

## **Effect of an Educational Program on Nurses' Performance Regarding Heat Stroke.**

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### **Abstract**

Heat stroke is an acute, life-threatening emergency characterized clinically by elevated body temperature and central nervous system dysfunction. The nurse has an important role in critical care team. Therefore, the aim is to evaluate the effect of an educational program on the nurses' performance regarding heat stroke. Quasi-experimental research design was used to conduct this study. This study was carried out at Emergency department and isolation room at Assiut University Hospitals. The sample: A convenient sample included all nurses working at Assiut University Hospital ;30 nurses in the emergency unit and 12 nurses in isolation room .Tools: Two tools were utilized in this study. Tool I: Nurses' knowledge assessment. Tool II: Nurses' performance observational checklist questionnaire. Results: The present study revealed that total mean scores of the nurses' knowledge was  $13.02 \pm 4.49$  pre implementation,  $27.57 \pm 2.38$  post implementation of educational program and  $26.33 \pm 4.06$  at follow up. Total mean scores of the nurses' performance was  $112.64 \pm 8.84$  pre implementation,  $177.97 \pm 8.35$  post implementation of the program and  $160.67 \pm 14.44$  at the follow up .So there is a significant difference between their knowledge before and after the educational program. Conclusion: The study concluded that the educational program led to improvement in nurses' knowledge and performance about heat stroke. Recommendation: The program should be utilized for all new graduated nurses to be orientated to all aspects of care provided for heat stroke patients.

**Keyword: Heat stroke, Nurse's Performance & Educational Program.**

### **Introduction**

Heat stroke is defined as a core temperature more than  $40.5^{\circ}\text{C}$  accompanied by central nervous system (CNS) dysfunction. There are two clinical presentation of heat stroke (HS) as classical HS (CHS) and exertion HS (EHS). They are defined by etiology but clinical presentation is similar (**Abd Wahab 2016**).

The first type of heatstroke is classic heat stroke (CHS). It takes place when someone is exposed to passive environment heat stress .This is most frequently observed during heat waves; particularly young children , schizophrenic patients and patients who are bed ridden are vulnerable to classical heat stroke during heat waves , patients with heart disease contribute to higher morbidity and mortality from heat stroke in extremely hot weather ,Classic heat stroke has been attributed to impairment of homeostatic mechanisms under conditions of high ambient temperature (**Seet, 2010**).

As for exceptional heat stroke (EHS), it occurs during physical exertion, when hyperthermia is due to the inability to remove endogenous metabolic heat. Those who work under hot and humidified weather are risk for exertional heat stroke (**Seet, 2010**).

Symptoms that are noted when assessing patient with heat stroke such as: profound central nervous system dysfunction, elevated body temperature ( $40.6^{\circ}\text{C}$  or higher), hot, dry skin and anhidrosis, tachypnea, hypotension and tachycardia (**Hinkle, 2014**).

The first line in management should be done quickly for the high body temperature to reduce risk for mortality resulting from hyperthermia (**Smeltzer, 2010**).

The nurse starts to assess airway, breathing and circulation (ABCs). Consciousness should immediately established, based on Glasgow Coma Scale. Nursing interventions should be included hemodynamic monitoring and initiating fluid resuscitation with crystalloid intravenous 0.9% sodium chloride solution. (**Carl, 2015**)

### **Significance of the study**

Population exposure to heat stroke is increasing due to climate change and this trend will continue. This led to increase of heat stroke patients who admitted to emergency care unit at Assiut University Hospital . Statistics of Medical emergency unit of Assiut university hospital in years 2015 and 2016 revealed that the number of patients admitted to the unit is 60 heat stroke patients.

It has become necessary to improve the nurses' knowledge and performance concerning heat stroke.

### Aim of the study was

To evaluate the effect of an educational program on the nurses' performance regarding heat stroke

### Study Hypothesis

Nurses' knowledge and practice after program implementation will be improved than their knowledge and practice before program implementation

## Subjects & Methods

### Research Design

A quasi – experimental research design has been utilized to fulfill the aim of this study.

**Setting:** This study was carried out at the medical emergency unit and the isolation room of Assiut University Hospital.

**Subjects:** A convenient sample of all nurses working at the emergency unit and at the isolation room of an Assiut university hospital. (30 of them were at the emergency unit and 12 were at isolation room).

**Study Tools:** Two tools used for collections were utilized to assess the nurses' Knowledge and performance regarding care of heat stroke patient.

**Tool one: Nurses' knowledge assessment questionnaire,** this tool was developed by the researcher after reviewing literatures to assess the knowledge level of nurses about care of heat stroke patient. This tool consists of two parts:-

Part I: Socio-demographic data of nurses (code, age, level of education, marital status, years of experience and attendance of previous training courses).

Part II: Nurses' knowledge( pre /post test) about meaning of heat stroke , types of heat stroke ,complications of heat stroke ,predisposing factor, nursing care of heat stroke and patient assessment of the neurological status (GCS). It consisted of 22 questions including three types of questions which contained (multiple choice, true / false and complete).

### Scoring system for nurses' knowledge

There were 22 knowledge questions including 15 multiple choice questions and 5 true / false questions & 2 complete questions.

Items	Score
Correct answer	1
Wrong answer	zero

A total score of the questionnaire was 33 grades. All questions were measured and divided by the number of questions to obtain the total knowledge of each nurse. Knowledge below 75% was considered unsatisfactory while those equal to or above 75% were considered satisfactory.

**Tool two: Nurses performance observational checklists:** This tool was adopted from (Pamela2015) intravenous fluid intake (32 steps), using a hypothermia blanket (23steps), Applying Cold Therapy (16steps) and applying of emergency care in heat stroke patient. It was adopted from (Abdwaha, 2016) & (Alghamdi, 2015) & (Benjamin, 2010).

### Scoring system for nurses' practices

Items	Score
correctly done	2
incorrectly done	1
Not done	zero

All steps were measured and divided by the number of steps to obtain the main practice of each nurse. Below 75% was considered unsatisfactory while those equal to or above 75% were considered satisfactory.

### Methods:

The study was conducted throughout three phases, preparatory phase, implementation phase and evaluation phase.

### 1-Preparatory phase and administrative design: -

An official permission to conduct the study was obtained from the Dean of Faculty of Nursing to Head of department of emergency after explaining the aim of the study.

The tools used in the study were adopted by the researcher based on reviewing the relevant literature.

**Content validity:** The tools were tested for content validity by jury of 5 Experts in the field of critical care nursing who reviewed the instrument for clarity, relevance, comprehensiveness, understanding and applicability.

### Pilot study:

It was conducted on 10% nurses to test the clarity and applicability of the tools and tool modification was done.

**The reliability:** Was test for tool one (Knowledge assessment tool), and tool two (performance assessment tool) by using Cronbach,s alpha for knowledge was 0.805 and performance was 0.740 .

**Ethical consideration:** An approval was obtained from the ethical committee and the study followed the common ethical principles in clinical research protection of the human rights (ethical considerations): oral informed consent was obtain from each nurse .The researcher Emphasized that participation is voluntary confidentiality and anonymity of the nurses will be assured through coding of data. The nurses were assured that they can withdraw from the study at any time without any rational.

### Implementation phase

The study was implemented through four phases:

**Preliminary session:** In this session the researcher met the participants and explained the objectives, contents, and methods of evaluation of program

**Assessment:** researcher introduced herself and explained the aim of the study the researcher assessed nurses knowledge of the nurses concerning the subject matter of the research and detected the weak points of it.

**Planning:** based on the collected data, the researcher developed an educational program in form of hand out booklet in Arabic language. The objective of the program was to improve nurses' knowledge and performance regarding care of patients with heat stroke .The program was developed to cover all necessary knowledge needed for heat stroke patients.

#### **Implementation of program**

The total sample was divided into subgroups including 5 nurses in each session. The program was carried out at emergency department nurses' office and at the Isolation room department nurses' office of Assiut University Hospital

The researchers choose their optimal time for giving the educational program whenever they have minimal workload. The implementation of the program took six months. Each subgroup had six sessions .They took two sessions per week. At initial interview the researcher introduced herself to initiate line of communication.

#### **Theoretical part which included**

**First session** last for (1hour) included: Pathophysiology of heat stroke, definition of heat stroke and Signs &Symptoms of heat stroke.

**Second session** last for (1hour) which included: Types of heat stroke and complication of heat stroke.

**Third session** last for (1hour) which included: Type of cooling methods and assessment of the neurological status (GCS).

**Fourth session** last for (1 hour) which included: Algorithm management of heat stroke

**Practical part included:-** Cooling methods and applying of emergency real situation guideline in emergency unit.

In these sessions (practical part) lasted for 2 hours. Each nurse demonstrated and re-demonstrated the steps of each procedure individually under the supervision of the researcher.

#### **Learning environment**

##### **Teaching method**

Lecture, discussion, demonstration and re-demonstration were the teaching methods.

**Teaching facilities:** posters, a booklet, internet, power point and video

##### **Learning activities**

Practice re-demonstration of used learning activities.

**Data collection:** Data were collected by the researcher during approximately 6 months starting from May 2017 to October 2017.

#### **Evaluation of the teaching program**

The same pretest study tools (questionnaire sheet, observational checklist) were used as posttest for nurses in order to test the effectiveness of the program on nurses' knowledge and performance. A comparison was done three times, the before, immediately after and follow up.

#### **Statistical analysis**

data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by **Number and Percent (N, %)**, where continuous variables described by mean and standard deviation (**Mean, SD**). **Chi-square test** was used to compare between categorical variables where comparison between continuous variables was by **One way ANOVA t test**. **A two-tailed p < 0.05** was considered statistically significant. All analyses were performed with the **IBM SPSS 20.0** software.

## Results

### Part (I) personal characteristics of the studied nurses'.

Table (1): Frequency distribution of socio demographic data of the studied, Nurses (n=42)

personal characteristics	N	%
<b>Age</b>		
20- 35 years	31	73.8
More than 35 years	11	26.2
<b>Mean <math>\pm</math>SD(range)</b>	<b>29.86<math>\pm</math>10.97 ( 20 - 53 )</b>	
<b>Sex</b>		
Male	6	14.3
Female	36	85.7
<b>Marital status</b>		
Single	15	35.7
Married	27	64.3
<b>experience year</b>		
<b>Mean +SD(range)</b>	<b>9.88<math>\pm</math>7.75 ( 1 – 29.0 )</b>	
<b>Previous attendance</b>		
Yes	-	-
No	42	100

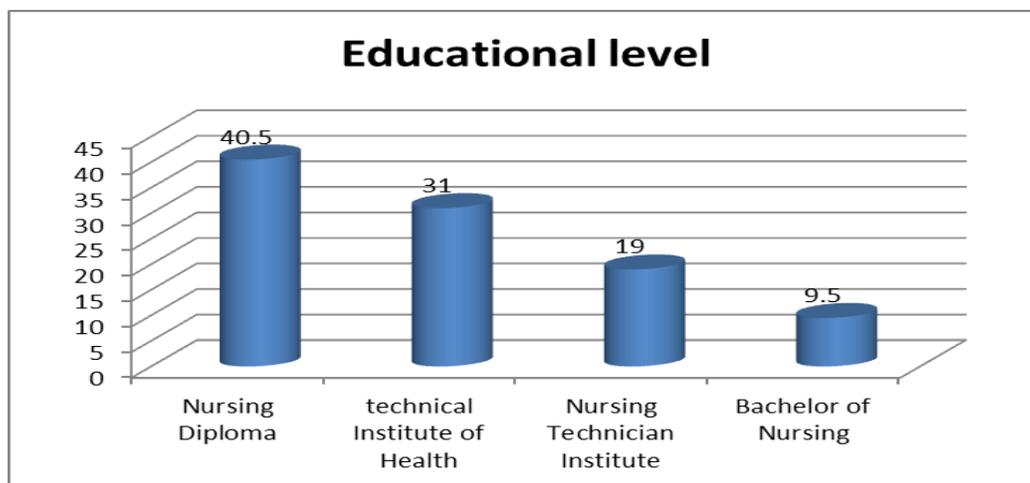


Figure (1): This figure shows percentage distribution of studied nurses according to the level of educational.

Table (2): Relation distribution between nurses knowledge score pre, post and follow up regarding heat stroke.

Variable	Max Score	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	Follow up Mean $\pm$ SD	P. value	P1	P2	P3
<b>Total Knowledge score</b>	33	13.02 $\pm$ 4.49	27.57 $\pm$ 2.38	26.33 $\pm$ 4.06	<0.001**	<0.001**	<0.001**	0.133

One way Anova with LCD Method

\* Significant difference at p. value<0.05,

\*\* Significant difference at p. value<0.01)

P. value:- comparison between 3 phases ( Pre, Post and follow up)

P1:- comparison between Pre &Post

P2:- comparison between Pre & follow up

P3:- comparison between Post & follow up

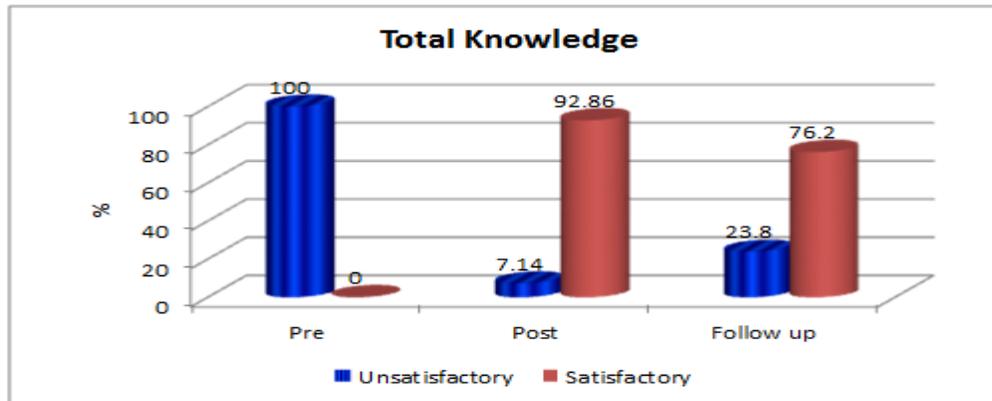


Figure (2): Percent distribution for level of satisfactory among nurses' knowledge score pre, post and follow up implementation educational program.

Table (3): Relationship between nurses knowledge score and their demographic data during the three program Phases

Socio-demographic data	Total Knowledge Score		
	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	Follow up Mean $\pm$ SD
<b>Age</b>			
20- 35 years	13.8 $\pm$ 4.4	27.4 $\pm$ 2.5	26.5 $\pm$ 3.8
More than 35 years	10.9 $\pm$ 4.3	28.18 $\pm$ 2.2	25.9 $\pm$ 4.8
<b>P. value</b>	0.068	0.302	0.691
<b>Marital status</b>			
Single	15.0 $\pm$ 4.6	28.0 $\pm$ 2.3	25.9 $\pm$ 3.9
Married	11.9 $\pm$ 4.1	27.3 $\pm$ 2.5	26.5 $\pm$ 4.2
<b>P. value</b>	<b>0.041*</b>	0.391	0.640
<b>Educational level</b>			
Nursing diploma	10.7 $\pm$ 3.9	26.9 $\pm$ 2.8	26.1 $\pm$ 3.8
technical institute of health	14.4 $\pm$ 4.1	27.8 $\pm$ 1.9	25.8 $\pm$ 4.2
Nursing technician institute	14.1 $\pm$ 4.7	27.4 $\pm$ 1.6	27.4 $\pm$ 4.3
Bachelor of nursing	16.0 $\pm$ 4.9	30.0 $\pm$ 2.16	27.0 $\pm$ 5.5
<b>P. value</b>	<b>0.045*</b>	0.117	0.829
<b>Training courses</b>			
Yes	14.6 $\pm$ 3.3	28.2 $\pm$ 1.5	26.3 $\pm$ 3.6
No	12.5 $\pm$ 4.7	27.4 $\pm$ 2.6	26.4 $\pm$ 4.3
<b>P. value</b>	0.135	0.228	0.975

- Independent T- test\* Significant difference at p. value<0.05

- Anova Test \* Significant difference at p. value<0.05

Table (4): Distribution of the mean scores of nurses' performance at before, after and follow up educational program. (N: 42).

Variable	Max Score	before	after	Follow up	P. value	P1	P2	P3
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD				
Mean $\pm$ SD	196	112.64 $\pm$ 8.84	177.97 $\pm$ 8.35	160.67 $\pm$ 14.44	<0.001**	<0.001**	<0.001**	<0.001**
Range		85-141	166-196	122-180				

One way Anova with LCD Method (\* Significant difference at p. value<0.05, \*\* Significant difference at p. value<0.01)

P. value:- comparison between 3 phases ( Pre- Post and follow up)

P1:- comparison between Pre &Post

P2:- comparison between Pre & follow up

P3:- comparison between Post &follow up

P3:- comparison between Post &follow up

**Table (1).** This table shows personal characteristics of the nurses, It was found that, those who aged between 20-35 years are (73.8) with mean  $\pm$  SD (29.86 $\pm$ 10.97). The majority of them were females (85.7 %). More than half of the studied nurses were married (64.3% ). Moreover, all of the nurses had not received any previous training about heat stroke

**Figure (1):** Shows that the nurses who had technical health institute of nursing are (31.0%), (40.5%) of the nurses had secondary school of nursing and 9.5% of them had Bachelor of Nursing.

**Table (2):** Shows mean scores of nurses' knowledge concerning heat stroke before, after and follows up educational program. It was apparent from this table that the total mean scores of knowledge was higher immediately after the program (27.57 $\pm$ 2.38) than before the program with mean score (13.02 $\pm$ 4.49), while mean scores of the nurses' knowledge at 3 months follow up (26.33 $\pm$ 4.06). It was found that there were a statistically significant improvement in nurses' knowledge between before educational program and after educational program and between before and follow up.

**Figure (2):** Shows that all nurses (100%) had unsatisfactory level of knowledge in before implementation of the educational program, while most of them (92.86%) had satisfactory level of knowledge after implementation of the educational program.

**Table (3):** This table revealed that there was no significant relation between nurses' knowledge score and socio-demographic data before, after and follow up implementation of the educational program except the educational level.

**Table (4):** Showed mean scores of nurses' performance concerning heat stroke before, after and follow up educational program. It was apparent that total mean scores of the nurses performance in the pre program with mean score (112.64 $\pm$ 8.84) was less than immediate after program (177.97 $\pm$ 8.35) while mean scores of the nurses performance at 3 months follow up was (160.67 $\pm$ 14.44).It was found that there was statistically significant improvement in nurses performance between before and after educational program and between before and follow up.

## Discussion

Heat stroke is a preventable severe condition of heat-related illnesses; it is an emergency. A condition affecting millions of people around the world. Heat related illnesses ranged from mild heat exhaustion to life-threatening heat stroke. Early detection and treatment of heat-related illnesses crucial to avoid mortality and morbidity (Aljumaan, 2018) Critical care nurses need specialized skills and knowledge

and must be vigilant to protect their patients from serious complications. In some cases, the nurse must also provide care for patients who are not expected to survive. Of all members of the health care team, the nurse may be the person who spends the most time with the patient and family (Greenwood, 2019). So the aim of the present study is to evaluate effect of educational program on nurses, knowledge and practice about heat stroke.

### Socio-demographic characteristics of the nurses

In the study the majority of the studied nurses were in the age group between (20-35years). This may be attributed to the study of (Ahmed, 2019) that the majority of the study was young adults.

In the study the majority of them were females. More than half of the studied nurse were married and the majority of the nurses held secondary school of nursing, all of the nurses had not received any previous training regard heat stroke .

The results agree with (Musleh, 2015) who stated that the majority of nurses were at the age group less than 40 years, married and disagree with (Ahmed, 2019) who had more than half of the nurses were graduates from Nursing Technician Institute.

This result agree in this point about training program with (Ahmed, 2019) & (Sayed, 2019) that showed that all of nurses didn't receive training program.

The results of this study showed that the hypothesis was achieved.

### Nurses knowledge and performance regarding heat stroke

The present study revealed that the total score of nurses' knowledge and performance before implementation of the educational program generally was not satisfactory. This might be related to the fact that the majority of nurses did not receive any previous program about heat stroke that, in my opinion due to lack of continuing education programs or special training for each unit in the hospital. Another cause for the lack of knowledge of nurses dues to lack of Arabic nursing text books and they were overloaded by their work. The results agree with (Ahmed, 2019), (Mehany, 2015 & Sayed, 2019) who found that the nurses had poor knowledge and performance in all items pre educational program. And (shamran, 2016) who found that most of the study group have failed in majority of the items in pre test. The present study showed that there was statistically significant improvement in knowledge and performance of the studied nurses immediately after implementation of the educational program (p. value<0.001) this means that the educational program was effective .The results agree with (Ahmed, 2016) who found that their knowledge improved after the educational program it is in the same line with (Abd Elaziz,

2014) who found that there was a statistically significant difference between nurses' knowledge and their skills.

The results of the present study showed that the total scores of nurses' knowledge and practices in follow up of the implementation of the educational program decreased slightly than the result immediately after the implementation of the educational program but still better than scores in pre implementation of educational program. The results of the present study are in agreement with

(Abdulatif, 2016) & (Sayed, 2019) who reported that ,after 3 month post –test ,the percentage were slightly reduced as the majority of nurses were having satisfactory and good levels in all items of knowledge .

**Relation between socio-demographic data and total score of nurses' knowledge before, after and follow up implementation of the educational program.**

The present study showed that there is no significant relation between nurses' knowledge score and socio demographic data before, after and follow up implementation of the educational program except educational level. These results agree with (Ahmed, 2019) who found that there was no significant relation between nurses' knowledge and score and socio-demographic data before ,after and follow up implementation of the education program .and disagree with (Mehany, 2015) who found that findings nurses qualification and years of experience did not have influence on the nurses' knowledge and performance scores improvement , they agree with (sayed, 2019) who found that there was a significant positive relation between knowledge before the education program and nurses' marital status and level of education. These results disagree with (Mostafa et al., 2019) who found that there was no statistical significant relation between nurses' practice mean score (pre and posttest) and their demographic characteristics either their level of education or years of experience. Also these results disagree with (Mohammed et al., 2019) that showed no statistical difference between post nurses knowledge and socio demographic characteristics.

Finally, the findings of the present study supported the research hypothesis that nurses working at emergency unit who are exposed to educational program about heat stroke showed high score of performance after test (posttest) than that before (pretest) and after three month (follow up).

**Conclusion**

The educational program for nurses working at the emergency medical unit was successful in upgrading

their knowledge and practice concerning heat stroke. Newly graduated nurses did not receive any orientation program about management of heat stroke before working in this unit.

**Recommendations**

**Based on the findings of the current study, the following recommendations are suggested**

- The use of demonstration and planned teaching information material for staff nurses to supplement verbal information, increases knowledge, practice and satisfaction among the staff nurses.
- Orientation program should be utilized for newly graduated nurses'.
- Periodic refreshing courses for these nurses concerning any emergency situation in this critical care units
- Repeating this research on a larger and different sample.

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