Quality Improvement Abstract Example

Improving Emergency Department Throughput: The Impact of a Split-Flow Model

Justin R. Burshtynsky, MSN, RN, Stanford Health Care, Capitola, California; Zaina Alzawad, PhD, NP, M.Ed, RN, Stanford Health Care - Stanford University, Palo Alto, California; Karen Stuart, MSN, RN, CEN, Stanford Health Care, Belmont, California; Andrew Stromberg, MD, Stanford University/Stanford Health Care; Ian Brown, MD, MS, Stanford Health Care & Stanford University

Aim: Our Emergency Department (ED) faced persistent challenges with prolonged Length of Stay (LOS) for moderate-acuity (ESI-3) patients, who frequently experienced delays due to limited care space and the prioritization of higher-acuity cases. These delays led to reduced throughput, increased rates of patients leaving without being seen (LWBS), and diminished patient satisfaction. To address these challenges, the Indigo Zone was introduced as part of a Split-Flow Model. This model stratifies patients based on acuity into vertical (ambulatory) and horizontal (stretcher-based) pathways, enabling more efficient use of resources. This quality improvement initiative aimed to evaluate the impact of the Indigo Zone on LOS for ESI-3 patients and its role in improving patient flow and throughput across all care zones.

Framework: The project employed a Lean methodology to optimize ED workflows systematically. Value Stream Mapping visualized patient flow and identified bottlenecks, prioritizing interventions. Kaizen cycles supported iterative, data-driven improvements, enabling real-time adjustments. Additionally, 5S principles streamlined the physical environment by ensuring that essential equipment and resources were accessible, reducing delays. These Lean tools established a structured framework for enhancing efficiency, resource utilization, and patient flow while supporting sustainable improvements.

Setting: The project was conducted in a suburban Level 1 teaching hospital ED in Northern California, serving over 100,000 patients annually.

Stakeholder Team: The core team included ED nurses who implemented and monitored workflow changes. Physicians refined patient stratification criteria to ensure clinical appropriateness. Leadership, including the Vice President and Director of Emergency Services, oversaw the project, provided resources, and aligned goals with institutional priorities. Assistant Patient Care Managers (APCMs) facilitated daily operations and staff adherence. This interdisciplinary approach ensured smooth transitions and consistent care across all zones.

Methods: Operational metrics from July through November 2024 were analyzed retrospectively across five care zones: Alpha, Indigo, and a combined grouping of Bravo, Cardinal, and Delta, along with virtual care services. The study focused on ESI-3 and ESI-4 patients. Primary outcomes included median LOS (ED arrival to departure) and room-to-departure intervals. Secondary metrics included patient volume distribution by zone and acuity level. Data analysis comprised descriptive statistics and monthly volume distribution tracking across zones, with particular emphasis on Indigo and the combined Bravo/Cardinal/Delta group to evaluate vertical and horizontal care workflows.

Outcomes: Analysis of 13,298 patient encounters demonstrated the Indigo Zone's superior efficiency in managing ESI-3 patients, with median LOS of 185–235 minutes compared to the combined Bravo/Cardinal/Delta group's 340–366 minutes. The Indigo Zone showed continuous improvement in room-to-departure times, decreasing from 139 to 127 minutes. Despite managing 40% of total encounters, the Bravo/Cardinal/Delta group exhibited greater variability, whereas Indigo maintained consistent efficiency across varying patient volumes.

Implications: This project demonstrates the effectiveness of zone-based workflows, particularly the Indigo Zone,

in reducing LOS variability and improving throughput. Indigo's success highlights the potential for replicating vertical care models to optimize ED operations. Future analyses will examine specific factors contributing to Indigo's efficiency, with plans to standardize high-performing practices across all care zones to enhance patient care, resource utilization, and operational outcomes.

Research Abstract Example

Predicting Hospital Admission and Undertriage in ESI 3 Encounters

Samantha Ewing, DNP, ARNP, FNP-C, ENP-C, CEN, TCRN, Emergency Nurse Practitioner, Tacoma, Washington; Ronald C. Eldridge, PhD, MPH, Assistant Professor, Emory University, Atlanta, Georgia; Ran Xaio, PhD, Assistant Professor, Emory University; Nicole Narain, DNP, ARNP, FNP-C, ENP-C, Urgent Care Nurse Practitioner, UCSF , San Mateo, California

Purpose: The emergency severity index (ESI) is the most used triage system in US emergency departments (ED). Scores correlate with hospital admission but over half of ED encounters are assigned an ESI score 3, creating undifferentiation and defeating the intent of triage. Undertriage, the under assumption of patient acuity, threatens patient safety by delaying care. The purpose was to predict hospital admission and undertriage defined as admission to critical care in ESI 3 encounters using variables commonly available during ED triage.

Design: This was a retrospective data analysis of deidentified data supported by a big data repository.

Setting: Data was collected between the years 2013-2016 within a large health system in metro Atlanta, Georgia, and the surrounding communities.

Sample: 156,300 ESI 3 adult ED encounters, in which each encounter represents an independent patient visit, were included in the analysis.

Methods: We investigated associations between hospital admission and critical care admission with the following variables: age at encounter, gender, insurance, marital status, race, chief complaint, method of arrival, ED encounter within 30 days of inpatient discharge, and vital signs including pain. These variables were used to build and internally validate a resampled logistic regression model with regularization. Using the same variables, an XG Boost model was built.

Results: Preliminary results demonstrate the logistic regression model's sensitivity of predicting hospital admission was 72.2% and specificity was 71.3%. This produced an AUC of 0.79. The XG Boost model had a sensitivity of 42.2%, a specificity of 93.1%, and produced an AUC of 0.80. Pertaining to undertriage, the logistic regression model's sensitivity of predicting critical care admission was 70.9%, and the specificity was 78.2%. This produced an AUC of 0.82. An XG Boost model predicting critical care admission had a sensitivity of 25.6%, a specificity of 95.4%, and produced an AUC of 0.79. Although the AUCs are similar for both outcomes and modeling techniques, the logistic regression was more sensitive while the XG Boost was highly specific. A post-hoc analysis revealed a triage heart rate greater than 100 almost tripled the risk of ICU admission.

Implications: The knowledge that tachycardia greatly increases risk of ICU admission can help clinicians and nurses identify possible undertriage in ESI 3 encounters. At our study's conclusion, we expect further revelations on the relationship between chief complaint and vital signs variables with outcomes of hospital and critical care admission. Sorting the ESI 3 category by a patient's risk for admission may protect patient safety, expedite throughput, and decrease ED length of stay. Continued research is needed to refine the ESI algorithm to support ED patient volumes and challenges with increasingly complex patient populations, increase in ED usage driven by social determinants of health, and aging healthcare infrastructure.

Evidence Based Practice Abstract Example

Ready, Set, Boom! Disaster Preparedness Training for Nurses

Kassi Huffman, RN, Nurse I, Atrium Health Carolinas Medical Center, Stanley, North Carolina; Marissa Donnelly, RN BSN, RN, Atrium Health Carolinas Medical Center

Objective: This project aims to enhance nurses' knowledge and preparedness for disaster management, specifically targeting new or transitioning Emergency Department (ED) nurses, by covering all stages of disaster management—mitigation, preparedness, response, and recovery—along with current policies and available resources.

EBP Model: The JHNEBP Model was used.

Setting: This is based at a Level 1 Trauma Center within a public hospital, serving the largest city in NC. This hospital stands as a pinnacle in providing trauma care, along with being an ENA lantern award recognized department and an ANCC magnet designated facility. These accolades signify excellence in delivering the highest standard of emergency medical services to critically injured patients. The center's commitment to comprehensive care is evident through its capability for advanced interventions and specialized treatments.

Participants: The Emergency Management Liaison, ED Educator, and staff nurses of the ED.

Methods: During orientation, new nurses attend a 2.5-hour didactic presentation and a 1.5-hour table-top exercise (TTX) to practice disaster management objectives like PPE, HID, CBRNE, Simple Triage and Rapid Treatment (START) triage, and locating policies. Topics are chosen based on staff knowledge and current emergency trends from FEMA, the Center for Domestic Preparedness (CDP), and the Department of Homeland Security (DHS). The TTX simulates a large explosion with 50 patients arriving in 15 minutes, with challenges like staffing shortages and unknown chemicals. Nurses must adapt to manage the patient surge effectively. Proper planning, education, training, and hands-on experience are essential.

Outcomes: The knowledge base of nurses (n=18) was evaluated through a pre-test, post-test, and a six-month follow-up exam, focusing on START Triage, MCI knowledge, policies, and CBRNE events. The total pre-test score showed a notable knowledge gap initially, but the immediate post-test total score marked a significant mean improvement of 3.78, 95% CI [4.41, 3.15], $t(17) = 12.69$, $p < .001$, $d=-2.99$ after the educational sessions. Nurses also reported feeling better prepared for disaster scenarios and requested more frequent TTX sessions to maintain and enhance their knowledge.

Implications: Initially, new nurses had low knowledge and comfort levels about mass casualty events. Education and TTX significantly improved their knowledge. Being well-prepared with knowledge and skill sets enhances ED nurses' comfort in responding appropriately to disasters and mass casualty scenarios. Future direction involves implementing education for all ED nurses and a more strategic approach to disaster preparedness.