AI Triage vs. Emergency Room Triage: A New Era of Patient Prioritization

Rasit Dinc

Rasit Dinc Digital Health & AI Research

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Abstract

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The emergency department (ED) is the critical frontline of healthcare, where rapid, accurate decision-making is paramount. At the core of ED operations is **triage**, the system used to prioritize patients based on the severity of their condition, traditionally relying on protocols like the **Emergency Severity Index (ESI)**. The advent of artificial intelligence (AI) is now introducing a new paradigm: **AI triage**. This technological shift promises to redefine efficiency, accuracy, and equity in emergency care, moving from a purely human-centric process to one of augmentation.

The Foundation: Traditional Emergency Room Triage (ESI)

Traditional ED triage, predominantly utilizing the five-level ESI, is a robust, nurse-driven process. The ESI algorithm stratifies patients from Level 1 (most urgent, requiring immediate life-saving intervention) to Level 5 (least urgent, requiring no resources).

The ESI's strength lies in its human element: the nurse's clinical judgment, ability to communicate, and capacity to handle complex, ambiguous presentations. However, it is not without its limitations. It is inherently subjective to some degree, and high patient volumes can lead to triage fatigue, potential for human error, and increased wait times, particularly for non-critical patients.

The Disruptor: The Promise of AI Triage

AI triage systems leverage machine learning and deep learning models to analyze vast datasets—including patient vitals, chief complaints, medical history, and even unstructured data from electronic health records (EHRs)—to

predict patient outcomes and assign an acuity level.

Studies have shown that AI models can significantly improve ED efficiency. By analyzing data points far beyond the capacity of a human to process in a short timeframe, AI can potentially reduce both **under-triage** (assigning a low priority to a critical patient) and **over-triage** (assigning a high priority to a non-critical patient). Research indicates that AI models can achieve high accuracy, with some systems demonstrating performance in the 80% to 99% range in predicting critical outcomes [^1].

A Comparative Analysis: Accuracy, Speed, and Bias

The comparison between human and AI triage is best viewed through the lens of their respective strengths:

Feature	Traditional ESI Triage	AI-Driven Triage
Primary Driver	Experienced Triage Nurse (Clinical Judgment)	Machine Learning Algorithms (Data Analysis)
Speed & Throughput	Limited by human processing speed and fatigue	Near-instantaneous analysis of complex data
Data Scope	Limited to immediate presentation and verbal history	Vast, multi-modal data from EHRs and sensors
Accuracy	High, but susceptible to human variability and fatigue	High, with potential for greater consistency
Ethical Risk	Implicit bias of the individual nurse	Algorithmic bias from flawed or unrepresentative training data

The speed and data-processing power of AI are undeniable advantages in a high-stakes environment. However, the most significant challenge for AI lies in the ethical domain. AI systems are highly susceptible to **algorithmic bias** if trained on unrepresentative or historically biased data, potentially exacerbating existing health disparities [^2]. Furthermore, questions of **accountability**—who is responsible when an AI system makes an error—remain a complex legal and ethical hurdle.

The Future: A Collaborative Model

The consensus among digital health experts is that the future of triage is not a zero-sum game, but a collaborative model. AI is best positioned as a powerful **supportive tool** for the triage nurse, not a replacement.

In this hybrid model, the AI system provides a rapid, data-driven risk assessment, flagging high-risk patients that might be missed by a quick human assessment. The nurse then integrates this AI-generated insight with their essential human skills: empathy, communication, and the nuanced clinical judgment required for complex, non-standard cases. This integration promises to create a more resilient, accurate, and efficient triage process.

For more in-depth analysis on the ethical implementation and regulatory landscape of AI in healthcare, the resources at **www.rasitdinc.com** provide expert commentary and professional insight into the digital health revolution.

Conclusion

The transition to human-AI collaborative triage marks a pivotal moment in

emergency medicine. While traditional ESI triage provides a proven, human-centered foundation, AI offers the speed and analytical depth necessary to meet the growing demands on modern EDs. By carefully navigating the ethical challenges of bias and accountability, and by focusing on a symbiotic relationship between the nurse and the algorithm, healthcare systems can harness this technology to ensure every patient receives the right care at the right time.

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[^1]: Yi, N. (2025). The effects of applying artificial intelligence to triage in the emergency department. Journal of Nursing Scholarship*. [^2]: MacIntyre, M. R. (2023). Ethical considerations for the use of artificial intelligence in healthcare.* International Journal of Medical Informatics*.

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