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STRATIFICATION OF PATIENTS WITH EMERGENCY SEVERITY INDEX AND EFFECTS OF ITS IMPLEMENTATION ON THE OUTCOME IN EMERGENCY DEPARTMENT OF TERTIARY CARE HOSPITAL

Medicine

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ABSTRACT

In the hospital the emergency medicine department represents the nodal point of entry for all patients. There is always an overcrowding of the patients in the ED. emergency Severity Index is a reliable and validated triage tool.

Aim: To stratify patients with ESI triage tool and to analyze the effect of ESI implementation.

Material and Methods

All patients coming to the Emergency Department were included except Pediatric patient below 18 years of age. Then Patients were categorized according to ESI level 1 to 5. Level 1 is most urgent and to Level 5 is least urgent. Outcome of all the patients analyzed. Data was collected analyzed statistically.

Results: Total 1438 patients were attended. There were 4.03% patients of ESI 1 i.e. most urgent category, 23.71(ESI 2), 37.98 %(ESI 3), 26.91(ESI 4) and 7.37(ESI 5) i.e. least urgent category. patients of <40 years were more and least from >60 years age group. Most of the <40 years patients were from ESI 3 and 4. Around 35% of patients in 40-60 years age group were presented in acute condition (ESI 1 and 2). While out of 247 patients of >60 years age, 9% were in urgent category.

There were around 63% males. Pattern of presentation is nearly comparable in males and females. Less number of patients were shifted to ICU and HDU.

Conclusion : ESI is a convenient system for triage in emergency department. This study will help to focus on planning of resources so that demand can be managed efficiently and effectively.

KEYWORDS

emergency department, triage,ESI

In a hospital, the emergency department (ED) represents the nodal point of entry for all patients. It provides the perfect setting for classification of patients according to a triage system. Triage is defined as allocating priority for provision of care and cure for the patients in the emergency department.[1]

In today's scenario there is an unquestionable overcrowding of the ED owing to an increased number of road traffic accidents, rapid industrialization, bioterrorism, natural and manmade disasters. Hence the resources are remarkably strained. In such situations it is difficult to ensure that every patient has the right resources at the right place and at the right amount of time. Researchers predict that establishing the need for hospital admission at the time of triage may help identify patients deserving an early attention. [2] In a congested ED, it is not possible to apply a triage system in all instances. Available triage systems were proving inadequate and time consuming in the current scenario. Hence a definite need was felt to switch to a more appropriate triage system.

Emergency physician have tried various triage scales like Canadian Triage and Acuity Scale , Taiwan Triage System, Australasian Triage Scaleand Emergency severity index (ESI).[3] Out of all the triage scales ESI stands out in both its conceptual approach and practical application.[4]

Version 1 of the ESI was originally implemented at two university-based EDs in 1999. It was revised to include pediatric patient triage criteria. Based on feedback from nurses and physicians, the ESI was further refined to version 3. The ESI Research Team revised ESI level 1 resulting in ESI version 4, the most current version of the triage algorithm .[3]

ESI stratifies patients on the basis of acuity and resource needs like diagnostic test and procedures. It uses an algorithm with four decision points[A,B,C,D]to sort the patients into triage levels 1[most urgent] to 5(least urgent). Its single algorithm method helps to streamline the stratification process, thus saving our valuable time.

The reliability and validity of the ESI has been approved in US [5], however not much information is available on its application to patients in a developing country. One researcher has commented negatively on the use of the ESI scale in a developing country.[6]

Therefore this study was planned to administer the ESI triage scale to patients in the emergency medicine department and to stratify the pattern of cases visiting the department. This information will be further used to assess the effect that the implementation of ESI scoring has on the eventual outcome of critical patients.

Material and Methods

Approval from the institutional ethics committee was obtained. This is a record based cross sectional study; it was conducted during the 3-month study period at Emergency department of Bharati hospital. Medical and nursing staff was trained to administer the ESI scale to a multitude of patients. They were guided and supervised at every step. All patients coming to the Emergency Department were included except Pediatric patients.

Primarily demographic profile and detailed history of each patient was recorded. Then Patients were categorized according to ESI level 1 to 5 with Level 1 is most urgent and to Level 5 being the least.[3] all the patients were duly followed up until the outcome of their stay in the hospital. This Data was collected meticulously. Later it was analyzed statistically using frequency and percentages.

Results: Total 1438 patients were attended.

Table no. 1: Number of patients in each ESI category.

ESI level	1	2	3	4	5	Total
Number of patients	58	341	546	387	106	1438
Percentage	4.03	23.71	37.98	26.91	7.37	100

Table no. 1 shows that there were 4.03% patients of ESI 1 i.e. most urgent category, 23.71(ESI 2), 37.98 %(ESI 3), 26.91(ESI 4) and 7.37(ESI 5) i.e. least urgent category.

Table no. 2: Age wise distribution of patients in different ESI categories

ESI level	age group in years, n (%)		
	<40	40-60	>60
1	14(1.74)	22(5.42)	22(8.90)
2	142(17.6)	114(29.45)	85(34.41)
3	301(37.4)	154(39.79)	91(36.84)
4	282(35.11)	79(20.41)	26(10.52)
5	64(7.97)	19(4.9)	23(9.31)
Total	803	388	247

Table no. 2 shows more number of patients <40 years age and least from >60 years age group. Most of the <40 years patients were from ESI 3 and 4. Around 35% of patients in 40-60 years age group presented in acute condition (ESI 1 and 2). While amongst the >60 years age, 9% were included in the urgent category.

Table no. 3: Sex wise distribution of patients in different ESI categories

ESI level	Females (%)	Males (%)
1	23(4.3)	35(3.8)
2	111(20.9)	231(25.3)
3	200(37.7)	348(38.1)
4	155(29.2)	233(25.5)
5	41(7.7)	66(7.1)
Total	530	908

Table no. 3 shows that around 63% males presented to the ED. Pattern of presentation is nearly comparable in males and females.

Table no. 4: Outcome of patients before and after implementation of ESI triage system

Outcome	No of patients	
	Before ESI	After ESI
Shifted to ICU	310(22.87)	299(20.23)
Shifted to HDU	235(17.34)	220(14.88)
Shifted to Ward	427(31.51)	563(38.09)
Death	72(5.31)	64(4.33)
Dialysis	118(8.70)	128(8.66)
Discharged	56(4.14)	66(4.46)
Transferred	70(5.16)	31(2.09)
Refused to admit	67(4.94)	107(7.23)

Table no. 4 shows that, after ESI implementation less number of patients were shifted to ICU and HDU. Number of patients transferred to outside hospital also reduced and deaths were also less.

Discussion:
A total of 1438 patients visited the Emergency department of Bharati hospital during the study period of 3 months. Table no. 1 shows around 28% patients presented in acute conditions with serious ailments (ESI level1 and 2).This outlines the need for timely management of patients without delay. Maximum no. of patients (37.98%) were of ESI level 3. Only 7.37% of patients were of ESI level 5, they can be managed on an OPD basis without any resources. 26.91% were of ESI level 4 who could be managed with one resource. Multiple resources are needed for management of patients of ESI levels1, 2 and 3. These patients comprised of 65% of the total. This information helps in better allocation of the resources available in the hospital.

This is in agreement with study conducted by Yuksen, C who reported that a maximum number of patients were of ESI level 3 and nearly 20% of patients presented with acute conditions. [7] Other researchers have also reported similar findings.[8,9]

However a study by Tanabe et al. on 403 patients, showed that very few patients of ESI 4 and 5.[5] These numbers give a useful foresight in management of recourses at the department

Findings of this study suggest that more number of <40 years patients visited the emergency. Most of those patients were in ESI level 3 or more. BH is located near a state highway therefore more number of trauma cases were recorded. Being placed in crowded urban area stress associated conditions are also common. Around 35% of patients in 40-60 years age group presented in acute condition (ESI 1 and 2). Elderly patients were less in number, 9% of them presented with acute condition. This is much more than other two groups. It may be because of comorbidities associated at this age.[10]

Table no. 3 shows sexwise patient distribution in different categories of ESI. More number of males presented to emergency department. This is in accordance with a study by Moore L et al.[11] Equal number of male and female patients were seen in ESI level 1, 3 and 5. In ESI level 2 females were more than males and exactly opposite was observed in level 4.

Out of total 1438 patients nearly 25% patients needed immediate life saving intervention.

Table no.4 shows the comparison amongst the outcome of patients with the prior spot triage method and the new ESI scoring system. There is a notable drop in the number of patients referred to the ICU and HDU. Thus we can infer that before ESI, many cases were being referred erroneously to higher management centres when there was no need for the same. ESI has therefore helped us in saving valuable resources, to be used in management of more deserving patients. Talking about the eventual outcome, the number of patients that died also took a significant hit. This decrease can be attributed to a plethora of factors. But it is worth observing that as both the readings were from the same hospital, majority of the factors remained the same. The only major change that happened was the application of the ESI score. The single algorithm system of ESI Also helped in speedy referrals and thus saved much valuable time.

Conclusion: Our overall experience was that ESI is a convenient and time saving system as it uses only one flowchart for all patients. This also makes it easy to implement. The study shows that with improved focus on planning of resources, critical patients can be managed efficiently and effectively. This has significantly helped to improve the quality of care. We can vouch for the fact that ESI implementation has helped our ED to properly assign and manage its resources, thereby increasing its contribution to saving lives. In developing nations, few hospitals have dedicated EDs and fewer have fixed stratification & management protocols for their EDs. This study will help to familiarize them with the advantages of using the ESI score. This will help to improve emergency services all over. It will lead to an overhaul, helping in furtherment of nursing care and referrals system in the ED. This study has the potential to be a benchmark for emergency stratification. Surely and steadily helping to change the ways EDs are run in this country.

REFERENCES
1. Moskop & Iserson, Triage in Medicine, [Ann Emerg Med. 2007;49:275-281
2. Sun, Y., Heng, B. H., Tay, S. Y. and Seow, E. (2011), Predicting Hospital Admissions at Emergency Department Triage Using Routine Administrative Data. Academic Emergency Medicine, 18: 844–850.
3. Gilboy N, Tanabe T, Travers D, Rosenau AM. Emergency Severity Index (ESI): A Triage Tool for Emergency Department Care, Version 4. Implementation Handbook 2012 Edition. AHRQ Publication No. 12-0014. Rockville, MD. Agency for Healthcare Research and Quality. November 2011.
4. Travers DA,Waller AE,Bowling JM, Flowers D,TintinalliJ [2002].five level triage system more effective than three level in tertiary emergency department.JEN.28[5];395-400
5. Tanabe P ,Gaimbel R,Yarnold PR ,Kyriacou DN,Adams JG. Reliability and validity of scores on the Emergency Severity index version 3 Acad Emerg Med 2004;11[1]59-65
6. Amir Mirhaghi et al., Emergency Severity index: Is it as Good as it Looks Journal of Clinical and Diagnostic Research. 2015 Apr, Vol-9(4): OC04-OC07
7. Yuksen, C., Sawatmongkornkul, S., Suttabuth, S., et al. (2017). Emergency severity index compared with 4-level triage at the emergency department of Ramathibodi University Hospital. Asian Biomedicine, 10(2), pp. 155-161.
8. Wuerz, R. C., Travers, D., Gilboy, N., Eitel, D. R., Rosenau, A. and Yazhari, R. (2001), Implementation and Refinement of the Emergency Severity Index. Academic Emergency Medicine, 8: 170–176.
9. C.H. Chi, C.M. Huang Comparison of the Emergency Severity Index (ESI) and the Taiwan Triage System in Predicting Resource Utilization J Formos Med Assoc | 2006 • Vol 105 • No 8
10. Roberts DC, McKay MP, Shaffer A. Increasing rates of emergency department visits for elderly patients in the United States, 1993 to 2003. Ann Emerg Med 2008;51:769e74.
11. Moore L, Deehan A, Seed P, et al Characteristics of frequent attenders in an emergency department: analysis of 1-year attendance data Emergency Medicine Journal 2009;26:263-267.