system	13	37.1	12	34.3	10	28.6	20	57.1	10	28.6	5	14.3	25.71	0.001
Nurse role used in assessing the cardiovascular system	10	28.6	16	45.7	9	25.7	25	71.4	8	22.9	2	5.7	15.56	0.001
Meaning of fluids replacement	14	**40.0**	15	42.9	6	17.1	23	**65.7**	9	25.7	3	8.6	19.07	0.001
Basic steps in fluid replacement process	14	40.0	16	45.7	5	14.3	27	77.1	7	20.0	1	2.9	21.44	0.001
Importance of fluid replacement	13	37.1	16	45.7	6	17.1	20	57.1	13	37.1	2	5.7	10.18	0.001
The equation used in fluid replacement (Parkland formula)	11	**31.4**	17	48.6	7	20.0	24	**68.6**	8	22.9	3	8.6	19.05	0.001

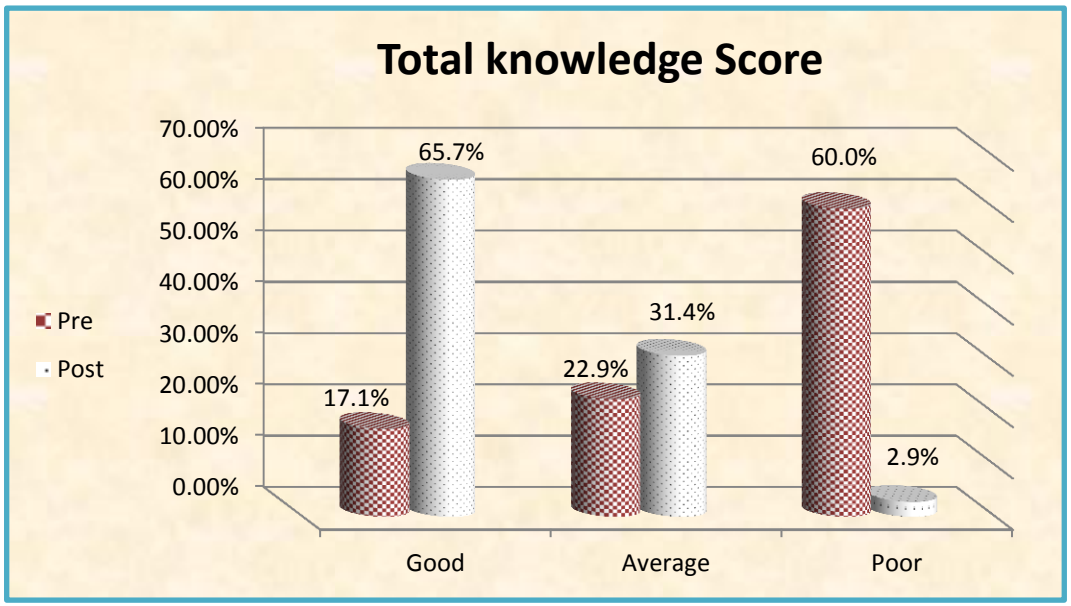

Figure (1): Distribution of the studied nurses' total knowledge score regard monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation

Table (4): Distribution of the studied nurses' practices towards monitoring fluids and electrolytes replacement therapy for burned patient pre and post program implementation , (n = 35).

The nurses' practices	Pre program				Post program				Significance test	
	Done correctly		Not done correctly		Done correctly		Not done correctly			
	No.	%	No.	%	No.	%	No.	%	X^2	P-value
1-Hand hygiene.	12	31.4	24	68.6	29	82.9	6	17.1	23.00	0.001
2-Check fluid according five rights.	13	37.1	22	62.9	28	80.0	7	20.0	16.77	0.001
3-Check I.V line are flow freely	13	37.1	22	62.9	30	85.7	5	14.3	23.47	0.001
4-Check the infusion rate \date.	12	34.3	23	65.7	27	77.1	8	22.9	20.60	0.001
5-Document the prescribed fluid on chart.	19	**54.3**	16	45.7	30	**85.7**	5	14.3	11.33	0.001
6- Check if inflammation signs show	20	57.1	15	42.9	32	91.4	3	8.6	10.61	0.001
7-Record the time when administration of fluid starts	17	48.6	18	51.4	29	82.9	6	17.1	16.00	0.001
8- Flush the tubing with heparinized normal saline at the end.	15	42.9	20	57.1	30	85.7	5	14.3	14.96	0.001
9- Mentioning the amount of fluid infused and documents the additives which added to the fluid.	13	**37.1**	22	62.9	27	**77.1**	8	22.9	15.75	0.001
10- Record date and signature.	21	60.0	14	40.0	32	91.4	3	6.8	13.75	0.001

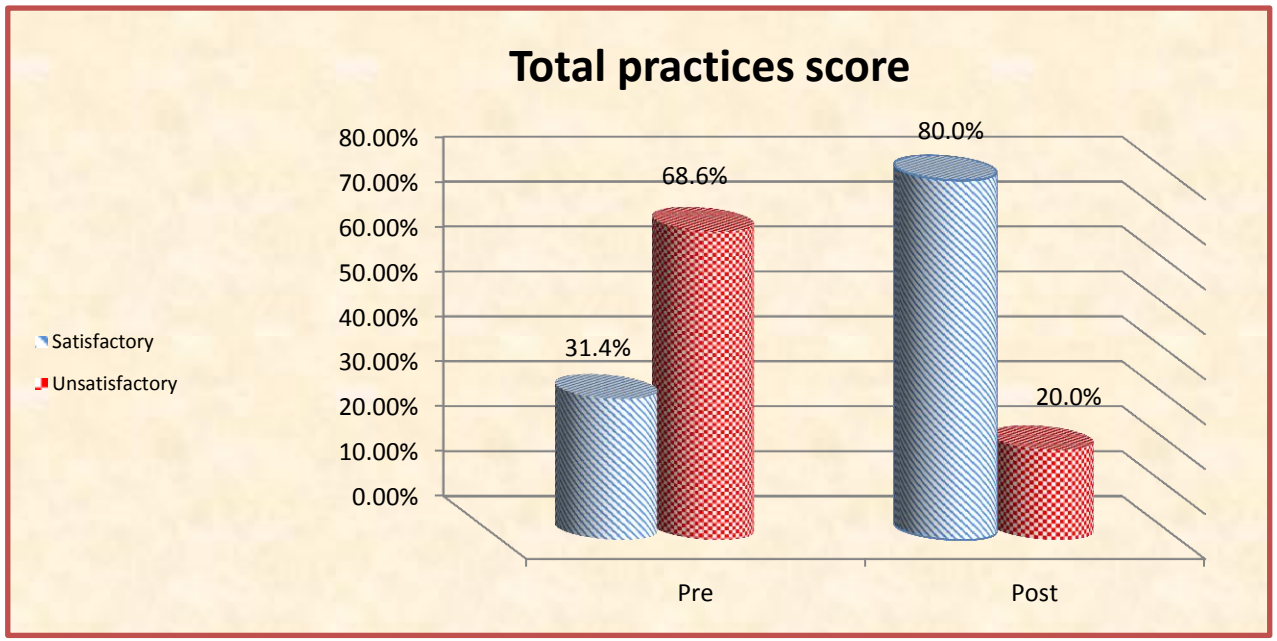

Figure (2): Distribution of nurses' total practices score regarding monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation, (n = 35).

Table (5): Correlation between the studied nurses' total knowledge and total practices pre and post program implementation, (n = 35).

Items	Total knowledge			
	Pre program		Post program	
	R	P-value	r	P-value
Total practices Pre program	0.570	0.001**		
Post program			0.829	0.001**

Discussion

The effective management of burned patients requires accurate assessment of their fluid balance status. This assessment includes appropriate monitoring of fluid intake and output, as well as the accurate calculation. The correct recording of this data therefore, is essential that a critical care nurse implements appropriate fluid balance monitoring, accurate calculation and correct recording to deliver safe, quality patient care ***(Asfour, 2016).*** The fluid balance of a patient is essential for preserving homeostasis and to maintain optimal tissue perfusion, thus monitoring fluid and electrolyte plays an important role in the managing a burned patient. Current literature and best nursing practice emphasize the importance of accurate and correct monitoring fluid balance and replacement in critically ill patients including recording fluid intake and output on a purpose designed fluid balance chart and monitoring fluid and electrolyte replacement for burned patient ***(AbdElalem and Fouad, 2018).***

The current study aims to evaluate the effect of an educational program on nurse performance regard monitoring fluid and electrolyte replacement for burned patients. The discussion of current study cover four main parts; the first part Socio-demographic characteristics of nurses, second part nurses' knowledge regard monitoring fluid and electrolyte replacement therapy for burned patients pre and post program implementation, third part nurses' practice pre / post program, and finally the fifth part discuss the correlation between the studied nurses' total knowledge and practices pre and post program.

The first part included demographic variables, regarding the age the current study showed that nearly half of the nurses' age was between 30 ≥ 40 years old. This study was agreed with ***El-Sayed ,Gomaa And Abdel-Aziz ,(2015)*** in study about "Nurses' Knowledge and Practice for Prevention of Infection in Burn Unit at a University Hospital: suggested Nursing Guidelines" stated that the studied nurses 'age was 30 ≥ 40. While this findings disagreed with ***El-Sayed, El-guindi and Omar, (2019)*** in study about **"**Nursing Core Competencies of Staff Nurses Providing Care for Burned Patients" It reveal that the majority of staff nurses' age was ranged from 20 to <30 .

As a regarding to the educational level the current study showed that the highly percentage of the studied nurses had nursing diploma. As the highly

percentages of nurses in especially areas as burn need nurses working for long times and they were worked from the graduate from nursing school .This result agreed with ***Sheta and Mahmoud, (2018)*** who studied "effectiveness of structured educational program on knowledge and practice regarding body fluid balance for patients" stated that the high percentage of staff nurses had diploma school in nurse.

As regards years of experience in burn unit, the current study revealed that more than half of the studied nurses had more than 10 years in burn unit. This study was agreed with another study done by ***El-Sayed, Gomaa and Abdel-Aziz, (2015)*** they stated that more than half of the studied nurse have 10-20 years of experience burn unit. While this result disagreed with ***El-Sayed, El-guindi and Omar, (2019)*** stated that the nurses' years of experience ranged from 5- 10 years in burn unit.

Concerning previous training about monitoring fluids and electrolytes replacement therapy for burn patient, more than half of them not received any previous training; this indicated that they are a need educational program because they hadn't received more training courses. This result are agreed with ***Mohamed, Mohamed and Taha (2019***) in study about "Effect of Educational Protocol Regarding Accurate Monitoring Fluid Balance on Critical Care Nurses' Knowledge and Practice" revealed that the majority the nurses hadn't attended any previous workshop regarding fluid balance monitoring.

Second part concerning with the nurses' knowledge about fluids and electrolytes balance for burn patients, the present study results show that there were improvements in nurses' knowledge regarding fluids and electrolytes balance for burn patients after program implementation. The researcher point of view the educational program created a great effect on nurses' knowledge about fluids and electrolytes balance for burn patients and nursing care for electrolyte imbalance post program. Also this result answers the first hypothesis in this study. This study was agreed with another study done by ***Sheta & Mahmoud (2018),*** stated that there were highly significant differences between pre and post program implementation in relation to total mean score of nurses' knowledge regarding body fluid balance assessment.

Also the present study show there are statistical difference in nurses knowledge about fluids and electrolytes balance for burn patients and nursing care for electrolyte imbalance preprogram compared with post program. These results match with the results of the study done by ***Mohamed ,Mohamed and Taha (2019),*** they revealed that the nurses′ knowledge regarding the assessment of fluid balance are found that the majority of the study group had high level regarding the fluid balance assessment post-educational program compared with pre-education.

As regard to nurses' knowledge about monitoring fluids and electrolytes replacement therapy, the current study represented that there were highly statistically significant in all items between pre, and post program. One the researcher point of view this result indicated that the program had positive effect on to the studied nurses'

knowledge regarding monitoring fluids and electrolytes replacement therapy between pre, and post program implementation. This result agree with ***Asfour, (2016),*** who studied "Fluid Balance Monitoring Accuracy in Intensive Care Units" stated that regarding importance of fluid balance monitoring, it was noted that more than half of nurses agreed that fluid balance assessment is important to guide nursing care in critically ill patients.

This result is agree with ***Mahran, Mahgoup and Abass (2019),***who studied "The Effect of Scenario Based Teaching for Critical Care Nurses and Physicians on their knowledge of fluid creep" stated that it is obvious from the findings of the study that nurses knowledge about fluid replacement improved after the application of the scenario. Also this result agreed with ***Olszewski et al.,. (2017),*** they stated that knowledge was strongest in resuscitation fluid calculation, with an improved knowledge in maintenance fluid rate calculation after reading the burn handbook.

In addition to the equation used in fluid replacement (Parkland formula), the present study donated that one third of the studied nurses had complete answer regarding which increased to more than two third post program. This result agreed with ***Lam, Huong & Tuan (2018),*** who stated that the nurse should calculate the total fluid requirement for a burn using the Parkland formula and had the highest percentage of correct answers, with more than three quarter had correct answers for the pre-survey compared with the majority for the post-survey.

Also this result is agreed with ***Olszewski et al.,., (2017)*** who studied "Development and Implementation of an Innovative Burn Nursing Handbook for Quality Improvement" stated that nurses knowledge related to fluids maintenance rate calculation was less than one quarter correct answers for the pre-survey but improved to more than half correct answers for the post-survey.

Third part is nurses' practices; concerning to nurses' practices score regarding monitoring fluid and electrolyte replacement therapy for burn patient pre and post program implementation, the current study describes that, less than one third of the nurses had satisfactory practices score preprogram, while increased to the majority post program implementation. That's mean the empowering education assisted nurses for completing the professional tasks competently and correctly . Also this result answers the first hypothesis in this study. These findings validated by ***AbdElalem & Fouad, (2018)*** state that the majority of nurses had satisfactory practices post program compared with unsatisfactory preprogram.

Regarding nurses' practices towards measuring the patients' output, the current study that there were highly statistically significant differences in all items between pre, and post program. One researcher point of view the educational program created a great effect on the studied nurses' practices towards measuring the patients' output post program. This finding may be due to practical, comprehensive, concise, and clear program, active learning methods, and explicit learning materials &

increased nurse's motivation. These results supported by ***Sheta & Mahmoud, (2018)*** who concluded that there was a highly statistically significant improvement score of nurses' practices post-program implementation regarding to recording fluid output for critically ill patients.

Regarding nurses' practice documentation of fluid and electrolyte replacement therapy for burned patients ,the current study indicated that half of the nurses correctly document the prescribed fluid on chart preprogram which increased to the majority post program implementation. This result agreed with ***Kanakalakshmi, (2014)*** who studied "Knowledge and Practice Regarding Fluid and Electrolytes Replacement Therapy for Patient with Burns among working nurses" showed that more than one third of nurses followed safe practice, less than half of nurses had moderately safe practice and less than one quarter of them had unsafe practice. Also this result agreed with ***Waqas (2017),*** who studied "The Assessment of Nurses' Knowledge and Practices about fluid and electrolytes monitoring and administration among patients" mentioned that highest percentage of study sample correctly document the prescribed fluid on chart post-educational program.

The current study illustrated that one third of nurses correctly monitoring the amount of fluid infused and documents the additives which added to the fluid Preprogram which increased to more than two third post program. These findings agreed with ***AbdElalem and Fouad (2018),*** who stated that one hundred percent of the study sample had poor level regarding monitoring the amount of fluid infused and documents the additives which added to the fluid pre-intervention, while post-intervention the majority of them had a good level.

The fourth part related to correlation between nurses' total knowledge and total practices pre and post program, the study indicates that there were highly statistically significant positive correlations between the studied nurses' total knowledge and total practices regarding monitoring fluid and electrolyte replacement therapy for burn patient. This finding means when increase in nurses knowledge that lead to increase in practice level also this may be due to effective, clear demonstration and re-demonstration of practice

This result agreed with **Abwalaba, Ogutu and Ngarngar.** ***(2018),*** they showed that there was a highly statistically significant association between knowledge and practice of IVF therapy with $p<0.05$. Also the result agreed with ***Mohamed, Mohamed & Taha (2019*)*,*** they indicated that, there were highly statistically significant positive correlations between the studied nurses' total knowledge and total practices regarding monitoring fluid and electrolyte replacement therapy for burn patient pre and post program.

This is confirmed with ***AbdElalem & Fouad (2018),*** who emphasized on that there was statistically significant relation between nurses' knowledge score and level of practice regarding body fluid balance assessment post intervention Also in the same line with ***Aslam et al.,. (2017),*** in study about assessment of nurses' knowledge and

practices about fluid and electrolytes monitoring and administration among patients, illustrated that empowering education is a model designed for in-service training for nurses that advisable to match the training programs according to educational needs related to practical skills for nursing staff..

This related to every practicing nurse needs to acquire theoretical and technical information which is necessary to develop her skills in clinical practice. Technical skills cannot be separated from intellectual and interpersonal skills. Intellectual skills related to technical skills include the nurses' knowledge of the principles and steps of the procedure. Also these results answer the second hypothesis of this study

Conclusion:

The current study concluded that, implementation of health education program has a positive effect on improvement of the nurses' knowledge and practices practice regard monitoring fluid and electrolyte replacement therapy for burned patient post program than preprogram. Also the current study concluded that there are positive correlation between nurse's knowledge and practice regard monitoring fluid and electrolyte replacement therapy for burned patient post program. Those results justified the research hypothesis

Recommendations:

This study recommended that emphasize the importance of a continuous in-service educational program regard monitoring fluid and electrolyte replacement therapy for burned patient

Further study with replication of the current study on a larger probability sample is recommended to achieve generalization of the results and wider utilization of the designed educational program

Nursing administration should develop effective departmental policies and procedures for staff nurses related to monitoring fluid and electrolyte replacement therapy for burned patient

Provision of in-service training on regular basis in order to update and refresh practice related to monitoring fluid and electrolyte replacement therapy for burned patient

References:

AbdElalem, S. and Fouad, N. (2018). Effect of an instruction intervention about body fluid balance assessment on knowledge and practice among nurses. Thesis for Doctor Degree in nursing science, Faculty of Nursing, Menoufia University, PP: 94-105**.**

Abd El Hamid,H (2016). Fluid Balance Monitoring Accuracy in Intensive Care Unit, ISOR Jornal of Nuursing and health Science (ISOR- JNHS) 5: 4 ,pp:53-62.

Abwalaba, R., Ogutu, P &Ngarngar, S., (2018). Nurses' competence on intravenous fluid therapy for patients with dehydration in Kakamega country hospitals Kenya. IOSR Journal of Nursing and Health Science; 7 (2): PP. 41-48.

Asfour,H. (2016): Fluid Balance Monitoring Accuracy in Intensive Care Units. Alexandria university IOSR Journal of Nursing and Health Science 5(4): 53-62 Available at www. iosrjournals. org Retrieved on11-12-1019.

Aslam, S., Afzal, M., Kousar, R., Waqas, A., &Gilani, S. A., (2017). The assessment of nurses' knowledge and practices about fluid and electrolytes monitoring and administration among patients, International Journal of Applied Sciences and Biotechnology; 5(2): PP. 208-215.

Coca, S., Bauling, P., Schiffner, G., Howard, C., Eitelbaum ,I. &ParikhC.(2019). Contribution of acute kidney injury toward morbidity and mortality in burns: a contemporary analysis, Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 49 (4): 517- 523

El-Sayed, z., Gomaa, A. & Abdel-Aziz, M. (2015). Nurses' Knowledge and Practice for Prevention of Infection in Burn Unit at University Hospital: Suggested Nursing Guidelines, Thesis for Master Degree in nursing science, Faculty of Nursing, Cairo university, pp154-156.

El-Sayed, A., EL-Guindi, F & Omar, H., (2019). Nursing Core Competencies of Staff Nurses Providing Care for Burned Patients ,Master Degree in nursing science, Faculty of Nursing, Ain Shams university, PP113-116.

Endor, F.&Ahrenholz, D. (2019). Burn management. PMC part of springer journal, 17(6):601-605.

Fayed, M.N., Hanan, T., Elbahnasawy, T.H., & Omar, KT. (2016). Effect of Instructional Program on Nurses Compliance with Universal Precautions of Infection Control, International Journal of Novel Research in Healthcare and Nursing, 3(1): 81-92.

Ipaktchi,K. & Arbabi, S. (2018). Advances in burn critical care. Journal of intensive care, Med, 34(9):239-244 Available at https:// journals .sagepub.com /doi/ abs/ 10. 1177/ 0 8850 6661 5592 346 Retrieved on 25-12-2019

Kanakalakshmi, R. (2014). Knowledge and practice regarding fluid and electrolytes replacement therapy for patient with burns among working nurses, Narayana Nursing Journal; 3(4): PP. 34-36.

Kasten, K., Makley, A, & Kagan, R.(2019). Update on the critical care management of severe burns, Journal of Intensive Care Med, 26(4):223-236 .

Kumar, P. (2018): Burns Fluid Resuscitation with Considerations for Changing Target Goals, JSM Burns Trauma, 3 (1):1038.

Lam ,N.,Huong, H.& Tuan.A. (2018). Nurse Knowledge Of Emergency Management For Burn And Mass Injures, Annals Journal of burns and fire disasters, 4(3) : 43-54.

Mahran, H., Mahgoub, A., & Abass, M. (2019). The effect of scenario based teaching for critical care nurses and physicians on their knowledge of fluid creep, Thesis for Doctor Degree in nursing science, Faculty of Nursing, assuit university, PP. 194-195.

Mohamed, M., Mohammed ,I. & Taha,S.(2019). Effect of Educational Protocol Regarding Accurate Monitoring Fluid Balance on Critical Care Nurses' Knowledge and Practice Thesis for Doctor Degree in nursing science, Faculty of Nursing, Minia University, PP176-178.

Mohammed,S. (2016) : Nursing Guidelines and Its Effects on Nurses' Knowledge and Patient Safety Regarding Nosocomial Infection Control Measures in Burn Unit.IOSR Journal of Nursing and Health Science V. 5, N. 5, PP 06-16

Sheta, H. &Mahmoud, M. (2018). Effectiveness of Structured Educational Program on Knowledge and Practice among Nurses Regarding Body Fluid Balance, IOSR Journal of Nursing and Health Science, 7(5):74-83 .

Sharp, M., & Corp, D. (2019). Overview of electrolytes. Available at: https:// www. msdmanuals. com/ home/ hormonal- and- metabolic disorders/ electrolyte- balance/ overview- of- electrolytes ,Retrieved on 23-12-2019.

Olszewski, A., Yanes, A., Stafford, J., Greenhalgh, D., Palmieri, T., & Sen, S. (2017). Development and implementation of an innovative burn nursing handbook for quality improvement. J Burn Care Res J; 37(1): PP.20–24.

Waqas, A. (2017). The assessment of nurses' knowledge and practices about fluid and electrolytes monitoring and administration among patients, International Journal of Applied Sciences and Biotechnology; 5(2): PP.58-60.

World Health Organization (2018). A WHO plan for burn prevention and care, Available at: WWW.Who .int /entity/ Mediacentre/factsheet / fs365/ en/- 41k, Accessed on April 2018.