

## Effect of early assessment and management of emergency physician on time and mortality of pediatric poly trauma patients

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**Abstract: Objective:** to study the effect of early assessment and management of emergency physician on time and mortality in pediatric poly-trauma patients. **Methods:** A prospective study included 100 poly traumatized patients aged less than 16 years presented to emergency department at Menoufiya University Hospitals. Every patient was subjected to: triage, Primary survey (Airway, Breathing, Circulation, Disabilities and Exposure/Environmental control), Resuscitation: all life threatening conditions detected in primary survey were managed as guidelines in the pediatric advanced life support and advanced trauma life support, Secondary survey: a complete history and head to toe physical examination including reassessment of all vital signs were done and Reevaluation and monitoring. **Results:** delayed grade in revised trauma score took  $23.9 \pm 6.1$  minutes in primary survey and  $87.8 \pm 39.2$  minutes in Time of image, while dead grade took  $88 \pm 52$  minutes of Mean  $\pm$  SD in primary survey. The basic management took  $24.7 \pm 6.5$  minutes in primary survey and  $83.7 \pm 37.2$  minutes in Time of image and the advanced management took  $86.7 \pm 32.2$  minutes in primary survey and  $35.3 \pm 13.86$  minutes in Time of image. 100% patients in delayed grade of revised trauma score were alive while 100% patients in dead grade were dead. 100% dead patients had advanced management and in regarding to alive patients: 29.1% patients had advanced management and 70.9% patients had basic management. **Conclusion:** there is effect of early assessment and management of emergency physician on mortality in pediatric poly-trauma patients.

[Magdi Ahmed Abd El Fattah Lolah, Nagwan Yousery Saleh, and Eman Mahmoud Hegazy. **Effect of early assessment and management of emergency physician on time and mortality of pediatric poly trauma patients.** *Stem Cell* 2017;8(4):78-82]. ISSN: 1945-4570 (print); ISSN: 1945-4732 (online). <http://www.sciencepub.net/stem>. 14. doi:[10.7537/marsscj080417.14](https://doi.org/10.7537/marsscj080417.14).

**Keywords:** assessment; management; emergency; physician; mortality; pediatric; poly trauma; patient

### 1. Introduction

Trauma is a worldwide health problem and the major cause of death and disability, affecting the young people<sup>(1)</sup>.

16.000 people die due to trauma each year, but survival of the cases especially with multiple traumas have been increasing due to improvements in the management of health and resuscitation<sup>(2)</sup>.

The care of the trauma patient is one of the cornerstones of emergency medicine spatiality. Emergency physicians play an important role in the stabilization and diagnosis of trauma patients. Management involves complex, time-dependent decision-making, leadership capability, and technical skill. Effective resuscitation can enhance outcomes, especially in severely injured patients<sup>(3)</sup>.

Emergency medical services in Egypt are still rudimentary. There is delay of arrival of trauma patient to hospital and in many of the hospitals there is a weak trained medical staff and poor resources to handle him<sup>(4)</sup>.

Pediatric Poly trauma patients present a specific set of problems to the emergency physician. Lethal injury is rare in Children; however, any delay in

recognition and any inappropriate management of the common trauma problems can lead to worse results in the outcome<sup>(5,6)</sup>.

The Initial management of the pediatric trauma patient and adult trauma patient are similar. However, it needs qualified knowledge of the physiologic and anatomic differences between children and adults. Proper Successful management requires adequate assessment and resuscitation of the airway, breathing, and circulation. Evaluation of the ABCs is a dynamic process that needs assessment and resuscitation simultaneously, as well as continues reassessment until the child becomes hemodynamically stable<sup>(7)</sup>.

The rapidity of care and mortality are thought to be major determinants and outcome measures of the quality of trauma care so, reducing the time interval from patient arrival to provision of definitive care and so, decrease the mortality seemed a worthwhile goal<sup>(8,9)</sup>.

### 2. Patients and Methods:

This prospective study was carried out in emergency department, Menoufiya University Hospitals. It included 100 poly traumatized patients

aged less than 16 years presented to emergency department.

Every patient was subjected to:

#### 1- Triage:

Triage involves the sorting of pediatric patients based on their needs for treatment.

#### 2- Primary survey of the injured child:

- Airway: securing patent airway with control of the cervical spine.
- Breathing: checking and maintenance of adequate respiratory Movement was done and assisted ventilation was started in some cases.
- Circulation: control of any bleeding site either by compression or tourniquet with adequate fluid resuscitation.
- Disabilities: stabilization of any fractures with neurologic screening.
- Exposure/Environmental control with thorough examination.

#### 3- Resuscitation:

All life threatening conditions detected in primary survey were managed as guidelines in the pediatric advanced life support and advanced trauma life support.

#### 4- Secondary survey of the injured child:

A complete history and head to toe physical examination including reassessment of all vital signs were done.

- History:

The AMPLE history was taken for this purpose:

**A -Allergies**

**M -Medications currently used**

**P -Past illnesses**

**L -Last meal**

**E -Events/Environment related to the injury**

- Physical examination:

Follows the sequence of head, maxillofacial structures, cervical spine and neck, chest, abdomen, perineum/rectum/vagina, musculoskeletal system, and neurologic system.

- Adjuncts to the Secondary Survey:

1- Laboratory Investigations:

CBC, RBS, liver and kidney functions, electrolytes, ABG and blood type and specify.

2- Radiological Examination:

These include x-ray examinations of the spine and extremities; CT scans of the head, chest, abdomen, and spine; contrast Urography and angiography.

#### 5- Reevaluation and monitoring the injured child after resuscitation after 2 hours.

### 3. Results

Table (1): This table shows that there was highly significant relationship between revised trauma score grades regarding time taken in primary survey & Time of image of patients (P value is 0.0001).

Table (2): This table shows that there was highly significant relationship between types of management and time (P value is 0.0001).

Table (3): This table shows that there was highly significant relationship between the grades of revised trauma score and the ways of management.

Table (4): This table shows that there was highly significant relationship between revised trauma score grades and outcome (P value is 0.0001).

Table (5): This table shows that there was highly significant relationship between outcome in relation to ways of management (P value is 0.0001).

Table (6): This table shows that there was highly significant relationship between outcome regarding time taken as Time of Primary survey (P value is 0.0001) and time of image (p value 0.002).

Table (1): Comparison between revised trauma score grades regarding time taken in primary & Time of image of patients:

	Revised trauma score grades				Kruskal-Wallis Test	P value
	Delayed	Urgent	Immediate	Dead		
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Time of primary survey	23.9±6.1	52.6±31.39	93.5±29.1	88±52	32.5	0.0001
Time of image	87.8±39.2	51.8±23.3	34.5±14.9	---	61.9	0.0001
Total time	111.8±41.1	103.5±28.1	128±35.5	---	6.1	0.045

Table (2): Comparison between types of management regarding time taken in primary & Time of image of patients:

	Management		Mannwhitny test	P value
	Basic management	Advanced management		
	Mean ± SD	Mean ± SD		
Time of primary survey	24.7±6.5	86.7±32.2	8.3	0.0001
Time of image	83.7+37.2	35.3+13.86	6.1	0.0001
Total time	108.5+38.3	122.27+35.02	1.88	0.06

Table (3): Revised trauma score grades in relation to way of management:

	Management (NO=100)				$\chi^2$	P value
	Basic		Advanced			
	N	%	N	%		
Revised trauma score grades						
Delayed	49	80.3	0	0	73.3	0.0001
Urgent	12	19.7	13	33.3		
Immediate	0	0	21	53.8		
Dead	0	0	5	12.8		

Table (4): Revised trauma score grades regarding outcome:

	Outcome				$\chi^2$	P value
	Dead (NO=14)		Alive (NO=86)			
	N	%	N	%		
Revised trauma score Grades						
Delayed	0	0	49	57	50.89	0.0001
Urgent	1	7.1	24	27.9		
Immediate	8	57.1	13	15.1		
Dead	5	35.7	0	0		
Pediatric trauma score mean± SD	8.05±3		8.7±2.9		2.2	0.05
Glasgow	7.07±4.12		14.12±3.5		U=6.4	0.0001

Table (5): Relation between outcome and ways of management:

	Outcome				$\chi^2$	P value
	Dead (NO=14)		alive (NO=86)			
	N	%	N	%		
Management						
Advanced	14	100	25	29.1	25.4	0.0001
Basic	0	0	61	70.9		

Table (6): Comparison between outcome regarding time taken in primary &amp; Time of image of patients:

	Outcome		Mannwhitny test	P value
	Dead (NO=14)	Alive (NO=86)		
	Mean ± SD	Mean ± SD		
Total time	139.4±36.1	110.5±37.5	2.003	0.045
Time of Primary survey	100.36±39.8	40.5±28.7	4.8	0.0001
Time of image	32.22±36.67	70.4±38.9	3.1	0.002

#### 4. Discussion

Poly-trauma should be considered as a systemic disease due to involving two or more system injuries at the same time with endangering life as a result of one single or a combination of several lethal injuries<sup>(7)</sup>.

Ruling out the presence of life-threatening or limb-threatening injury is the highest priority in the

approach and management of the injured child. Resuscitation of these injuries occurs before the rest of the physical examination proceeds. This initial assessment (the primary survey) and proper initial resuscitation efforts occur at the same time. In general, we should complete the assessment and resuscitation within the first 5 to 10 minutes of evaluation<sup>(10)</sup>.

Multiple alternative scoring systems have been proceeded to demonstrate the severity of trauma in a patient with multiple injuries; therefore, each with its own problems and limitations. The ability to predict outcome from trauma (i.e., mortality) is perhaps the most fundamental primary use of injury severity scoring systems. Using of these scoring systems arises from the patient's and the family's desires to know the prognosis of poly-trauma patients<sup>(11)</sup>.

Our study include 100 patients underwent initial assessment and management guided by pediatric advanced life support guidelines and advanced trauma life support guidelines.

In initial assessment (primary survey) of pediatric poly trauma patients, we use Glasgow coma scale, revised trauma score and pediatric trauma score.

Mean  $\pm$  SD of: Revised trauma score was  $10.38 \pm 2.766$ , Pediatric trauma score was  $8.31 \pm 2.97$  and Glasgow coma scale was  $13.14 \pm 3.5$ . There is significant positive Correlation between revised trauma score and pediatric trauma score (Figure 1).

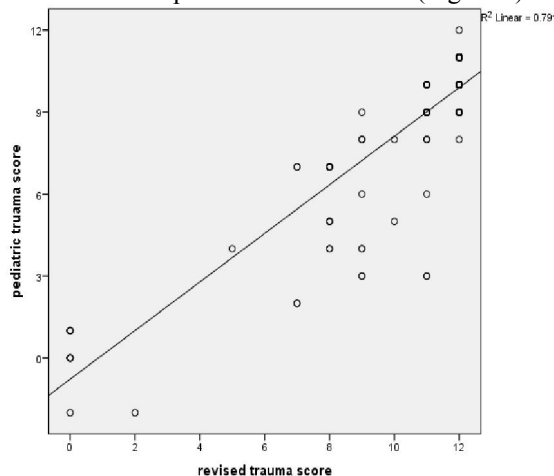


Figure (1): Correlation between revised trauma score and pediatric trauma score.

On analyzing our data, we detected highly significant relationship between Glasgow coma scale and outcome (table 4) these results are in agreement with many literatures as **Ali Dur et al.**<sup>(12, 13)</sup>.

Statistical analysis showed significant relationship between pediatric trauma score and outcome (table 4) as in **Shahrokh et al.**<sup>(12)</sup>.

There was also highly significant relationship between revised trauma score and outcome (table 4) as in agreement with **Hannah F Watts et al.**<sup>(14)</sup>.

Management has highly significant relationship with revised trauma score and outcome (table 3 and 5) and that supported by **Kam Chak Wah et al** literature which Showed that Children who were intubated had a risk of death 10 times greater than that of non-intubated children and airway management and

hemodynamic resuscitation were essential to critically injured child<sup>(15)</sup>.

**Woosley et al.** emphasized that airway and ventilation resuscitation was the first priority to improve patients of thoracic injury in children<sup>(16)</sup>.

Likewise of severe traumatic brain injury, **Boer et al.** showed the association of adequate control of airway management, prevention of hypoxia and hypo-hypercapnia were major essential components of trauma care improvement<sup>(17)</sup>.

**Avarello et al.** and **Brindis et al.** have also suggested aggressive resuscitation which included intubation was indicated to injured patient to improving their results<sup>(18, 19)</sup>.

One of the objectives of this study is to demonstrate that the presence of emergency physician should decrease the time of injured child in the emergency department. Members of National Pediatric Trauma Registry demonstrated the presence of a pediatric emergency physician in the emergency department reduced the time of the injured child spent in the emergency department from his arrival to hospital<sup>(8)</sup>.

**Donald D. Vernon et al** demonstrate generally the organization of trauma response team decreases the time required for initial care of injured patients in pediatric emergency department<sup>(9)</sup>.

In our study we cannot achieve this objective as there is no data base of old cases before presence of emergency department. By recording the time of arrival, time of primary survey and time of image we found that:

1- Mean  $\pm$  SD of primary survey time is  $48.95 \pm 36.73$  minutes and mean  $\pm$  SD of Time of image is  $66.76 \pm 38.78$  minutes.

2- There is highly significant relationship between revised trauma score grades regarding time taken in primary survey & Time of image of patients (table 1) as:

- In primary survey, delayed grade of revised trauma score takes the fewer amounts of time and the maximum amount time in immediate grade. That is explained by the type of management in each grade (table 3) as all cases in delayed grade had basic management and advanced management in all cases of immediate grade and we found that basic management takes less time than advanced management (table 2).

- In time of image the opposite happens, the maximum amount time in delayed grade and the fewer amounts of time in the immediate grade. That explained by many causes as cases of delayed grade are stable so no accompany doctor to the image room and no previous coordination, all images in our hospital should be paid and most patients are low socioeconomic so they take longer time to save the money and high rate of cases in the image room that

receive not only injured patients but also acute medical patients.

Statistical analysis showed highly significant relationship between outcome regarding time taken in primary & time of image of patients (table 6) as **D. Vernon et al** demonstrated the rapidity of response and the effective of definitive care are the major determinants of control the time required for trauma care in emergency department and it is a useful measure of outcome<sup>(9)</sup>.

On the other side, members of the National Pediatric Trauma Registry demonstrated that the presence of a pediatric emergency physician in the emergency department reduced the amount of time taken by the injured child but there was no effect on mortality<sup>(8)</sup>.

#### Conclusion:

There is effect of early assessment and management of emergency physician on mortality in pediatric poly-trauma patients.

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