Mortality in Emergency Department Sepsis Score (MEDS): Predictive Accuracy and Feasibility for 28-Day Mortality of Patients with Sepsis in an Indian Emergency Department

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Abstract: Objectives: (1)To assess the ability of MEDS score to predict mortality in septic patients treated with modified EGDT.(2) To find out the clinical profile of the patients presenting to emergency department in severe sepsis & septic shock. Materials and Methods: This is a prospective study conducted in Kempegowda Institute of Medical Sciences and Research Centre, Bengaluru, India. The study was carried out in the period of November 2014 to September 2016 and 50 patients were included in the study. The detailed history, clinical examination and all the relevant laboratory investigations were done including blood culture. In the present study, the conditions were defined according to standard practice and based on relevant literature. All the patients of sepsis admitted to ICU/ emergency ward were prognosticated on the basis of MEDS score. We have analyzed various profiles between two groups ; survivor group which include the patients who are successfully discharged after recovery and non-survivor group which include the patients who died. <u>Results</u>: The clinical profiles of 50 patients with sepsis with septic shock were treated with modified EGDT were studied. There were 26 males and 24 females in this cohort. In our study, 16 patients died and 34 patients survived for an in-hospital mortality of 32.0%.. In this study, mean MEDS score was high among non survivors than survivors ((16.31 vs 9.15), it was very much statistically significant (p=<0.001.) .Calculated AUCs were 0.99(95% CI: 0.925-1.00) for the MEDS score. <u>Conclusion</u>: We found that measurement of MEDS score on the day of ED admission is very useful tool in predicting the outcome. Death rate in our patients were lower compared to similar studies. So modified early goal directed therapy provides significant benefits with respect to outcome in patients with severe sepsis and septic shock. Urosepsis is one of the most common etiology of sepsis but the survival rate among these subset of patient population was much better. Patients with sepsis secondary to underlying respiratory etiology had grave prognosis.

Keywords: MEDS; EGDT; Survivors; Non-survivors

1. Background

Sepsis remains a leading cause of death in critically ill patients in the emergency department (ED).¹Sepsis can be reversed if recognised early but as sepsis progresses to severe sepsis and septic shock the mortality rate substantially increases.²

The diagnosis of sepsis relies on overt symptoms of systemic illness causing a change in the vital parameters of the patient as well as indication of infection through microbial cultures and serology. Various clinical biochemical and hematological parameters in septic patients serve as indicators of organ dysfunction and hence can be used to define the prognosis in a patient with sepsis 3.

Patients admitted to the Emergency department need aggressive supportive management as well as detailed investigations to reverse the cause.⁴

Rapid and intensive treatment of septic patients with early goal directed therapy (EGDT) has been shown to decrease mortality.⁵ Because of the need for rapid and consistent stratification of patients' illness severity to treat individual patients and to reliably compare patient cohorts across geographic boundaries, a number of scoring systems have been developed that circumvent the complexity and time constraints of traditional scoring systems developed for use in the emergency department.¹

There are many scores available at present. But our study focuses on mainly Mortality in emergency department sepsis (MEDS) score. ⁶⁻⁸

The predictive capability of the MEDS score for 28-day mortality in patients with severe sepsis or septic shock was found to be superior to that of the Acute Physiology and Chronic Health Evaluation (APACHE) II score. ¹³ The application of these newer scores to the increasing number of patients treated with EGDT, however, has been limited, with one analysis suggesting poor accuracy for in-hospital mortality in this patient population. We restricted our analysis to ED patients treated with our hospital's modified EGDT protocol. ¹

Objectives

- 1) To assess the ability of MEDS score to predict mortality in septic patients treated with modified EGDT.
- 2) To find out the clinical profile of the patients presenting to emergency department in severe sepsis & septic shock.

2. Materials and Methods

The study was carried out in the period of November 2014 to September 2016 and 50 patients were included in the study. The detailed history, clinical examination and all the relevant laboratory investigations were done including blood culture. In the present study, the conditions were defined according to standard practice and based on relevant litera-

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ture. All the patients of sepsis admitted to ICU/ emergency ward were prognosticated on the basis of MEDS score. We have analyzed various profiles between two groups ; survivor group which include the patients who are successfully discharged after recovery and non-survivor group which include the patients who died.

3. Results

The study was carried out in the ED of KIMS Teaching Hospital, a tertiary care center from November 2014 to September 2016 and 50 patients presenting in the ED who fulfilled the inclusion criteria were the study subjects.

In our study, subjects were all adults youngest was 21 years of age and oldest was 102 years of age. Maximum number of subjects were in the 6th and 7th decades. Highest numbers of cases were seen in the age group of 61 to 80 years i.e. 18 patients (36%) followed by 41 to 60 years in 15cases (30%), 21 to 40 years in 13 cases (26%).

Out of 50 patients, 26 were males and 24 were females which was statistically similar in two groups p=0.846

Table 2: Etiology Distribution among Survivors And Non Survivors							
	ETIOLOGY						
	Gastro intestinal	Multiple etiologies	Pneumonia	Uro Sepsis	Wound	Unidentified	Total
Non	0	5	7	0	3	1	16
survivors	0%	31.30%	43.80%	0.00%	18.80%	6.30%	100.00%
S	3	7	8	9	4	3	34
Survivors	8.80%	20.60%	23.50%	26.50%	11.80%	8.80%	100.00%
Tetal	3	12	15	9	7	4	50
Total	6.00%	24.00%	30.00%	18.00%	14.00%	8.00%	100.00%

Chi-Square Tests value 8.114 and p value 0.150

The commonest cause for sepsis was pneumonia (15 patients), followed by, multiple etiologies (12 patients), urosepsis (9 patients) wound (7 patients) gastrointestinal (3 patients), and unidentified (4 patients).which was similar in two groups p=0.150



Graph 2: Etiology Distribution among Survivors and Non Survivors

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Table 3: Evaluation of MEDS Score with Survivors and

		N	Maan	SD	Min	Mar	Т	Р
		in Mean	Wiean	50	wiin.	wax.	value*	value
MEDG	Non survivors	16	16.31	2.182	13	21		
MEDS Score	Survivors	34	9.15	2.002	3	13	131.632	< 0.001
Score	Total	50	11.44	3.944	3	21		





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Mean MEDS score was high among non-survivors than survivors (16.31 vs 9.15), it was very much statistically significant (p=<0.001).

4. Discussion

The clinical profile of 50 patients of sepsis with septic shock who are included in the study were treated with modified EGDT were studied. There were 26 males and 24 females in this cohort. In our study, 16 patients died and 34 patients survived for an in-hospital mortality of 32.0%.

Age: The age of patients varied from 21 years to 102 years. The mean age was 57.16 years. Similar studies have also shown most common age group is 6^{th} decade.²⁹ Even in our study, most patients were 6^{th} to 7^{th} decade . Old age with its associated co morbid condition like DM ,HTN,COPD predispose these patients to sepsis.

 Table 4: Comparison of Age Distribution with Similar Studies

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Study	Mean age
Todi S, Chatterjees et al ⁹ (2010)	58.17
Oliveira AP et al(2008) ¹⁴	60.14
Present study	57.16

Sex: The present study there were 26 males and 24 females. There is a slight male preponderance. This is noticed in similar studies by other authors

 Table 5: Comparison of Sex Distribution with Similar Studies

ules		
Study	Male	Feamle
Todi S, Chatterjees et al ⁹ (2010)	58%	42%
Oliveira AP et al(2008) ¹⁴	56%	44%
Present study	52%	48%

Finding the cause was not the main objective of the study. Specific etiologies of sepsis identified in our patient population, and the numbers of patients with each diagnosis, are as follows: pneumonia (15 patients), urosepsis (9 patients), multiple etiologies (12 patients), gastrointestinal (3 patients), wound (7 patients), and unidentified (4 patients) .In our study 18 patients had growth in the blood culture.10 were staph areous, 3 were klebsiella species. 3 were psuodomonas 1 being Eschieria coli, and 1 being non fermentative gram negative bacilli other than psuedomonas species.

Clinical predictors of mortality

In our study, 16 patients died and 34 patients survived for an in-hospital mortality of 32.0%. The mean age among non-survivors was little high compared to survivors (63.00 v/s 54.41) which was not statistically significant (p=0.137).

Table 6:	Comparison	of Mortality	y with (other	Studie	s
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Study	Mortality
Degoricija et al ¹¹ (2006)	44%
Jacobson S et al ¹² (2004)	247%
Todi s chatterjees et al(2010) ⁹	12.08%
our study (2015)	32%

Study	Survivors
M A.W Hermans et al $(2012)^{10}$	24.20%
Present study	9%

In our study, 12 out of 16(75.0%) among non-survivors had an end organ dysfunction whereas 22 out of 34(64.7%)among survivors also had an end organ dysfunction so it was not statistically significant p=0.467.The mean duration of hospital stay was less in non- survivors compared to survivors (5.0 vs 8.38) which was statistically very significant p<0.001. It may be attributable to early death among nonsurvivors and late recovery among survivors.

In our study 13 out of 34 (38.0%) among survivors had urosepsis compared to one out of 16 among survivors which was statistically significant p=0.019. Urosepsis had a good prognosis in our study.

The median MEDS score was 11. ROC curve analysis yielded an AUC of 0.99(95% CI: 0.925-1.00) . Survivors had a median MEDS score of 9 compared to non- survivors, whose median MEDS score was 16 .Many studies shows that high MEDS score at the time of admission was associated with high mortality^{1,65}. In this study mean meds score was high among non survivors than survivors(16.31 vs 9.15) it was very much statistically significant **p=<0.001**.Calculated AUC is high among non survivors which is also noticed in similar studies.

 Table 7: Comparison of MEDS Score with Non Survival in Similar Studies

Similar Stadles				
Study	Non survivors			
Colleen A Crowe et al $(2010)^1$	AUC 0.74(95%CI 0.67-0.81)			
M A.W Hermans et al (2012) ¹⁰	AUC 0.81(95%CI 0.73-0.88)			
Present study	AUC of 0.99(95% CI: 0.925-1.00)			

5. Interpretation and Conclusion

We found that measurement of MEDS score on the day of ED admission is very useful tool in predicting the outcome. The MEDS score demonstrated the largest AUC for the outcome of mortality. Death rate in our patients were lower compared to similar studies. So modified early goal directed therapy provides significant benefits with respect to outcome in patients with severe sepsis and septic shock. Urosepsis is one of the most common etiology of sepsis but the survival rate among these subset of patient population was much better. Patients with sepsis secondary to underlying respiratory etiology had grave prognosis.

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