REVIEW ARTICLE

Effectiveness of the Emergency Saverity Index (ESI) Triage Used in Health Service ? A Literature Review

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ABSTRACT

An emergency is a condition that requires immediate action and generally begins with triage, which aims to sort out the level of urgency of the victim or patient. Triage is the initial focus of handling emergency cases, with the aim of sorting patients based on their level of urgency. How effective is the Emergency Severity Index (ESI) triage system in health services (Emergency Department)? This literature used inclusion and exclusion criteria, and articles were obtained, reviewed, and sourced from the following databases: Google Scholar (2018–2023), PubMed (2018–2023), and ScienceDirect (2018–2023). The search strategy using English terms was as follows: “Triage system” AND “Emergency Severity Index” AND “emergency department”. The year of publication of the bibliographic source was selected from 2015 to 2020. The search strategy included keywords such as "Triage" OR "ESI" OR "ED" in English and "Triage" OR "Emergency Severity Index" and "Healthcare" in Indonesian. Indonesia. Initial identification of titles and abstracts in Google Scholar yielded 4,250 articles, in ScienceDirect yielded 750 articles, while in PubMed yielded 1,580 articles for a total of 6,580 articles. After conducting a literature review, it was found that from the 14 articles reviewed, ESI was very effective when applied in health services. This helps reduce overcrowding in emergency rooms, so patients can receive treatment and diagnosis quickly. Triage using the ESI method can be applied in all emergency units, not only reducing patient density but also saving costs and workload for medical personnel on duty during shifts.
Malaysian Journal of Medicine and Health Sciences (2025) 21(SUPP3): 241-247. doi:10.47836/mjmhs.21.s3.36

Keywords: Triage, Emergency severity index, Emergency department, Health services

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INTRODUCTION

Emergency is a condition that requires immediate action and is generally initiated with triage to determine the severity of the victim's or patient's condition (1). Triage is a fundamental skill that healthcare professionals must possess, as it involves sorting patients based on the level of emergency (2). Emergency situations often occur in everyday life in the surrounding environment, where the ability to determine the level of urgency requires strong triage skills (3).

Triage is the initial focus of managing emergency cases with the aim of categorizing patients based on their level of urgency (4). The Emergency Severity Index (ESI) was developed in the late nineties in the United States (5). The ESI system classifies patients into 5 categories, ranging from ESI 1 to ESI 5 (6). The determination of a patient's condition is based on the medical resources needed, as assessed by medical personnel in the Emergency Department (7). ESI can be more easily applied in Indonesia because it does not require a long time or in-depth examination to determine the medical resource needs of patients (8). The ESI triage system does not require specific diagnoses to assign a patient's triage level (9).

The implementation of ESI in Indonesia can be simplified by considering what medical resources the patient needs and promptly taking action (10). The principle is that as the patient's need for medical resources increases, their triage level is categorized as priority 1 (level 1) (Ganjali et al., 2020; Pouyamehr et al., 2019; Kurniasih, Regina, 2016). The Emergency Severity Index (ESI) utilizes a triage concept with five scales for classifying patients in the Emergency Department (13). During the application of ESI, initial patient care will determine whether the patient needs to be admitted to the Emergency Department or discharged (14,15). Afterward, patients admitted to the Emergency Department will be assessed for their level of urgency based on their medical requirements and

categorized into levels 1 through 5 (14).

The Emergency Severity Index triage was developed in the United States. ESI triage also consists of 5 levels or acuity priorities, namely level 1, resuscitation; level 2, emergent; level 3, urgent; level 4, less urgent; and level 5, non-urgent (16). According Muthmainnah, (2022). There are several reasons why ESI triage is easier to implement in Indonesia, namely, nurses can more easily assess the triage priority or level by observing the severity of the patient's condition, and nurses find it easier to determine what medical resources the patient needs (18). The ESI triage system also uses a pain scale of 1-10, which is the same as what is commonly used in Indonesia (19). There is no time constraint for nurses or doctors to provide care in the emergency room, making the treatment flexible and allowing it to be administered as soon as possible while considering triage priorities and the number of patients (20). ESI triage has a clear, simple algorithm and high validity in determining triage priorities for patients (21).

The implementation of ESI was developed by the US Emergency Department, where hospitalization rates can be clearly predicted through ESI (22). The application of ESI considers the diagnostic tests that the patient may require (23). How can the ESI (Emergency Severity Index) triage system in healthcare services (Emergency Department) affect patient overcrowding?

OBJECTIVE

This paper aims to determine how the effectiveness of the Emergency Saverity Index (ESI) in the triage system in broad health services can affect the patient's queue?

REVIEW LITERATURE METHOD

The selection process has several stages: In the first stage, the results are filtered for the feasibility according to the inclusion and exclusion criteria. In the second stage, related to inclusion criteria, we chose the original research journal article reviewed by peer-review published between 2018 to 2023, written in English. Literature review articles are issued from this study. The selection and improvement process of the study is shown using the 2009 prism flow diagram. The recorded notes consider methodologically with quality that is not in accordance with the subjective opinions of the reviewer. The main focus in this literature review is effectiveness of the emergency saverity index (ESI) in the triage system in broad health services can affect the patient's queue. To optimize this interpretation, we will first clarify the findings. Figure 1: Article Search Process.

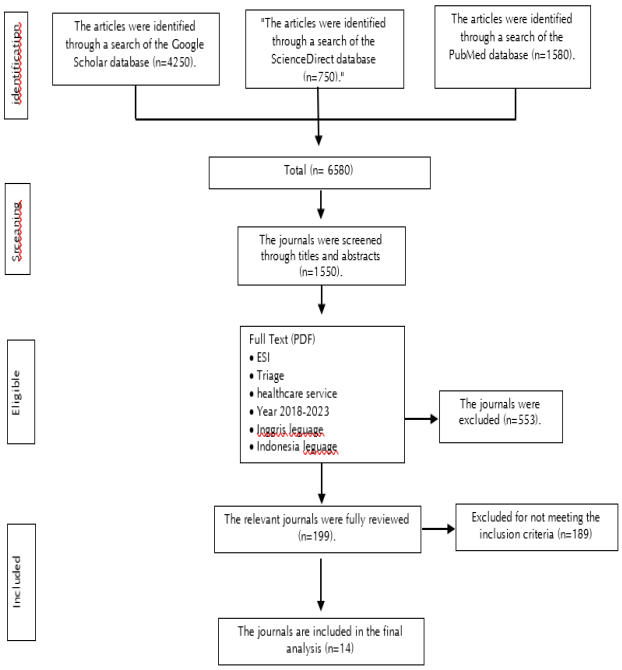

Figure 1: Article Search Process

Table I: Article search process

No	Author	Title	Method Study/ Study Design	Intrumens	Sample	Result
1	Roudi *et al.*, (2019)	Comparison between Emergency Severity Index plus peak flow meter and Emergency Severity Index in the dyspneic patients with chronic obstructive pulmonary disease: A randomized clinical trial	Quantitative	Intervension Group	70 patients	The results indicate that the use of the Emergency Severity Index (ESI) plus peak flow meter can provide a more accurate method for COPD patients in healthcare triage, as it assists doctors in correctly identifying high-risk patients with COPD.
2	Elsi & Novera, (2019)	Different triage categorization using Emergency Severity Index (ESI) method in emergency department	Quantitative	*Pre-test and Post-test One Group* design and questionnaires	21 Nurse	The results show that the obtained outcomes are significant in implementing the Emergency Severity Index in healthcare units, especially in the Emergency Department, to minimize patient congestion or queues.
3	Al Hasni & AL-Rawajfah, (2019)	Effectiveness of Implementing Emergency Severity Index Triage System in a Selected Primary Health Care Center in Oman: A Quasi-Experimental Study	quasi-experimental design	A pretest/ posttest and questionnaires	289 patients	The results indicate that the Emergency Severity Index system in healthcare services at the Emergency Department can contribute effectively and accurately, leading to a reduction in negative crowding outcomes in primary healthcare centers in Oman.

CONTINUE

Table I: Article search process (CONT.)

No	Author	Title	Method Study/ Study Design	Intrumens	Sample	Result
4	Sarvari *et al.*, (2020)	Effect of Emergency Severity Index Implementation on the Waiting Time for Patients to Receive Health Services in the Emergency Department	quasi-experimental	A pretest/ posttest and questionnaires	368 patients	Considering the effects of implementing the Emergency Severity Index triage, which can reduce patient waiting times and improve healthcare delivery, the Emergency Severity Index is recommended for training nurses and other emergency staff in providing healthcare services, particularly in the Emergency Department.
5	Fong *et al.*, (2018)	Comparison of the Emergency Severity Index versus the Patient Acuity Category Scale in an emergency setting	cross-sectional study design	ESI Implementation Handbook and questionnaires	27 nurses	The triage system demonstrates moderate interrater reliability and construct validity in patient triage. The Emergency Severity Index is capable of optimizing resource utilization to improve management in the emergency department and reduce patient queue congestion within the Emergency Unit.
6	Mirhaghi *et al.*, (2015)	Outcomes for Emergency Severity Index Triage Implementation in the Emergency Department	A single-center study was conducted and cross-sectional study design	A paper-based scenarios questionnaire and Training programs consist of workshop	10567 patients	The research results indicate that the Emergency Severity Index triage demonstrates significant improvements in triage accuracy in the emergency department, leading to an increased allocation of high-risk, life-threatening patients at levels I and II after the implementation of the Emergency Severity Index in the emergency unit.
7	Narayanan SP, Rath H, Mahapatra S, (2023)	Utilizing mobile health method to emergency nurses' knowledge about Emergency Severity Index triage	quasiexperimental study	pre and posttest, control group, and singleblind design	35 participants	The results obtained in this study are excellent, as evidenced by the evidence-based application of the Emergency Severity Index using mobile technology in the emergency department service, and its implementation in the education program is highly effective in enhancing nursing students' knowledge.
8	Jordi *et al.*, (2015)	Nurses' accuracy and self-perceived ability using the Emergency Severity Index triage tool: a cross-sectional study in four Swiss hospitals	cross-sectional	ESI Implementation Handbook Version 4 and questionnaires	69 nurses	The competence of nurses in assessing patient acuity when applying the Emergency Severity Index in the emergency department service is highly significant. Accuracy in guiding patients in its application can be reflected in the appropriate patient acuity rankings and categories.
9	Pourasghar *et al.*, (2016)	Validity of the emergency severity index in predicting patient outcomes in a major emergency department	cross-sectional study	Emergency Severity Index Implementation Handbook and questionnaires	562 patients	The research findings indicate that the Emergency Severity Index triage ranking successfully predicts patient outcomes in terms of hospitalization, in-hospital mortality, resource utilization, and patient service costs.
10	Zakeri *et al.*, (2022)	Comparison the Emergency Severity Index and Manchester Triage System in Trauma Patients	cross-sectional study	Training Center and questionnaires	915 patients	The use of ESI triage in trauma centers results in more patients coming to the emergency department because its application is highly accurate, reducing patient queue congestion.
11	Phungoen *et al.*, (2020)	Emergency Severity Index as a predictor of in-hospital mortality in suspected sepsis patients in the emergency departmen	A retrospective cohort study conducted	Observasional study	1200 patients	*The Emergency Severity Index is accurate and has the highest sensitivity in predicting hospital mortality and ICU admission in patients suspected of sepsis in the emergency department. This confirms that the Emergency Severity Index is valuable for triage in the emergency unit.*

CONTINUE

Table I: Article search process (CONT.)

No	Author	Title	Method Study/ Study Design	Intrumens	Sample	Result
12	Doni, (2020)	The Effectiveness of Emergency Severity Index (ESI) and Canada Triage Acuity Scale (CTAS) Documentation Writing on Triage Priority Accuracy by Nursing Students from STIKES Cahaya Bangsa in the Emergency Department of RSUD Ulin Banjarmasin	*Quasi Experimental*	Triage documentation	100 Nursing Student	The Emergency Severity Index triage system is more effective in accurately prioritizing patient triage compared to the Canada Triage Acuity Scale.
13	Ganjali *et al.*, (2020)	Accuracy of the Emergency Department Triage System using the Emergency Severity Index for Predicting Patient Outcome; A Single Center Experience	cross-sectional	questionnaire	400 patients	Current research findings reveal that the five-level triage system using ESI (Emergency Severity Index) has a high level of accuracy in triage and effectively predicts patient outcomes. Therefore, it can be utilized as an effective hospital triage system.
14	Siddiqui *et al.*, (2021)	Efficacy of Emergency Severity Index (ESI) in Early Identi¦cation of Patients with Sepsis and Septic Shock at Triage	cross-sectional	questionnaire	240 patients	The Emergency Severity Index has proven to be a useful triage tool with high sensitivity and specificity in identifying and prioritizing patients with sepsis and septic shock in busy emergency units.

Data Sources and Research

The search for this article was conducted using internet databases through Google Scholar (2018-2023), PubMed (2018-2023), and ScienceDirect (2018-2023) in June 2023. There were no publication date restrictions for each database. The search strategy used English keywords: 'triage system' OR 'ESI (emergency severity index)' OR 'emergency department.' This was done to ensure that all obtained articles were relevant and suitable. Subsequently, the full texts were downloaded and saved. In this research we did not use the Scopus, Web Of Science and EBSCO databases because we did not subscribe or did not pay. This is not included and is not used.

Inclusion And Exclusion Criteria

The following inclusion criteria are used in the selection of this Literature Review:

- Original research (original journal articles or conducted by researchers).
- Full text available.
- Research related to the ESI (Emergency Severity Index) triage system in healthcare services (Emergency Department) and its impact on patient overcrowding. Journals published from 2018 to 2023.
- Articles/journals available in both Indonesian and English languages.

The following exclusion criteria are used in the selection of studies for this literature review:

- Non-original publications such as letters to the editor, abstracts only, and editorials.

Selection

After the initial identification of titles and abstracts, 4,250 articles were obtained from Google Scholar, 1,580 articles from PubMed, and 750 articles from ScienceDirect, resulting in a total of 6,580 articles. The research was screened based on titles and abstracts, resulting in 752 articles. A review was conducted with full-text screening, leading to 553 remaining articles, which were independently examined according to inclusion criteria, resulting in 199 articles. Further exclusion led to the removal of 189 articles that did not meet the criteria. In the final stage, 14 articles were obtained.

Methodological characteristics

Out of the 15 articles reviewed, seven articles employed a cross-sectional study design (2,12,24–28). Four articles utilized a Quasi-Experimental design Experimental (15,29–31), two articles employed quantitative methods (9,32), and one article conducted a retrospective cohort study (14).

Intervention Methods

From the 14 articles, five used a Pre-test and Post-test One Group design along with questionnaire surveys (9,15,30–32). Three articles employed interventions in the form of questionnaires (12,28). Three articles utilized the ESI Implementation Handbook Version 4 along with questionnaires (24,26,27). One article used the intervention of a Training Center and questionnaires (2). One article applied an observational study as the intervention (14), and one article utilized the intervention of triage documentation (29).

RESULTS

From the 14 fully reviewed articles, eight articles mention that the Emergency Severity Index triage shows a significant impact on improving accuracy in the emergency department (9,12,14,24–26,31,32). The use of the Emergency Severity Index triage in trauma centers results in more patients coming to the emergency

department because of its accurate application and reduction in patient queue congestion (2,27). Using the Emergency Severity Index with mobile technology in the emergency department and educational programs is highly effective in enhancing nurse knowledge (30). The Emergency Severity Index reduces patient waiting times and improves healthcare service delivery (15). The Emergency Severity Index is more effective in triage patient priority accuracy compared to the Canada Triage Acuity Scale (29), and the Emergency Severity Index is proven to be a useful triage tool with high sensitivity and specificity in patient identification and prioritization (28).

DISCUSSION

In total, the literature review yielded 14 articles, and from these 14 articles, significant results were obtained, including:
(12) stated that the five-level triage system using the Emergency Severity Index has very high accuracy in triage determination and can effectively predict patient outcomes. Therefore, it can be used as an effective triage system in hospitals or healthcare services. The implementation of the ESI triage system not only reduces waiting times but also enhances patient satisfaction and triage acuity accuracy. The ESI system can also improve patient queues through healthcare facility service centers (31).

The Emergency Severity Index (ESI) triage shows a significant impact on improving triage accuracy in the emergency department, resulting in the allocation of high-risk patients to levels I and II after ESI implementation . ESI serves as a highly valid and reliable tool in optimizing outcomes in the emergency department (25). ESI is highly accurate in predicting hospital mortality and ICU admission in patients suspected of sepsis in emergency situations (33). Therefore, in addition to its usefulness in prioritizing sepsis patients, ESI is a promising tool for predicting patient acuity in sepsis diagnoses without the need for reevaluation using other conventional tools (14).

Patients arriving at the Singapore Emergency Department present a wide spectrum of minor emergencies classified under the P3 category, but they are subsequently differentiated into three subacute levels within the Emergency Severity Index (ESI) system: ESI 3, 4, and 5. This refinement is beneficial for the Emergency Department, which receives a substantial number of P3 patients. ESI (Emergency Severity Index) is also valuable in busy Emergency Departments as it assists in managing limited resources more effectively (24).

Patients arrive at the Singapore Emergency Department with a broad spectrum of minor emergencies classified under the P3 category. However, these cases are further differentiated into three subacute levels within the Emergency Severity Index (ESI) system: ESI 3, 4, and 5. This refinement proves beneficial for the Emergency Department, which receives a substantial number of P3 patients. ESI (Emergency Severity Index) also proves valuable in busy Emergency Department healthcare services because it is highly effective and assists the Emergency Department unit in managing limited resources more effectively when implementing ESI (Emergency Severity Index) (24).

According to (27) The effectiveness of the ESI (Emergency Severity Index) triage system in predicting outcome measures such as hospitalization, in-hospital mortality, nursing workload, and patient service costs in hospitals is highly beneficial and supportive for nursing workforce. According to (15) Research results indicate that the implementation of ESI (Emergency Severity Index) triage system components has a very positive effect on reducing all studied average time intervals for healthcare service delivery and the overall patient length of stay in the emergency department, demonstrating that this system is a suitable management intervention for improving the situation (34). The presence of specialist doctors in the emergency department is crucial for reducing the time spent on diagnosis and patient treatment in the emergency unit (35).

Advantages of Emergency Severity Index Triage

Triage nurses are guided to see the conditions and severity without having to wait for intervention from the doctor, consideration of the use of resources allows the triage nurses to estimate the utilization It is also the triage esi system that explains what needs to be checked for children which are not found in other triage systems (36).

Weaknesses of emergency severity index triage

Lack of triage eSi where patients are grouped based on the level of severity or emergency conditions so that there are a number of patients complaining of the length of handling given by officers because patients are categorized at the emergency level (Emergency Severity Index) with service time that can still be tolerance. Response time ESI according to the category, ESI 1≤0 minutes, ESI 2 ≤15 minutes, ESI 3 ≤30 minutes, ESI 4 ≤60 minutes, and ESI 5 ≤120 minutes (37).

CONCLUSION

Every article discussed has stated that the use of the Emergency Severity Index (ESI) in healthcare units, especially in the Emergency Department, is highly feasible and beneficial for implementation in healthcare facilities. The Emergency Severity Index system in managing patient congestion in emergency areas significantly contributes to reducing negative crowding outcomes in healthcare service centers, and the Emergency Severity Index is recommended for training nurses and other emergency staff.

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