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Research Article

THE EFFECTIVENESS OF START TRIAGE AS AN ALTERNATIVE TO ESI IN MANAGING MASS CASUALTY INCIDENTS (MCI) IN THE EMERGENCY DEPARTMENT: A SYSTEMATIC LITERATURE REVIEW

Al-Mohades[1] *, Nadya Puteri[2], Zaqyyah Huzaifah[3]

[1,2,3]Faculty of Nursing and Health Sciences Universitas Muhammadiyah Banjarmasin, Kampus 1 Banjarmasin 70114, Indonesia

Corresponding Author :
Al-Mohades, E-mail: almohades.net@gmail.com; Phone: +6285705858917

ABSTRACT

Background:
The Emergency Department (ED) frequently faces patient overcrowding during Mass Casualty Incidents (MCI). The Emergency Severity Index (ESI) is often considered too complex and time-consuming during patient surges. The Simple Triage and Rapid Treatment (START) method has been proposed as an alternative due to its rapid application. This study aims to evaluate the effectiveness of START compared to ESI in terms of speed, accuracy, and ease of use in disaster situations.
Methods: This study employed a Systematic Literature Review design based on the PRISMA 2020 guidelines. Searches were conducted in electronic databases for articles published between 2015 and 2025. Of 50 identified articles, 25 met the inclusion criteria and were analyzed.
Results: The findings indicate that START is significantly faster (less than 60 seconds per patient) than ESI (3–5 minutes) effectively reducing patient flow bottlenecks. While ESI shows high specificity for non-trauma cases, START demonstrates up to 100% sensitivity in identifying critically injured trauma patients. START also imposes a lower cognitive burden on nurses in high-stress conditions.
Conclusion: These findings support START as an effective alternative triage system during disaster response to manage trauma patient surges.

Keywords: *disaster triage; ESI triage; emergency department; mass casualty incident; START triage*

INTRODUCTION

The Emergency Department (ED) serves as the frontline of healthcare services and must be prepared to handle both routine and disaster situations. During disasters or Mass Casualty Incidents (MCI) a sudden imbalance occurs between the surge of victims and the limited availability of medical personnel (1). This condition demands a rapid and accurate triage process to prioritize care and prevent avoidable or preventable deaths (2).

Most modern hospitals use the Emergency Severity Index (ESI) as the gold standard for daily triage due to its ability to classify patients into five priority levels based on acuity and anticipated resource utilization (3). The complexity of the ESI algorithm which requires comprehensive vital sign assessment and detailed history taking becomes an operational limitation during the disaster response phase. Studies by (4) and Mirhaghi (5) indicate that prolonged ESI triage time contributes to overcrowding and increases the risk of mistriage when nurses experience excessive workload. ESI reliability is highly dependent on nurses' clinical experience and intuitive judgment which may decline under extreme psychological pressure (6)

Simple Triage and Rapid Treatment (START) method, traditionally used in prehospital settings has begun to be considered as an alternative for implementation within the ED during disasters in response to this research gap and these limitations (7). START offers a concise operational algorithm by assessing only three basic parameters (respiration, perfusion, and mental status) without requiring additional medical diagnostic equipment. This approach is considered highly relevant for minimizing the cognitive burden on healthcare personnel, particularly in crisis situations where diagnostic resources are limited (8).

Although START offers advantages in terms of speed, the accuracy and validity of implementing this field protocol in the ED setting as a temporary substitute for the ESI standard remain subjects of academic debate (9). This systematic review aims to comprehensively compare the effectiveness of the START and ESI triage systems to provide scientific evidence and strategic recommendations for managing mass casualty surges in the Emergency Department.

MATERIAL AND METHODS

This study is a Systematic Literature Review (SLR) conducted systematically in accordance with the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) 2020 guidelines. A comprehensive literature search was carried out through major electronic academic databases PubMed, ScienceDirect and Google Scholar to identify articles relevant to the research question.

The data collection procedure was formulated using the PICO framework (Population, Intervention, Comparison, Outcome). Strict inclusion and exclusion criteria were established to filter the articles most relevant to the study objectives. The detailed eligibility criteria of the literature used in this study are presented in Table 1.

Table 1. literature inclusion and exclusion criteria.

Criteria	Inclusion(accepted)	exclusion(rejected)
Population (P)	Emergency Departement patiens, Victim of Mass Casualty Incidents (MCI), Mass disasters, Emergency Departement nurses	Outpatient, Emergency patient, Stable/non-critical conditions
Intervention (I)	Use of the START (*Simple Triage and Rapid Treatment*) triage system	Use of field triage without a basic algorithm
Comparison (C)	Use of the ESI (*Emergency Severity Index*) triage system or another emergency departement triage system	Descriptive study without comparing two or more triage systems
Outcome (O)	Clinical accuracy, time efficiency (speed), under/over triage rates, nurse workload	Patient satisfaction
Characteristics	Original research (Observational, experiment), Systematic Review. publication from 2015-2025	Opinion

The literature selection process was conducted in four main phases: identification, screening, eligibility assessment, and inclusion. The initial search yielded 50 documents. During the preliminary screening based on titles and abstracts, 15 documents were excluded because they did not address clinical emergency topics or were not peer reviewed manuscripts.

35 full text articles were assessed for eligibility in depth. At these stage 10 articles were excluded because they did not specifically compare START and ESI or had invalid methodological designs. 25 valid and relevant articles were included for qualitative extraction and synthesis. The literature selection flow is illustrated in detail in Figure 1.

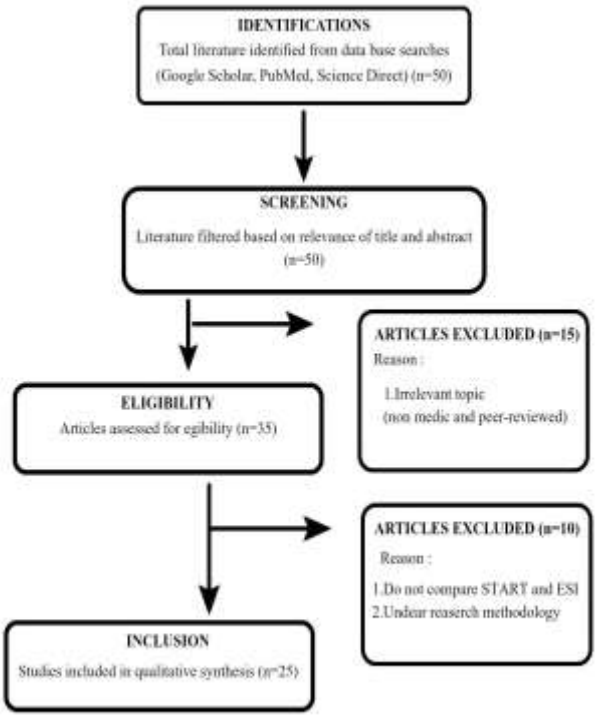

Figure 1. PRISMA 2020 Flow Diagram

RESULTS

The discussion explores the eligibility of the operational transition from ESI to START during crisis situations in the ED, relating directly to the initial objectives. Based on the extraction results regarding speed, this finding aligns with the main principle of disaster medicine, which prioritizes patient flow. The execution speed of START, being under 60 seconds, essentially prevents bottlenecks at the hospital entrance. In surge capacity management theory, the failure to distribute patients rapidly from the triage area is the primary predictor of increased mortality due to the collapse of the emergency system. Therefore, the operational hindrance of ESI due to its long evaluation duration makes it counterproductive to maintain when a wave of disaster patients arrives.

Speed and Patient Flow

Evaluation of time efficiency revealed significant differences between the two systems. Six simulation and retrospective studies consistently reported that the implementation of START triage required an average of 30 to 60 seconds per patient. This speed was achieved because START assesses only three clinical parameters (respiration, perfusion, and mental status) without the need for medical equipment. In contrast, ESI implementation required an average of 3 to 5 minutes per patient due to the need for comprehensive history taking and basic vital sign assessment.

Accuracy, Sensitivity, and Specificity

Analysis of accuracy outcomes demonstrated performance variations depending on the type of case. Five articles focusing on routine ED evaluation found that ESI had substantially higher overall accuracy and specificity (above 85%) in predicting hospital admission and resource utilization for non-trauma cases. However, in three observational studies examining trauma-specific Mass Casualty Incidents (MCI), such as earthquakes and mass transportation accidents, START demonstrated sensitivity of up to 100% in identifying red-category (immediate) victims.

Nurses' Cognitive Load

Four studies evaluated user-friendliness and its impact on mistriage. These studies found that when the patient-to-staff ratio exceeded operational capacity, the rate of under-triage with ESI increased significantly (reaching 15–20%), particularly among elderly patients. In contrast, brief training interventions on START were shown to immediately improve the assessment accuracy of medical volunteers, as its decision-making algorithm is objective and binary, thereby minimizing cognitive burden in high-stress situations.

DISCUSSION

The discussion focuses on the feasibility of operational transition from ESI to START during crisis situations in the Emergency Department (ED). Based on the findings related to speed, the results are consistent with the core principle of disaster medicine, which prioritizes efficient patient flow. The execution time of START, which is under 60 seconds, essentially prevents bottlenecks at the hospital entry point. In surge capacity management theory, failure to rapidly distribute patients from the triage area is a primary predictor of increased mortality due to emergency system collapse. Therefore, the operational limitations of ESI resulting from prolonged evaluation time render it counterproductive when maintained during disaster patient surges.

Regarding the findings on the trade-off in accuracy, the results reinforce the view that no universal triage system is absolutely optimal for all conditions. ESI is clinically superior due to its detailed physiological assessment, which reduces over-triage and makes it rational for routine daily operations in the ED. However, the findings discourage the use of ESI in mass trauma situations due to its reduced sensitivity when nurses experience fatigue. The high sensitivity of START in identifying severe trauma confirms its role as a strong safety net. Although START tends to generate over-triage (yellow-labeled patients categorized as red), modern disaster management theory agrees that moderate over-triage is acceptable, as it is far safer than life-threatening under-triage.

The finding of increased under triage rates with ESI under pressure provides important insight into the psychological factors affecting healthcare personnel. The complexity of ESI requires high level decision making that is vulnerable to subjective bias when nurses are fatigued. In contrast, the START algorithm minimizes this dependency by providing rigid, step-based instructions without the need for equipment, and has proven effective even in healthcare systems with limited diagnostic resources, which are commonly encountered in developing countries.

CONCLUSION

Based on a comprehensive synthesis of 25 research articles, it can be concluded that the START method is a triage alternative that is significantly more valid and effective than ESI when applied specifically during the disaster emergency response phase in the Emergency Department (ED). The overall findings indicate that although ESI possesses greater medical specificity for routine daily cases, the primary advantage of START lies in its time efficiency in patient sorting (<60 seconds) and its algorithm, which reduces the cognitive burden on healthcare personnel under pressure. Consequently, START plays a crucial role in minimizing patient overcrowding and preventing avoidable deaths during mass casualty surges.

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