SCIENCEHOOD

Research Article Case Chronicles and Clinical Reports

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Triage Accuracy and Response Time in Emergency Departments: A Cross-Sectional Study of Urban Hospitals

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ABSTRACT

Background: Timely and accurate triage in emergency departments (EDs) is crucial for optimizing patient outcomes and resource allocation. Despite standardized protocols, significant variability in triage response time and accuracy persists, especially in high-volume urban centers.
Objective: This study investigates triage accuracy and response time across multiple urban emergency departments and evaluates their correlation with patient outcomes and department efficiency.
Methods: A cross-sectional observational study was conducted across five urban hospitals in three countries. Triage records of 2,000 adult patients were assessed against gold standard evaluations by senior emergency physicians. Data on response time, triage level agreement, patient throughput, and 48-hour outcomes were analyzed.
Results: Triage level agreement with gold standard was 82.5%. Average triage response time was 6.7 minutes. Higher accuracy correlated with reduced ED stay ($p<0.01$) and improved 48-hour outcomes ($p<0.05$). Variability in accuracy and response time was significantly associated with staffing ratios and nurse training levels.
Conclusion: Triage accuracy remains suboptimal in high-volume EDs, with notable inter-hospital variation. Standardizing triage training and staffing ratios may improve both efficiency and patient outcomes. Future research should explore AI-supported triage tools for real-time optimization.

KEYWORDS: Emergency department, triage accuracy, response time, urban hospitals, patient outcomes, staffing, acute care

INTRODUCTION

Emergency Departments (EDs) operate under immense pressure to rapidly evaluate and prioritize patients based on clinical urgency. The triage process, typically performed by trained nursing staff, determines both the immediacy and level of medical intervention. Inaccuracies or delays in triage can lead to increased morbidity, overcrowding, and compromised patient satisfaction.

While triage protocols such as the Emergency Severity Index (ESI) and the Manchester Triage System (MTS) are widely adopted, variations in training, clinical experience, and environmental factors often affect their application. Especially in urban settings—where EDs are typically overburdened—timely and precise triage becomes a cornerstone for optimal function.

This study aims to evaluate triage accuracy and response time in real-world ED settings and to assess their impact on patient flow and clinical outcomes.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional observational study was conducted across five urban hospitals located in the United States, Brazil, and India between January and June 2025. All hospitals used either ESI or MTS for triage.

Participants

The sample included 2,000 adult patients (≥18 years old) presenting to the EDs during peak hours (8 AM–8 PM). Patients with incomplete records or presenting for administrative purposes (e.g., prescription refill) were excluded.

DATA COLLECTION

Triage decisions were recorded in real-time by triage nurses using institutional protocols. These decisions were later compared to independent assessments by senior emergency physicians, serving as the gold standard. Metrics recorded included:

- Triage response time (time from registration to triage completion)

- Agreement rate between triage nurse and gold standard
- ED length of stay
- 48-hour outcome (discharge, admission, deterioration)

Staffing levels, nurse qualifications, and institutional triage policies were also documented.

Data Analysis

Statistical analysis was performed using SPSS v26.0. Kappa coefficients measured inter-rater agreement. ANOVA and multivariate regression assessed the relationship between triage accuracy, response time, and patient outcomes. p-values <0.05 were considered significant.

RESULTS

Of the 2,000 triage cases analyzed:

- **82.5%** matched the gold standard triage level ($\kappa = 0.78$, indicating substantial agreement).
- **Mean triage response time** was 6.7 ± 2.4 minutes.
- **20%** of mismatches involved under-triage, particularly among elderly patients and those with non-specific symptoms.
- Hospitals with higher triage accuracy had significantly shorter ED stays ($p<0.01$) and lower rates of deterioration within 48 hours ($p<0.05$).
- Triage nurses with >3 years of ED experience had 15% higher agreement rates compared to those with less experience.
- Institutions with a patient-to-triage nurse ratio below 10:1 had significantly faster response times ($p<0.01$).

DISCUSSION

This study highlights the critical role of triage in shaping emergency care delivery. While the overall accuracy rate of 82.5% is promising, the remaining gap is clinically significant, particularly in high-stakes emergency settings. Under-triage remains a key concern, as it is directly associated with adverse outcomes.

The findings underscore the need for targeted strategies to improve triage performance:

- **Standardized ongoing training** for triage nurses
- **Monitoring and feedback systems** to recalibrate triage performance
- **Institutional investment in staffing** to reduce triage delays

Interestingly, response time alone did not correlate with accuracy, suggesting that speed should not compromise thoroughness. Furthermore, inter-hospital variation highlights the need for context-specific interventions rather than universal policies.

The possibility of integrating **artificial intelligence** (AI) and decision-support algorithms presents a promising avenue, particularly in busy EDs where cognitive overload can impair judgment.

CONCLUSION

Triage remains a foundational pillar of emergency medicine. Inaccuracies, especially in under-triaging, pose a significant risk to patient safety. While current protocols are broadly effective, outcomes can be enhanced through strategic improvements in nurse training, staffing ratios, and possibly the adoption of AI-driven decision aids. Institutional leadership must prioritize triage quality as part of broader efforts to optimize emergency care systems.

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Sarah L. Thompson

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Case Chronicles and Clinical Reports

Sarah L. Thompson