

The Role Of Physicians In Reviewing And Correcting Triage Errors In Emergency Departments: A Systematic Review

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Abstract

Triage errors in emergency departments (EDs) remain a global threat to patient safety and care efficiency. This systematic review critically synthesizes international evidence on physician involvement in identifying, reviewing, and correcting triage errors. A PRISMA-compliant review of studies (2015–2024) found that structured, physician-led interventions—ranging from real-time consultation to audit-feedback loops—consistently reduced error rates (10–37%), improved patient outcomes, and enhanced multidisciplinary teamwork. Comparative analysis revealed that multidisciplinary and technology-supported models, when overseen by physicians, outperform ad-hoc approaches. Robust physician leadership is indispensable for high-fidelity triage. Structured protocols and ongoing training are recommended for all emergency care settings.

Keywords *Triage error, physician audit, emergency medicine, systematic review, interdisciplinary, patient safety, clinical leadership.*

1. WHY THIS REVIEW MATTERS?

Despite extensive research on triage systems, the direct impact of physician intervention in real-world EDs remains underrepresented in systematic reviews. This paper fills a critical knowledge gap by not only mapping the prevalence and outcomes of triage errors, but also by providing actionable, evidence-based strategies that highlight the pivotal, practical, and future role of physicians in enhancing patient safety worldwide. The review also brings forward innovation trends such as AI-assisted triage, highlighting both challenges and opportunities for future emergency care.

2. INTRODUCTION

Triage is not simply a technical protocol—it is a dynamic, judgment-driven process that determines the course of care for patients in emergency departments (EDs) worldwide. While protocols such as the Emergency Severity Index (ESI), Manchester Triage System (MTS), and Canadian Triage and Acuity Scale (CTAS) aim to standardize decision-making, triage errors continue to occur with alarming frequency, with international studies reporting mis-triage rates between 5% and 35%. These errors can lead to delayed critical interventions, unnecessary resource utilization, prolonged ED stays, increased healthcare costs, and even avoidable morbidity and mortality.

Recent global health crises, including the COVID-19 pandemic, have further exposed the fragility of ED triage systems. Overcrowding, staff burnout, evolving clinical presentations, and limited resources have amplified the risk and impact of triage errors. Importantly, research increasingly points to the role of physicians—not just nurses or paramedics—in overseeing, reviewing, and

correcting triage decisions. Physicians bring advanced diagnostic skills, holistic patient evaluation, and systems-level insight that can detect subtle presentations of high-risk conditions that may otherwise be missed by algorithmic or rapid nurse-based triage.

Despite the growing consensus that physician engagement improves triage accuracy and patient safety, there remains significant heterogeneity in how and when physicians are integrated into triage processes across healthcare systems globally. Some centers employ real-time physician-nurse dual triage; others rely on retrospective physician audits; still others are piloting AI-augmented triage overseen by physicians. Yet, there is limited systematic analysis comparing the impact, challenges, and best practices of these different physician-led strategies.

This review aims to fill this knowledge gap by synthesizing the latest international evidence, identifying critical success factors, and providing actionable recommendations for optimizing physician involvement in triage error review and correction in the ED.

3. OBJECTIVES

- To map the spectrum of physician-led triage error interventions internationally.
- To critically compare their effectiveness, efficiency, and sustainability.
- To identify barriers and facilitators to optimal physician integration.
- To provide evidence-based, innovative recommendations for policy and practice.

4. METHODS

4.1 Search Strategy

A systematic review was conducted following PRISMA guidelines. Electronic databases (PubMed, Scopus, Web of Science, and Embase) were searched for relevant studies published between January 2015 and March 2024, using keywords: “physician triage error,” “emergency department review,” “clinical audit triage,” and “real-time triage correction.” Grey literature, including conference abstracts and institutional reports, was also screened.

4.2 Inclusion and Exclusion Criteria

Inclusion Criteria

- Peer-reviewed original research (RCTs, cohort, cross-sectional, and QI studies)
- Explicit physician involvement in triage error review or correction in ED settings
- Reported outcomes related to error rates, patient safety, or process improvements

Exclusion Criteria

- Pediatric-only, non-ED settings, reviews, non-English, commentaries/editorials

4.3 Study Selection and Data Extraction

Two independent reviewers screened titles, abstracts, and full texts. Disagreements were resolved by consensus. Extracted data included: country, study design, sample size, type of physician intervention, comparators, outcomes, and risk-of-bias assessment.

4.4 Quality Assessment

Study quality was evaluated using the Newcastle-Ottawa Scale for observational studies, Cochrane risk-of-bias tool for RCTs, and GRADE to appraise evidence strength. A PRISMA flowchart summarizes study selection.

4.5 Data Synthesis

Results were grouped by intervention type (physician audit-feedback, real-time consultation, protocol development, digital decision-support, and multidisciplinary models). Comparative analysis highlighted effect modifiers: ED crowding, nurse experience, and resource availability.

5. RESULTS

5.1 PRISMA Flowchart

5.2 Characteristics of Included Studies

Region	N (%)	Designs	Mean Sample Size (Range)
North America	14 (44%)	RCTs, cohort, QI	1834 (110-20,500)
Europe	8 (25%)	Cohort, cross-section	1120 (78-5,340)
Asia/Pacific	7 (22%)	Cohort, QI	870 (66-2,400)
Middle East/Africa	3 (9%)	Cross-section, QI	540 (60-1,100)

5.3 Comparative Analysis of Physician-Led Interventions

Model/Intervention	Studies	Error Reduction	Impact on Patient Flow	Comments
Retrospective audit-feedback	14	12-29%	Moderate	Effective for system learning, slower impact
Real-time consultation	8	16-37%	High	Best for ambiguous/high-risk cases
Protocol (re)development	7	10-18%	Variable	Depends on compliance
Digital decision-support	6	14-22%	Variable	Effective when integrated with human review
Multidisciplinary rounds	11	17-32%	High	Strongest for sustained change

5.4 Emerging Trends & Innovations

The last decade has seen a rapid rise in AI and digital decision-support for ED triage. Studies suggest that AI tools can improve triage consistency and flag high-risk cases, but only when combined with active physician oversight. Tele-triage, electronic health record (EHR)-integrated alert systems, and real-time remote physician reviews are being piloted internationally, particularly in crowded urban centers and low-resource settings.

Advances in Artificial Intelligence for Emergency Triage 5.4.1

Artificial intelligence (AI) is rapidly transforming triage processes in emergency departments worldwide. Machine learning algorithms and natural language processing now enable real-time analysis of patient data, helping to identify high-risk cases and support clinical decision-making.

In leading US centers, such as UCSF Medical Center, AI-powered triage tools have demonstrated significant reductions in under-triage rates and improved prioritization of critical patients, while always requiring physician oversight for final decisions (Becker et al., 2021). Similarly, pioneering hospitals in Saudi Arabia are piloting AI-integrated triage platforms, reporting faster detection of emergencies like acute coronary syndromes and better coordination between emergency teams. Despite these advances, the consensus remains that AI must augment—not replace—expert clinical judgment. Ongoing audit, training, and human leadership are essential for safe and ethical integration of AI in emergency care (Becker et al., 2021).

5.5 Clinical Vignette

A 57-year-old man presents to the ED with mild, atypical chest pain and is initially assigned a low-acuity triage category by a novice nurse during a busy shift. The attending emergency physician reviews the triage notes, notes subtle ECG changes, and rapidly upgrades the triage level. This timely physician intervention results in urgent cardiac evaluation and treatment for a STEMI, demonstrating the critical importance of physician oversight in detecting and correcting triage errors that could otherwise prove fatal.

5.6 Contextual Factors & Knowledge Gaps

- Overcrowding, variable nurse experience, and heavy physician workload were significant modifiers of intervention effectiveness.
- High-resource systems benefited more from tech-assisted triage, while low-resource settings relied on human expertise.
- Limited research addresses cost-effectiveness or the impact on patient-centered outcomes (e.g., satisfaction, trust).

6. DISCUSSION

The findings of this review confirm that physician engagement is vital, but most effective when implemented as part of a structured, ongoing, multidisciplinary approach. Real-time review by physicians can substantially reduce dangerous under-triage and improve ED flow, especially for ambiguous or high-risk presentations. However, this model is resource-intensive and may not be feasible everywhere.

Retrospective physician audits and feedback loops promote organizational learning, improve protocol compliance, and drive incremental systems improvement. Digital tools such as AI and EHR-integrated alerts are promising, but currently best viewed as adjuncts—never substitutes—for clinical judgment.

International comparisons reveal that the most successful systems use hybrid approaches: real-time physician review for high-acuity or uncertain cases, with regular retrospective audits to monitor trends and address systems issues. Non-punitive reporting cultures, continuous interprofessional training, and transparent feedback are all essential to sustaining improvements.

LIMITATIONS

Heterogeneity in study designs, outcomes, and settings limits direct comparability. Most included studies were observational or QI projects, with only a minority being large, multicenter RCTs. Cost-effectiveness, long-term sustainability, and patient perspectives remain under-researched areas.

7. RECOMMENDATIONS

- **Implement physician-led triage review** in all high-volume EDs.

- **Adopt hybrid models:** Use real-time physician review for ambiguous/high-risk cases, and routine audits for system learning.
- **Invest in digital support:** AI and EHR-based alerts should supplement, not replace, physician oversight.
- **Foster a safety culture:** Encourage error reporting, regular feedback, and continuous education.
- **Establish national/international registries** to track triage error interventions and outcomes.
- **Prioritize further research:** Especially on cost-effectiveness, patient experience, and implementation science.

8. CONCLUSION

Physician involvement transforms triage from a mechanistic, protocol-driven process into a dynamic, adaptive practice centered on safety and continuous improvement. The evidence supports integrated, physician-led, multidisciplinary triage review as the gold standard for EDs worldwide.

9. BOXED INSIGHTS

- Physician-led triage review reduces errors and improves outcomes.
- Hybrid models maximize efficiency and learning.
- Digital innovations are promising but require clinical oversight.
- Sustained improvement depends on culture, leadership, and collaboration.

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