



Advancing Triage Scales: Enhancing Quantitative Measures for Improved Patient Assessment

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Dear Editor,

Mistriage is the inappropriate assignment of patients to triage categories in the emergency department (ED) (1). Considering all these factors, mistriage, giving patients in generally good condition the more acute category they deserve, is also called over-triage, or receiving a less acute category in those experiencing a critical condition. Some studies have further reflected on the significant problem of mistriage (2). A systematic review showed mistriage rate is significantly varied. The undertriage rate ranged from 1 to 71.9%, and the overtriage rate from 19 to 79% (1). Mistriage is associated with increased morbidity and mortality. In other words, mistriage means increasing the time until a physician visit or a rescue procedure. It may be necessary to explain how validity interfaces with mistriage and what factors may be strongly associated with such a wide range of mistriage. To reduce the mistriage, two points should be kept in mind: acuteness as a continuum and protecting the validity of the triage scale, both horizontally and vertically.

Acuteness is a continuum, from the maximum acuteness (category I) to the minimum limit (category V), and is not a binary variable. Therefore, is vital to generate a well-structured continuum. Hospital triage protocols can thus be partitioned into five categories based on the levels of acuteness, ranging from category-I patients having no vital signs to Category V, wherein patients have a stable general condition (2). Besides, it can be assumed that the conditions of resuscitation (category I) or emergent (category II) are acute, characterized by serious changes in patients' vital signs, along with severe instability in their general conditions. Hence, such cases are at risk of losing their lives. This condition also demands patient care and treatment with no delay and less than a few

minutes. Even though such patients constitute a small group of referrals, providing them with the required care and treatment services is the main mission of hospitals' emergency departments (EDs). The essential task in the ED is to care for and treat patients with multiple trauma, ischemic cardiovascular diseases, stroke, sepsis, etc. The triage scale is designed to protect the rights of critically ill patients.

Nevertheless, outpatients are referred to hospitals more than ever before as a result of population growth in cities, the insufficient number of outpatient clinics, limited-benefit insurance coverage for outpatient services, and inadequate round-the-clock services at health care centers, giving rise to a phenomenon called overcrowding, which makes triage necessary. This condition has also made both sub-acute and non-acute patients refer to EDs. These cases are accordingly labeled as Category III (urgent), Category IV (semi-urgent), and Category V (non-urgent). Therefore, as mentioned earlier, acuteness, like a continuum, can have maximum and minimum limits.

Triage protocols must thus have two types of validity, i.e., vertical and horizontal modes. Most studies on triage have so far focused on vertical validity (3). For example, vertical validity for those referred to EDs with complaints of chest pain demonstrates that they can be placed in category I considering some factors and even reach category V without some risk factors. In this respect, Pouyamehr et al. reported that patients with heart failure experiencing dyspnea and severe changes and abnormalities in their vital signs could be allocated to category I (4). Presenting some risk factors such as electrocardiogram (ECG), and ischemic

changes accompanied by relative stability in vital signs, such patients could also fall into category II. If signs and symptoms and the history of diseases are mild with no serious risk factors, patients could be dedicated to category III. They are also placed in category IV for non-specific signs and symptoms of heart failure or category V merely for some routine procedures such as check-ups and periodic visits. These categories are also available in the emergency severity index triage system (ESI) for sub-acute and non-acute patients without any specified criteria for any kind of disease. Category-III patients are, accordingly, those experiencing stable vital signs with no serious risk factors and needing more than two facilities. Category-IV patients also need one facility, while Category-V cases do not demand even one facility, and only a simple visit suffices. Such categories are even evident in other triage scales, such as the Australian Triage Scale (ATS), the Canadian Triage and Acuity Scale (CTAS), the Manchester Triage Scale (MTS), and the Stroke Triage Scale (STS) (3, 5).

Therefore, the vertical-mode validity needs specific components such as vital signs, risk factors, resources used, disease-specific symptoms or criteria, and so on to differentiate in the acuteness continuum. For example, adding a peak flow meter for the triage of patients with chronic obstructive pulmonary disease, supplementing a rapid troponin kit for the triage of cases with low-risk chest pain, using an ECG for the triage of those with heart failure (HF), ordering an X-ray of isolated limb fractures, etc. can minimize mistriage. Disease-specific symptoms are the most important criteria as long as vital signs enhance the vertical validity of the acuteness continuum. For example, the Heart failure triage scale recruited ECG and specified risk factors for HF to decrease mistriage from 26% to 1.4% compared to ESI (4). Therefore, the literature shows that disease-specific symptoms are important in focusing triage nurse decisions based on disease acuity. General triage scales such as ESI lack specialized criteria for recognizing disease severity, resulting in arbitrary triage decisions. However, triage decisions are still largely subjective and simply made based on judgments by triage nurses despite the development of quantitative criteria such as vital signs. Some studies have further reported that triage nurses reflect on factors other than acuteness in their decisions, which can ultimately progress to the point where they can do triage practices arbitrarily (6).

Other strategies can reduce mistriage. Of note, taking an accurate history can reduce this type of mismatch. Re-triaging patients waiting long and upgrading their triage category can also help tackle this problem. The point is that triage protocols, despite all their weaknesses, have been able to significantly moderate mistriage compared

with the time when they have not been available. Another point mentioned in this study was the drawback of horizontal validity in triage protocols. There is also little information in this regard. For example, patients with a history of heart failure presenting with mild dyspnea may be placed in category III alongside those with abdominal pain (appendicitis suspected). However, the risk of death is very different in such cases. No clarity of gold standards for all patient complaints, together with the complexity of the signs and symptoms of diseases, is one of the important reasons for this issue. Future research should be thus shifted toward compensating for this deficiency. Finally, it should be reminded that triage has been assumed as a response to overcrowding in the EDs of hospitals and one part of a reaction to overcrowding management.

Therefore, it is essential to shed light on other parts of the overcrowding process, such as activating outpatient clinics, developing telemedicine, distributing patients among the EDs of hospitals properly, accelerating patient discharge from EDs, and so on. In terms of triage protocols, it is suggested to develop specialized ones in accordance with patients' complaints and add quantitative complaint-related indices to their triage to minimize mistriage. Extensive research is also needed to develop the horizontal validity of triage protocols as much as their vertical validity.

Footnotes

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References

1. Najafi Z, Abbaszadeh A, Zakeri H, Mirhaghi A. Determination of mis-triage in trauma patients: A systematic review. *Eur J Trauma Emerg Surg.* 2019;**45**(5):821-39. [PubMed ID: 30798344]. <https://doi.org/10.1007/s00068-019-01097-2>.
2. 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.* Rockville, MD: Agency for Healthcare Research and Quality; 2011. 114 p.
3. Farrohknia N, Castren M, Ehrenberg A, Lind L, Oredsson S, Jonsson H, et al. Emergency department triage scales and their components: A systematic review of the scientific evidence. *Scand J Trauma Resusc Emerg Med.* 2011;**19**:42. [PubMed ID: 21718476]. [PubMed Central ID: PMC3150303]. <https://doi.org/10.1186/1757-7241-19-42>.

4. Pouyamehr A, Mirhaghi A, Sharifi MD, Eshraghi A. Comparison between Emergency Severity Index and Heart Failure Triage Scale in heart failure patients: A randomized clinical trial. *World J Emerg Med.* 2019;**10**(4):215-21. [PubMed ID: 31534595]. [PubMed Central ID: PMC6732167]. <https://doi.org/10.5847/wjem.j.1920-8642.2019.04.004>.
5. Abedi A, Mirhaghi A, Ebrahimi M, Mazloun SR. Comparison between stroke triage scale and emergency severity Index to triage patients with neurological Complaints: A randomized clinical trial. *Int Emerg Nurs.* 2020;**53**:100871. [PubMed ID: 32312685]. <https://doi.org/10.1016/j.ienj.2020.100871>.
6. Mirhaghi A, Ebrahimi M, Noghani-Dokht-Bahmani M, Heydari A. Contextual factors interfacing with quality of care in the emergency department: A micro-ethnographic study. *J Patient Safety Quality Improv.* 2019;**7**(4):145-54.