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Improving Triage Accuracy in the Emergency Department

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NURS 653: Internship

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Abstract

A Northern California emergency department (ED) faced increased triage inaccuracy. An analysis of 400 random ED visits from January to April 2023 discovered a 23% mistriage rate, with under- and over-triage rates at 16.25% and 6.75%, respectively. Mistriage creates an imbalance in unit acuity, leading to inappropriate staffing levels. Potential breaks in the triage process, include inaccurate triaging by the screener or triage nurses, as well as delays in the providers inputting initial orders, leaving patients waiting without appropriate care orders. An educational training focusing on the updated Emergency Nurses Association Emergency Severity Index (ESI) algorithm version 5 was mandated. Supplemental materials, including posters and badge reference cards that outlined the ESI algorithm were created. In the pre-survey, nurses often felt comfortable assigning ESI levels 1 through 5, which increased to mainly always in the post-survey. Regarding the department's overall triage ability, the pre-survey revealed a perception of correct triaging only sometimes, while the post-survey showed a new majority consensus of triaging accurately as often. Another audit of 400 random ED visits (October 16th to November 16th) showed the mistriage rate dropped from 23% (pre-data collection) to 10.5%, and under- and over-triage rates improved, decreasing to 6.25% and 4.25%, respectively. Despite a brief post-data collection timeframe, the educational trainings and supplemental materials showed initial success in reducing triage inaccuracies. This hints at the potential to further lower the mistriage rate to below 10% with consistent application of the interventions. Include suggesting the implementation of an annual educational training, adopting a flipped classroom style, incorporating the use of an AI model, or a combination of these approaches. Keywords: emergency department, triage inaccuracy, mistriage, under-triage, over-triage, emergency severity index, educational training
Section II: Improving Triage Accuracy in the Emergency Department

Introduction

In the summer of 2023, the Clinical Manager (CM) at an emergency department (ED) in Northern California launched a quality improvement (QI) initiative. The CM observed through the electronic medical record (EMR) that several patients were under-triaged per the updated Emergency Nurses Association (ENA) Emergency Severity Index (ESI) algorithm. This alarming data prompted the recruitment of nursing students to look further into the issue of triage inaccuracy and to assist in developing effective interventions.

The repercussions of mistriaging, specifically under-triaging, were significant. Incidences of preeclampsia patients seizing and clear acute coronary syndrome patients waiting in the lobby indicated flaws existed in the triage process. These instances showed how improper triage can lead to adverse patient outcomes, emphasizing the necessity for the QI project. Additionally, under-triaging obscured the true acuity of patients, leading to less than adequate staffing levels in the unit. The situation has pushed the microsystem to prioritize enhancing triage accuracy to maintain safe and appropriate staffing levels, aligning with the organization's values of innovation and accountability (Our mission and values, 2023).

Summary of ESI Algorithm

The ESI algorithm is a five-level triage scale that categorizes ED patients based on patient acuity and resource needs. High acuity level patients are an ESI level 1 or 2, whereas depending on the predicted number of resources needed the patient will be a level 3, 4, or 5. An experienced triage nurse or a nurse who completed a comprehensive triage education program are the intended users. Acuity is determined by the stability of the patient's vital signs and potential threats to life, limb, or organ (Montella & Zahn, 2023). Resource needs are dictated by
what the nurse believes the patient will need to be either discharged, admitted, or transferred (Montella & Zahn, 2023).

The ESI algorithm uses the following four decision points in descending order: patient dying, shouldn't wait, number of resources, and vital signs (Montella & Zahn, 2023). Once the triage nurse gets experience with the algorithm, the decision points will help rapidly assess and sort incoming patients into the five levels. The first decision point asks whether life-saving interventions are required, and if the answer is yes then the patient is triaged as an ESI level 1 (Montella & Zahn, 2023). The questions to derive a yes for the first point include assessing airway, breathing, circulation; pulse rate, rhythm, and quality; pre-hospital intubation; concern about patient's ability to adequately oxygenate; immediate medications or other hemodynamic interventions; and other criteria: already intubated, apneic, pulseless, severe respiratory distress, oxygen saturation less than 92%, mental status changes, or unresponsiveness (Montella & Zahn, 2023). If the answer to these questions is no, then the next point looks at whether the patient should not wait to be seen by a provider (Montella & Zahn, 2023). This patient would be a level 2 if they meet questions concerning whether they are in a high-risk situation, confused, and/or in severe pain or distress (Montella & Zahn, 2023). High-risk situations are patients whose condition could rapidly deteriorate without time-sensitive treatments (Montella & Zahn, 2023). Confusion from baseline status is questioned and seen as a risk. The triage nurse can consider a patient with 7/10 pain to be a level 2 if they think it is appropriate to give them the last open bed (Montella & Zahn, 2023). As for severe distress, it can be physical or psychological as in a case of sexual assault (Montella & Zahn, 2023).

The last levels are determined based on resource need where a level 3 needs two or more resources, a level 4 needs one resource, and a level 5 needs none. The ESI defines a resource as
the following: labs, ECG, radiographs, CT, MRI, ultrasound, angiography, IV fluids, IV/IM/nebulized medications, specialty consult, laceration repair, foley insertion, and conscious sedation (Montella & Zahn, 2023). Elements of patient care that do not count as resources include H&P, POC testing, oral medications, tetanus shots, prescription refills, simple wound care, and crutches or splints (Montella & Zahn, 2023). The last decision point assesses high-risk vital signs and should be done before triaging the patient. If abnormal vital signs exist, then the nurse is encouraged to reassess the patient as a level 2 based on the entire clinical picture (Montella & Zahn, 2023). In summary, the ESI algorithm is a tool to help nurses accurately triage incoming patients and place them in the appropriate department area. The tool is reliant on the nurse's experience and decision-making capabilities.

**Problem Description**

The ED serves the community as a primary stroke center, as well as a receiving center for pediatric and ST segment elevated myocardial infarction (STEMI) patients. It operates with 40 beds and employs approximately 127 dedicated nursing staff members. The microsystem sees around 160 patients daily, catering to a diverse demographic from local and county-wide areas. While highly skilled and experienced nursing personnel are assigned to the civilian triage area, it is imperative to note that the rest of the nurses are involved in the triage process of patients arriving through the ambulance bay. All nursing staff then share the collective responsibility of accurately triaging patients to enhance patient outcomes and streamline the flow of care.

The current understanding of mistriaging comes from a study conducted at Kaiser Northern California EDs, where nearly a third of 5.3 billion patients experienced mistriaging (Sax et al., 2023). Given the geographical similarity between the study’s environment and the ED, it is a valuable comparative reference for comprehending the mistriage problem. However,
Sax et al. (2023) observed that over-triaging was more prevalent than under-triaging in 28.9% and 3.3% of cases, respectively. Still, 176,131 patients were under-triaged highlighting a critical area for improvement (Sax et al., 2023). Therefore, a QI project addressing triage inaccuracy in the ED is appropriate, especially for critical cases of under-triage that can potentiate patient complications. Under-triaged patients were found in a variety of scenarios, including non-office hour walk-ins, ambulance arrivals, high comorbidity burdens, and recent critical care admits, as well as social demographic characteristics where Black, youth males were being under-triaged more than White, older females (Sax et al., 2023). The potential consequences of mistriaging revolve around the failure to properly allocate resources to patients in emergencies, specifically under-triage resulting in patient harm and over-triage leading to operational insufficiency (Sax et al., 2023). For the ED, under-triage and other pertinent metrics are more of a priority than over-triage.

The primary metrics of concern are the rate of triage accuracy, occurrences of near misses or sentinel events, and maintaining the appropriate staffing levels. These key indicators form the core focus of the ongoing QI project and warrant further examination. To establish a foundation for improvement efforts, standard benchmark data for triage accuracy, incidents of near misses or sentinel events, and staffing adequacy is essential. Triage accuracy was benchmarked at almost a third of patients being mistriaged in Northern California EDs (Sax et al., 2023). For sentinel events, The Joint Commission's 2022 annual review reported that 88% of the 1,441 documented sentinel events occurred within a hospital setting (The Joint Commission, 2023). More specifically, the emergency department ranked in the top three departments where sentinel events most commonly occur (Patra & De Jesus, 2023). Griffey et al. (2023) estimated that 19.3% of all ED visits had a near-miss incident. As for nurse staffing levels, California law
states that the nurse-to-patient ratio is 4:1 for the emergency department, yet this does not reflect the true acuity of the unit and patient load (Kasprak, 2004). This comparative data has provided valuable context for assessing the current performance of the microsystem and can help identify areas for enhancement.

The initial discovery made by the CM revealed that gross number of patients were under-triaged, indicating that efforts to improve triage accuracy rate were needed. To gain a better understanding of the triage process, nursing students conducted an extensive audit of 400 randomized ED visits in the EMR from January to April 2023. This detailed examination uncovered that 23% of patients experienced mistriaging, with 16.25% and 6.75% falling into under-triaged and over-triaged cases, respectively. With the department seeing around 160 patients per day at a mistriage rate of 23%, then roughly over 13,000 patients are mistriaged in a year. The findings highlight the critical need for targeted interventions to improve triage accuracy and, consequently, help staff the unit properly and create better patient care outcomes.

**Literature Search**

The Problem/population, Intervention, Comparison, Outcome (PICO) tool was utilized to guide a literature search for the QI project. The PICO question was formulated as "For incoming ED patients, will educational training for nursing staff on the ESI version 5 algorithm and an ESI badge reference card help reduce the future risk of inaccurate triage assignments and poor patient outcomes compared with the current triage protocol and training?" Initiating the search in the CINAHL Ultimate database, pertinent keywords such as *triage accuracy*, *triage nurse*, and *ESI triage* proved to be the most helpful in identifying articles relevant to the PICO question. Given that under-triaging was identified as the primary issue in the QI project's baseline data, research specifically addressing *under-triage* was looked at. The project's goal was to optimize staffing
levels by accurately reflecting the true acuity of the department, so the keywords *staffing* and *staffing levels* were explored in their relation to better patient outcomes. Since the primary intervention centered around the education of the new ESI protocol, investigating studies related to *education* was necessary to identify similar interventions and potential successes.

While phrases like *badge reference card* and *emergency department* were less useful, combining *triage accuracy* and *patient outcomes* yielded valuable evidence linking the two concepts. During this process, CINAHL proved to be the most suitable database in providing an extensive amount of relevant research in comparison to PubMed and Scopus. Although PubMed presented mostly overlapping articles with CINAHL, it did offer one particularly noteworthy study comparing triage algorithms that could be used as a future recommendation. On the other hand, a search in Scopus yielded specific cases of mistriage, such as in traumatic brain injury and sepsis, not applying to the QI project. A total of ten journal articles pertinent to the QI project were discovered and evaluated for further relevancy.

**Available Knowledge**

In summarizing the available knowledge, this discussion encompasses various journal articles related to triage accuracy, staff competence, educational interventions, and staffing levels. Beginning with ESI and triage accuracy, Chmielewski and Moretz (2022) asserted that EDs across the United States (US) needed to establish and maintain ongoing quality control programs to enhance the accuracy and reliability of triage nurses. Their research revealed that ESI level 3 showed the highest variability among the twenty-five EDs, while levels 1 and 2 were consistently under-triaged (Chmielewski & Moretz, 2022). The authors recommended implementing a QI project with a continual presence in the department to address any issues with triage accuracy and provide necessary re-education to the staff (Chmielewski & Moretz, 2022).
The study mirrored the initial state of the ED, where discrepancies in patient triaging led to the creation of an annual re-education training becoming standard practice.

Another study concerning triage accuracy found that increased age, severe bradycardia, severe tachycardia, severe hypoxia, and hypertension were significantly associated with instances of under-triage (Rashid et al., 2021). Using the ESI, Rashid et al. (2021) specifically focused on levels 3 through 5 to assess triage accuracy. Accuracy was determined by comparing the predicted resource consumption with the actual resource utilization (Rashid et al., 2021). The ESI faced the most challenges when triaging elderly patients, possibly due to difficulties in interpreting vital signs (Rashid et al., 2021). Other factors specific to older individuals that may further complicate their assessment include communication issues, altered mental status, and complex medical and social issues (Rashid et al., 2021). By uncovering these limitations in the ESI, especially the failure to triage the elderly population, the study aimed to inform triage nurses of these discrepancies and help improve the triage process. In the context of the QI project, it is important to understand and address the limitations of ESI as this will contribute to refining the triage nurse's clinical judgment when assigning acuity levels.

To understand factors influencing the triage competency of ED nurses, Hwang and Shin (2023) assessed work-related stress, nurse-physician collaboration, and clinical reasoning competence. The study's findings indicated that ED nurses demonstrated higher levels of triage competence when they exhibited increased clinical competence, experienced more work-related stress, engaged in effective nurse-physician collaboration, and had substantial clinical experience (Hwang & Shin, 2023). Clinical experience as an ED nurse emerged as the most influential variable in reflecting triage competence (Hwang & Shin, 2023). Each potential factor underwent assessment through respective self-rated tools used by the nursing participants. The data from the
self-assessments concluded that a nursing education program emphasizing the improvement of clinical reasoning competence could significantly enhance triage competency (Hwang & Shin, 2023). The other interventions considered to improve triage competency were identified as strategies to manage work-related stress and initiatives to foster positive nurse-physician collaboration (Hwang & Shin, 2023). Since previous studies have predominantly concentrated on triage accuracy tools rather than the nurses utilizing these tools, assessing the nurse rather than the tool is imperative in addressing triage accuracy. Therefore, a deeper understanding of triage competency and factors affecting nurses can assist the QI project in identifying educational priorities more effectively.

Regarding educational interventions, Javadi et al. (2023) concluded, through a randomized control trial, that nurses' triage knowledge saw significant improvement when learned in a flipped classroom setting as opposed to traditional lecture-based instruction. The flipped classroom had the following three components: pre-class activities where learners spent time outside of class to watch lectures, in-class activities where discussions were held, and post-class assignments based on the content of each session (Javadi et al., 2023). Initially, there was no notable disparity in triage capabilities or knowledge between the two groups post-education (Javadi et al., 2023). However, one month later, the nurses from the flipped classroom setting still exhibited an increase in both areas, triage capabilities and knowledge, demonstrating the sustained effectiveness of this teaching method (Javadi et al., 2023). If the traditional lecturing approach proves ineffective in enhancing triage accuracy and knowledge for the QI project, advocating for a flipped classroom format might be a better proposition.

In understanding the impact of appropriate staffing levels, Twigg et al. (2021) determined that research on specific nurse staffing methodologies and their effects on patient and nurse
outcomes remains an ongoing area of investigation. While current research indicates that increased staffing levels lead to improved outcomes for nurses and patients, no single staffing methodology stands out as superior (Twigg et al., 2021). Two unresolved questions remained on the optimal number of nurses required per shift over time and the number of hours necessary for a nurse to deliver safe, high-quality, and cost-effective care (Twigg et al., 2021). Inaccurate triaging of patients has failed to capture the unit's true acuity and has led to inadequate staffing levels and poorer patient outcomes. In recognition of this correlation, the QI project acknowledged the benefits of triage accuracy and advocated attaining optimal staffing levels.

Rationale

Kurt Lewin's (1951) change model was applied to guide the QI project through three distinct stages: unfreezing, moving, and refreezing (Mitchell, 2013). During the unfreezing phase, the manager identified a discrepancy in the ESI levels of previously triaged patients. Upon reviewing the EMRs of several patients, it became evident that many of the charts showed that patients were under-triaged, signaling a clear need for change. A pre-survey (see Appendix A) and corresponding flier (see Appendix B) were created by the students and distributed among the staff to get the conversation on the QI project started. Another aspect of the unfreezing phase occurred with the assistance of students who further investigated mistriaging data, providing a more comprehensive view of the department's performance from January to April. When analyzing 400 randomized ED visits, the rate of under-triage was calculated at 16.25%, which was not as severe as the initial assessment by the manager. According to Brosinki et al. (2017), the recommended percentage of under-triage should be less than 10%, verifying the need for the QI improvement.
The moving phase of the model started with the initiation of the educational trainings and creation of the supplemental materials. The educational training was conducted through twelve Zoom sessions held on six different days, ensuring the inclusion of all nursing staff outside of regular work hours. Additionally, during this phase, the students partnered with the primary educator to develop a badge reference card (see Appendix C) and posters (see Appendix D) featuring the updated ESI algorithm. The materials serve as supplements for the main educational intervention.

In the refreezing phase, the educational training may become a mandatory step for all new hires and an annual review for all staff via HealthStream. The supplemental materials, including the badge reference card and the posters, also aide in the re-freezing phase as resources to keep the QI project as an ongoing process. Due to the limited timeframe of the QI project, assessing the long-term effects of this permanent change was not feasible, making assumptions about its success premature.

Aim Statements

Global Aim Statement

We aim to improve the triage process in the emergency department at a hospital in Northern California. The process begins with collecting data on patients previously triaged based on the ESI version 4 algorithm. The process ends with collecting data on patients triaged after the education for ESI version 5 algorithm has been completed. By working on the process, we expect incoming ED patients to be accurately triaged. It is important to work on this now because of patient health outcomes, efficient use of resources, and ensuring proper staffing levels.
Specific Project Aim

The specific aim of the *Improving Triage Accuracy in the Emergency Department* project was to reduce triage inaccuracy to less than 10% by mid-November 2023. This was to be achieved through the implementation of educational training focused on the updated ENA ESI version 5 algorithm and complementary supplemental materials for staff, including a badge reference card and posters.
Section III: Methods

Context

Microsystem Assessment

**Purpose.** The hospital is driven by the seven core values of quality, compassion, community, collaboration, stewardship, innovation, and accountability (Our mission and values, 2023). The purpose of the ED is to carry out the core values while facilitating care to patients seeking emergency medicine. Accountability is highlighted in the QI project as the nursing staff learned that they have a responsibility to prevent negative patient outcomes by accurately triaging.

**Patients.** The ED in Northern California serves patients from the local surrounding community and those not in the immediate area. Since the healthcare system accepts government-funded insurance like Medical and Covered California, as well as an updated the insurance list as of August 1, 2023, the demographic of patients has expanded (General Services Insurance Information, 2023). With the healthcare system extending its services to more neighborhoods and accepting various types of insurance, the patient demographic is diversifying.

**Professionals.** The microsystem has an interprofessional team that consists of physicians, psychiatrists, physician associates, nursing professionals, emergency technicians, respiratory therapists, behavioral health workers, imaging technicians, phlebotomists, and administrative support. The main staff working on the QI project are the manager, lead nurse educator, triage nurses, and student nurses from the University of San Francisco (USF). The triage process directly includes the charge nurse, screener nurse, emergency technician, and triage nurse.

**Processes.** Patients can enter the ED entrance or the ambulance bay. The process for triaging patients through the hospital emergency entrance starts with the screener nurse
identifying if the patient has life-threatening symptoms. The charge nurse is informed that the patient needs a bed immediately. If the patient does not have apparent life threats, then they are directed to registration. After getting registered, the emergency technician checks the vital signs. Next, the triage nurse will call patients in to be assessed and assign them ESI levels 1 through 5. Ideally during triage, a provider will perform a brief assessment on the patient and place their initial orders called a TIP. A break in the process would be when patients are inappropriately triaged by the screener or during the triage nurse assessment, as well as when the provider is unable to put in the TIP and patients are waiting in the ED without appropriate care orders. For instance, if a patient comes in with chest pain and the screener nurse does not call for an EKG and allows the patient to wait in the waiting room then the triage process is disrupted. From the emergency medical services (EMS) side of triaging, the process flows slightly differently. The charge nurse receives the ring down from the ambulance that states whether a code 3 or code 2 will be arriving. The charge nurse then decides which room and nurse to assign the incoming patients. Once the patient arrives in the room, the nurse will triage them based on the ESI algorithm and a provider will assess them and input the appropriate orders. In this triage pathway, possible breaks in the flow of care could be at the charge nurse’s point of contact with EMS, if the EMS report is incorrect or inadequate, or once the patient is assessed in the room. The triage steps can be visualized in Appendix E.

Patterns. Patterns that characterize the functioning of the ED include the under-triaging of patients, the volume of patients, wait times, and understaffing. As observed in review of EMRs, the microsystem’s CM found a gross number of patients were under-triaged. Under-triaging patients poorly reflects the staffing needs of the department. More critical patients require the nurses to have a lesser patient load, meaning the staffing office would need to send
extra nurses. There is an increase in patient volume from 2 PM to 12 AM and about 160 patients come in daily. Patients wait about 15 minutes for their initial exam (Z Hospital ratings, n.d.). For non-critical patients, the overall time spent until disposition averages about two hours, whereas serious cases may be in the ED for an average of six hours until admitted to an inpatient floor (Z Hospital ratings, n.d.).

**SWOT Analysis**

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis can be found in Appendix F and is next elaborated upon in greater detail. The microsystem has received the 2023 ENA Lantern Award, highlighting its strengths in leadership, practice, education, advocacy, and research. Other strengths identified in the department are their use of safe opioid prescription practices and the use of evidence-based practices like using the Flo Patch to improve sepsis outcomes. Weaknesses seen in the microsystem include triage inaccuracy, extended wait times, and the culture of the staff. These factors have created challenges in the department by leading to worse patient outcomes, delays in the flow of care, and low staff buy-in for new changes. Opportunities for the unit to address the weaknesses would be to improve triaging patients and reduce wait times between the levels of care. Two more areas to improve on include accurately representing the unit's acuity by assigning the appropriate amount of nursing staff, as well as helping enhance discharge outcomes for homeless patients. Possible threats to implementing interventions that solve the weaknesses in the microsystem include staff resistance, inadequate education, and financial barriers.

**Root Cause Analysis**

A root cause analysis (RCA) was performed by following the American Society for Quality (ASQ) fishbone diagram guidelines. In addition to the ASQ recommendations, the
domains described by Fekonja et al. (2023) regarding patient safety were integrated with the ASQ generic categories. The potential factors contributing to triage inaccuracy fall into five groups: measurements, materials, methods, environment, personal factors, and machines.

With measurements and machines, there exists a similar potential for errors when using vital signs or electrocardiogram machines. Measurement errors may be due to the machines having calibration inaccuracies or from users misinterpreting the data. Under the materials category, potential issues may stem from a lack of resources. Resource materials that could help the triage accuracy problem include the ESI supplemental material of a badge reference card and posters, as well as an artificial intelligence (AI) program used within the EMR designed to identify and correct triage errors. Methods employed before the QI project that could affect triage accuracy include the ESI version 4 algorithm and insufficient training on its application. Since nursing staff may be using the ESI algorithm insufficiently and make judgment errors, training on the updated version can prove to be beneficial in addressing this potential cause. Current research by Fekonja et al. (2023) helps further explain possible causes for triage inaccuracy and better develops the RCA of the QI project.

According to Fekonja et al. (2023), patient safety during the triage process is influenced by two main domains: the personal factors of the nurse and the triage environment. The personal factors domain has two subcategories: attributes of the triage nurses and their lived experiences in triage (Fekonja et al., 2023). Aspects included in the subcategories are personality traits, clinical and practical proficiency, and experience, as well as factors like fatigue/burnout and shift scheduling (Fekonja et al., 2023). Additionally, potential factors within the nurses’ attributes might encompass personal biases or implicit biases, as well as language and cultural barriers. As for the lived experience, other issues can arise from the reality that only one screener and one
triate nurse independently make triage decisions. In the environment domain, two subcategories emerged: triage performance and the workplace setting (Fekonja et al., 2023). These subcategories encompassed various subthemes, including assessment, workload, staffing levels, interruptions, mentoring and supervision, teamwork, and communication, as well as the unit organization and leadership (Fekonja et al., 2023). Other potential factors within the environment domain could involve issues such as a shortage of beds and resources. These domains and generic headings are displayed in Appendix G.

**Stakeholder Analysis**

The stakeholders of the QI project include the patients, the nurse manager, the triage nurse, the screener nurse, the nurse educator, the nursing students, the providers, and the chief nursing officer (CNO). Since triage accuracy ultimately affects the patients receiving care, they are included in the analysis. The QI project intended that patient outcomes would naturally improve with triage accuracy. The nurse manager found the issue of under-triaging in the department and was imperative in approving the QI interventions. Triage accuracy directly involves the triage and screener nurses, leading the staff to be at the center of the improvement. To coordinate the educational training for the nursing staff a seasoned charge nurse on the unit was designated as the lead educator. The nursing students collaborated with the lead educator to create the ESI badge reference card and posters. Since ESI levels determine which area of the ED the patient will be treated in, the providers are concerned with triaging accurately as they may want the patient on telemetry or to CT for an immediate scan. As for the CNO, they will be responsible for approving hiring new staff members for the ED to achieve adequate staffing levels, if justified by the results of the interventions.
Financial Analysis

The QI project incurred expenses in two main categories. Students from USF contributed 193 dollars for the following expenses: creating the quick response (QR) code for both pre- and post-surveys, as well as costs associated with survey promotion (65 dollars) and posters (58 dollars). On the other hand, the hospital covered the ENA ESI training program (120 dollars), the primary educator's hourly pay (2,592 dollars), badge reference cards (333 dollars), and the attendance of nursing staff at the educational training (11,558 dollars). In sum, the total cost of the QI project amounted to 14,796 dollars. Detailed calculations can be found in Appendix H.

While investing in the development of the QI project required financial resources, its primary objective did not center around monetary gains. The microsystem aimed to find evidence regarding triage inaccuracy that would substantiate the need for staffing the unit based on a higher acuity level. While financial revenue was considered an additional benefit, the focus was on achieving accurate ESI levels. Assigning the correct ESI levels of patients in the EMR will capture the criticality the department sees regularly and could potentially influence the CNO to address the nursing shortage in the ED by hiring additional staff and prevent adverse patient outcomes.

Per billing guidelines, procedures, medications, and specific care provided in the ED are billed based on the assigned acuity level. A point system is used to calculate each ED visit with 20 points given for level 1, 15 points for level 2, 10 points for level 3, 5 points for level 4, and no points for level 5. If a patient accumulates over 251 points during their visit, they are classified as a critical care patient, which results in higher insurance charges. This means that with the correct documentation, ESI acuity levels can affect insurance reimbursements. For instance,
Correcting an ESI level 3 to an ESI level 2 allows for appropriate care and leads to higher reimbursement. Mednition (2023) found in an annual sample hospital of forty-four thousand ED visits, 3,198 patients who were corrected to an ESI level 2 generated an increase in revenue of 457,000 dollars. Therefore, if triage accuracy improves in ED, then the microsystem will increase revenue and provide further justification for hiring more staff.

**Timeline**

By employing a Gantt chart (see Appendix I) and adhering to the Plan, Do, Study, Act (PDSA) cycle (see Appendix J), the timeline for the QI project is depicted visually and elaborated upon below. The Gantt chart is segmented into four distinct phases: project initiation, planning, implementation, and concludes with project evaluation and synthesis.

In the project initiation stage, the nursing students met with the clinical instructor and CM in late August to discuss the foundation, expectations, and general guidelines for the QI project. Following the meeting, the students were responsible for submitting a Statement of Determination (see Appendix K) for approval that briefly described the QI project in mid-September.

The planning phase, which integrates the Gantt chart and PDSA cycle, commenced with the creation of essential components such as the pre-survey, QR code survey flier, badge reference card, and posters. Subsequent activities included the pre-data collection and development of the post-survey (see Appendix L) and corresponding flier (see Appendix M). The end of the planning phase occurred with the post-data collection. The pre-survey inquired about the staff’s comfortability with ESI triaging, their perception of the unit’s triaging skills, their understanding of under-triaging patients, and any suggestions to improve triage accuracy. A flier promoting the survey was generated and disseminated throughout the unit, alongside email
distribution by the clinical instructor. Despite an initial low response rate, a marketing event featuring pizza was organized on the unit, resulting in a slight uptick in responses. Additional support was sought from the lead educator on the project, leading to another email campaign that ultimately increased the response rate to approximately 29% of the unit. Further details about the badge reference card and posters will be provided in the intervention section. Recognizing that the students had limited experience in triaging, the lead educator conducted a comprehensive training tutorial and chart reviews that bolstered their understanding of the process and boosted their confidence in adhering to the ESI protocol. This initiative facilitated the completion of pre-data collection by mid-September.

The project implementation and do stage unfolded simultaneously. The pre-survey was made available for participation from the end of August until the start of the educational trainings conducted via Zoom from the end of September to mid-October. Unfortunately, the distribution of the badge reference cards and posters faced delays due to multiple approval exchanges and production complications. At the end of October, the badge reference cards were available at the main nurses’ station for staff to access, and the posters were prominently displayed in both the triage area and the main nurses’ station. These supplementary materials will remain accessible in the unit indefinitely, or until otherwise advised.

The study phase and aspects of the project evaluation and synthesis section occurred together. In mid-November, another 400 ED visits were reviewed for triage accuracy, starting October 16th to November 16th. The nursing students analyzed and compared the pre- and post-data collections, which showed that there was an overall improvement in triage accuracy. The responses from the post-survey were also collected from November 7th to November 16th.
Unfortunately, there were not the same amount of staff member responses in the post-survey when compared to the pre-survey, making the data comparison difficult.

After completing the study phase, the subsequent action step identified potential enhancements for the interventions and formulated recommendations. Despite indications of success in the QI project interventions, the constrained time frame for post-data collection raises uncertainty about the correlation adequately representing a direct link between the interventions and improved triage accuracy. Recognizing this limitation, the QI project acknowledges its role as an ongoing tool in the microsystem. To support the efficacy of the training, it is recommended to conduct another chart pull at least three months after QI project completion. The proposed recommendations by USF students included implementing an annual educational training, incorporating a flipped classroom style for training, adopting the AI model, or a combination of these approaches. This will be expanded upon in the conclusion.

**Intervention**

The QI project introduced two interventions: an educational training program with a post-quiz assessment needing a passing score of 100% in two attempts and supplemental materials, which included a badge reference card and posters. The educational training was developed by an experienced full-time charge nurse who approved the supplemental materials created by the students.

To gain a comprehensive understanding of the educational training, the students interviewed the lead nurse on the project. She completed the ENA ESI version 5 training, which comprised a five-hour section dedicated to adults and a corresponding section focused on pediatrics. Additionally, she thoroughly reviewed both the ESI 4th and 5th edition handbooks to evaluate any differences or similarities between them. However, she found the ENA training to
be insufficient in enhancing her understanding of triaging and the updated ESI algorithm. Consequently, she took it upon herself to create a PowerPoint training module for the department. In its development, they concentrated on the 5th edition, condensing the key points from the handbook into clear, concise statements. Recognizing the nuanced nature of triaging, they emphasized the importance of all nursing staff thoroughly familiarizing themselves with the new guidelines. She asserted that this would be the most effective way to truly benefit from the training and enhance the staff’s understanding.

Drawing from the educational training, ESI version 5 algorithm, and the lead nurse’s endorsement, the students crafted a badge reference card and posters that accurately represent the ESI algorithm. The badge reference card reflects the ESI version 5 algorithm flow chart on one side of the card and the other side has charts to reference the high-risk vital signs and the differences between what qualifies as a resource and what does not. The flow chart reflects the four decision points of the ESI algorithm for the nurses to refer to during their triage assessment. For the resources table, a note explains that two tests from the same department account for one resource. Examples are given to help determine assigning levels 3 through 5, where a complete blood count and a urine analysis count as one resource while a CT and MRI count as two resources. The poster has all the same elements of the badge reference card plus a table on types of lifesaving interventions that help discern an ESI level 1.

**Study of the Intervention**

To assess the effectiveness of the interventions, both quantitative and qualitative data will be examined. During the *study* phase of the PDSA cycle, students will compare the rates of mistriage, under-triage, and over-triage from the pre- and post-data collections. If improvements in triage accuracy are observed, it may suggest that the intervention and additional supplemental
materials successfully re-educated the nursing staff. However, it's important to note limitations, including the short time frame for post-data collection and potential variability in students' triaging abilities. Due to these factors, the correlation between the interventions and triage accuracy may be loose and will need reassessment in the months following the QI project to establish a stronger connection.

A potentially more informative way to gauge the success of the interventions is by comparing responses from pre- and post-surveys. This qualitative data will provide insights into the nurses' feelings and perceptions regarding the interventions, as well as whether there has been a shift in their perception of triage accuracy within the department. One limitation of this approach is the potential challenge of obtaining post-survey data within a restricted time frame, potentially creating an unequal comparison. Additionally, the pre-survey may not capture the viewpoints of the entire department, as it only reached a small percentage of the staff.

Studying the success of the interventions is limited in understanding the improvements' true impact on the unit. Nonetheless, if some degree of success is noted, it offers hope that continuing these changes may yield positive results in the future and warrant reevaluation at another time. The lead educator mentioned that she would be doing another round of data collection in Spring 2024 to personally assess for changes. This may derive more prominent conclusions on the effects of the interventions given a longer time span and a more experienced nurse examining the triage decisions. Given the numerous variables influencing triage accuracy and its ongoing nature, establishing direct cause-and-effect relationships can be exceedingly challenging. Since this is a QI project and not a randomized controlled study, the results can only yield inferences about their relationship to the interventions.

Measures
The measures collected include responses from the pre-survey and the pre-data collection on ED triage visits. According to the pre-survey, 67.6% of nurses expressed being *often* comfortable with assigning ESI levels 1 and 2, while 75.7% felt the same for levels 3 through 5. When asked about the department's overall ability to triage, 62.2% of the staff had conflicting views, with a majority believing that the department only triages correctly *sometimes*. There was a consensus within the department that the training for orienting new triage nurses was insufficient, and that an educational training program would have a positive impact on triaging in the unit. The short answer questions provided evidence that the nurses recognized triaging inaccuracy as a relevant issue in the department, and they suggested solutions such as implementing an educational training program and providing supplemental materials. From these answers and feedback, the staff buy-in on the QI project was more positive than initially anticipated.

The pre-data collection also indicated a higher-than-desired level of mistriaging in the unit, although not to the extent that the CM discovered from their chart pull. Mistriaging occurred in 23% of the 400 randomized ED triage visits assessed by the students, as well as 16.25% of cases being under-triaged and 6.75% of cases being over-triaged. The post-survey responses helped to evaluate the staff’s perception of the interventions by showing a positive change in the department’s ESI capabilities and approval of the new triage educational training. The post-data collection discerned that there was a significant amount of progress in triage accuracy within a short timeframe of one month after the educational trainings and distribution of the supplemental materials.

**Ethical Considerations**
Ethical considerations in the development of the QI project encompass privacy, autonomy, and nonmaleficence. To collect and triage patients, the students accessed protected health information (PHI), which was reviewed and printed for data collection purposes. They took measures to minimize patient identifiers, leaving only the last name and first initial visible to act as a safeguard in addressing any difficulties in triaging with their CI. After the pre-data collection, the PHI was appropriately disposed of in Health Insurance Portability and Accountability Act (HIPAA) approved trash bins.

Autonomy pertains to the nursing staff on the unit, as they possess the authority to triage based on their experiences and knowledge. The algorithm serves as a guiding tool to assist the nurses in making the best decisions possible for the patients. Nonmaleficence is evident in the nurse's responsibility to exert their best efforts in accurately triaging patients, as they help determine the appropriate treatment and prevent any further harm. By aiming to enhance triage accuracy, the QI project naturally leads to better patient outcomes, thereby aligning with the principle of nonmaleficence while respecting the autonomy of the nurses.
Section IV: Results

The QI project's outcomes were assessed through post-data collection and survey responses. To ensure comparability with pre-data collection, nursing students conducted a final audit of 400 randomly selected ED visits from October 16th to November 16th. This timeframe accommodated all 127 staff members who attended the educational trainings to practice the new triage guidelines and allowed sufficient time for the badge reference cards and posters to be on the unit. The analysis of the post-data collection revealed a decrease in the mistriage rate from 23% (pre-data collection) to 10.5%. Improvements were also observed in under-triage and over-triage rates, which decreased to 6.25% and 4.25%, respectively. Within this limited timeframe, the QI project interventions appeared to have positively impacted triage accuracy in the unit, with all areas of mistriage approaching satisfactory levels. With the triage inaccuracy rate being off by a mere 0.5 percent, the project's goal to decrease the triage inaccuracy rate to less than 10% was nearly achieved. The continued use of supplemental materials and annual educational trainings could potentially lead the department to attain and even surpass this goal.

The impact of the improvements on the staff is evident in the post-survey responses. While the initial pre-survey had a 29% departmental response rate, the post-survey only had a 22% response rate. Although the survey responses may not be directly comparable using percentages like the pre- and post-data collections, they provide insight into the staff's evolving comfort with the updated ESI algorithm, perceptions of the department's triage abilities, and attitudes toward the interventions. Upon reassessing their triage abilities for ESI levels 1 through 5, the nurses at all levels expressed a heightened confidence in consistently triaging accurately, as seen by most of the responses being *always* and *often*. This contrasts with the pre-survey, where nurses felt they only *sometimes* accurately triaged ESI levels 1 and 2. The post-survey
showed a perceived improvement in the department's overall triage accuracy, with most responses indicating *often* compared to the prior consensus of only *sometimes*. Additionally, the staff believed that educational trainings and supplemental materials were more effective in orienting triage knowledge compared to the previous triage orientation process. These results showed that new practices have the potential to reshape the unit's culture and establish a new standard of care.
Summary

The QI project's key findings indicate a remarkable reduction in mistriage rates to 10.5% within one month of implementing interventions. The decrease in mistriage signifies that the educational training and supplemental materials initially enhanced triage accuracy rates. Additionally, under-triage experienced a significant drop to 6.25%, suggesting that the department's acuity now aligns more closely with the actual staffing requirements of the unit. Another significant change was that the staff members perceived the department to be triaging more accurately, reflecting a positive shift in staff morale and culture. These positive transformations can be attributed to the lead nurse educator's efforts in developing the educational training and the collaborative work of nursing students who provided easily accessible supplemental materials for the unit.

By applying Kurt Lewin's change theory, the QI project nearly achieved its specific aim by employing a systematic approach. The unfreezing phase started with a pre-survey that initiated the conversation on possible weaknesses in the microsystem. In the pre-survey, the staff's comfort with assigning ESI levels and perceptions of prior triage training were assessed. Subsequently, in the freezing phase, an educational intervention was implemented, involving the active participation of all nursing staff members. ESI posters were prominently displayed in the main triage area and nursing station and accompanied by the distribution of badge reference cards. This phase successfully established a new standard of care, resulting in a positive impact on triage accuracy. In the refreezing phase, the effects of the educational training and the continued use of badge reference cards are an ongoing process. The QI project hopes that the supplemental materials will help sustain the knowledge gained from the training and continue to
help reduce triage inaccuracy. Although the QI project fell short of its aim to decrease triage inaccuracy to less than 10% by only 0.5%, the data indicates promising results. The interventions may have a cumulative impact over time, and a reassessment in another chart pool is recommended within the next two to three months. With this tangible success came valuable lessons that showed the importance of developing a quality improvement project.

The QI process taught two valuable lessons. The first is that staff buy-in and trust evolve over time. Since the students did not have adequate time to establish relationships with the nursing staff, getting them to participate in the surveys was more challenging than anticipated. Reflecting on this, a suggestion to have the CM or lead nurse on the education make an initial announcement of the student’s involvement in the project may have made the staff more open to the QI project. Secondly, the project highlighted the crucial role time has in achieving success. With more time for the interventions to come into effect and an extended presence of students in the department, there may have been a potential increase in survey responses and staff participation in using the badge reference cards. Also, more time could have potentially allowed the data collection to meet the specific aim of the QI project. The constraints of a limited timeframe-imposed restrictions on the extent of achievable outcomes. Having an extended period on the unit, building rapport with staff, and engaging in more face-to-face interactions could have led to improved survey responses, providing more meaningful insights into the department's overall sentiment. These lessons will inform future QI projects on how to navigate similar challenges and create success in advancing evidence-based practices within the nursing profession.
Conclusions

The efficacy of the QI project became evident with a decrease in the mistriage rate from 23% pre-interventions to 10.5% post-interventions. Although there was a short timeframe for the post-data collection, the educational trainings and supplemental materials demonstrated initial success in minimizing triage inaccuracies. This suggests the potential for further lowering the mistriage rate to below 10% if the interventions are consistently applied across the microsystem. The sustainability of these interventions is promising, as the educational training can be transformed into a Health Stream for both new hires and annual departmental use. The posters have a considerable shelf life, as long as they remain undamaged, and even with wear and tear they can be replaced through reprinting. Regarding the badge reference cards, their quantity is three times that of the staff, and they can be readily replaced at a minimal cost through the copy center.

As the QI project focused specifically on the ED, particularly on triaging, the potential for its interventions to extend into other microsystems was not applicable. The processes of triaging and utilizing the ESI are highly specialized to the ED and lack relevance in other departments where these procedures are not employed. The practical implications highlighted that educational training, coupled with supplemental materials, can effectively serve as an ongoing resource for sustaining newly acquired knowledge. Replicating the QI project in other EDs may yield similar success, given that the interventions are neither costly nor overly complex. Since mistriage was identified as a prevalent issue in EDs across Northern California, the success of these interventions can offer valuable insights to other departments grappling with the same challenge (Sax et al., 2023). The QI process can be adapted for implementation in other
ED Microsystems, starting with a unit assessment to determine the presence of triage inaccuracy and the viability of an ESI re-education training as a potential solution.

In conclusion, the QI project demonstrated tangible success in reducing mistriage rates and highlighted the potential for further improvement below 10% with consistent microsystem-wide interventions. The promising sustainability of these interventions, coupled with the adaptability of the QI process to other ED Microsystems, underscores the broader applicability of its strategies for enhancing triage accuracy and promoting ongoing education in healthcare settings.

**Recommendations**

The USF students presented three recommendations. Firstly, they proposed the implementation of an annual educational training through Health Stream, a consideration already being entertained by the CM and lead educator. Making the updated ESI educational training a mandatory refresher course each year would ensure that staff remains well-informed and current with the latest ESI protocols. Additionally, the accompanying supplemental materials should be regularly replaced, as needed, to sustain their use in the department indefinitely.

Secondly, the students suggested exploring a flipped classroom style for educational training, citing its success over traditional lecturing in a recent journal article (Javadi et al., 2023). The flipped classroom approach would involve pre- and post-quizzes to assess ESI knowledge, a self-paced lecture, and a mandatory training session for discussing concerns related to triaging and practicing abnormal case study scenarios. This method is expected to be more effective as it requires greater staff participation and interaction with educational materials.

The third recommendation involves adopting an AI model named KATE, an extension of EPIC, to help serve as a clinical decision support tool. KATE operates in real-time, analyzing the
triage note and EMR to provide ESI acuity and sepsis alerts within seconds (Mednition, 2023). A validation study demonstrated KATE is 27% more effective in triaging patients compared to nurses on average, positioning it as a safety net tool for triage nurses (Ivanov et al., 2021). Despite an initial cost of 10,000 dollars and a three-dollar fee per patient use, hospitals have reported increased insurance reimbursements that outweigh KATE's expenses, leading to improved patient outcomes (Mednition, 2023). These recommendations collectively represent a forward-thinking strategy to not only ensure continual staff proficiency but also to elevate the efficiency and precision of the triage process, ultimately contributing to improved patient outcomes and financial benefits for the healthcare institution.
Section VI: References


Section VII: Appendices

Appendix A

ED: ESI Pre-survey

ESI Pre-survey

Hello ED Staff,

We are graduate nursing students at the University of San Francisco and are participating in research on triage accuracy in the Emergency Department. Thank you for your responses, they are greatly appreciated!

How often do you feel that you accurately assign patients in triage ESI levels 1 and 2? *

- Never
- Rarely
- Sometimes
- Often
- Always

How often do you feel that you accurately assign patients in triage ESI levels 3 through 5? *

- Never
- Rarely
- Sometimes
- Often
- Always
**As a department,** how often do you believe patients are being appropriately triaged? *

- Never
- Rarely
- Sometimes
- Often
- Always

Do you agree the current triage training by the department is sufficient for orienting new triage nurses? *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Do you believe an inservice education program on the new ESI version 5 algorithm will positively improve triage efforts in the department? *

- Very unlikely
- Unlikely
- Neutral
- Likely
- Very likely
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Briefly describe your understanding of the negative impact under-triaging has in your department.</td>
<td>Short answer text</td>
</tr>
<tr>
<td>Please provide any suggestions you may have to help improve triage accuracy in your department.</td>
<td>Short answer text</td>
</tr>
</tbody>
</table>
Appendix B

ED: ESI Pre-survey Flier

Graduate nursing students at the University of San Francisco are conducting research on triage accuracy in the Emergency Department. We would greatly appreciate your participation!
Appendix C

ESI Badge Reference Card

### Front

**ESI Algorithm**

1. **Requires life saving measures?**
   - Yes
   - No

2. **High risk situation? or Confused/lethargic/disoriented? or Severe pain/distress?**
   - Yes
   - No

3. **How many different resources are needed?**
   - 2 or more resources
   - 1 resource
   - No resources

4. **High Risk Vitals?**

5. **Reassess**

### Back

**High Risk Vitals**

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<thead>
<tr>
<th>Age</th>
<th>HR</th>
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<tbody>
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<td>&lt; 1 mo</td>
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<td>&gt; 55</td>
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<td>3 - 12 yr</td>
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<td>&gt; 30-35</td>
</tr>
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<td>&gt; 12 yr</td>
<td>&gt; 100</td>
<td>&gt; 20</td>
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<table>
<thead>
<tr>
<th>Age</th>
<th>Temp</th>
<th>Consider ESI level</th>
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<tr>
<td>&lt; 28 days</td>
<td>&gt; 100.4°F</td>
<td>1 or 2</td>
</tr>
<tr>
<td>&lt; 3 mo</td>
<td>&gt; 100.4°F</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 3 mo</td>
<td>&gt; 102.2°F or &lt; 98.8°F/ incomplete immunizations/ unknown fever origin</td>
<td>2 or 3</td>
</tr>
</tbody>
</table>

**SpO2 < 92%**

**Resources**

- Labs (blood, urine)
- ECG
- Xray
- CT
- MRI
- Ultrasound
- IV fluids
- IV/IM/nebulized medications
- Specialty consultation
- Simple procedure (laceration, urinary catheter)
- Complex procedure (conscious sedation)

**Not Resources**

- Hx and physical exam (including pelvic)
- Point-of-care testing
- Saline or heparin lock
- PO medications
- Tetanus immunizations
- Prescription refills
- Call to primary care provider
- Simple wound care (dressing, recheck)
- Crutches, splints, slings

*Note: 2+ tests from the same department count as a single resource; i.e., a CBC and UA are counted as 1 resource, a CT and MRI are counted as 2 resources.*
Appendix D

ESI Poster

### ESI Triage Algorithm

**Requires life saving measures?**

- Yes → **1**
- No → **No**

**High risk situation?**

- or

**Confused/lethargic/disoriented?**

- or

**Severe pain/distress?**

- Yes → **2**
- No → **No**

**How many different resources are needed?**

- 2 or more resources → **3**
- 1 resource → **4**
- No resources → **5**

**High Risk Vitals?**

- Reassess

### Intervention Types

**Lifesaving Interventions**

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<tr>
<th>Type</th>
<th>Interventions</th>
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<tbody>
<tr>
<td>Airway/breathing</td>
<td>Assisted ventilation, intubation, surgical airway, emergent BiPap</td>
</tr>
<tr>
<td>Electrical Therapy</td>
<td>Defibrillation, emergent cardioversion, external pacing</td>
</tr>
<tr>
<td>Procedures</td>
<td>Chest needle decompression, pericardiocentesis, open thoracotomy</td>
</tr>
<tr>
<td>Hemodynamics</td>
<td>Significant IV fluid resuscitation, blood administration, control of external hemorrhage</td>
</tr>
<tr>
<td>Medications</td>
<td>Adenosine, atropine, D50, dopamine, epinephrine, naloxone</td>
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</table>

### High Risk VS

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<tr>
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<td>3 - 12 yr</td>
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<td>&gt; 12 yr</td>
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### Resources vs. Not Resources

<table>
<thead>
<tr>
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<tr>
<td>• Labs (blood, urine)</td>
<td>• Hx and physical exam (including pelvic)</td>
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<td>• ECG</td>
<td>• Point-of-care testing</td>
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<td>• Xray</td>
<td>• Saline or heparin lock</td>
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<tr>
<td>• CT</td>
<td>• PO medications</td>
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<td>• MRI</td>
<td>• Tetanus immunizations</td>
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<td>• Ultrasound</td>
<td>• Prescription refills</td>
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<td>• IV fluids</td>
<td>• Call to primary care provider</td>
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<td>• IV/IM/nebulized medications</td>
<td>• Simple wound care (dressings, recheck)</td>
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<td>• Specialty consultation</td>
<td>• Crutches, splints, slings</td>
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<tr>
<td>• Simple procedure (iac repair, urinary catheter)</td>
<td></td>
</tr>
<tr>
<td>• Complex procedure (conscious sedation)</td>
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</tbody>
</table>

### Note:
- 2+ tests from the same department count as a single resource; i.e., a CBC and UA are counted as 1 resource, a CT and MRI are counted as 2 resources.
Appendix E

Process Flow Map

Triage Process Map

- Patient presents ED via walk-in
- ED nurse screener determines if patient is ESI level 1
- If not ESI level 1, patient directed to registration
- ED tech will take patients vital signs
- If patient's VS aren't reportable, patient will wait to be triaged
- If yes, the charge nurse is informed and looks to assign patient to a bed
- If patient is a Code 3, the patient receives care immediately
- Charge nurse receives ringdown from EMS as a Code 2 or 3
- If patient is a Code 2, they will wait in the ambulance bay until called in
- Once patient arrives in a room, the nurse will triage them using the ESI algorithm
- Patient will then be taken back to the triage area and the triage nurse will assign ESI levels
- Possible break in the process
Appendix F

SWOT Analysis

**STRENGTHS**
- AACN Magnet Designation
- 2023 ENA Lantern Award recipient for innovation in leadership, practice, education, advocacy and research
- Previous success with quality improvement initiatives, such as the implementation of Flapatch to improve sepsis outcomes

**WEAKNESSES**
- Under-triaging of patients
- Long wait times to triage and rooming
- Staff culture challenges
- Lack of formal triage education
- Limited staff

**OPPORTUNITIES**
- Improve accurate triage according to ESI guidelines
- Reduce wait times
- Improve nursing assignments by accurately assessing unit acuity
- Increase nursing knowledge

**THREATS**
- Staff buy-in
- Availability of adequate and effective staff education
- Financial barriers and necessary approval from CNO for expenditures
Appendix G

Root Cause Analysis
### Appendix H

Cost Calculations

<table>
<thead>
<tr>
<th>Developmental Costs</th>
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<td><strong>Student Costs</strong></td>
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<tr>
<td>QR Code</td>
<td>$35 per month x 2 = $70</td>
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<tr>
<td>Promotion of Survey</td>
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<td>Posters</td>
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<td><strong>Hospital Costs</strong></td>
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<td>Badge Reference Cards</td>
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<tr>
<td>Lead Nurse - Hourly Salary</td>
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<td>ENA ESI Training (Membership price)</td>
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<td>Nurses Attendance</td>
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**Total Costs:** $14,796
## Appendix I

### Gantt Chart

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</tr>
<tr>
<td>Poster Distribution on Unit</td>
<td>10/25/2023</td>
<td>Indefinitely</td>
</tr>
<tr>
<td>Post-Survey Posted</td>
<td>11/7/2023</td>
<td>11/16/2023</td>
</tr>
<tr>
<td><strong>Project Evaluation and Synthesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td>11/16/2023</td>
<td>11/17/2023</td>
</tr>
<tr>
<td>Project Poster Creation</td>
<td>11/1/2023</td>
<td>11/20/2023</td>
</tr>
<tr>
<td>Project Poster Presentation</td>
<td>12/14/2023</td>
<td>12/14/2023</td>
</tr>
</tbody>
</table>
Appendix J

PDSA Cycle

- Continue to monitor triage accuracy
- Consider altering education style (i.e. flipped classroom) or adding AI to triage
- Follow up staff survey
- Assess triage accuracy for improvements
- Assess baseline triage accuracy
- Staff survey
- Create education content and materials
- Educate nurses on latest ESI algorithm
- Distribute education materials (badge buddies, posters)
Appendix K

Statement of Determination

Student Project Approval: Statement of Determination

Title of project: Improving Triage Accuracy in the Emergency Department

Brief description of project: The quality improvement project will be focused on improving triage accuracy in the emergency department at a hospital in Northern California. An educational program on the ESI version 5 algorithm will be implemented and a badge reference and poster will be developed. First, a survey will be sent out to the nursing staff to assess their comfortability of triaging patients accurately and their perspectives on the current triage training and negative impacts of triage inaccuracy. Next, data will be collected from charts on patients triaged from January 2023 to April 2023 to assess triage accuracy. There will be eight educational training sessions via Zoom from September to October. Multiple training sessions will occur over two days in order to ensure all department staff are trained. The badge reference cards will be distributed before the virtual educational seminars, and will be explained by the USF master students. A poster resembling the badge reference card will be placed in designated areas for view by the triage nurse. After the training sessions, another survey will be distributed to the nursing staff to reassess their comfortability and perspectives. After an implementation period, a new set of chart pulls will occur to be compared with the previous data. An analysis of the surveys and chart data will be conducted in order to see an improvement in triage accuracy, and allow for the ongoing assessment of the potential impact on patient outcomes and the allocation of staffing resources.

This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Students may proceed with implementation.

Comments:

Signature of Supervising Faculty ________ (Date) ________ 9/16/2023 ________

Signature of Student ________ (Date) ________ 9/16/2023 ________
Appendix L

ED: ESI Post-Survey

Hello ED Staff,

We are conducting a post-intervention survey to assess the effects of the recent ESI education class. Thank you for your responses, they are greatly appreciated!

After receiving the ESI education and badge buddy resource, how often do you feel that you accurately assign patients in triage levels 1 and 2?

- Never
- Rarely
- Sometimes
- Often
- Always

*Required field

After receiving the ESI education and badge buddy resource, how often do you feel that you accurately assign patients in triage levels 3 through 5?

- Never
- Rarely
- Sometimes
- Often
- Always

*Required field
Do you agree the new triage training is sufficient for orienting new triage nurses and promoting ongoing competency?

- [ ] Strongly disagree
- [ ] Disagree
- [ ] Neutral
- [ ] Agree
- [ ] Strongly agree
Appendix M

ED: ESI Post-Survey Flier

GRADUATE NURSING STUDENTS AT THE UNIVERSITY OF SAN FRANCISCO ARE CONDUCTING RESEARCH ON TRIAGE ACCURACY IN THE EMERGENCY DEPARTMENT. WE WOULD GREATLY APPRECIATE YOUR PARTICIPATION!

UNIVERSITY OF SAN FRANCISCO
School of Nursing and Health Professions