Improving Triage Accuracy in the Emergency Department

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Improving Triage Accuracy in the Emergency Department

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NURS 653: Internship

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December 15, 2023
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Abstract

**Problem:** Mistriage was occurring at higher than acceptable rates. In turn, this caused poor staffing levels and patient outcomes. This project seeks to improve triage accuracy according to the Emergency Nurses Association’s (ENA) Emergency Severity Index (ESI) algorithm.

**Context:** The Emergency Department in a prominent bay area hospital that was experiencing high rates of mistriage.

**Interventions:** The staff nurses were required to attend a retraining on the Emergency Nurses Association (ENA) Emergency Severity Index (ESI) algorithm. Following the retraining, a follow up online exam with sample patients must be passed at 100%. Furthermore, badge buddies containing the ESI algorithm will be provided to all nurses. Additional posters containing the algorithm were posted in the department specifically in the triage area.

**Measures:** Random data collection from January, February, March and April 2023 were used as baseline mistriage rates. After the retraining and educational material distribution, charts from October 16, 2023 to November 16, 2023 were audited to assess if mistriage rates improved. Pre and post surveys assessing the staffs’ comfortability with the ESI were also used to evaluate improvements with triage accuracy.

**Results:** Mistriage rates were found to be occurring at a rate of 23% at baseline which was 400 charts from January to April 2023. The rate of mistriage improved to 10.5% for one month following the final ESI retraining.

**Conclusion:** Triage accuracy rates improved for one month immediately following the intervention. Further monitoring will be necessary to ensure improved rates are sustained.

**Keywords:** emergency department, triage, mistriage, emergency severity index, ESI, emergency nurses association, ENA
**Introduction**

Emergency Departments are required by law to treat all patients that seek medical attention regardless of their insurance status or acuity. In order to best serve the patients, they are treated based on need, prioritizing those in the greatest need and not in a first come first serve method. In order to be the most effective at prioritizing patients, emergency departments must triage patients. At this particular hospital and over 90% of US hospitals, the Emergency Nurses Association’s (ENA) Emergency Severity Index (ESI) algorithm identifies and prioritizes patients quickly and efficiently so that providers can then treat them appropriately.

The ESI is a tool designed to efficiently assess patients upon their arrival at the emergency department and to be placed in the appropriate treatment areas based on need. The Emergency Nurses Association (ENA) published version 5 of the ESI algorithm earlier this year (2023) which consists of five levels of severity. The triage system is based on research, evidence, and patient outcomes while striving to mitigate biases.

Patients present to the emergency room with an array of problems and conditions. Being able to recognize patients that require immediate lifesaving interventions, high risk interventions or by how many expected resources to treat them is necessary to sort and prioritize which patients will be seen first and who on the healthcare team will treat them.

A Level 1 patient necessitates immediate lifesaving interventions which include anyone with airway compromise, needs emergency medications or blood or who is unresponsive or only respond to painful stimuli. Level 2 is a high risk patient who could decompensate rapidly including altered mental status (acutely) or severe pain and distress (including psychological).

Levels 3, 4 and 5 are determined by how many resources are expected to treat the individual upon presentation to the emergency department. A single resource is a lab test (blood
and urine), imaging, IV fluids, medications (IM/IV/Nebulized), specialty consultation, simple procedure (e.g., laceration repair). A complex procedure (requiring sedation) would count as 2 resources. A simple exam or prescription refill does *not* count as a resource.

It is easiest to start at level 5 which requires *no* resources to treat whereas level 4 requires one resource (note: a blood and urine test together count as one resource). Level 3 will be 2 or more resources to treat based on the current assessment at registration. Patients' ESI level can only be changed if the vital signs warrant such a change and have not been seen by a provider. A patient's ESI level should not be changed to alter emergency room metrics or once seen by a provider.

Triaging patients is only effective when it is consistently accurate so that the department is properly staffed to achieve the best possible patient outcomes. This project is working to retrain nurses and provide reference materials to improve triage accuracy rates. The accuracy of triaging directly affects staffing levels to maintain proper ratios, it assures billing rates are appropriate and ultimately will provide best patient outcomes. This project focuses on improving the triage accuracy rate.

**Problem Description**

ESI levels are crucial for the emergency department in a multitude of ways with patient outcomes being of the highest priority. Mistriage, whether it be over-triage or under-triage, can be problematic for the specific patient or, in turn, adversely affect other patients that may not receive the necessary medical attention as urgently. Furthermore, triage levels are used to assess staffing levels. Appropriate staffing levels are necessary to obtain enough nurses to provide proper patient care. The ESI algorithm was recently updated in early 2023 so a retraining is necessary to be sure the nursing staff are up to date on the triage algorithm produced by the
PROVING TRIAGE ACCURACY IN THE EMERGENCY DEPARTMENT

ENA. Currently based on a random sampling of 400 charts total with 100 charts from each month of 2023, January, February, March and April, there was a 23.0% mistriage rate.

PICO Question

The PICO which is Patient, Intervention, Comparison and Outcome is the overarching question posed to investigate the research project. For this paper, the question posed is: Will an educational retraining for nursing staff on the Emergency Severity Index (ESI) algorithm with supplemental reference materials (I) help improve triage accuracy (O) of emergency department patients (P) compared to the original triage training (C)?

Rationale

Lewin’s three stage change theory is most relevant to the quality improvement project in this emergency department. The first stage of Lewin’s is unfreezing of current habits of the triage nursing staff that lead to the mistriage. To start this phase, a survey was provided to the nurses to assess their current knowledge and comfortability with the ESI algorithm. Also chart pulls of the triage data established the need to unfreeze the patterns of mistriage. Nursing management has found mistriage to be too common and has led to a negative impact on patient outcomes along with staffing issues. The ESI triage algorithm is only an effective tool if it is applied accurately and consistently.

Change is the second step of Lewin’s change model and this is where the intervention of retraining nursing staff on the ESI algorithm will occur. The retraining is a Zoom conference call with a PowerPoint lecture explaining the ESI with a focus on common problems applying the ESI algorithm. A follow-up mandatory exam will be provided to all the nursing staff to complete and pass. If they do not, further training with management will happen. This phase must be monitored for nursing resistance to this change and communicate clearly why the need to triage
appropriately. Ultimately it will be in the nurse’s best interest so staffing levels will be based on patient acuity and favorable patient outcomes will follow.

The final stage of Lewin’s theory is to refreeze the new habits and training into a nurse's daily work flow. Support from management and those specially trained in the ESI algorithm will continue to be available. To support and freeze the retraining, badge buddies containing key information regarding the ESI algorithm will be distributed to the nursing staff as reference material. There will also be the same reference material printed in poster format to be displayed in the triage area to aid in proper triage decision making. This solidifies the changes of how to apply the triage algorithm appropriately so patients receive quality and efficient care while in the emergency department.

**Search Strategy**

In order to best find the current and available literature on emergency department triage issues and concerns, the search engine provided by University of San Francisco searches multiple databases at once including CINAHL, PubMed, and Scopus. The search terms that included emergency department, triage, mistriage, emergency severity index, and patient outcomes. Reviewing cited sources in a given article also produced quality peer reviewed journals. There are ample current peer reviewed journals discussing this topic within the last 5 years from 2018 to 2023.

**Available Knowledge**

The background knowledge on nursing triage shows that many departments triage inaccurately and with a retraining supported with reference materials, the triage accuracy rates usually improve dramatically. Below are more details annotations of some of the specific sources and their studies.
Chiang’s (2021) article explored the different ESI rating levels for patients who were having an anaphylaxis reaction requiring epinephrine injection. A lower ESI level means longer wait times until receiving epinephrine. If the chief complaint was skin related (rash or itching), the ESI level was lower than if it was respiratory compromise even though it was still considered an anaphylaxis reaction. Pediatric patients tended to receive lower ESI levels than adults with similar signs and symptoms. This study reports that the patients with lower than expected triage levels did not have fatal outcomes.

An interesting investigative article by Essa (2023), found cognitive biases among inexperienced and experienced triage nurses in the emergency department. The research showed limited retraining of the ESI algorithm to experienced emergency department nurses assuming they had already received training. Most importantly this study found that experienced nurses tended to under triage patients while the less experienced nurses would over triage patients. This article raises the question as to how to fix these cognitive biases and always work towards properly assigning ESI levels appropriately.

Understanding the value of retraining nurses on triage, looking at Hoffman’s study (2022) found problems with the competency training and the mistrage rate increased from 25.3% to 28% suggesting an alternate type of training or the addition of AI software would be needed to improve these rates. This was simply a lecture based training and suggests interactive, teach back methods or other case study based learning may be needed to reinforce the concepts of the ESI.

Javadi’s (2023) study sought to find out which method of teaching would increase nurses’ knowledge and retention of triage training. There were two randomized groups that were divided into traditional lecturing and flipped classroom learning. In a flipped classroom setting, the nurses become the teachers and teach back the information to enforce the concepts and be
evaluated on their competency. Immediately following the education portion both groups showed significant increase in knowledge and understanding of emergency triage criteria. When reevaluating knowledge a month later, only the flipped classroom group showed a higher level of competency in nursing triage suggesting that flipped classroom education might be a stronger method of education in the long run.

Another issue to consider when evaluating why mistriage is happening is time of day and confounding injuries. A retrospective study was conducted at a hospital in Bangkok to determine rates of under triage and over triage and potential causes for the error. The rate of under triage was 4.9% while over triage was 26.0% for the 1,000 cases investigated. The data showed that evening admissions were often over triaged more than patients during the day. Also, it found that traumatic injuries tended to be over triaged than those without trauma injuries. Younger age (18-30 years old) was the only factor contributing to under-triaging patients (Huabbangyang, 2023).

This study investigates the accuracy of software product KATE compared to triage nurses for properly assigning triage levels to patients in the emergency department. The overall results were that KATE was 75.7% accurate while nurses were only 59.8% accurate. Even more compelling this study found that the accuracy between levels 2 and 3 which is a large defining line of how critical a patient may be, KATE was 80% accurate in differentiating these levels while triage nurses were only 41.4% accurate. This is suggestive that leveraging artificial intelligence may be a critical part of the triage process in emergency departments (Ivanov, 2021).

There is ample evidence to support the need to continue to educate nurses on triage practices. There seems to be some discrepancy on how best to go about teaching and reinforcing
the ESI algorithm. Furthermore, there is emerging evidence in support of using AI to support the nursing triage process to ensure accuracy.

**Specific Aim**

The specific project aim was to improve triage accuracy using the updated Emergency Service Index training at the hospital along with the use of supporting reference materials in the forms of badge buddies and posters. The goal was to reach the benchmark standard in the industry of 10% total mistriage rate. The process begins with surveying the nurses to understand their baseline knowledge and comfort with the ESI algorithm along with pulling a random sampling of charts to establish baseline mistriage rates. After the training and distribution of reference materials, a follow up survey was conducted to observe any changes in the staff’s comfort level and ability to triage. Also, a final random chart pull was done after all the staff has been retrained to assess mistriage rates and will ultimately be the data that shows improvement in applying the ESI triage algorithm.

**Methods**

**Project Overview**

The project has one overarching goal of improving triage accuracy through retraining of the ESI version 5 with the support of reference materials that are badge buddies and posters in the triage area. The training is online with the support of charge nurses who have gone through speciality training directly with ENA on the ESI algorithm. After the Zoom retraining, an online exam via Health Stream will be required of the nurses as well. They have two attempts to pass this exam.
The nurses will be surveyed to understand their baseline understanding and knowledge of the ESI algorithm. The online training and printed materials were developed with the charge nurses to ensure accuracy.

A baseline mistriage rate was established from a random sampling of data from January through April 2023. Any improvement to the mistriage rate will be measured after the implementation of the training to all staff. The success of this quality improvement project was measured by assessing triage accuracy of patients for one month after all nurses have undergone the training and reference materials are distributed.

**Microsystem Assessment & Stakeholder Analysis**

The purpose of the project is to improve nurses’ competency implementing the Emergency Severity Index (ESI) algorithm published by the Emergency Nurses Association to improve patient outcomes and experiences. Accuracy of triaging patients is critical so the patients receive the best possible care as well as proper allocation and planning of hospital resources.

Patients are all of those presenting to the Emergency Department at the Hospital whether they are walk-ins or brought in by EMS. Patients are of all ages and all acuity levels including life threatening emergencies.

Professionals of the microsystem are primarily those working in the triage nurse role but include all nurses, nurse practitioners, doctors, medical assistants, emergency room technicians who may help to identify critical signs or symptoms affecting the severity index level. All professionals work as a team to ensure all patients are accurately triaged. The process includes understanding and refining how patients are initially assessed to be assigned their ESI triage level upon registration so improvements to triage accuracy can be made. To evaluate the patterns
of the emergency department’s ability to triage appropriately, comparing the full assessment data to the initial triage level will give an indication if the triage levels are appropriate.

Stakeholders in this quality improvement project include all of the following parties involved from the patients whose care is directly affected by accurate triage, the nurses, charge nurses, nurse managers, and providers. While triage is a nurse driven process, it does affect the flow of the entire emergency department. In the short term, the patient may be most affected by triage but ultimately all stakeholders will be affected by accuracy of triage. All stakeholders have an interest to strive for triage accuracy.

**Plan, Do, Study, Act (PDSA) Cycle**

In the PDSA cycle, as found in Appendix C, collaboration with the charge nurses took place to plan to take a random sampling of triage data to understand the scale of the problem, design the educational materials, and the online zoom retraining of the ESI algorithm. A staff survey was needed to better understand the baseline knowledge and comfort level of the ESI algorithm. A poster with a QR code was distributed to the nursing staff. When participation levels were low, an offering of free pizza was provided to incentivize participation. Ultimately 29% of the nursing staff participated in the survey. Making it mandatory or providing cash incentives could improve participation rates.

For the Do phase, the historical data of mistriage was pulled for January, February, March and April of 2023 to set the baseline mistriage rate. The next step was to design the badge buddy and poster in Canva to complement the online educational training. The education took place with a follow up exam for the nurses to complete; anyone that did not pass the follow up exam will be offered additional retraining to clarify any issues.
For the third step in the cycle, a follow up survey will be provided to the nurses to assess their perception of the retraining and new comfort level with the ESI algorithm. Ultimately, the success of the quality improvement project will be determined if random chart pulls show an increase in triage accuracy in the month following the final retraining session. Each month following the initial training triage accuracy should be assessed to determine if there are sustained accuracy improvements.

The final step in this cycle will be to continuously monitor triage accuracy and adjust future training accordingly to be sure the department maintains the improved mistriage rates. As new hires are added to the nursing team, thorough ESI training will be included and if the data shows mistriage rates beginning to rise again, additional training must be held. The possibility of a flipped classroom (teach back method) training may be needed in addition to other resources or materials or possibly the implementation of AI software to recognize critical vitals and warning signs.

**Root Cause Analysis (RCA)**

A root cause analysis is an approach to understand the underlying origins of what might be causing the mistriage issues. A fishbone diagram was created to provide a visual representation of the root causes which is available for reference in Appendix D. Some of the common potential causes for triage error include judgment error, collecting inaccurate or insufficient data, insufficient staffing, equipment errors or simply a lack of understanding of the ESI algorithm. The RCA determined that misunderstanding of the ESI algorithm and biases into the triage process were some of the leading causes of mistriage. For example, intoxicated patients were often under-triaged; however, if they only responded to noxious stimuli the nurse should assign them as an ESI level 1 based on the algorithm. This undertriage error includes both
a misunderstanding of the algorithm as well as bias against repeat patients. Accuracy of equipment for blood pressure or EKG were not investigated in this project but remain a potential root cause of mistriage if critical vital signs are not found due to equipment failure.

**Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**

A SWOT analysis was completed to better understand various aspects of implementing this quality improvement project from the start. The SWOT is subject to change as the implementation of the project progresses. The detailed SWOT analysis is also available in Appendix E. Strengths in this microsystem include the support of management along with experienced and knowledgeable staff. Another strength includes successful implementation of other evidence based projects in the past in the emergency department. The weaknesses include the subjective nature of information presented by patients, history of mistriage of patients, and staff culture resistant to change. Opportunities include reducing patient wait times and improving hospital ratings. Meanwhile threats include nurses resistant to change, the cost to retrain staff and the potential cost to hire more staff if undertriage is corrected.

**Cost-Benefit Analysis (CBA)**

The cost of implementing this project totaled $14,796 which included the nurses’ wages to attend the training, the cost of the charge nurses’ wages to provide the training to the staff as well as to attend ENA’s training, cost to print 150 badge buddies and posters, and survey related costs. There are no additional costs to consider or estimate at this time that are related to the implementation set forth in this quality improvement project.

Staffing levels are directly related to patient acuity levels (i.e. higher acuity patients need to have higher staffing ratios); specifically undertriage is causing lower staffing levels in the unit because the triage levels are not capturing the true acuity of the patients. Staffing levels should
be appropriate for treating the specific acuity levels of the patients. Treating critically ill patients with the proper staff will avoid adverse patient outcomes and the costs associated with those negative outcomes.

Also, billing is related to the acuity of a patient, so it is crucial that ESI levels are accurate so the hospital can bill at the appropriate rate for the services rendered. Billing is on a point based system that when 251 points are accrued for a given patient, the patient is considered a critical care patient with higher rates for the insurance company. A level 1 ESI patient is assigned 20 points while an ESI level 5 is given 0 points, the remaining levels are assigned in 5 point increments. The monetary benefits here will be better understood after accuracy along with proper charting improves and the billing department can assess increases in revenues as this study was not able to access all billing data.

Furthermore, in doing a CBA for this project, the benefits for this project may not be seen upfront in terms of monetary value. However, if the training fails to maintain accurate triage rates for the long term, then potentially KATE AI could be an alternate solution to implement. While KATE has an initial investment to be implemented, the accuracy of patient triage is not left to chance in the hands of a single triage nurse. It can help to recognize critical patients to get the appropriate care they need and avoid costly negative patient outcomes due to mistriage. A visual representation of the CBA chart is found in Appendix G.

**Timeline**

This project will be implemented starting in August of 2023 and ending December 2023. The Planning, execution and assessment of the project is visually represented in the Gantt Chart and is available to see in Appendix H. For this project, there is only one month of available data
since the last training has taken place and the reference materials were distributed and posted in the emergency department.

**Intervention**

The primary intervention for this quality improvement project is the online Zoom training reviewing each level of the ESI algorithm as well as what qualifies as a resource to determine the appropriate levels 3, 4 and 5. The training also highlighted when to differentiate between levels 1 and level 2 as well as level 2 versus level 3 where some of the most critical determinations of patient acuity must be made. The education is approximately 1 hour to review the ESI algorithm with a follow up exam for each nurse to complete on Health Stream. The badge buddies, one per nurse, and the ESI algorithm poster are also included as part of the intervention.

**Study of the Interventions**

The primary way to study the interventions will be to see if triage accuracy improves by assessing triage data from charts. Furthermore, survey results from the nurses to assess if they feel like they learned more about triaging from the training, the competency test, badge buddy or having the reference posters will assess the effectiveness of this project.

**Measures**

To best measure the effectiveness of the education, data collection will occur following the date of the last training when all nurses have completed it. A random sample of 400 charts in the month (October 16, 2023 to November 16, 2023) following the final training will be reevaluated for triage accuracy.
**Ethical Considerations**

This quality improvement project was thoroughly assessed for any ethical considerations and no concerns were present. Sensitive patient data was protected throughout this project by shredding printed patient lists at the hospital. Patient names were not used in this project.

**Results**

The results of a random sampling of 400 charts (100 per week) from the period of one month from October 16, 2023 to November 16, 2023 have a mistriage rate of 10.5% with the rate of undertriage at 6.25% and overtriage at 4.25%, which was close to our goal of 10% mistriage rate. The baseline mistriage rate starting this project was at 23.0% representing a total reduction of 12.5% to the mistriage rate.

The staff survey results with 28 responses, which represents 22% of the nursing staff, found an improvement in perception of ability to triage accurately when compared to the prior survey. Nurses believe the department ‘often’ triages accurately 61.5% which was an increase from 35.1% that originally said the unit ‘often’ triages appropriately. Also 53.8% of the nurses found they ‘agreed’ the training was sufficient while 23% ‘strongly agreed’ the training provided them with the tools and knowledge to triage accurately. Overall the staff rated the training as an improvement to prior training and has had a positive impact on triage accuracy. Over 85% of the nurses reported ‘likely’ or ‘very likely’ the training education provided this positive impact. These numbers in the department suggest the staff was ultimately receptive to the implementation of the project.

**Discussion**

These initial data findings suggest that the educational intervention and supplemental reference material was effective in improving triage accuracy. However, this is only the first
month after the retraining has been completed so while the trend is in the right direction, further monitoring of triage accuracy will be needed to assess the longevity of the training.

**Limitations**

This project was limited in time from start to finish, preventing the long term study of how well the education improves triage accuracy over time. The longevity of improved triage accuracy is important for understanding the long term implications for the unit including staffing, patient outcomes and billing concerns. Limited staff participation in the pre and post surveys limited the amount of available data to analyze to best tailor the education materials. Furthermore, the researchers had limited experience with the ESI prior to evaluating charts for accuracy which could potentially alter the mistriage rate data.

**Summary**

This study and intervention found that improving triage accuracy is possible and in the long run will promote proper staffing levels, maximize billing rates and promote best patient outcomes at this stage in the treatment process. An online lecture, follow-up exam and reference materials appear to be effective for improving triage accuracy rates in the emergency department according to the data collected in this project. Making the training mandatory was crucial to have full staff participation. With the development of a clear PICO question, microsystem assessment, root cause analysis, and retraining with supplemental reference materials can make an improvement to triage accuracy in this microsystem.

**Conclusion**

This quality improvement project was successful in increasing triage accuracy rates based on the current data. Sustained levels of triage accuracy in the long-term will be important to
monitor. Consistent triage accuracy is necessary to alter staffing levels, adjust billing levels and ultimately track patient outcomes which would all be follow-up studies to evaluate effectiveness. Furthermore, AI software such as KATE that integrates directly into EPIC should be considered as an additional tool that can improve triage accuracy and minimize human error. The project framework with a microsystem assessment, plan-do-study-act cycle, and RCA are in place so that new training cycles can be implemented or altered as needed to continue to maintain high levels of triage accuracy. Ongoing education will be necessary for even the most experienced staff to refresh any technical changes as well as promote the importance of accurate triaging for the department as a whole.
References


Appendix A: 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. 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. A poster resembling the badge reference card will be placed in designated areas for view by the triage nurse. 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) 9-16-23

Signature of Student ____________________________________________ (Date) 9-16-23
Appendix B: Education Materials

### ESI Algorithm

1. **Requires life saving measures?**
   - Yes → 1
   - No → 2

2. **How many different resources are needed?**
   - 2 or more resources → 3
   - 1 resource → 4
   - No resources → 5

3. **High Risk Vitals?**
   - Yes → Reassess
   - No → Proceed

### High Risk Vitals

- **Age**
  - < 1 mo: < 190
  - 1 - 12 mo: < 160
  - 1 - 3 yr: < 140
  - 3 - 12 yr: < 120
  - > 12 yr: < 105

- **SpO2 < 92%**

### Resources

<table>
<thead>
<tr>
<th>Resources</th>
<th>Not Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labs (blood, urine)</td>
<td>Hx and physical exam (including pelvic)</td>
</tr>
<tr>
<td>ECG</td>
<td>Point-of-care testing</td>
</tr>
<tr>
<td>Xray</td>
<td>Saline or heparin lock</td>
</tr>
<tr>
<td>CT</td>
<td>PO medications</td>
</tr>
<tr>
<td>MRI</td>
<td>Tetanus immunizations</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>Prescription refills</td>
</tr>
<tr>
<td>IV fluids</td>
<td>Call to primary care provider</td>
</tr>
<tr>
<td>IV/IM/nebulized medications</td>
<td>Simple wound care (dressings, recheck)</td>
</tr>
<tr>
<td>Specialty consultation</td>
<td>Crutches, splints, slings</td>
</tr>
<tr>
<td>Simple procedure (laceration, urinary catheter)</td>
<td>Complex procedure (conscious sedation)</td>
</tr>
</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 C: Plan, Do, Study, Act (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 D: Root Cause Analysis (RCA)

FISHBONE DIAGRAM

- **Measures**: EKG errors, Calibration error, Triage performance
- **Materials**: Lack of ESI badge reference card, Lack of AI program to catch triage errors
- **Methods**: ESI algorithm, Improper use, Judgement error, Lack of education on ESI algorithm
- **Environment**: Lack of resources and/or available beds
- **Personal Factors**: Fatigue, Stress
- **Machines**: EKG errors, Improper analyser, Calibration error

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IMPROVING TRIAGE ACCURACY IN THE EMERGENCY DEPARTMENT
Appendix E: Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

**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 EkoPatch 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 F: Research Survey

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!

In partnership with
ED: 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!

rvharrington@dons.usfca.edu Switch account

* Indicates required question

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

- Never
- Rarely
- Sometimes
- Often
- Always
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you feel that you accurately assign patients in triage ESI levels 3 through 5?</td>
<td>Never, Rarely, Sometimes, Often, Always</td>
</tr>
<tr>
<td>As a department, how often do you believe patients are being appropriately triaged?</td>
<td>Never, Rarely, Sometimes, Often, Always</td>
</tr>
<tr>
<td>Do you agree the current triage training by the department is sufficient for orienting new triage nurses?</td>
<td>Strongly disagree, Disagree, Neutral, Agree, Strongly Agree</td>
</tr>
</tbody>
</table>
Do you believe an inservice education program on the new ESI version 5 algorithm will positively improve triage efforts in the department?

- Very unlikely
- Likely
- Very likely

Briefly describe your understanding of the negative impact under-triaging has in your department.

Your answer

Please provide any suggestions you may have to help improve triage accuracy in your department.

Your answer

Submit
Clear form

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Google Forms
Pre-intervention Survey Results

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

37 responses

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

37 responses

As a department, how often do you believe patients are being appropriately triaged?

37 responses
Briefly describe your understanding of the negative impact under-triaging has in your department. 27 responses

- People who need to be seen wait longer than needed and people who could wait are seen before those who may need to be seen sooner
- Resources are stretched thin
- Impact patient negatively
- Inadequate patient care
- It incorrectly and ineffectually reflecting patient assignments and capturing the true acuity in the department
- Potentially sick patients with abnormal vitals are left in WR due to mistriage. Staff don’t seem to follow the ESI algorithm.
- Not having enough staff
- Affects provision of safe care to patients
- Improper rooming and waiting times
- Under triaging puts patients at risk who may need more immediate attention, especially when we have a full waiting room and no beds.
- It doesn’t reflect the acuity of the department as a whole. Acuity represents how urgent resources are needed. In addition, having a proper acuity helps upper management understand the need for more nurses and therefore quality care.
- we have traditionally triaged to the department so upper management does not want to staff us for the high acuity patients we care for
- High risk patients or critical patients aren’t seen in a timely manner. Also sick patients aren’t identified and assigned to the proper area/nurse.
- Death…worse case
- It can cause unnecessarily longer wait times for critical patients.
- It creates longer wait times, delay in care and
Patient safety and risk for further injury and complications related to increased wait times in the waiting room

Loss of patients in the flow; delays of care

Not providing the best care efficiently or allocating resources

Looks as if we have lower patient acuity than is true, which makes it difficult to have appropriate staffing. Also patients have better outcomes when triaged appropriately.

In other hospitals triage was important because providers would see the acuity and make those patients a priority. Under triaging in the ED allows for potentially sick patients to sit in the waiting room longer.

Patient is not getting room appropriately and nurses can get overburden by wrong under triaged patient

Not getting the sick pts to resources fast enough and patient is possibly harmed

the lower the acuity, I feel like the sense of urgency in the dept correlates with that so under-triaging a patient that could potentially become very acute/unstable can be dangerous

Longer door to bed times for fragile patients, inaccurate representation of acuity of patients in the department,

Negative outcomes for patients, decreased patient safety, inaccurate staffing

Financial and staffing consequences. Doctors will order what they feel is necessary, despite ESI level.

Please provide any suggestions you may have to help improve triage accuracy in your department. 22 responses
• Better triage process training and unique scenarios. Less death by PowerPoint and more applicable scenarios.

• There is an esi course being created. It will help

• Case for review

• Poster of ESI algorithm visible in triage

• Additional training and continued training

• All staff performing triage should take the ENA ESI course at least every 2 years to refresh knowledge and to get everyone on the same page. Providers should take courses too to understand what ESI is and why we assign levels the way we do. We perform hundreds of triage a day but never retrain after initial training. We are required to keep up BLS ACLS PALS NIHSS. Triage should be required upkeep training.

• Provider that is assigned to triage to tip in real time

• feedback

• Routine reminders and trainings with examples

• The re-iteration of assigned ESI 2 for “high risk” patients, which I feel is too often overlooked

• I think every nurse who is triage capable at the bedside, needs to also undergo this training. It should not be just for a triage, Trang Nurses, but it should be a requirement for all nurses working in the emergency department.

• educate the staff on correct levels

• Additional training

• More training
- Triage nurses need to have a better understanding of interventions and severity of certain situations
- Further education and recurrent training
- I think signage on every computer. With very clear criteria. Such as medications given makes this person a level 1. For level 3-5 what constitutes resources needs to be updated and specific to our department
- Mandatory triage training for all RNs in ER and yearly competency education for ESI levels
- In-service with typical presentations of patients/examples that we see often and correct ESI levels.
- Find common patient scenarios that are inaccurately triaged and create a cheat sheet or flow chart? Create a standard or department wide policy so everyone is on the same page. Include it in triage training and update periodically
- Increased structured training
- Awareness is improving
### Appendix G: Cost-Benefit Analysis (CBA)

<table>
<thead>
<tr>
<th>Developmental Costs</th>
<th>Calculations</th>
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<tbody>
<tr>
<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>
<td>$29 x 2 = $58</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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<tr>
<td>Nurses Attendance</td>
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**Total Costs:** $14,796
## Appendix H: Gantt Chart

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<tr>
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<tbody>
<tr>
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<td>Statement of Determination</td>
<td>9/9/2023</td>
<td>9/16/2023</td>
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<tr>
<td>Badge Buddy Creation</td>
<td>9/11/2023</td>
<td>9/20/2023</td>
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<tr>
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<td>Post-Survey Development</td>
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<tr>
<td>Post- Data Collection</td>
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<td><strong>Project Implementation</strong></td>
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Appendix I: Post-Intervention Survey Results

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?
28 responses

- 35.7% Always
- 64.3% Sometimes

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?
28 responses

- 57.1% Sometimes
- 25% Often
- 17.9% Rarely

After receiving the ESI education and badge buddy resource, how often do you feel the department as a whole is accurately assigning triage levels?
28 responses

- 64.3% Often
- 32.1% Rarely
Do you agree the ESI education and resources are sufficient for orienting new triage nurses and promoting ongoing competency?
28 responses

Do you believe that the ESI education positively impacted triage accuracy in the department?
27 responses