

Effectiveness of the manchester triage system in the emergency department: a literature review

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Abstract. Congestion in emergency rooms is a worldwide problem that is frequently caused by rising patient volumes, which can lead to organizational challenges. The Manchester Triage System (MTS) and other triage systems seek to enhance patient flow management and forecast the severity of illnesses. This study assesses how well MTS categorizes patients in emergency rooms according on their risk. Using inclusion and exclusion criteria, a literature analysis was carried out, and papers were sourced from databases such as Science Direct (2020–2024), PubMed (2020–2024), and Google Scholar (2019–2024). Efficacy, Manchester Triage System, and Emergency Department were among the search phrases used. Full texts of articles released between 2019 and 2024 were obtained once their applicability was assessed. The results confirm that MTS is applicable to a range of patient populations, including adults, children, and those suffering from acute pulmonary embolism and coronary syndromes. In terms of forecasting ED visits and short-term mortality, the MTS proved to be reliable. Sub-triage and super-triage (misclassification of severity) problems persist despite its efficacy. The majority of research leads to the conclusion that MTS is a helpful tool for patient triage in emergency situations, improving patient outcomes and resource allocation.

1 Introduction

Worldwide, the number of patients visiting emergency units with various issues, ranging from severe clinical conditions to minor injuries, is steadily increasing [1]. This situation can lead to overcrowding in emergency units, which often face other organizational issues, such as providing assistance to patients based on the order of arrival rather than the severity of their medical condition [2]. Triage has become a method to improve service efficiency and reduce the impact of overcrowding by identifying patients who require immediate care [3]. Patients are assessed based on the severity of their clinical condition, level of distress, and risk to their own health [4]. Thus, triage is described as a dynamic process of classifying patients, enabling them to be placed into the most appropriate service to receive faster care [5].

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The triage scale is used to determine the severity of illness, mortality risk, and resource needs [6]. It is straightforward to understand, easy to implement, and has a high level of agreement among observers [7]. Worldwide, various triage scales are used in emergency units due to functional differences in services [8]. A standardized triage scale that is suitable for all services is needed [9]. No measurement instrument is infallible, as measurement errors can arise from personal factors, environmental conditions, changes in data collection methods, and the process of cultural adaptation [2]. The Manchester Triage System (MTS) is a priority classification and risk prediction system for patients seeking emergency care, widely used in the European Union. However, there is currently no standard for its application, nor significant evidence of its benefits [10]. The goal of the MTS is to reduce queues in emergency unit facilities and aid in decision-making when patients enter healthcare services, ensuring that patients are assessed based on the severity of their clinical condition rather than the order of arrival in the emergency unit [11].

The Manchester Triage Scale (MTS) includes 52 predefined conditions or presentation flows, combined with the chief complaint reported by the patient and recorded by a nurse [12]. The classification is divided into five colors: red (immediate), orange (very urgent), yellow (urgent), green (standard), and blue (non-urgent) [13]. Although theoretical and systematic perspectives have discussed the use of MTS in emergency units, it is crucial to identify and analyze scientific publications on this topic, as MTS has been relatively recently introduced into practice [14]. This enhances the understanding of the triage system and provides scientific indications for its implementation in various social contexts [15].

Therefore, the aim of this paper is to evaluate the application of MTS in patient risk classification as well as to describe and analyze its use in relevant articles that have been identified.

2 Method

The process of selection had several stages: In the first stage, the results were screened for eligibility according to the inclusion and exclusion criteria. In the second stage, related to inclusion criteria, we selected peer-reviewed journal original research article published between 2019 and 2024, written in English language. Literature review articles were excluded from the study. The process of selection and refining the studies is shown using PRISMA 2009 flow diagram. Excluded records were either considering methodologically of a less quality according to the subjective opinions of the reviewers. The main focus of this literature review is the effectiveness of the Manchester Triage System in Emergency Department. To optimize this interpretation, we will first clarify the findings. The search flow is summarized in Table 1.

2.1 Inclusion criteria and exclusion

The following inclusion criteria are used in the review literature selection:

An original study (original journal or done by researchers)

1. Research on the Effectiveness of the Manchester Triage System in Emergency Department
2. Journal starting from 2019 to 2024
3. Available in English
4. full text

The following exclusion criteria were used in this study : non-original articles, such as editorials, abstracts only, and letters to the editor. These standards were put in place to

guarantee that only relevant and high-caliber studies were included. As shown in Figure 1, the PRISMA search algorithm is used in the selection process [16].

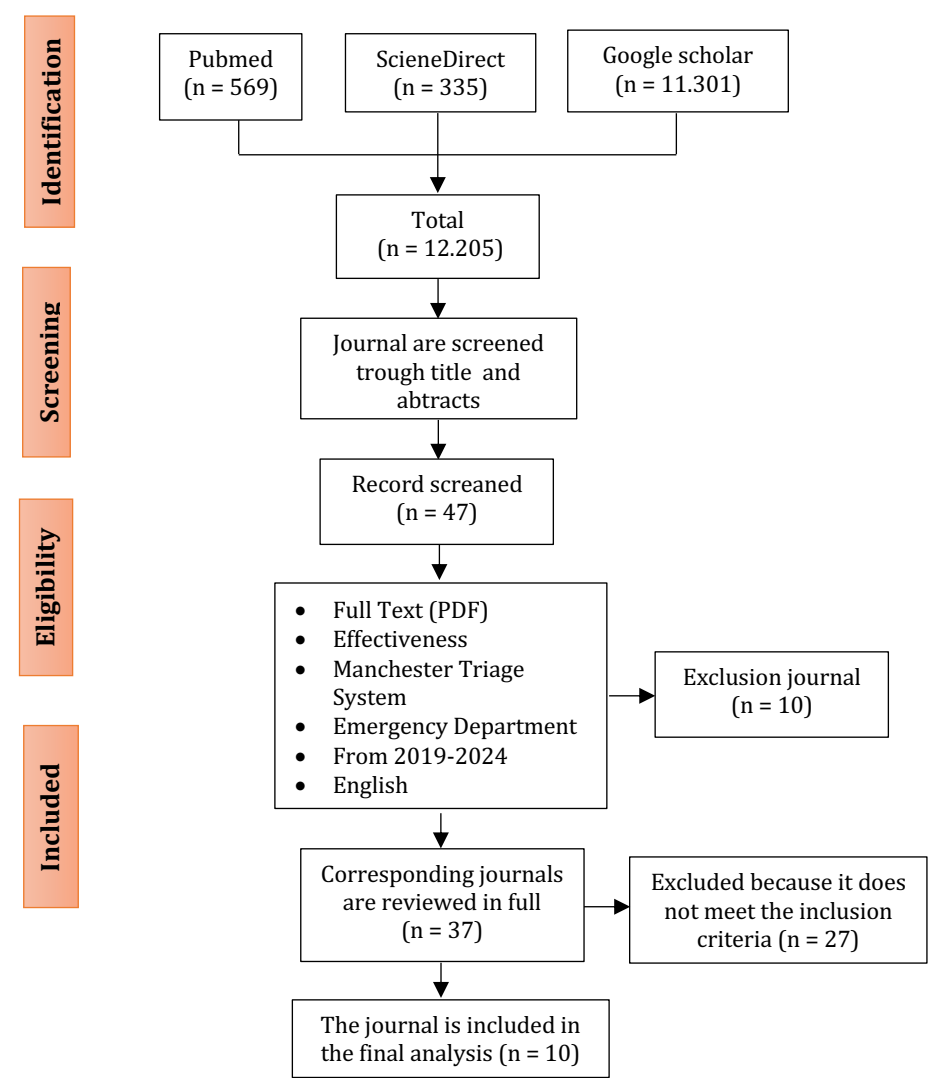


Fig 1. PRISMA flow diagram of the systematic review showing the search results and the process of study selection and inclusion.

2.2 Data sources and search

The strategy was collecting journals as a literature study material using The PubMed Journal site, Sciencedirect and Google Scholar. The year the literary source is taken from 2019 until 2024. Search strategy with the keyword “Effectiveness “OR” Manchester Triage System “OR” Emergency Departement. This is to make sure all the articles obtained are relevant and appropriate, then the full text is downloaded and saved.

2.3 Screening

A total of 12,205 articles were obtained from multiple databases following the initial identification of titles and abstracts: 11,301 articles from Google Scholar, 335 articles from ScienceDirect, and 569 articles from PubMed. 214 papers that were judged pertinent to the study were chosen from this large pool of articles after they were screened using their titles and abstracts.

The selection was then further reduced to 47 articles by a more thorough evaluation that was carried out utilizing the full-text category. Following an impartial review of these 47 articles in relation to the predetermined inclusion criteria, 27 articles that did not satisfy the requirements were excluded. Consequently, 37 articles were left after this phase.

A second screening was conducted in the latter phase of the review process to further narrow the selection, and ten papers that satisfied all research requirements were eventually included. This thorough and methodical selection procedure demonstrates the work done to guarantee that only pertinent and high-caliber studies are included in the final analysis.

3 Methodological characteristics

An observational, retrospective methodology was used in five of the ten reviewed publications [17–21], enabling the examination of past data to spot patterns and results. In order to evaluate prevalence and relationships, three employed a cross-sectional design [22–24], providing a snapshot of data. One systematic review [25] that synthesized information from several research and one qualitative study [26] that focused on in-depth contextual insights were included in the remaining two papers. The review is enhanced by these many approaches, which contribute both qualitative and quantitative viewpoints.

4 Intervention method

Out the 10 articles, five using the Manchester Triage System scale [17], [18], [19], [20], [21], two article using medical record [22], [23], one article using Inspection of records of risk classification of adult patients [18], one article using semi-structured interview [24], and one using article review [25].

5 Result

The ten examined studies (summarized in Table 1) highlight the Manchester Triage System's dependability and security in providing timely care for patients who need it in less than ten minutes. It has been demonstrated that this triage technique improves the caliber of clinical evaluations performed by nurses, allowing for a more organized and efficient method of setting patient care priorities. The triage procedure incorporates essential elements including reviewing the patient's medical history, taking vital signs, and doing auscultation to guarantee a thorough assessment of every patient. In emergency care settings, these results highlight the system's capacity to facilitate prompt and well-informed decision-making [14, 17–26]

Table 1. Characteristics and assessment of included articles (n = 10)

Author	Title	Method study/ design study	Intrument	Sample	Result
da Costa et al. [17]	The accuracy of the Manchester Triage System in an emergency service	Cross-sectional study	inspection of records of risk classification of adult patients	400 Patients	The results indicate that there is accuracy in patient risk classification through the Manchester Triage System (MTS).
Ausserhofer et al. [18]	Performance of the Manchester Triage System in patients with dyspnoea: A retrospective observational study	Retrospective, observational study	Manchester Triage System scale	145 patients	The sensitivity of the Manchester Triage System is acceptable and accurate in the emergency department.
Zakeri et al. [19]	Comparison the Emergency Severity Index and Manchester Triage System in Trauma Patients	Cross-sectional study	Manchester Triage System and ESI scale	447 patients ESI and 468 patients MTS	The use of the Manchester Triage System (MTS) significantly reduces the length of care in the emergency unit compared to the Emergency Severity Index (ESI).
Cicolo et al. [20]	Effectiveness of the Manchester Triage System in time to treatment in the emergency department: a systematic review	Systematic review method	Article review	10 article	The Manchester Triage System (MTS) can reduce treatment time for patients classified in the highest priority

					categories (orange and yellow)
Zachariasse et al. [21]	Improving the prioritization of children at the emergency department: Updating the Manchester Triage System using vital signs	prospective observational study	Electronic medical record data	100 patients	The Manchester Triage System (MTS) is highly relevant and should be implemented, as it enhances performance in assessing vital signs.
Sousa et al. [22]	Patients' perceptions resulting from the contact with emergency departments using the Manchester Triage System protocol	a qualitative	Semi- structured interviews	100 sample	These results can be used to improve how patients handle emergency situations and contribute to enhancing knowledge about the impact of emergency units and triage protocols on patients.
de Jesus et al. [23]	Manchester Triage System: assessment in an emergency hospital service	cross- sectional	medical records	533 records of patients	A high prevalence of changes in vital signs and mortality has been demonstrated within the categories of the MTS protocol.
Kiblboeck et al. [24]	Evaluation of the Manchester triage system for patients with acute coronary syndrome	Retrospective analysis	Manchester Triage System scale	431 patients	The use of the Manchester Triage System (MTS) for Acute Coronary Syndrome (ACS) is highly

					effective in initiating actions within less than 10 minutes.
Brouns et al. [25]	Performance of the Manchester triage system in older emergency department patients: a retrospective cohort study	A retrospective cohort study	MTS scale assessment	7108 emergency department	The Manchester Triage System (MTS) demonstrates better performance in both elderly and adult patients in the emergency department (ED).
Zaboli et al. [26]	Effectiveness of Manchester Triage System in risk prioritisation of patients with pulmonary embolism who present dyspnoea, chest pain or collapse	Observational, retrospective, study	MTS scale assessment	7055 patients	Although pulmonary embolism is difficult to diagnose, the Manchester Triage System is an effective tool for prioritizing patients.

6 Discussion

In total, the literature of review obtained 10 article and 10 article has significant result, among others:

Based on research result The Manchester Triage System is a safe triage system for patients with dyspnea and all types of emergency patients requiring immediate action [27]. It enhances clinical assessment during nurse triage (e.g., by considering clinical history and lung auscultation) [20]. The use of the Manchester Triage System in adult emergency services at general hospitals has proven to be a good predictor of evaluated outcomes, indicating that patients initially classified with high urgency may later be reclassified to lower urgency and subsequently discharged [18].

The use of the Manchester Triage System for trauma patients significantly reduces the length of care in the emergency unit and conserves hospital resources (labor and equipment). The Manchester Triage System can benefit patients needing immediate care who visit the emergency department by reducing wait times and length of treatment [25]. Patients arrive at the emergency department based on vital signs, heart rate, and respiratory rate. Organizing them into subgroups using a flowchart can enhance the performance of the Manchester Triage

System (MTS) and effectively reduce wait times or overcrowding in the emergency department. Thus, it may be beneficial to incorporate these evidence-based modifications into the MTS [22].

Patients have a high level of trust in the Manchester Triage System and the performance of healthcare professionals; however, improvements should be implemented to enhance patient experience quality [28]. Emergency department managers and professionals should, in addition to ensuring the quality of technical services, adopt a more person-centered approach to triage, upgrade emergency department facilities, improve the information provided to patients, and take steps to reduce waiting times for medical care [13]. Strengthening the function of primary healthcare units will also contribute to increased patient satisfaction with the emergency department [24].

The majority of patients diagnosed with Acute Coronary Syndrome (ACS) who come to the emergency department and are triaged by the Manchester Triage System (MTS) are classified as MTS levels 2 and 3, requiring assessment within 10 to 30 minutes [29]. We observed that the MTS assists nurses in taking timely actions for ACS patients, as a rapid ECG recording is recommended to determine further interventions. The Manchester Triage System demonstrates good specificity and positive predictive value in patients experiencing chest pain, dyspnea, or collapse. MTS provides a high level of safety for severe illnesses. As previously shown for ACS and sepsis, the current research indicates that MTS is an effective method for prioritizing patients with symptoms requiring immediate attention [21].

7 Conclusion

The Manchester Triage System (MTS) can be applied and benefits some patients visiting the Emergency Department. As evidenced by the results of this study, the use of MTS in trauma patients significantly reduces the length of stay in the emergency department and saves hospital resources (labor and equipment). The Manchester Triage System is an effective tool for prioritizing patients with respiratory symptoms.

References

1. G. Savioli et al., Emergency department overcrowding: Understanding the factors to find corresponding solutions. *J. Pers. Med.* **12**, (2022)
2. G. Wachtel, A. Elalouf, Addressing overcrowding in an emergency department: An approach for identifying and treating influential factors and a real-life application. *Isr. J. Health Policy Res.* **9**, 1–12 (2020)
3. J. Bienzeisler et al., The effects of displaying the time targets of the Manchester Triage System to emergency department personnel: Prospective crossover study. *J. Med. Internet Res.* **26**, 1–14 (2024)
4. M.M. Valença, M.F.P. Peres, Urgent need for reform: Addressing the inadequate emergency care for headache patients under the Manchester Triage System. *Headache Med.* **15**, 98–103 (2024)
5. L.S. Peng, M.F. Rasid, W.I. Salim, Using modified triage system to improve emergency department efficacy: A successful Lean implementation. *Int. J. Healthc. Manag.* **14**, 419–423 (2021)
6. M. Shaheen, M. Afzal, M. Mukhtar, Effectiveness of modified Manchester triage flow model regarding patients' waiting time. *Cardiometry* **29**, 99–102 (2023)
7. S.H. Moon, I.Y. Cho, Development of a competency-based triage education application and usability testing for triage training based on the Korean Triage and Acuity Scale. *J. Cont. Educ. Nurs.* **55**, 33–41 (2024)

8. D. Pabst et al., Risk management in the triage of emergency room patients to outpatient care: Manchester Triage System and CEReCo-blue as a tool for low-risk patient management in integrated emergency centers. *Med. Klin. Intensivmed. Notfmed.* **117**, 410–418 (2022).
9. L. Pivina et al., Comparative analysis of triage systems at emergency departments of different countries: Implementation in Kazakhstan. *Russ. Open Med. J.* **10**, 0301 (2021)
10. C.M.M. Tinoco, C.F. Poltronieri, E. Melo, The implementation of Lean Healthcare six sigma in a public hospital. *Int. J. Ind. Eng. Oper. Manag.* **20**, 1–12 (2023).
11. D.S. Bastos, Automatic classification of risk and priority in emergency care through the Manchester Triage System. *J. Emerg. Med. Stud.* **10**, 0–21 (2022).
12. B. Li, Z. Zhang, K. Li, Y. Deng, The effectiveness of a modified Manchester Triage System for geriatric patients: A retrospective quantitative study. *Nursing Open* **11**, 1–10 (2024)
13. A. Zaboli et al., Italian validation of the Manchester Triage System towards short-term mortality: A prospective observational study. *Emerg. Care J.* **19**, (2023)
14. Zaboli et al., Acute abdominal pain in triage: A retrospective observational study of the Manchester Triage System's validity. *J. Clin. Nurs.* **30**, 942–951 (2021)
15. N. Beck et al., The Manchester Triage System in a pediatric emergency department of an Austrian university hospital: A retrospective analysis of urgency levels. *Pediatr. Emerg. Care* **38**, E639–E643 (2022)
16. V. Mishra, M.P. Mishra, PRISMA for Review of Management Literature – Method, Merits, and Limitations – an Academic Review. *Rev. Manag. Lit.* **2**, 125–136 (2023)
17. J.P. da Costa, R. Nicolaidis, A.V.F. Gonçalves, E.N. de Souza, C.R. Blatt, The accuracy of the Manchester Triage System in an emergency service. *Rev. Gauch. Enferm.* **41** (2020).
18. D. Ausserhofer, A. Zaboli, N. Pfeifer, M. Siller, G. Turcato, Performance of the Manchester Triage System in patients with dyspnoea: A retrospective observational study. *Int. Emerg. Nurs.* **53**, 100931 (2020). <https://doi.org/10.1016/j.ienj.2020.100931>
19. H. Zakeri, L. Afshari Saleh, S. Niroumand, M. Ziadi-Lotfabadi, Comparison the Emergency Severity Index and Manchester Triage System in Trauma Patients. *Bull. Emerg. Trauma* **10**, 2, 65–70 (2022). <https://pubmed.ncbi.nlm.nih.gov/35434164>
20. E.A. Cicolo, F.A. Nishi, H.H.C. Peres, D.D.A.L.M. Da Cruz, Effectiveness of the Manchester Triage System on time to treatment in the emergency department: A systematic review. *JBIC Evid. Synth.* **18**, 1, 56–73 (2020).
21. J.M. Zachariasse, I.K. Maconochie, R.G. Nijman, S. Greber-Platzer, F.J. Smit, D. Nieboer, et al., Improving the prioritization of children at the emergency department: Updating the Manchester Triage System using vital signs. *PLoS ONE* **16**, 2, 1–14 (2021).
22. M. Sousa, M.N. Cunha, J. Rodrigues, Patients' perceptions resulting from the contact with emergency departments using the Manchester Triage System protocol. (2024).
23. A.P.S. de Jesus, M.F.P. Okuno, C.R.V. Campanharo, M.C.B.T. Lopes, R.E.A. Batista, Manchester Triage System: Assessment in an emergency hospital service. *Rev. Bras. Enferm.* **74**, 3, 1–9 (2021).
24. D. Kiblboeck, K. Steinrueck, C. Nitsche, W. Lang, J. Kellermair, H. Blessberger, et al., Evaluation of the Manchester triage system for patients with acute coronary syndrome. *Wien. Klin. Wochenschr.* **132**, 11–12, 277–282 (2020).
25. S.H.A. Brouns, L. Mignot-Evers, F. Derkx, S.L. Lambooi, J.P. Dieleman, H.R. Haak, Performance of the Manchester triage system in older emergency department patients: A retrospective cohort study. *BMC Emerg. Med.* **19**, 1, 1–11 (2019).
26. A. Zaboli, G. Turcato, P. Solazzo, D. Sorrento, E. Zorzi, T. Marsoner, et al., Effectiveness of Manchester Triage System in risk prioritisation of patients with

- pulmonary embolism who present dyspnoea, chest pain or collapse. *Int. Emerg. Nurs.* **50**, 100842 (2020). <https://doi.org/10.1016/j.ienj.2020.100842>
27. M. Haid, P. Heimerl, B. Tossmann, E. Nöhammer, The Prioritization of Outpatients by Nurses Using the Manchester Triage System: A Case Analysis in An Austrian Accident Hospital. *Med. Leg. Updat.* **21**, 3, 380–385 (2021).
 28. M.M. Previdelli, A.A.P. Liberato, M.I. Taninaga, C.N. Huss, R.L.O. Alves, Effectiveness of the triage system in a private emergency service: Cohort study. *Med.* **54**, 3, 1–9 (2021).
 29. K. Dewitte, E. Scheurwegs, S. Van Ierssel, H. Jansens, K. Dams, E. Roelant, Audit of a computerized version of the Manchester triage system and a SIRS-based system for the detection of sepsis at triage in the emergency department. *Int. J. Emerg. Med.* **15**, 1, 1–9 (2022). <https://doi.org/10.1186/s12245-022-00472-y>