

Reduce Patient Time-to-Discharge by 14 Minutes with More Accurate Acuity-Level Assignment in the ED

Accelerating Nurses' Disposition Decisions at Yale New Haven Health System



Summary

A major contributor to overcrowding in emergency departments (EDs)—a problem that's plaguing hospitals across the US—are patient flow bottlenecks caused by the lack of clarity and specificity in the commonly used Emergency Severity Index (ESI) triage system. As many as 60-70% of all ED patients in the US are triaged to ESI level 3, which indicates a moderate risk of hospitalization since the severity of their conditions is not immediately apparent.¹ Because so many patients are assigned moderate risk (ESI level 3) and their course of care is undetermined and non-urgent, this can cause lengthy delays in assigning low-risk patients (ESI levels 4–5) to fast-track pathways, ultimately prolonging wait times for higher risk patients (ESI levels 1–2) requiring more urgent care.

One month after implementing the TriageGO Clinical Decision Support (CDS) tool, the Yale New Haven Shoreline Medical Center ED found that the number of patients designated at ESI level 3 acuity decreased by 20%. By improving the accuracy of its risk assessments, the YNHHS Shoreline ED reduced median length-of-stay (LOS) for patients admitted to the hospital by more than 30 minutes. In addition, the median time-to-discharge across all patients decreased by 25 minutes, and the median time-to-discharge for critical care patients decreased by more than 90 minutes.

YALE NEW HAVEN HEALTH SYSTEM (YNHHS)

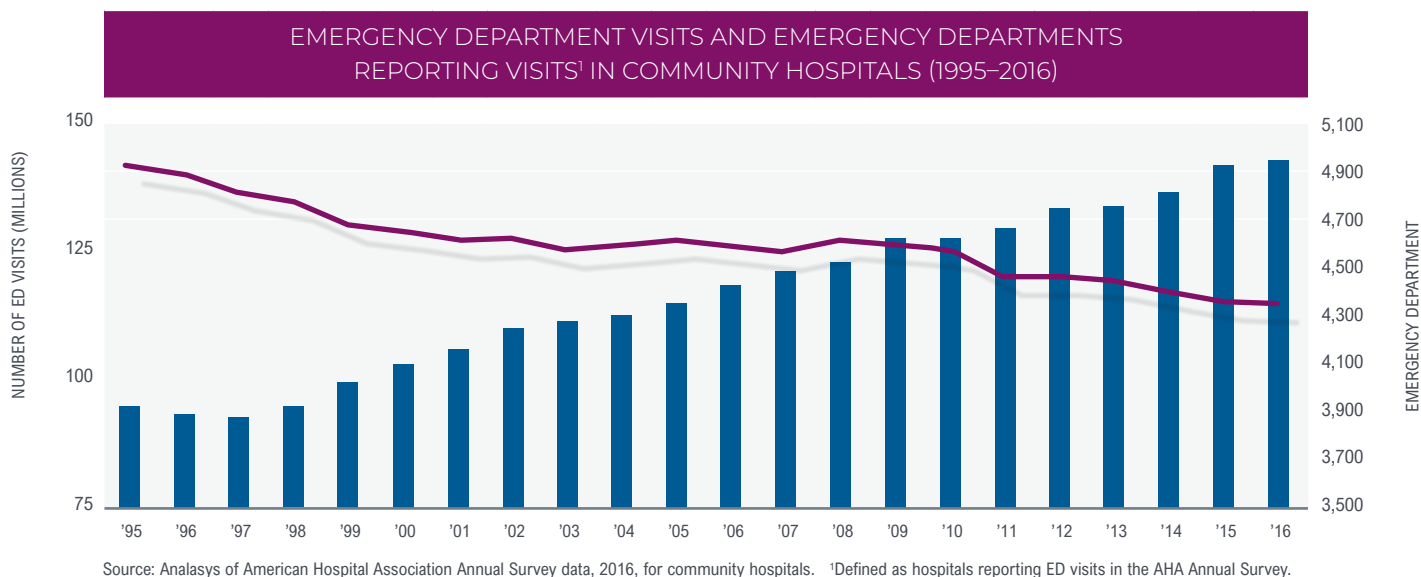
- › With more than 7500 members of the medical staff, Yale New Haven Health is the largest academic multispecialty practice in New England. It offers 220 specialized clinical services in more than 350 locations throughout Connecticut, New York and Rhode Island.
- › *Connecticut Magazine's* 2023 'Top Doctors' list included more than 660 Yale New Haven Health physicians selected by their peers as the best in their fields.

Overcrowding: A Pervasive and Pernicious “Canary in the Coal Mine”

As more people require emergency care and hospitals often have few if any available inpatient beds, most EDs have excessively long wait times for patients awaiting treatment decisions as well as a backlog of admitted patients boarding in the ED until a bed becomes available. In fact, overcrowding has been called “the sentinel canary in the coal mine,” a key indicator reflective of a dysfunctional health system.²

- Between 1997 and 2016, ED visits nationwide increased by more than 60% to about 146 million
- ED visits in the last two decades have strongly outpaced population growth
- Overcrowding is a persistent norm—as early as 2007, more than 90% of US EDs were stressed beyond capacity
- The evidence is indisputable: ED overcrowding leads to significant patient harm, including morbidity and mortality events related to delayed treatment

> Figure 1



Despite mounting evidence of its adverse impact, overcrowding continues to worsen. Recent data from the Association of Academic Chairs of Emergency Medicine (AACEM) hospitals shows that the proportion of ED patient boarding at least 8 hours rose nearly 130% from 2012 to 2019.²

Re-evaluating the Emergency Severity Index

The Emergency Severity Index (ESI) is a five-level emergency department (ED) triage algorithm that provides clinically relevant stratification of patients into five groups, from 1 (most urgent) to 5 (least urgent), on the basis of acuity and resource needs.⁴ It is used by 80–94% of US EDs and influences most decisions on whether a patient will be discharged or admitted.

YNHHS Shoreline ED began using ESI more than 20 years ago, Chris Chmura, the organization's Clinical Projects & Education Emergency Services Manager, felt that the tool's intent shifted in recent years from determining patients' acuity levels to meeting the needs of the changing ED environment. This shift combined with changes in the nursing workforce caused increased variability and inconsistency in how triage acuity levels were assigned. As a result, the ESI had become less useful to clinicians caring for patients after triage.

In addition, as ED patient volume grew significantly in recent years, triage nurses who had to quickly assess and score patients frequently had little or no time to review and evaluate patients' medical history in the Electronic Health Record (EHR).

› **Table 1.** Overall ESI Distribution Summary

	ESI VISIT-LEVEL PERCENTAGE							
	Rounded annual ED volume	1	2	3	4	5	6	None assigned
Combined data	955,000	0.7%	18.2%	54.6%	23%	1.9%	0.1%	1.4%
Facility Min	9,000	0.1%	2.6%	25.9%	4.2%	0.2%	0%	0%
Facility Median	35,000	0.6%	14.6%	55.9%	24.8%	1.3%	0%	1%
Facility Max	87,000	1.9%	69%	68.3%	32.8%	7.7%	2.1%	5.1%

According to the *ESI Implementation Handbook*, about 30–40% of ED patients are expected to be categorized as an ESI level 3. However, one survey of observed ESI distributions for 139 million US ED visits reported that more than 56% of patients were classified as either ESI level 3 or unknown/blank.⁵

An Integrated Solution: TriageGO

To improve triage decision-making and expedite appropriate patient care in 2021, Yale’s ED decided to implement TriageGO, a clinical decision support tool that was seamlessly integrated into its EHR system and current triage workflow. TriageGO has been used by major hospitals, including Johns Hopkins and Yale New Haven Health, to triage more than 1.5 million patients.

TriageGo enables hospital EDs to:

- More accurately assign acuity levels
- More quickly identify high-risk patients needing emergent care
- Increase the number of low-risk patients directed to more efficient “fast-track” care pathways
- Reduce decision time on whether a patient will be discharged or admitted

Multiple peer-reviewed studies have demonstrated the throughput benefits of TriageGO, due to its ability to assign acuity levels more accurately than ESI (based on outcomes).

How it Works

TriageGO applies machine learning and predictive analytics to stratify the severity of patients' conditions and more accurately recommend an acuity level based on their probability of emergent care and/or hospitalization. Research shows that it can help reduce the ED population of ESI level 3 patients (the primary cause of long wait times) by 15–20%.¹

- TriageGO scans readily available patient data, including the presenting complaint, vital signs, demographic information, and patient's EHR (active medical history)
- TriageGO instantly scans the records of hundreds of thousands of the facility's anonymized ED visits, which it combines with insights derived from millions of additional ED visits across other facilities using TriageGO
- The algorithm uses the routine intake information at triage to make an acuity-level recommendation (1-5) based on the patient's clinical risks, not the anticipated resources needed for care
- A triage nurse accesses the TriageGO score in the acuity section of the EHR, which also includes brief notes about the reason(s) for the recommendation

TriageGO is not intended to replace nurses' critical role in the triage process. TriageGO is designed to give nurses more timely, robust evidence-based information to guide and accelerate clinical decisions. The clinical decision support tool recommends but does not assign patients' acuity levels, which must be done by the examining nurse. If nurses disagree with the TriageGO recommendation, they can input the reason why, and this information is then used to improve the predictive capabilities of the tool.

Measurable Results & Impact

- **Alleviated ED patient flow bottlenecks** caused by delays in care for the large number of ESI level 3 patients by decreasing its Level 3 acuity designations by 20%.⁶
- **Reduced Median Length-of-Stay (LOS)**⁶
 - 14 minutes (total, unadjusted)
 - 34 minutes (total, volume adjusted)
 - 31 minutes (Hospitalized Patients)
 - 92 minutes (Critical Care Patients)
- **Facilitated critical thinking, better decisions, and practice-based learning.** According to Chmura, "the feedback on why TriageGO recommends a level helps our nurses identify key abnormal data and other information that should be more carefully examined and considered. The knowledge they gain can be beneficial in all their triaging evaluations."

"The biggest benefit of using TriageGO was having the data and analytics to see how our triage nurses are leveling patients and being able to link that to outcomes. This enables us to provide feedback to nurses on their performance and improve quality assurance."

CHRIS CHMURA, YNHHS ED MANAGER, CLINICAL PROJECTS & EDUCATION EMERGENCY SERVICES

Key Learnings

- Accuracy in designating appropriate acuity levels reduces patient wait times and plays a critically important role in improving ED throughput
- Because the ED environment has changed so much in recent years, everyone in these departments needs to think differently about how they operate
- TriageGO can reduce stress-inducing uncertainty for ED staff and patients
- A risk-based approach to assigning acuity designations has operational and clinical advantages over a resource-based system such as the ESI
- It's time to provide nurses who are the ED gatekeepers for patient care with more effective decision-support tools



“While healthcare organizations make huge investments in decision-support tools for physicians, the tools for triage nurses have become outdated. Our investment in TriageGO empowers our nurses to use data more efficiently and effectively from patient records to help predict outcomes from the point of entry. The system’s ease of use was especially attractive to our team.”

CHRIS CHMURA, YNHHS ED
MANAGER, CLINICAL PROJECTS &
EDUCATION EMERGENCY SERVICES

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- 2 Kelen, Gabor et al. Emergency Department Crowding: The Canary in the Health Care System. *NEJM Catalyst* commentary. September 28, 2021. Emergency Department Crowding: The Canary in the Health Care System | Catalyst non-issue content (nejm.org) Accessed November 25, 2022.
- 3 American Hospital Association. TrendWatch Chartbook 2018. <https://www.aha.org/system/files/2018-07/2018-aha-chartbook.pdf>. Accessed November 25, 2022.
- 4 Emergency Severity Index (ESI): A Triage Tool for Emergency Departments. Agency for Healthcare Research and Quality (AHRQ). May 2020. Emergency Severity Index (ESI): A Triage Tool for Emergency Departments | Agency for Healthcare Research and Quality (ahrq.gov) Accessed November 26, 2022.
- 5 Chmielewski, Nicholas DNP, RN, CEN, CENP, NEA-BC, FAEN; Moretz, Jason MHA, BSN, RN, CEN, CTRN. ESI Triage Distribution in U.S. Emergency Departments. *Advanced Emergency Nursing Journal*: January/March 2022 - Volume 44 - Issue 1 - p 46-53. ESI Triage Distribution in U.S. Emergency Departments : *Advanced Emergency Nursing Journal* (lww.com) Accessed November 27, 2022.
6. Data on File Pre-Intervention: Apr-19-2021 to May-19-2021 to Post-Intervention (TriageGO): May-20-2021 to Jun-20-2022 Yale Shoreline Hospital. Data last analyzed at Stochastic on 04.04.2022

For more information on TriageGO visit

[beckmancoulter.com/triagego](https://www.beckmancoulter.com/triagego)