



Effect of an educational program about heat stroke patients' outcomes

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Abstract

Heat stroke is an acute, life-threatening emergency characterized clinically by elevated body temperature and central nervous system dysfunction. Nursing care for patients with heat stroke must prevent complications and optimizes patient outcomes.

Aim: The aim is to evaluate the effect of an educational program on patients outcomes regarding heat stroke.

Design: A quasi-experimental research design was used to conduct this study.

Sitting: This study was carried out at Emergency department and Isolation room at Assiut University Hospitals.

Subject: A convenient sample included 60 adult patients diagnosed with Heat Stroke.

Tools: Patients assessment and patients outcomes sheets.

Results: There was no statistically difference between two groups regarding social demographic of the studied patients. There was statistically significant difference between the before and after educational program regarding complications (P. value 0.001**). They included (Acute renal failure, Arrhythmias, Acute respiratory distress syndrome and brain damage). Regarding outcomes there was statistically significant difference between the studied groups in the mortality rate and length of staying.

Conclusion: The incidence of heat stroke complications of patients cared by nurses who received the education program decreased.

Recommendation: Replication of this research on a large sample is acquired from different geographic areas in the Arab republic of Egypt for generalization.

Keywords: heat stroke, educational program, patients outcomes

Introduction

Heat stroke is defined as a core temperature more than 40.5°C accompanied by central nervous system (CNS) dysfunction. There are two clinical presentations 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) [2].

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) [16].

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) [16].

Symptoms that are noted when assessing patient with heat stroke such as: profound central nervous system dysfunction, elevated body temperature (40.6°C or higher), hot, dry skin and anhidrosis, tachypnea, hypotension and tachycardia (Hinkle, 2014) [9]. The first line in management should be done quickly for the high body temperature to reduce risk for mortality resulting from hyperthermia (Smeltzer, 2010) [19].

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).

The complication of the insult may persist beyond the initial CNS dysfunction, involving injury to the gut, kidney, skeletal muscle, or other organ systems. Complications of heat stroke include acute respiratory distress syndrome, disseminated intravascular coagulation, acute kidney injury, hepatic injury, hypoglycemia, rhabdomyolysis, and seizures. Despite normalization of core temperature with cooling, many patients continue to display core temperature disturbances and multi-organ dysfunction. Research has

shown that even reversible complications following heat stroke may take longer than weeks to resolve.

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 Assuit 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 that could help them to contribute a successful patient care outcomes.

Aim of the study

To evaluate the effect of an educational program about heat stroke on patients outcomes.

Hypothesis

Patients outcomes after program implementation will be improved than Patients outcomes before program implementation.

Patients and Method

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 Assuit University Hospital.

Subjects: A convenient sample included 60 adult patients (male and female) diagnosed with Heat Stroke, 30 patient before implementation of educational program (control group) and 30 patient after implementation of educational program (study group). The samples were selected randomly.

Criteria of the sample

Inclusion criteria

Patients who admitted to emergency care unit at Assuit University Hospital with diagnosis of heat stroke.

Exclusion criteria

The excluded are young patients of age younger than 16 years. Addition to patients with complications related to heat stroke when come to the hospital.

Study Tools

Two tools were used for collecting data in the study and were developed by the researcher based on the review of the related literature.

Tool one: patients' assessment sheet

This tool was developed by the researcher after reviewing literatures to assess the patients' condition. This tool consists of two parts:-

Part 1: Socio-demographic data of patients (code, age, occupation, level of education, marital status,) to assess

patients' profile.

Part II: assessment of the patients clinical data

This part included data of admission, date of discharge, history of present illness and past medical diagnosis.

Tool two: patient outcomes sheet

This tool was developed by the researcher to evaluate the patients' outcomes. It was divided into three parts:

Part 1: Assessment of expected complications

This part is used with the patients of heat stroke (Brain damage, Liver injury, acute renal failure, Arrhythmias, Acute respiratory distress syndrome and DIC)

Part 2: Days of hospital staying.

Part 3: Mortality Rate.

Methods

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

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 developed by the researcher based on reviewing the relevant literature.

Content validity: The tools were tested for content and validity by a 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 a random sample of six patients to test the feasibility and applicability of the tools and tool modification was done.

The reliability: Was tested by using Cronbach,s alpha for was 0.805 respectively which is acceptable.

Ethical consideration

An approval was obtained from the local ethical committee and the study followed the common ethical principles in clinical research protection of the human rights (ethical considerations)

Implementation phase

Record of socio demographic data which include (age, sex, level of education, occupation and marital status).

Record of medical data which include (date of admission, date of discharge, history of present illness and past medical diagnosis).

Observation of expected complication for critically ill patients' heat stroke (Brain damage, Liver injury, acute renal failure, Arrhythmias, Acute respiratory distress syndrome and DIC)

Record of days of stayed at the intensive care unit record of mortality rate.

Evaluation of the teaching program

Each patient included at present evaluated for complications from admission to discharge, staying day at hospital and mortality rate before and after implementation of education program by using tools predict patients outcomes. Evaluation done before and after implementation of education program.

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

Table 1: Frequency distribution of demographic characteristics of patients (N =60)

| Age | Control | | Study | | P value |
|----------------|---------|------|-------|------|---------|
| | No | % | No | % | |
| 16-20 | 1 | 3.3 | --- | --- | 0.763 |
| 21-30 | 5 | 16.7 | 3 | 10 | |
| 31-40 | 5 | 16.7 | 4 | 13.3 | |
| 41-50 | 12 | 40 | 3 | 10 | |
| 51-60 | 4 | 13.3 | 3 | 10 | |
| > 60 | 3 | 10 | 15 | 50 | |
| Sex | No | % | No | % | 0.233 |
| Male | 20 | 66.7 | 25 | 83.3 | |
| Female | 10 | 33.3 | 5 | 16.7 | |
| Occupation | No | % | No | % | 0.832 |
| Farmer | 5 | 16.7 | 4 | 13.3 | |
| House wife | 8 | 26.7 | 5 | 16.7 | |
| Employee | 1 | 3.3 | 2 | 6.7 | |
| Student | 2 | 6.7 | 3 | 10 | |
| Worker | 14 | 46.7 | 16 | 53.3 | |
| Education | No | % | No | % | 0.700 |
| Illiterate | 13 | 43.3 | 9 | 30 | |
| Read & write | 14 | 46.7 | 16 | 53.3 | |
| Primary | --- | --- | 1 | 3.3 | |
| Secondary | 2 | 6.7 | 2 | 6.7 | |
| Bachelor | 1 | 3.3 | 2 | 6.7 | 0.742 |
| Marital status | No | % | No | % | |
| Single | 4 | 13.3 | 5 | 16.7 | |
| Married | 21 | 70 | 20 | 66.6 | |
| Divorced | 1 | 3.3 | -- | --- | |
| Widow | 4 | 13.3 | 5 | 16.7 | |

Table 2: Comparison between control and study groups of Signs of heat stroke

| | Control | Study | P value |
|------------------|--------------|-------------|---------|
| | Mean±SD | Mean±SD | |
| Temperature | 40.23±0.55 | 40.02±0.83 | 0.237 |
| Pulse | 106.33±13.32 | 98.67±20.1 | 0.087 |
| Blood pressure | 56.33±7.18 | 62.67±11.04 | 0.011* |
| GCS in admission | 7.7±2.82 | 9.87±3.07 | 0.006** |

Independent samples T Test

* Statistically significant difference ($p < 0.05$),

** Highly statistically significant difference ($p < 0.01$).

Table 3: Comparison between studied groups of patients regarding complications of heat stroke (N =60)

| Complications | control | | study | | P value |
|-------------------------------------|---------|------|-------|------|---------|
| | No | % | No | % | |
| No complication | 9 | 30.0 | 25 | 83.3 | 0.001** |
| Acute renal failure | 3 | 10.0 | 1 | 3.3 | |
| Arrhythmias | 14 | 46.7 | 2 | 6.7 | |
| Brain damage | 1 | 3.3 | 1 | 3.3 | |
| Acute respiratory distress syndrome | 3 | 10.0 | 1 | 10.0 | |

Chi-square test,

* Statistically significant difference ($p < 0.05$),

** Highly statistically significant difference ($p < 0.01$).

Table 4: Comparison between studied groups of patients according to out comes

| Patients' out comes | Control | | Study | | P value |
|---------------------|-----------|----|-----------|-----|----------|
| | No | % | No | % | |
| Mortality | 9 | 30 | 2 | 6.7 | 0.046* |
| | Mean ± SD | | Mean ± SD | | |
| Length of Staying | 5.33±1.52 | | 2.03±0.81 | | <0.001** |

Table 1: Shows the distribution of the studied patients regarding age characteristics. It clearly shows that the majority of patients preprogram and post program were ranged between 51-60 years were 40% preprogram and ≥60 years of 50% post program. Regarding patient's sex, results revealed a relatively high percent of patients were male patients 66.7% of preprogram and 83.3 of post program, both groups could read and write. Regarding Marital status the majority of studied patients were married of 70% preprogram and 66.6 of post program. Regarding occupation, results revealed a relatively high percent of the patients were workers 46.7of preprogram and 53.3 of post program

There was no statistically difference between the two groups regarding social demographic of the studied patients

Table (2) regarding signs of heat stroke, there was statistically significant difference between pre and post program groups 0.011* in the blood pressure and 0.006** GCS (Glasgow Coma Scale)

Table (3) regarding complications: They included (Acute renal failure, Arrhythmias, Acute respiratory distress syndrome and brain damage) There was statistically significant difference between the before and after the educational program (P. value 0.001**).

Table (4) regarding outcomes, there was statistically significant difference between the studied groups in the mortality rate and Length of Staying.

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) [7]. 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 an educational program about heat stroke on patient outcomes.

Socio-demographic characteristics of the patients

Elderly patients particularly those with poorer socioeconomic status or those taking multiple medication, are at increased risk of heat illness, this agree with (Henkel. S, 2011) that shows that men are having a higher incidence of heatstroke than women, and agrees with (Lee V, 2019), Workers performing strenuous activities both outdoors and indoors-such as farming, construction and manufacturing in poorly ventilated buildings are risk of heat stroke. And disagrees with (betterhealth, 2020) living alone: there is no one to take care of the person if the person ignores symptoms.

Regarding complications include (Acute renal failure, Arrhythmias and Acute respiratory distress syndrome) there was statistically significant difference between before and after educational program. This agrees with (Mo *et al.*, 2018) that show that there were 22 patients with complications in the elderly group, including 19 cases of liver function damage, 5 cases of pneumonia (whose primary disease had been ruled out with pneumonia at admission), 8 cases of renal function damage, and 13 cases of nervous function damage.

Mortality rate was between 20-30% before and after program that agree with (Kalaiselvan, *et al.* 2015) Nine out of twenty six patients died. Mortality rate was (34%).

Conclusion

The incidence of heat stroke complications of patients cared by nurses who received educational program decreased.

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.
- Periodic refreshing courses should be given to these nurses concerning any emergency situation in this critical care units
- Repeating this research on a larger and different sample.

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