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**Research Article**

# Detection of medical errors in management of traumatic hypovolemic shocked adult patients presented to emergency department in Suez Canal university hospital, Ismailia, Egypt

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## ABSTRACT

**Background:** IN 2010, Institute of Medicine in USA report that medical errors are estimated to result in about between 44,000 and 98,000 preventable deaths and 1,000,000 excess injuries each year in U.S. hospitals. The annual cost of treating medical injuries in USA has been estimated to be $9 billion. The objective of this study was to follow up guidelines in treatment of Traumatic hypovolemic shocked patients.
**Methods:** The design of this study is a cross sectional descriptive study was conducted on traumatic patients who presented to the emergency department between the periods from October 2012 to October 2013. This study was conducted at the emergency department Suez Canal University Hospital, Ismailia, Egypt. On 100 patients with traumatic hypovolemic shock male or female within the age ranges from 18 years till 65 years old. Patients admitted to the hospital with other types of shock with trauma, non-traumatic hypovolemic shock, pregnant females, advanced malignancy, patients below 18 years old or patients more than 65 years old should excluded from the study. Questionnaire was filled by the researcher during resuscitation of the patient diagnosed as traumatic hypovolemic shock by the medical team in details; medical error was identified by comparing the actual management plan to the standard plan according to the guidelines from "The Washington manual of critical care".
**Results:** This study was conducted on 100 patients who presented to the Emergency Department, Seuz Canal University Hospital, Ismailia, Egypt. Between the period from October 2012 to October 2013 in order to detect medical errors in treatment of Traumatic hypovolemic shocked patients and to reach the optimal scheme of management. 1-More than half of the patients were in age group (≥30-45). And most of them were males about 70% of the studied patients and females were 30%. 2- Most of the patients were delayed in hospital arrival as we found that 50% reached in more than 40 min. 3-The initial medical help in the pre-hospital period was given to almost all of the patients (94%). 4- Incomplete exposure of patients is a very frequent medical error occurs during hospital assessment in about 22% of patients.
**Conclusions:** Failure in oxygen saturation monitoring and forgetting complete exposure of the patient has statistically significant relation with mortality during in hospital assessment of the patient. Delayed insertion of 2 large cannula or central line, Fluid given not warmed and blood received not at the proper time all of them show statistically significant Relation with mortality during in hospital resuscitation of the patient with traumatic hypovolemic shock.

**Keywords:** Unwarmed fluids, Incomplete exposure, Temperature monitoring

## INTRODUCTION

Traumatic death remains a major public health issue. Injury occurs unexpectedly and often affects the most productive segment of society. In the developed countries, injury constitutes the leading causes of death among people aged 15-44 years and is increasingly a leading cause of death in the low-and middle-income countries. All trauma patients with overt or occult shock are presumed to be suffering from hemorrhagic shock until proven otherwise.[1,2]

Empirical criteria for diagnosis of circulatory shock regardless of the cause, four of these six criteria should be met:

- Ill appearance or altered mental status.
- Heart rate >100 beat/min
- Respiratory rate >20 cycle/min. or paco2 <32 mmhg
- serum lactate level >4 mmol/L
- Arterial base defecit ≥-4meq/L
- Arterial hypotesion >20 minutes duration[3]

IN 2010, institute of medicine in USA report that medical errors are estimated to result in about between 44,000 and 98,000 preventable deaths and 1,000,000 excess injuries each year in U.S. hospitals.[4] Medical error is defined as the failure of a planned action to be completed as intended, or the use of a wrong plan to achieve an aim. According to institute of medicine (IOM) report.[1] Errors can include problems in practice, products, procedures, and systems.[5]

## METHODS

A cross sectional descriptive study was conducted on traumatic patients who presented to the emergency department between the periods from October 2012 to October 2013.

This study was conducted at the emergency department, Suez Canal University Hospital, Ismailia, Egypt. On 100 patients with traumatic hypovolemic shock male or female within the age ranges from 18 to 65 years old. Patients admitted to the hospital with other types of shock with trauma, non-traumatic hypovolemic shock, pregnant females, advanced malignancy, patients below 18 years old or patients more than 65 years old should excluded from the study. All the patients were subjected to a full medical history (from patients or relative) including: demographic data, complaint and history of present illness, drug history, co-morbid conditions and risk factors, review of other systems, past history and history of chronic disease, family history, complete clinical examinations.

***General examinations, vital signs***

- Pulse rate, rhythm, volume, equality, special character, force, peripheral pulsations.
- Blood pressure was determined using standard mercury syphgmo-manometer.
- Temperature, respiratory rate, capillary filling time.
- Local examination complete cardiovascular examination, chest examination, abdominal examination, and neurological examination.

A questionnaire was filled by the researcher during resuscitation of the patient diagnosed as traumatic hypovolemic shock by the medical team in details, medical error was identified by comparing the actual management plan to the standard plan according to the guidelines from "The Washington manual of critical care".

## RESULTS

**Table 1: Demographic data of the studied patients (n= 100).**

| Demographic data | | Number | Percent |
|---|---|---|---|
| Age | 16 - <30 | 20 | 20% |
| | ≥30 - 45 | 52 | 52% |
| | ≥45 - 60 | 28 | 28% |
| Sex | Male | 70 | 70% |
| | Female | 30 | 30% |
| Total | | 100 | 100% |

**Table 2: Initial medical assessment in the pre-hospital period (n= 100).**

| Pre hospital period | | Number | Percent | Total |
|---|---|---|---|---|
| Initial medical help done | No | 6 | 6% | 100 |
| | Yes | 94 | 94% | |
| Peripheral cannula inserted | No | 18 | 18% | 100 |
| | Yes | 82 | 82% | |
| Intravenous fluid | No | 46 | 46% | 100 |
| | Yes | 54 | 54% | |
| Cervical spine assisted | No | 54 | 54% | 100 |
| | Yes | 46 | 46% | |
| Fixation for fracture | No | 32 | 32% | 100 |
| | Yes | 68 | 68% | |
| Cannula insertion and intravenous fluid, cervical spine assisted | NO | 88 | 88% | 100 |
| | Yes | 12 | 12% | |
| Cannula insertion and intravenous fluid and cervical spine assisted, fixed fracture | No | 90 | 90% | 100 |
| | Yes | 10 | 10% | |

This study was conducted on 100 patients who presented to the emergency department of Seuz Canal University Hospital, Ismailia, Egypt. Between the period from October 2012 to October 2013 in order to detect medical errors in treatment of traumatic hypovolemic shocked patients and to reach the optimal scheme of management.

Table 1 illustrates that more than half of the patients were in age group (≥30-45) and most of them were males about 70% of the studied patients and females were 30%.

Table 2 illustrates that the initial medical help in the pre-hospital period in the form of (Insertion of peripheral cannula IVF given cervical spine assessment fixation of fracture) was given to almost all of the patients (94%). And about 6% of the studied patients didn't receive pre-hospital medical help. Unassisted cervical spine was the most common error done in the pre-hospital medical help.

**Table 3: Relation between medical errors in the pre hospital period and mortality (n=100).**

| Pre hospital period | | Number | Mortality | | | | X 2 test |
|---|---|---|---|---|---|---|---|
| | | | Survived | % | Died | % | |
| Initial medical help done | No | 6 | 2 | 2% | 4 | 4% | X2= 2.7 |
| | Yes | 94 | 72 | 72% | 22 | 22% | P= 0.1 (NS) |
| Peripheral cannula inserted | No | 18 | 10 | 10% | 8 | 8% | X2= 0.42 |
| | Yes | 82 | 64 | 64% | 18 | 18% | P= 0.6 (NS) |
| Intravenous fluid | No | 46 | 34 | 34% | 12 | 12% | X2= 0.084 |
| | Yes | 54 | 40 | 40% | 14 | 14% | P= 1 (NS) |
| Cervical spine assisted | No | 54 | 44 | 44% | 10 | 10% | X2= 1 |
| | Yes | 46 | 30 | 30% | 16 | 16% | P= 0.4 (NS) |
| Fixation for fracture | No | 32 | 22 | 22% | 10 | 10% | X2= 0.62 |
| | Yes | 68 | 52 | 52% | 16 | 16% | P= 0.4 (NS) |
| Cannula insertion and intravenous fluid, cervical spine assessment | No | 88 | 66 | 66% | 22 | 22% | X2= 0 .364 |
| | Yes | 12 | 8 | 8% | 4 | 4% | P= 0.380 |
| Cannula insertion and intravenous fluid and cervical spine assisted, fixed fracture | No | 90 | 68 | 68% | 22 | 22% | X2= 1.044 |
| | Yes | 10 | 6 | 6% | 4 | 4% | P= 0.239 |

(NS): no statistically significant relation.

Table 3 relations between medical errors in the pre hospital period and mortality among traumatic hypovolemic shocked patients presented to the emergency department, Suez Canal University Hospital, Ismailia, Egypt. Between the period from October 2012 to October 2013 (n=100)

**Table 4: Illustrates that initial medical help usually done by health workers (34%).**

| Pre-hospital period | | Number | Percent |
|---|---|---|---|
| Initial medical help done by | Health workers | 34 | 34% |
| | Small hospital | 26 | 26% |
| | Doctor | 12 | 12% |
| | Non specialized center | 2 | 2% |
| Pre-hospital medical help not done | | 6 | 6% |
| Total | | 100 | 100% |

Table 4 the initial medical help done in the pre hospital period among traumatic hypovolemic shocked patients presented to the emergency department, Suez Canal University Hospital, Ismailia, Egypt. Between the period from October 2012 to October 2013 (n=100).

## DISCUSSION

This proscriptive observational study was done on 100 patients. The study was conducted in the Emergency department, Suez Canal University Hospital, Ismailia, Egypt. Only all traumatic hypovolemic shocked adult patients were included. Questionnaire was filled by the researcher in which describe all stages of management done to the patient, then comparing this questionnaire with the guidelines of management quoted from "The Washington manual of critical care 2013".[6]

Finally interoperated all the results to achieve the aim of the work which is detection of medical errors in management of Traumatic hypovolemic shocked patients in order to reach the optimal scheme of management

In the current study the mean age group of patients was (≥30 to <45) about 52% of the studied patients. Another study by Sunil et al showed nearly the same result as the mean age group of patients was (11 to 40) years old.[7]

The current study results show that males were about 70% of the studied patients, while study of Sunil et al. showed that males were about 85% of patients. IN the current study 50% of patients reached hospital in about ≥40 minutes duration, About 45% of them reached

hospital in(>20 to <40 ) minutes Kenny et al showed that total time interval between trauma and hospital arrive was 36.3 minutes for about 70% of their patients.[8]

Sukumaran et al showed that total time intervals between traumas to hospital arrive was 47 minutes for about 68% of their patients. Trauma patients benefit from shorter out of hospital time interval.[9]

The Golden Hour is a concept in which both in-hospital and pre-hospital personnel have faith. The concept holds that traumatized patients receiving definitive care during this first sixty minutes following injury have improved survival over those who do not on the contrary of that, other results such as Mccoy et al showed that no association between transport times and mortality in trauma patients presenting to an urban level I trauma center.[10,11]

Other prospective cohort study by Cariag et al found that there was no significant association between time and mortality for emergency medical services (EMS) interval.[12]

The current study show that 94% of patients received medical help out of hospital 82% of them in the form of peripheral cannula insertion, 54% received intravenous fluid, those with delayed cannula insertion show mortality of only 8% and those who didn't receive intravenous fluid showing mortality of 12%.

Sukumaran et al showed that only 32% of their patients were cannulated in the pre-hospital stage and only 14% received intravenous fluid and those with delayed cannula insertion show mortality rate of 20% And those who didn't receive intravenous fluid showing mortality of 10%.[9]

The benefits of pre-hospital fluid thereby in particular have been frequently questioned. The authors wondered if this was because the delay to definitive care attributable to performing cannulation outweighed any benefits from receiving fluids. Kaweski et al.[13-15] Conducted a retrospective study of almost 7,000 trauma patients and noted that mortality rates were similar in those patients who received fluids and those who did not (23% vs. 22%; p = NS). Comparison of groups with similar, injury severity, probability of survival, and hypotension on arrival also failed to show an influence of fluid administration on survival. Other authors have also demonstrated that pre-hospital fluid therapy confers no survival benefit and delays transport of critically injured patients.[16]

The current study results showed that percentage of patients with cervical spine assessment in the pre-hospital stage was 46%, and 68% with fixation of fracture, patients with unassisted cervical spine in pre-hospital stage showed mortality rate of about 10% the same as and those with unfixed fracture .

Sukumaran et al showed that patients with unassisted cervical spine show mortality rate of 15% and those with unfixed fracture was 9% of the patients.[9]

Many pre-hospital protocols advise for spine immobilization whenever there is potential for spinal cord injury. In contrast, pre-hospital trauma life support (PHTLS) course state that spine immobilization is not indicated in patients with penetrating trauma to the head, neck, or torso without neurologic deficit or complaint.[17-18]

Recently, the use of spinal immobilization for all trauma patients, particularly those with a low likelihood of traumatic cervical spinal injury has been questioned.[19]

It is unlikely that all patients rescued from the scene of an accident or site of traumatic injury require spinal immobilization.[20,21] The application of a splint is an essential aspect of the management of lower limb fractures. The benefits of splint age include reducing pain, reducing blood loss, reducing pressure on skin, reducing pressure on adjacent neurovascular structures reducing the risk of fat embolism, and reducing the risk of further damage.[22]

*The principles of immobilization include*

- Assessment and reassessment the neurovascular status before and after any manipulation or handling of the fracture.
- Immobilisation of the joints above and below the fracture.[22]

Splints commonly used by the ambulance service include box splints, vacuum splints, and traction splints.[22]

## CONCLUSION

During management of traumatic hypovolemic shock in Suez canal university hospital, Ismailia, Egypt.

From present study, we concluded that

- Unassissted cervical spine was the most common error 51%. In the pre-hospital period, with mortality rate of 10%, and morbidity rate of 35% of patients.
- Failure in oxygen saturation monitoring and forgetting complete exposure of the patient has statistically significant relation with mortality during in hospital assessment of the patient with the percentage of 8%, 22% respectively.
- Failure in temperature monitoring of the patient was the commonest error during in hospital assessment with percentage of 90 % of patients having mortality rate 24% of them.
- Delayed insertion of 2 large cannula or central line (18% of patients), Fluid given not warmed (98% of patients), blood received not at the proper time (36.8% of patients), all of them show statistically

significant Relation with mortality during in hospital rescusition of the patient.

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