

COMMENT

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# Establishing a common ground: the future of triage systems

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## Abstract

Triage systems, crucial for Emergency Departments, face unresolved doubts and issues that have not been addressed, coupled with increasing fragmentation due to a growing body of new evidence. International collaboration is essential for evidence-based triage solutions.

**Keywords** Triage, Triage system, Outcomes, Errors, Audit, Triage validation, Triage evaluation

It is now well known that triage plays a fundamental role within Emergency Departments (ED), having to quickly stratify the severity of patients [1, 2]. Currently, triage assessment is primarily performed by specially trained nurses who evaluate patients using structured triage systems. The most commonly used and studied systems include the Manchester Triage System, the Emergency Severity Index, the South African Triage Scale, the Canadian Triage and Acuity Scale, and the Australian Triage Scale [1, 2]. These systems, although different from one another, stratify patients using various methods. Some use flowcharts, while others base stratification on the presenting symptoms. Despite these structural differences in triage systems, they have been shown to stratify patient risk in a comparable manner [1, 2].

Despite the common issues that accompany all triage systems, new knowledge about them remains disjointed due to the isolated study of different systems rather than a global approach. In fact, over the years there has been an increasing fragmentation of new knowledge about triage, justified by the different triage systems analyzed and

studied. This goes against evidence-based practice; if we consider other areas of patient management in the ED, such as sepsis or myocardial infarction, we have common guidelines that indicate what is known about the pathology and what needs to be studied and expanded, providing a common global base from which to start [3, 4]. This approach is currently absent in the context of triage, where each country has its own system, and even within the same country, different triage systems may coexist [1, 2]. This lack of unification does not allow for constant and structured scientific advancement. Indeed, only through collaborative scientific efforts to address individual triage-related issues and continuous updates of existing systems will it be possible to develop global triage guidelines, similar to those adopted for other areas of emergency medicine.

Currently, there are several critical points that require a global approach:

1. **Triage system:** Several main triage systems have been validated and studied worldwide [1, 2]. Despite their intrinsic differences, all of them exhibit significant weaknesses in patient risk stratification [1, 2]. This diversity, instead of highlighting the need for a structured, global, and holistic approach to triage, has paradoxically contributed to greater fragmentation. This has led to the proliferation of

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new triage systems that combine new concepts with concepts from the most well-known models without robust, global, and comparable scientific support [5, 6]. This divergence moves us further away from a standardized and unified practice, preventing us from concretely analyzing triage systems. One of the most recurrent examples of fragmentation is that currently when specific issues are highlighted in triage systems, studies are conducted that add additional tools to the existing system. For example, triage systems are unable to reliably identify patients with subsequent major adverse cardiac events in cases of chest pain. As a result, various studies around the world have integrated new risk prediction tools, such as Emergency Department Assessment of Chest Pain Score (EDACS) and the HEART score, into the triage system [7, 8]. Nevertheless, this strategy does not resolve the fundamental problem of the triage system's inadequacy, which needs to be analyzed and corrected in a unified manner.

An alternative for improving and developing triage systems, recently used and shown to be potentially useful in supporting clinical decision-making, is a subfield of artificial intelligence known as machine learning [9]. When integrated into these systems, machine learning could assist the nurse in the risk stratification of patients [9].

- 2. Triage System Outcomes:** The evaluation of triage systems is currently complex due to the lack of a gold standard [10, 11]. This lack of standardization is compounded by patient heterogeneity and the variety of outcomes used in different studies, ranging from objective ones such as in-hospital mortality or admission to intensive care, to more subjective outcomes like chart review by a panel of experts [10, 11]. This issue needs to be fully addressed and understood by an international group of experts. There is a clear need to establish a forum for defining standardized guidelines for the use of defined outcomes for triage system evaluation. Different approaches could be considered, such as the Delphi method, guideline development, or the creation of a new methodology for assessing triage systems. For years, the creation of a specific outcome for triage has been suggested as a surrogate for severity to study these systems [10]. Although these surrogate outcomes are likely far from perfect, they would represent an advancement in the understanding and analysis of triage systems. Coordinated efforts could finally lead to greater consistency and comparability across studies, thereby enhancing the quality and effectiveness of triage globally.

- 3. Mistrriage and Ongoing education:** Recently, numerous studies have demonstrated a high error rate in the application of triage systems, ranging from 20 to 30% [12, 13]. Despite the significance of these findings, there is a lack of standardized methods for the evaluation of triage systems and clear guidelines on the frequency and methods for auditing triage practitioners [12, 13]. Some triage systems provide information on conducting audits and assessing triage performance [14, 15]; however, these practices often lack scientific evidence support.

Errors in triage are known to stem from factors related to the ED structure itself, the triage nurse, and the patient, but addressing or reducing these issues remains unclear [16]. Despite the recognized complexity of correctly assigning triage codes, there are no defined criteria for selecting triage practitioners or acceptable error thresholds [14, 15]. The direct correlation between training and error reduction is well-documented [12, 17]; however, triage training is typically a one-time event aimed at teaching system application without considering the need for ongoing education. Instead, continuous training should encompass not only the application of the triage system but also the clinical reasoning necessary for optimal patient stratification [17]. Paradoxically, continuous training is accepted in many clinical contexts, such as cardiopulmonary resuscitation training, where it is crucial to keep practitioners constantly updated [18]. Yet inexplicably, despite the recognized complexity, this practice is not commonly implemented in the delicate and complex environment of triage. For this reason, it would be necessary to expand the training of triage nurses by offering continuous updates and ongoing performance monitoring in triage.

These issues reflect a general lack of attention and coordination in the field of triage, highlighting the need for international working groups to promote discussion and implementation of evidence-based solutions. Only through a collective commitment to evidence-based practice, ongoing research, and professional development, the challenges of triage in EDs can be effectively address.

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