Integrating Evidence-Based Triage Protocols in an Emergency Department

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Abstract

Today emergency department (ED) overcrowding remains a concern at a global level posing a public health problem resulting in patients leaving the ED without being seen and an increased patient safety risk. The goal of this quality improvement project was to improve ED throughput of a Federal facility combining direct bedding, provider in triage (PIT), and implementation of evidence-based triage nursing protocols early in the patient visit. The Donabedian model was utilized for this project as delivery of quality care and improvement of patient outcomes is the overall goal. The project included education of evidence-based triage protocols and updated facility policy and procedures to a convenience sample of ED registered nurses (RNs). ED quality metrics were compared pre and post implementation of the project. The project resulted in an improvement in leave without being seen (LWOB's) from 3.6% to 0.97%, door to provider time from 32 minutes to 12 minutes, and length of stay (LOS) from 367 minutes to 334 minutes.

Keywords: Emergency department, overcrowding, nursing protocols, patient safety

Integrating Evidence-Based Triage Protocols in an Emergency Department

Overcrowding in the emergency department (ED) has become a significant concern at a national level resulting in increased length of stay, decreased door to provider time, patients leaving without being seen, and increased risk of patient safety. The Institute of Medicine (IOM) and the American College of Emergency Physicians (ACEP) has gone as far to identify ED crowding as a critical threat to public health (Chang et al., 2018). Many studies have been conducted over the past decade in the attempt to determine the root cause and solution to this chronic problem. Several components contributing to ED overcrowding include: an aging community, difficulty accessing care, and ED utilization for nonemergencies (Pierce & Gormley, 2016). Facilities are constantly working to improve processes to ensure patient safety and have optimal patient outcomes. Unfortunately, there continues to be lengths of stay (LOS) greater than six hours, patients leaving without treatment, increased door to provider times, and patient dissatisfaction. Many hospitals are tied to these time-sensitive metrics from the Centers for Medicare and Medicaid Services (CMS) to evaluate performance.

There are hurdles the patients must overcome before being seen by the provider or triage nurse. The typical process for the patient entering the ED is initially registration, then evaluation by a "Quick Look" nurse, followed by the "Secondary" triage nurse. A triage acuity is assigned using an evidence-based research scoring system such as the Emergency Severity Index (ESI), subsequently the patient is either escorted to the "Fast Track" area, lobby, or directly bedded. In most high volume, high census EDs there is a provider in triage (PIT) that will perform a rapid medical exam and initiate appropriate laboratory and diagnostic studies in order to expedite care. However, if there are multiple patients that arrive simultaneously, there may be an unknown wait

time to be triaged after registration. The Agency for Healthcare Research and Quality (AHRQ) has set forth quality measures that will be affected by unaccounted time waiting for triage evaluation and door to provider time of which has been shown to be an important measure per previous studies (Houston, Sanchez, & Fischer, 2015).

Background

Patients present to the ED with the expectation of being treated in a timely fashion however, in 2011 the AHRQ reported that two percent of ED patients leave without being seen due to the long wait times (Marino, Mays, & Thompson, 2015). The practice site is a government facility in Southern Nevada that opened in 2013 and has an adult/geriatric patient population with multiple co-morbidities and chronic conditions. There is a growing body of evidence suggesting that elderly patients with complex, multi-morbid conditions represent an increasingly important driver of ED crowding (Morley, Unwin, Peterson, Stankovich, & Kinsman, 2018).

The ED nurse manager at the practice site facility expects the patient is to be directly bedded to an open ED bed, unfortunately this is not a consistent practice. Direct bedding or "pull till full" process after registration produced a significant decrease in the median door-to-bed, door-to-provider, leave without being seen (LWOBS), and door-to-discharge metrics for an Orlando, Florida hospital after a three-month time frame (Porter, Frye, Rodriguez, Valez, & VanDenburg, 2018). The practice site facility has a current protocol in place for the triage nurse to assign an acuity and initiate the triage nurse protocols per the patient complaint however, there is not a policy that specifically states when the triage nurse-initiated protocols are to be deployed therefore nurses are not initiating the protocols. Morley, Unwin, Peterson, Stankovich, and Kinsman (2018) performed a systematic review to critique the findings of peer-reviewed

research studies to investigate the causes, consequences, and solutions to ED crowding: In 13 studies poor adherence to approved guidelines is reported as a consequence.

The practice site conceived triage nurse-initiated protocols to improve departmental performance and patient safety nonetheless, it has been observed that the triage nurse-initiated protocols are consistently not being utilized subsequently this underutilization is reflected in department metrics. The outcome of time-sensitive illness weighs a great deal on triage decision making with research establishing a correlation between time of ED arrival to disposition morbidity and mortality (Hinson et al., 2018).

Problem Statement

Extended length of stays and prolonged door to provider time has become an area of concern for the practice site ED resulting in patient dissatisfaction, increased risk of patient safety, and potential reimbursement loss. Current protocols require revision and annual review to ensure current best practices are integrated.

The current approach at the practice site is a PIT when available during the weekdays and "fast-track" for non-urgent acuity patients during specific hours. Current policies in place include: triage practices and procedure for assigning an acuity level, and ED nursing protocols. There is a recognized noncompliance with initiation of ED nursing protocols due to concern for an education shortfall and department culture. Management and leadership team support is essential to ensure protocol adherence is sustained (Douma, Drake, O'Dochartaigh, & Smith, 2016).

Purpose Statement

The purpose of this project is to reduce ED length of stay and reduce the door to provider time by implementing an evidence-based triage protocol process at the project host site. By

achieving this process, the result will be in compliance with the national initiative for ED overcrowding, improved reimbursement, improved access to care, increased patient safety, reduced length of stay, and reduced door to provider time.

Project Question

The project question is: Would there be a reduction in patient door to provider time and decreased length of stay by implementing an evidence-based triage protocol, as compared to current practice, within the time frame of the doctor of nursing practice (DNP) program? The project question inquiry has been formulated upon the problem, intervention, comparison, outcome, and time method (PICOT). The population of interest is the ED providers and nurses. The intervention is to implement an evidence-based triage protocol. The comparison is to the current practice of not following a triage protocol. The outcome would be an improvement in length of stay and door to provider time as evidenced by the metrics when compared to before the implementation of the process. The time period will be within the DNP program.

Project Objectives

The objectives for this project will be completed within the timeframe of the DNP program.

1. Evaluate and update current triage protocol and policy to reflect current best practice.
2. Improve throughput by reducing ED LOS by 40%.
3. Improve door to provider time by 40%.
4. Reduce LWOBS by 40%.
5. Evaluate compliance with new protocol and policy through evaluation of ED metrics post project intervention.

Significance of Evidence

The overcrowding of EDs has reached epidemic levels worldwide and involves a negative impact on patient safety: the practice site is a facility that is also challenged by this issue. There is a clear correlation between ED overcrowding and patient mortality therefore, improving throughput is essential (Ross, 2017). The triage process directly influences the trajectory of the patient hospital course therefore time delay to triage evaluation has a cascading effect resulting in increased LOS and LWOBS.

Carter, Pouch, and Larson (2014) noted that bottlenecks that occur during intake and extended LOS have been associated to increased rates of patient LWOBS. Consequences of increased LOS and LWOBS results in delayed care, reduced overall patient satisfaction, increased inpatient mortality, and risk for insufficient outcomes all resulting in patient safety issues. LOS is a key measure of throughput for the ED, timed studies have proven decreased LOS in the ED when diagnostic imaging, laboratory testing, and treatments are initiated early in the ED visit (Robinson, 2013). Decreasing the overall LOS by any means has financial benefit to the facility thus, shorter LOS means more capacity to treat patients.

Search Terms

A systematic search of electronic databases, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed to identify relevant literature published between 2008 and 2018. The key terms used were “emergency department overcrowding”, “decreased length of stay”, “door to doctor”, “triage nurse protocol”. The terms “direct bed”, and “nurse-initiated protocol” were also used as key terms. The search was further limited to full-text, peer-reviewed articles, and to the English language. The term “emergency department overcrowding” yielded 3,772 results. The terms “emergency department overcrowding”, “decreased length of stay”,

"triage protocol", "door to doctor" yielded 193 results. Twenty-three articles were published in English, empirically based, and encompassed a robust sample size from the past five years with studies in the United States and internationally. One article was selected as the content was relevant and it was published in 2010. An abstract review was performed of the articles evaluating for peer reviewed, high hierarchy of evidence, and relevance to the practice site mission and vision. In total, 20 articles will be the focus of the following literature review. The articles that were excluded were not applicable to the practice setting, did not support the goals of the practice site, did not reference national guidelines, and findings were not reproducible.

Review of Literature

The chosen articles had a congruent theme of reproducing evidence supporting initiation of evidence-based triage protocols that improve patient outcomes thus supporting the mission and vision of the organization and the nursing staff caring for the patient population at the project site.

Nurse-initiated protocol

Falconer, Karuppan, Kiehne, and Rama (2018) found that a redesign of door-to-vital signs by either direct bedding the urgent patients or redirecting the non-urgent patients through the non-urgent care process decreased LWOBS and door-to-vital signs process from 43.1 minutes to 6.44 minutes. The literature also suggests that a more experienced registered nurse (RN) performing triage using a standardized method will have a lower elapsed target time from ED arrival to treatment endpoints thus promoting better outcomes for the patient (Hinson et al., 2018; van der Linden, Meester, & van der Linden, 2016). A significant decrease was observed in the median door-to-provider, door-to-bed, and door to discharge metrics by combining a

standardized nurse led triage process while incorporating direct bedding, “pull-till-full”, and “quick look process” (Porter et al., 2018; Wolf et al., 2018; Marino et al., 2015).

Gardner, Friedman, Carlson, Bradham, and Barrett (2017) examined ED overcrowding associated with LWOBS, patient safety concerns, low satisfaction scores from patients, and lost revenue of the ED. The aim of the article was to measure the impact of revised triage by placing a PIT in conjunction with nurse led triage with the primary outcomes to decrease door to provider, LOS, and LWOBS. This study took place at a Level 1 Trauma, adult ED (with 70,000 annual census and 34% admission rate). A 2016 chart review found a decrease of 15 minutes for door to provider time and a decrease of 34 minutes on LOS. The LWOBS decreased from a pre-study rate of 4.6% to 2.2% with all p-Value comparisons <0.01. Overall, the revised triage process improved throughput ED metrics for this busy facility. The findings from this study echo in the literature previously reviewed: enhanced revised triage evidenced improvement in LOS, door to provider, and LWOBS metrics (Cheng et al., 2013; Pierce & Gormley, 2016).

Regulatory impact

Sharieff et al. (2013) conducted a comparative, pre- and post-intervention study at a San Diego, California ED with the objective to decrease the strain of their overcrowded ED based on the new regulatory measures mandated by CMS that required reporting times from triage, admit decision, and admit time. After a revision of the RN triage process and redesign of ED flow the conclusion of their study demonstrated a “dramatic” decrease in time to provider, LOS and LWOBS metrics.

Vermeulen et al. (2014) conducted a retrospective cohort study in Ontario, Canada of all ED visits at a control and revised process site to evaluate ED LOS and patient flow after the revision was initiated three years prior as a strategy to improve wait times and meet government

mandated metrics for revenue reimbursement. Overall the program that was revised did show a reduced ED wait time however, it was found that further evaluation of this particular process was warranted before widespread implementation due to certain initiatives such as pay for performance and public reporting.

Chang et al. (2018) performed a mixed methods study for incorporating certain strategies with the aim to reduce LOS in the overcrowded ED. This study involved sixteen hospitals with different levels of performance ranging from high to needing improvement. A similar study performed by Zocchi, McClelland, and Pines (2015) evaluated 42 hospitals that also assessed ED throughput, LOS, LWOBS, and door to provider time. The strategies that were utilized varied and included one or more of the following:

- Bedside registration
- Triage-initiated protocol
- Fast-track area
- PIT
- Reallocation of staff
- "Pull till full"
- Discharge lounge

The top performing facilities that had illustrated the greatest reduction in LOS, door to provider, LWOBS, and overall ED throughput revised their process to include a combination of: "pull till full", bedside registration, triage-initiated protocol, and PIT. The hospital collaborative that included 42 facilities demonstrated an average of decreased LOS by 26 minutes, LWOB rates reduced by 1.4 absolute percentage points (95% CI 0.2 to 2.7) with subsequent reduction in ED boarded patients by an average of 20.9 minutes (Zocchi et al., 2015).

Nursing Processes

The following literature discussed how nursing processes directly impact LOS, LWOBS, and ED overcrowding by utilizing certain methods to include "pull till full". Direct bedding or "pull till full" is when the patient is taken directly to an available bed, this process is continued until there are no more available ED beds. This process allows for the patient to be expedited through the hospital stay. Once the patient arrives to their assigned bed, the bedside registration is completed along with a comprehensive triage assessment to include vital signs and initiation of nurse protocols.

Salway, Shoenberger, Mallon, and Viccellio (2017) along with Wang et al. (2018) performed evidence-based studies in the U.S., Chile, and Beijing to find a cause and solution as to why ED overcrowding is occurring worldwide. These studies mirror the same problems to include misuse of the ED, ED boarded in-patients, and lack of in-patient bed capacity. The solutions for the studied facilities was a combination of triage nurse-initiated protocols, PIT, fast-track, rapid bed cleaning, and "pull till full". Measures taken to decrease ED overcrowding subsequently decreased LOS and revenue reimbursement. The 18 metropolitan teaching hospitals that were evaluated in Beijing proved to be the most challenging with ED flow due to emergency medicine being a fairly young discipline and the focus being on satisfaction: therefore, it was common for nonmedically indicated requests to be granted thus resulting in increased LOS.

Robinson (2013) proved through timed studies that LOS in the ED is directly influenced by launching diagnostic and laboratory studies early in the ED visit. The literature also demonstrated evidence that with appropriate education the RNs demonstrate the skill set to implement triage protocols that affect ED LOS and facility throughput. Begaz et al. (2017)

conducted a prospective, randomized, controlled trial that examined 1,659 adult patients in a community ED when the department was at capacity with patients waiting in the lobby. The aim of this study was to discern if the LOS would be affected by initiating protocols at time of triage. The results of the study showed, the patient spent significantly less time in the ED bed, reduced LOS, and decreased LWOBS. Douma et al. (2016) and Wiler et al. (2010) resonated in the literature that nurse-initiated protocols combined with "pull till full", bedside registration, dedicated "fast-track" will result in reduced LOS, LWOBS, and door to provider.

In summary, deploying nurse-initiated protocols early in the ED visit alone or combined with the above-mentioned strategies will improve LOS, LWOBS, and door to provider metrics with an upshot of increased patient satisfaction and department reimbursement.

Impact of ED overcrowding

The impact of ED overcrowding has been designated as a worldwide problem to include patient safety risks, increased patient mortality, delayed time sensitive illness interventions, and substandard adherence to approved guidelines. Morley et al. (2018) identified a significant association with physical violence directed toward the staff with subsequent staff stress and increased medication errors in the course of ED overcrowding during a retrospective chart review.

Addressing the Problem with Current Evidence

The reviewed literature outlines tactics to confront ED overcrowding with the theme to accelerate throughput within the ED by focusing on the "front-end" operations to include: nurse-initiated protocols early in the visit, PIT, "pull till full", bedside triage, and a designated "fast-track" for nonurgent acuity patients.

Review of Study Methods

Upon reviewing the study methodologies in the discussed literature, the emerging themes are relevant to this DNP project. The literature discussed included randomized controlled trials, meta-analysis of randomized controlled trials, retrospective and observational studies, mixed-methods comparative studies, multicentered cross-sectional studies, integrative reviews, systematic review of peer-reviewed research studies, retrospective cohort studies, exploratory qualitative studies, and interventional trials. These methods are relevant to the aim of the studies performed and are relevant to this DNP project. These study methods are relevant to this DNP project because they are reliable and valid since all produce the same results of decreased door to provider time, LOS, LWOBS with subsequent reduction of ED overcrowding, increasing patient safety and satisfaction. These methods will be able to be translated to the practice site during the DNP project for a successful end result.

Current recommendations.

The current recommendations cited in the literature is to initiate diagnostic testing early via nurse-initiated protocol, have a designated "fast-track" for nonurgent acuity patients, PIT, "pull till full", and bedside registration. Staff education and competency with triage acuity guidelines and nurse-initiated protocols along with staff buy-in of the process will boost ED throughput success.

Benefits of Current Recommendations.

Benefits of current recommendations contrived in the literature included decreasing LOS, LWOBS, and door to provider while enhancing patient safety and patient satisfaction. Additional benefits for meeting mandated metrics are increased department revenue and reimbursement.

Significance and Implications to Nursing Profession

ED overcrowding threatens the safety of the patient population as well as the mission of the nursing staff subsequently proving to be a significant concern to nursing leadership and nursing as a profession. The literature supports nurses to be proactive and autonomous by initiating evidence-based triage protocols thus endorsing nurses to be operationalized to the full extent of their scope of practice; resulting in improved quality healthcare and outcomes as well as a positive impact on nursing as a profession. A population study performed in Canada estimated that reducing ED LOS by one hour could decrease death in high-risk patients by 6.5% and by nearly 13% in lower-risk patients (Barish, McGaulgy, & Arnold, 2012).

In addition, the literature reflects that education to the nursing staff improves patient LOS, LWOBS rates, and patient safety by initiating protocols early in the ED visit therefore reducing ED overcrowding. This DNP project will reflect improved patient and organizational outcomes by directly involving the nursing staff to implement updated nurse triage protocols.

Theoretical Framework

The Donabedian framework model will be applied as the conceptual framework for this project. Avedis Donabedian, an immigrant from Lebanon studied epidemiology and health services administration at the Harvard School of Public Health and was later recruited to the University of Michigan in 1961. It was there that Donabedian worked to define and develop methods to measure the quality of health (Ayanian & Markel, 2016). Dr. Donabedian died on November 9, 2000 at the age of eighty-one. Students often referred to Donabedian as “Mr. Structure-Process-Outcome”. In addition, Donabedian is known internationally for the works “Seven Pillars of Quality” (Mullan, 2001). A diagram of the Donabedian model is provided. (See Appendix A).

Historical Development of the Theory

Dr. Donabedian published his landmark article in 1966 proposing the use of a triad; structure, process, and outcome to evaluate the quality of medical care while emphasizing the need for valid and reliable measures that were readily reproducible (Ayanian & Markel, 2016). Dr. Donabedian focused on the evaluation of the medical care process at the level of the clinician-patient interaction. Donabedian continued to demand evidence and to ask the essential questions of "What goes on here and how it can be better?" with the idea that greater neutrally and detachment are needed in quality studies (Donabedian, 1966, p. 721). Eleven years after Donabedian's 1990 article entitled *Medicare: A Strategy for Quality Assurance*, the "Seven Pillars of Quality" were later emulated in the Institute of Medicine (IOM) report *Crossing the Quality Chasm,* that highlighted six core aims for the 21st-century (Ayanian & Markel, 2016). These core aims have become benchmarks for health care organizations around the globe. It is clear that Dr. Donabedian left a legacy for the future clinicians to assess the delivery of quality health care to patients from his timeless framework. This framework is relevant to the nursing profession as it is a guide for delivery of health care and measurable outcomes by improving the quality of nursing practice.

Applicability of Theory to Current Practice

This model allows health care providers to conceptualize the underlying issues that may be contributing to poor patient outcomes. Donabedian's framework is applicable to this project because all concepts, interventions, and delivery methods will be identified along with measurable outcomes in a systematic process thus allowing revision to the structure of care delivery that will lead to the ultimate goal of improved patient outcomes. Donabedian's model is vastly recognized and has been implemented in an array of health care related fields, however

recently the trauma community has adopted the model to appraise trauma systems. Moore, Lavoie, Bourgeois, and Lapointe (2015) published that a Canadian provincial trauma system comprised of 57 centers performed a five-year assessment of the performance of an integrated trauma system considering: structure, process, and outcome to examine the relationship between quality domains. The results of the study were statistically significant, advocating that Donabedian's model is a valid tool for evaluating trauma care and trauma centers.

Major Tenets

The major tenets of the Donabedian model include: structure, process, and outcomes. This model designed by Donabedian has been described as a foundation to organizations and the blueprint to help define and measure quality for desired patient outcomes. When desired patient outcomes are not obtained, scrutinizing processes and structures will allow for identification of deficiencies. Each of these tenets will be described in further detail below.

Structure

Structure is comprised of the setting where care is delivered. According to Donabedian, structure can be not only a physical location in which care takes place, but also the quality of the attributes of the organization or entity of care and the qualifications of the providers (Donabedian, 1966; Liu, Singer, Sun, & Camargo, 2011). Trained staff, equipment, medications, and organizational characteristics are qualities of structure. Therefore, ascertaining an assessment of the organizations process's structure will allow examination of potential opportunities and limitations of individual performance and the organizations capability to provide high caliber of care (Hall & Roussel, 2017). Observation and measurement of structure is often uncomplicated therefore, may be identified as an upstream cause of problems discovered in process.

Process

Process is considered the totality of all tasks or activities that make up healthcare and how care is delivered and is the test of superiority in terms of acceptability, competency, or completeness of the service. The independent tasks and activities that inaugurate the healthcare process: diagnosis, treatment, preventative care, and patient education are traditionally performed by the professional healthcare provider however, patients and their family members may also contribute to process (Hall & Roussel, 2017). Further considerations for process may also include interpersonal process, technical process, or how care is given, which all embrace healthcare delivery. Since process contains all the interventions of healthcare delivery, the measurement of quality for these interventions is very similar to the measurement of process. Process may be directly observed, performed by completing chart audits, or by performing patient or care provider interviews.

Outcomes

Outcome is the final part of the framework that produces the improvement of the patient status from the structure and process application of the framework, therefore outcome is the end result of the delivered healthcare to the patient that includes any changes (desirable or undesirable) to health status, quality of life, education, patient satisfaction, behavior changes, and family satisfaction (Hall & Roussel, 2017). Since improving patient outcomes and quality of care is the goal, outcomes are often seen as the most consequential indicator of quality however, precise measurement of the results accredited solely to healthcare may be challenging. Outcome being utilized for measure of quality has the benefit of demonstrating interventions and skill level at which the intervention was performed. According to Donabedian, even though some outcomes are unmistakable and easy to measure (death, for example) other outcomes may be

more difficult to measure however, outcomes, by and large, remain the ultimate validators of the effectiveness and quality of medical care (Donabedian, 1966, p.693-694).

To have a complete approach, appraisal of all components of the triad (structure, process, and outcome) should be performed in conjunction. In doing so, this allows a more inclusive understanding of each component and measurement to the quality of care observed.

Application to the DNP Project

This triad approach to assessing the application of quality acknowledges the correlation between all the components: sound structure in return leads to sound process, thus increases the likelihood of optimal outcome. For application of this model to this project; the author considered other quality domains such as IOM quality measures, facility standard operating procedure (SOP), and evidence-based best practices.

During application of the *structure* phase of the framework; evaluation of the ED triage SOP will be performed and brought to current evidence-based practice. Education courses will be provided to the licensed ED staff. The education course will review process for evidenced-based triage, the revised triage protocols and how to enter in the electronic medical record. By ensuring that the RNs are appropriately trained, this will prepare for a more fluid initiation of the *process* phase.

The *process* phase initiation will consist of application of the revised triage nurse protocol and initiation of the "pull till full" process. Direct observation will be performed for real-time education and process adjustments. Analysis and data collection of the process phase will also be executed since these measurements will encompass the means in which care was provided. A retrospective chart review will be performed to evaluate for compliance of the new

policy and procedure. Appraising *structure* and *process* measures is imperative since these measures can affect *outcome* from the point of view of the stakeholders.

The application of the *outcome* phase of this project is to increase patient safety, improve ED throughput, improve door to provider time, and reduce LWOBS. Subsequent benefits will be improving quality of care delivered to the ED patients, improving access to care, and improving customer service. Using the view point of the patient, this author chose to define quality by applying the IOM (2001) six components of quality of care: safety, timeliness, patient-centeredness, effectiveness, equitability, and efficiency. Upon completion of the outcome phase, data collection will be ascertained for evaluation and compared with data from before the process was initiated.

Project Design

This project is considered a quality improvement (QI) design to improve the triage process in the ED. It will employ Donabedian's (1966) "structure-process-outcome" model to measure, improve quality, and effectiveness of this practice change. ED quality metrics are comprised of: LOS, door-to-provider-time, AMA, and LWOBS. These quality metrics will be compared pre- and post-intervention along with the data collected from the pre- and post-assessment of knowledge after the triage education course. The purpose of obtaining data collection from these two sources will provide accountability to the stakeholders, demonstrate QI, and demonstrate effectiveness in the population pertaining to the project. The population of interest is the ED RN staff and ED providers. A convenience sample of the ED nurses will complete the pre- and post- education knowledge assessment; these findings will be compared to the ED quality metrics pre- and post- intervention. The primary purpose of this DNP QI project

is to improve the ED triage process through integration of evidence-based triage nursing protocols with subsequent benefits of decreased ED overcrowding.

Population of Interest

The participants of this QI project will include RN staff, ED physicians, ED advanced practice registered nurses (APRNs), ED physician assistants (PAs), and the ED service chief for access of department metrics to assess and measure quality metric improvement. The ED employs 43 full-time RN's, 10 full-time ED technicians (ICTs), 15 full-time physicians, seven contract physicians, three APRNs, and one PA. The ED also employs three full-time clerks and is in the process of initiating a scribe program. The licensed staff consists of RNs, the majority are currently holding certifications as a Certified Emergency Nurse (CEN), and Trauma Nursing Core Course (TNCC) however, these are not required. All RN's are certified in Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and Pediatric Life Support (PALS) as these are mandatory certifications. Inclusion criteria for this project will be: all RNs, physicians, APRNs, and PAs working in the ED. Exclusion criteria are RNs, physicians, APRNs, and PAs not working in the ED, ED technicians, registration staff and volunteers. Potential participants will be verified prior to implementation of the project.

Setting

The host site has granted permission for the project and no human subjects will be used (See Appendix B). Data will be collected from an acute care hospital in Southern Nevada with the focus being on the ED. The facility is a Joint Commission accredited hospital. This hospital is the fifth busiest hospital in its organization nationwide, more specifically the network serves northern and central California, Nevada, Hawaii, the Philippines and U.S. Territories in the Pacific Basin. The facility population has a focus of adult and geriatric patients. The ED has a

total of 55 beds with eight fast track beds, three rooms with reverse isolation capability, three rooms that are specific to mental health patients, and three triage rooms.

Stakeholders

Stakeholders are the key persons or groups who touch the project in some way or have a vested interest in the project outcome (Moran, Burson, & Conrad, 2020). The stakeholders of this project are comprised of the ED project participants, ED Nurse Manager, ED assistant nurse manager, ED Medical Director, ED staff nurses, ED clinical educator, physician colleagues, hospital administration, patients, and the hospital itself. Involving stakeholders ranging from the micro to the macro level can provide exclusive perspectives on issues and provide ideas on topics that may not otherwise be considered. In order to establish a rapport with the stakeholders meetings will be organized to discuss the benefits of the projected project outcomes that will impact the organization as a whole by providing education to the nursing staff that will allow the RNs to practice to their full scope, improvement of ED quality metrics, and patient satisfaction.

Recruitment Methods

Participation for all staff that meets inclusion criteria, is mandatory, considered a condition of employment, and will be considered a convenience sampling. Ensuring that all documentation will be de-identified will protect participant privacy. There is no monetary benefit provided to the staff participating. The project site will assume the cost of labor for education sessions.

Tools/Instrumentation

The tools that will be used to implement this QI project will include a pre- and post-de-identified assessment of knowledge gained following the education session, the results of these assessments will be stored on the temporary drive at the project site. ED quality metric data

change pre- and post-intervention ascertained from the ED Service Chief will also be used. The ED quality metric data will also be stored on the temporary drive at the project site. Other tools used in the DNP project include a PowerPoint presentation.

Triage Knowledge Assessment

The ED staff RNs will take a pre- and post-knowledge assessment that is comprised of ten case questions that requires assignment of an appropriate Emergency Severity Index (ESI) level along with rationale of why that ESI level was chosen and to include number of predicted resources that will be utilized. The knowledge assessments are de-identified however will be graded as a pass or fail for data collection purposes. Since the exams are de-identified, remediation of the failed participants will not receive individual coaching. However, during the triage course there will be a group discussion with remediation for all the participants. The pre- and post-knowledge assessment has been derived from the AHRQ Emergency Severity Index Version 4 (See Appendix C and D). The AHRQ provided these competency test questions for use in nursing education to improve the quality measures previously mentioned. The permission that was granted for general educational use is provided (See Appendix E).

Education Presentation

The education course offered to the ED RNs will be provided in collaboration with the project site ED clinical educator and will include: a PowerPoint presentation (See Appendix F) that contains information regarding the evidence-based triage process constructed from the AHRQ (2011) publication *Emergency Severity Index (ESI): A Triage Tool for Emergency Department Care, Version 4. Implementation Handbook 2012 Edition*, review of facility inpatient nursing SOP 118-14-ED17 (triage practices and procedures), review of inpatient nursing SOP 118-12-ED24 (approved triage nurse-initiated clinical practice guidelines [CPGs]),

review of any revised policies and procedures pertaining to the triage process, de-identified pre and post-education knowledge assessment, and a post course evaluation. There will be two, two-hour sessions over four days in order to capture all the nursing staff. To ensure that all nurses have completed the education sessions the ED Nurse Manager will communicate with the ED Clinical Educator for make-up session opportunities. Processes are currently in place in order to obtain continuing education units (CEU) for the course. ED quality metric (door to provider time, LWOBS, LOS) data will be provided by the ED Service Chief upon request.

Compliance of the nursing staff will be monitored through the ED education department via retrospective chart process that is currently in place. The triage portion of the EHR is reviewed for appropriate assignment of ESI level (based on chief complaint and vital signs) and the initiation of triage-nurse protocols as per facility guidelines. If there is a noted trend of inappropriate assignment of ESI level or if the CPGs are not being initiated, individual remediation and education is performed through the education department.

Data Collection Procedures

The knowledge assessment will be de-identified. Results of the assessment will be compiled and stored onto a temporary folder on a secure drive that is password protected that is accessible only by the project lead and project lead preceptor form the host site. In addition, following the triage education course a post education knowledge assessment will be administered and will be de-identified. These results will be compiled and stored onto the temporary folder to the secure drive at the project site facility for comparison with pre-education knowledge assessment. Department quality metrics (LOS, LWOBS, AMA, and door-to-provider time) will be ascertained from the ED Service Chief Assistant for comparison of pre- and post-intervention of the project. This data will be stored on the temporary folder on the secure drive

at the project site facility. There will be no access to the patient EHR. A statistician will be consulted to ensure the appropriate statistical testing will be performed to measure objectives.

Intervention

Educational sessions will be provided to the participants to assess pre and post education knowledge of the ESI system. Educational sessions will be performed at the project host site facility in collaboration with the project site education department as this education will be part of the RN mandatory annual educational requirements. All participants are recruited from a convenience sample at the project host site, there will be no contact with patients or the EHR.

Applying Donabedian's conceptual model to the intervention process to this QI project, once the educational sessions are completed, implementation of the triage nurse protocols and CPGs will be launched. During the launch of the project, the project site ED Clinical Educator and project lead will be available for observation and to answer any questions or concerns that the participants may have.

After completion of the project, the ED quality metric data will be obtained from the ED Service Chief for evaluation with the data prior to implementation of the project. Results will be presented to the stakeholders and the participants will be notified of the results via ED Nurse Manager or ED Assistant Nurse Manager. In order to maintain sustainability of the progress made from this improvement initiative, continued compliance with the facility triage protocols and policies will be monitored by the ED Clinical Educator by a process that is currently in place. Follow up education will be offered as needed and annually by the ED Clinical Educator.

Project Timeline

The anticipated project timeline is approximately six weeks. During the preparation phase the project lead coordinated with the ED Clinical Educator, ED Nurse Manager, and ED

Assistant Nurse Manager for approval of all education materials and tools to be utilized for the education sessions. All participants were notified of the assigned education sessions, any participants that are on approved leave will be assigned to a "make-up" session at a later date. The ED Clinical Educator has obtained the necessary documentation to grant CEU credit for the participants. ED quality metrics have been requested from the ED Service Chief to be reviewed and entered into SPSS program. The project lead received IRB approval from the project site. The projected timeline is as follows:

Week of Implementation	**Activities**
Week 1 **7-10-19 to 7-16-19**	*All participants emailed as reminder for assigned educational sessions to include: date, time, location. *Education room secured with AV equipment. *ED metrics requested from ED Service Chief for review and input into SPSS program.
Week 2 **7-17-19 to 7-23-19**	*Administer pre-knowledge assessment to participants. Scores will be entered into SPSS program. *Implement education session: Two sessions daily for four consecutive days. *Administer post-knowledge assessment to participants. Scores will be entered into SPSS program.
Week 3 **7-24-19 to 7-30-19**	***** Implement project. *Monitor for potential problems in the implementation phase. *Give updates and keep constant communication with the ED Nurse Manager and ED Service Chief.
Week 4-6 **(Week 4) 7-31-19 to 8-6-19** **(Week 5) 8-7-19 to 8-13-19** **(Week 6) 8-14-19 to 8-20-19**	*****Continue to monitor for potential problems during the implementation phase. *Give updates and keep constant communication with the ED Nurse Manager and ED Service Chief.
Week 6	*Initiate close-out phase. *Evaluate process and the outcomes.

(Week 6) 8-14-19 to 8-20-19	*Obtain ED department metrics from the ED Service Chief for input into the SPSS program. *Meet with stakeholders to disseminate results of the project.

Ethics/Human Subjects Protection

The project host site requires that all projects be reviewed by the institutional review board (IRB) prior to implementation. This DNP project received approval June 4, 2019. According to the Federal Policy of the Protection of Human Subjects, the activities of this QI project present no more than minimal risk to human subjects, and involve procedures that may be reviewed by the IRB through the expedited review procedure authorized by 45 CFR 46.11 and 21 CFT 56.110 (Department of Health and Human Services, 1998). This QI project focuses on improving organizational processes, the participants are derived from a convenience sample and all information pertaining to the participants will be confidential and de-identified. Consent may be waived by the participants since the project presents no more than minimal risk of harm to the participants and involves no procedures for which written consent is normally required outside of the research context (Department of Health and Human Services, 2010). There will be no compensation awarded. As mentioned previously, the de-identified pre- and post- knowledge assessment findings will remain confidential and will be held on a temporary folder on a secure drive at the host site. No patient or personal health information will be extracted. Access to the drive is granted only to the project lead and the project lead host site preceptor. In order to access the folder designated secure login and passwords are required.

Plan for Analysis/Evaluation

The pre- and post-education assessment evaluations of ESI knowledge will be collected and graded. The grading system will be “pass” or “fail”. The AHRQ (2011) publication,

Emergency Severity Index (ESI): A Triage Tool for Emergency Department Care, Version 4. Implementation Handbook 2012 Edition recommends that the ED management and education staff define the parameters for a passing score prior to assessing staff competency (p. 60). After discussion with the ED Nurse Manager and the ED Clinical Educator it was determined that a passing score is 80% (for a ten question exam, each question is worth ten points). The scores will be entered into SPSS program under the pre- and post- knowledge assessment variables. The paired-samples t-test will be utilized to discern whether there is a statistically significant difference in the mean scores between the pre-knowledge assessment and post-knowledge assessment with the goal being that there is an increase in knowledge post educational session.

Upon completion of the project the ED metric data will be obtained from the ED Service Chief for comparison with pre project initiation ED metric data. Based on the type of continuous variables that will be compared (LOS, AMA, LWOBS, door to provider time), findings will be analyzed and displayed in a graph form that will easily display distributions of continuous variables.

Implications for Nursing

This QI initiative project will provide new insight to the existing knowledge of the ED RN staff by providing support to allow the triage RN to practice to their full scope by initiating the triage nurse protocols. By allowing RNs to practice to the full extent of their training, competencies, and education, this utilizes the full potential of the nurses increased quality of care while achieving greater value and foster an interprofessional collaboration (Institute of Medicine (US) Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine [IOM], 2011). The clinical significance of this QI project is that is has an impact on everyday life of the presenting ED patient and the RNs that care for the patients.

By employing the triage RN to utilize their critical thinking skills to initiate the appropriate triage protocol is bridging the gap of EBP to direct patient care (Solheim, 2016). In return, there will be a positive impact on the department and the organization. The statistical significance will be demonstrated on the review of the ED department metrics when compared pre and post initiation of the project. This QI project is not projected to incur any additional costs or re-allocation of resources to the project host site. With the projected success and improvements from this project, there is expectation that the sister facilities will be open to adopting this process in their EDs.

Analysis of Results

The facets of this QI project were to reduce the ED LOS, reduce door to provider time, provide education to the nursing staff on an evidence-based triage protocol process, and education on the facility specific triage nurse-initiated protocols thus improving the ED triage process with subsequent benefits of decreased ED overcrowding.

Education to the ED RNs was provided in collaboration with the project site ED clinical educator that included: eight live courses over a sequence of four days using a PowerPoint presentation (See Appendix F) containing information regarding the evidence-based triage process constructed from the AHRQ (2011) publication *Emergency Severity Index (ESI): A Triage Tool for Emergency Department Care, Version 4. Implementation Handbook 2012 Edition*, review of facility inpatient nursing SOP 118-14-ED17 (triage practices and procedures), review of inpatient nursing SOP 118-12-ED24 (approved triage nurse-initiated clinical practice guidelines [CPGs]), review of any revised policies and procedures pertaining to the triage process, de-identified pre and post-education knowledge assessment (See Appendix C and D), and a post course evaluation. The course was approved by hospital leadership and CEUs were

also approved and awarded. There were 41 RNs of the 43 that participated in the live courses. The RN's that were not able to participate in the live courses have been rescheduled for makeup live courses that are to be held August 14th and August 21st.

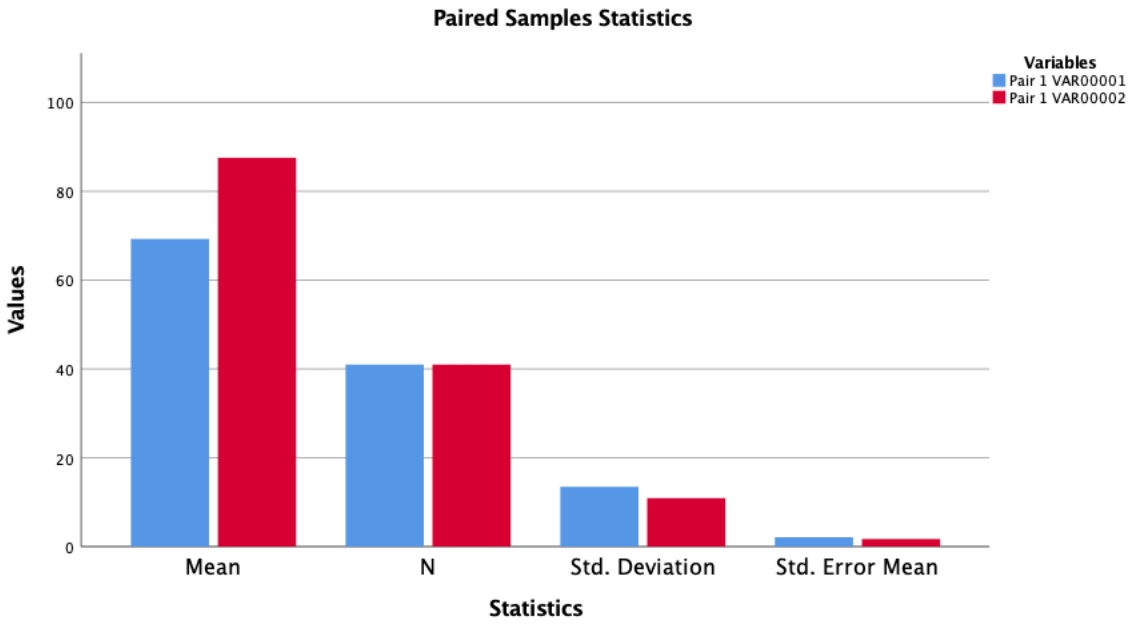
A paired-sample t-tests was performed to discern whether there was a statistically significant difference between the mean scores of the pre-knowledge assessment and the post-knowledge assessment with the goal being that there was an increase in knowledge post education. The following illustrates the results of the paired-sample t-tests performed in Table 1 and Table 2.

Table 1

Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
VAR00001 Pre-Knowledge Assessment Score	69.2683	41	13.48893	2.10662
VAR00002 Post-Knowledge Assessment Score	87.5610	41	10.90424	1.70296

Table 2

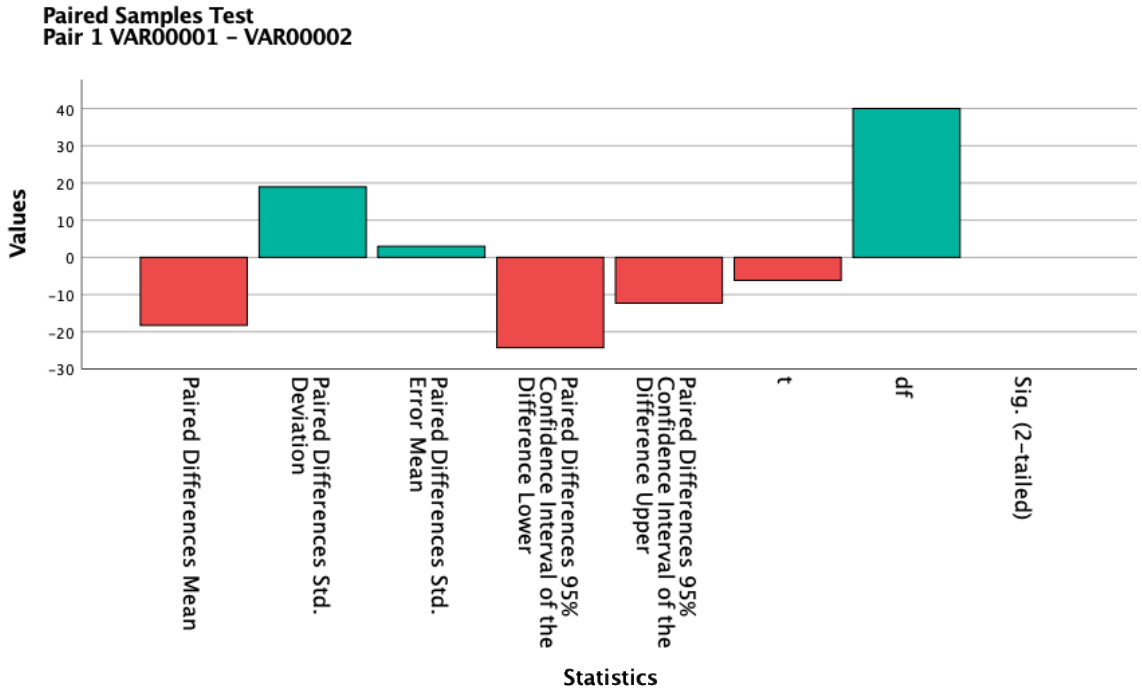


The paired-sample t-tests illustrates a significant change in the average of the pre-knowledge assessment when compared to the post-knowledge assessment with a p-value < 0.05, showing an improvement of knowledge after the education session. Tables 3 and 4 illustrates the paired differences of the paired samples test.

Table 3

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pair 1 VAR00001-VAR00002	-18.29268	18.96081	2.96118	-24.27745	-12.30791	-6.177	40	.000

Table 4



During the six weeks of project implementation, the project lead kept in constant communication with the ED Nurse Manager and the ED Assistant Nurse Manager that acted as a constant resource on the unit for the staff. Pre-shift huddles included reminders of the "pull-till-full process" and question opportunities for the triage nurse-initiated protocols. The live course PowerPoint, *Emergency Severity Index (ESI): A Triage Tool for Emergency Department Care, Version 4. Implementation Handbook 2012 Edition*, and the facility specific CPGs were available as reference on the unit and in the triage area.

ED metric data was collected on request from the ED Service Chief Assistant. Data was collected for the entire month (31 days) prior to the education sessions performed with the RNs (Table 5). The patient census for that time frame collected was 3,840. ED metric data was also obtained for the entire month (31 days) following implementation (Table 6). The patient census

for that time frame collected was 3,499. The data was provided to the project lead via the temporary folder on the secure drive at the project site.

Table 5 ED Metrics Prior to ESI Triage Education

LWOBS	140 = 3.6% (Goal < 2%)
AMA	16
DOOR TO PROVIDER	32 min (Goal < 25 min)
LOS	367 min

Table 6 ED Metrics Post ESI Triage Education

LWOBS	34 = 0.97% (Goal < 2%)
AMA	2
DOOR TO PROVIDER	12 min (Goal < 25 min)
LOS	334 min

Discussion of the Findings

The imbalance between ED capacity and the demand for patient triage, diagnostic studies, and speciality consultation affect patient flow by increasing LOS, door to provider times, and LWOBs. To alleviate this problem of ED overcrowding multiple studies have been performed and strategies to improve patient flow have been explored, to include initiation of triage nurse protocols based on patient complaint, “pull-till-full”, and utilization of a PIT.

During the six-week QI project period, this DNP project was successful in implementing education for an evidence-based triage system to ED staff RNs, facility approved CPGs, utilizing a PIT when available, and the “pull-till-full” process. The de-identified pre and post-knowledge assessment scores were compared by utilizing a paired-sample t-tests that illustrated a p-value

<0.05. The results showed a significant improvement of knowledge after the ESI education courses meeting the goal of increased knowledge post education. When reviewing and comparing the ED metric data pre and post implementation of DNP project the LWOBS went from (140 patients) 3.6% to (34 patients) 0.97%, door to provider time went from 32 minutes to 12 minutes (difference of 20 minutes), LOS went from 367 minutes to 334 minutes (difference of 33 minutes), and AMA went from 16 patients to 2 patients (difference of 14 patients). These findings are similar to the studies of Cheng et al. (2013), Gardner et al. (2017), and Pierce and Gormley (2016).

Significance/Implications for Nursing

As ED overcrowding continues be growing concern throughout the country, ED throughput has become a focus for many organizations due to CMS joining quality care measures to financial incentives. The data findings support that compliance with the evidence-based triage protocol, facility approved CPGs, and the "pull-till-full" process by directly involving the nursing staff to implement the updated nurse triage protocols does improve the patient LOS and door to provider time with the subsequent benefits of decreased AMA and LWOBS thus increasing patient satisfaction and patient safety at a departmental and organizational level.

The significance of the DNP proposed project to the emergency nursing community is to not only improve patient outcomes and improve the quality of care that is delivered but to ensure that the ED RNs are practicing to their full scope. As licensed healthcare providers, emergency RNs are qualified under CMS regulations to utilize computerized provider order entry (CPOE) programs to enter orders directly into the EHR (Gurney, Bush, Gillespie, Walsh, & Wilson,

2015). The literature reveals that nursing staff can improve patient LOS, LWOBS, patient safety and decrease ED overcrowding by initiating protocols early in the ED visit.

As this project continues to evolve, the continued success hinges on full compliance of the evidence-based triage protocols, facility approved triage policy, and CPGs. Continued education will be pivotal for sustained success. Education was provided initially during implementation, will be followed up annually and as needed. Active involvement of the ED education department and continued monitoring via the established retrospective chart audit process for individual remediation and education will need to be enforced and supported by administration.

Limitations

Several limitations were identified during the project. One important limitation identified was noncompliance of entering the triage nurse-initiated protocols. A second limitation identified was noncompliance of the "pull-till-full process". A third limitation identified was that the PIT was not available several times due to staffing.

Project Design

Since these limitations were identified early on in the process phase, additional measures were taken to promote compliance towards the evidence-based triage protocols and facility approved policies to include: daily emails, additional reminders in the pre-shift huddles, real-time reinforcement by the Triage Champion on the unit, and sharing progress with current ED metric data for positive reinforcement. Unfortunately, the limitation with not having a PIT during several days of the project was unable to be resolved due to the staffing challenge. The ED Service Chief was aware and did attempt for coverage of the PIT however, was unsuccessful.

Behavioral change and QI work can be a slow process however applying active reminders and providing support to the staff can result in behavior change (Kandom & Nagy, 2017).

Recruitment Sample

This QI project utilized convenience sampling of participants consisting of 43 full-time RNs. A total of 41 RNs participated in the implementation education with the remaining participants participating in the makeup course on August 21, 2019. It was noted by the ED Triage Champion, there were days that some of the RNs that did not participate in the initial education courses were performing triage and did require additional real-time education and reminding of the process.

Data Analysis

The paired-sample t-tests was performed to evaluate the difference of the average scores from the pre and post-knowledge assessment resulting with a significant improvement of knowledge after the education session. The overall ED metric data showed an improvement after the implementation of the project however, the days that a PIT was not available and there was not consistent compliance with entering the triage protocols or performing the "pull-till-full" process there was an increase in LOS, LWOBS, door to provider time, and AMA.

Dissemination

The results of the QI project will be disseminated through a PowerPoint presentation to the stakeholders at the project site during a staff meeting scheduled on September 25, 2019 at 0715. The project lead has also been asked to present to the nursing staff during their staff meeting with a date to be announced. A poster presentation will be created for display in the ED. The project results are pending approval as an e-poster presentation at the 2020 Emergency Nurses Association Annual Conference. A formal presentation of the project will be delivered to

the Touro University Nevada professors and faculty on October 18, 2019. Finally, the project will be submitted to the Doctor of Nursing Practice Repository.

Project Sustainability

Based on the improved results, the ED Service Chief, ED Nurse Manager, and Assistant Nurse Managers have agreed to continue an ongoing monitoring of the monthly ED metric data and maintain a Triage Champion on the unit at all times if possible. The DNP project will be sustained by performing yearly evaluation of project goals for decreasing LOS, LWOBs, door to provider time, and AMA. Yearly re-evaluation of the facility approved triage protocols, policy, and CPGs to reflect current best practice in conjunction with the mandatory yearly education of the nursing staff in collaboration with the ED education department will also be performed. The project lead has agreed to support the department in the future and will serve as a consultant and collaborate with the ED Clinical Educator in educating the staff during their yearly mandatory training and future triage improvement projects.

Conclusion

As ED overcrowding remains a national concern and patient safety risk, a finite solution to this convoluted predicament persists. The quality of services delivered in the ED is contingent on the collaborative efforts of the emergency providers, nurses and ancillary services available. This QI project demonstrated that implementation of evidence-based triage nurse protocols in conjunction with a PIT and “pull-till-full” process does decrease LWOBS, door to provider time, and ED LOS with the subsequent benefit of improving the quality of care delivered, increasing patient safety, and improving access to care. Various organizations have implemented one or an amalgamation of front-end throughput designs however, comprehension of which design is most suitable for an individual organization does require further investigation by that organization.

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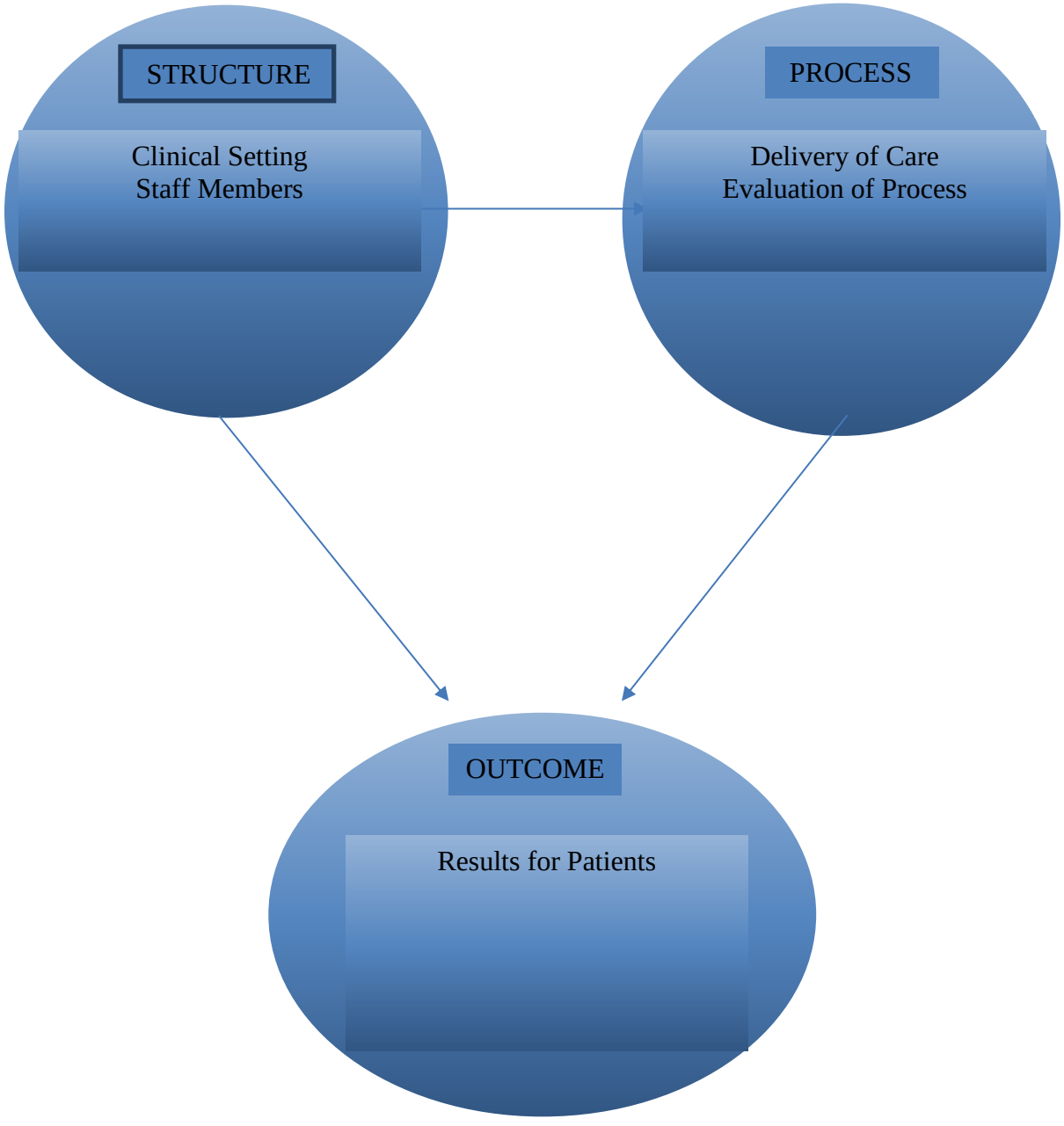
Appendix A

Donabedian Model



Appendix B

Host Site Permission

Wray, Tammy <Tammy.Wray@va.gov>
To:aileen thompson,Thompson, Aileen L.,Crawford, Desiree
Cc: Bah, April V.
Jun 4 at 1:22 PM

Aileen,

Thank you again, here is the signed copy, I have included System's Redesign so they could sign but again, you do not have to wait on anything to begin. If you have questions, please contact me. Have a great afternoon.

Wray, Tammy <Tammy.Wray@va.gov>
To: Thompson, Aileen L.,Taylor, Shavonne S.,allthompson@yahoo.com
Cc: Crawford, Desiree
Jun 3 at 7:48 AM

Aileen,

Thank you for the pre and post-test. **You may begin** (you do not have to wait for the paperwork since we are waiting for the drive information) and I will forward the signed paperwork as soon as Shavonne sends me the Folder's information so I can put it on the paperwork and sign it for you.

Appendix C

ESI Pre-Knowledge Assessment

Emergency Severity Index Test Cases

This text-only version has the test case at the top of the page and the answer at the bottom.

Test Case 1

"I shouldn't have eaten those fried clams," the patient tells you as you begin her triage assessment. Her chief complaint is abdominal pain that started two hours ago which she rates as a 6/10. She has vomited once and continues to be nauseous. She is 48 y o with no PMH, takes no medications and has no known allergies. Vital signs: T 99, HR 98, RR 20, BP 142/84.

Test Case 1 – Answer

• ESI Level 3

• This 48-year-old healthy female has abdominal pain that started two hours prior to admission. She has vomited once but continues to be nauseous. Her vital signs are within normal limits. This patient does not meet the criteria for ESI level 1 or 2. She will need two or more resources; labs, an IV with fluid, IV medication for nausea and pain as well as other diagnostic studies.

Test Case 2

EMS brings in an elderly patient from the nursing home. They were called to the scene for a "possible stroke." The patient is unresponsive with an obvious facial droop. VS: HR 96, RR 10, SPO2 89% on RA. She has a long medical history and no other information was sent with the patient from the nursing home.

Test Case 2 – Answer

• ESI Level 1

• This patient is unresponsive, with a respiratory rate of 10 and an oxygen saturation of 89%. This patient required immediate lifesaving interventions.

Test Case 3

"I have been sick for 4 days with the GI bug that is going around. Today, I am really dizzy." Reports multiple episodes of vomiting and diarrhea for 4 days, denies fever or chills, lips are dry and cracked. This 29-year-old male is healthy, takes no medications and has no allergies. Vital signs: T. 99.2, HR 132, RR 24, BP 82/palp.

Test Case 3 – Answer

• ESI Level 2

• A high-risk situation. This 29-year-old patient has been sick for 4 days with vomiting and diarrhea. He is now dizzy, has cracked dry lip, a heart rate of 132 and a blood pressure of 82/palpable. It would be unsafe for this patient to wait for more than a few minutes for care

Test Case 4

Medflight arrives with a 32-year-old female who was the restrained driver in a high speed MVC. The patient is 7 months pregnant and complaining of pain in her right lower leg and abrasions on her face from the airbag. She appears in no acute distress. Her skin is warm and dry. She asks you if her baby is going to be ok.
VS: HR 100, RR 26, BP 140/82.

Test Case 4 – Answer

- ESI Level 2
- A high-risk situation based on the mechanism of injury.

Test Case 5

A 19-year-old requests to see a doctor for treatment of an in grown toenail. He tells you that the nail area is red, tender and draining pus. He denies any medical problems, is on no medications and has no allergies. Vital signs: T 98.6, HR 82, RR 16, BP 118/72.

Test Case 5 – Answer

• ESI Level 4

• This patient does not meet the criteria for ESI level 1 or 2. He will need an incision and drainage of his toe – one resource. Therefore, he meets ESI level 4 criteria.

Test Case 6

"Mom thinks I broke my toe. I was running on the beach and stubbed it on a rock." A healthy 11-year-old male points to his bruised 4th toe on his right foot. "It hurts to walk or put on a shoe." His mother tells you that he takes no medications and has no allergies. Vital signs: T. 98.4, HR 82, RR 18, BP 102/78.

Test Case 6 – Answer

• ESI Level 4

• This child's toe will probably be x- rayed to determine if there is a fracture. X-ray is one resource.

Test Case 7

EMS arrives with a 76-year-old female who tripped over her dog and injured her right hip. On exam her right leg is shortened, externally rotated with +CMS. The patient rates her pain as 5/10. She has a history of HTN, medications include a diuretic, and she has no allergies. Vital signs: T 96.2, HR 78, RR 18, BP 148/90.

Test Case 7 – Answer

• ESI Level 3

• This elderly patient tripped over her dog and probably sustained a fractured hip. On arrival in the emergency department her pain is less than 7 out of 10. She does not meet ESI level 2 criteria. If there was no clear history as to why she fell, or her pain was more intense she would be assigned to ESI level 2. This patient will consume two or more resources; x-ray, labs, IV pain medication and an orthopedic consult.

Test Case 8

A 55 y/o female presents to triage with a sudden onset of acute loss of vision in her left eye. She has normal visual acuity in her right eye. She denies medical history or medication use. VS: T 98.6, HR 88, RR 16, BP 140/85

Test Case 8 – Answer

• ESI Level 2

• This is a high-risk situation. The patient's symptoms are suggestive of central retinal artery occlusion.

Test Case 9

"My heart is just pounding in my chest" reports a 26-year-old female with a history of SVT. At triage she has a HR of 188 and a BP of 70/palp. "I feel like I am going to pass out" she tells you.

Te**st Case 9 – Answer**

• ESI Level 1

• This patient requires immediate lifesaving interventions. She needs to be seen immediately by a physician and a nurse and care initiated. The patient is currently unstable and needs IV access, IV medications and perhaps cardioversion.

Test Case 10

A 17-year-old male walks into triage stating: “My boss won’t let me come back to work until I get a note from a doctor. I work in a grocery store stocking shelf. Yesterday I was moving stock and several boxes fell and hit my foot. I’m fine, it doesn’t hurt but my boss made me come. No signs of trauma to the foot. T. 98.4, HR 64, RR 16, BP 122/78.

Te**st Case 10 – Answer**

• ESI Level 5

• This patient has no complaints and has no obvious signs of trauma. The patient needs to be seen by a physician, examined and discharged. No resources are needed so the patient meets ESI level 5 criteria.

Appendix D

Post- Knowledge Assessment

Emergency Severity Index
Competency Cases

These questions contain realistic patient scenarios that a triage nurse would encounter in any emergency department. Please read each case and, based on the information provided, assign a triage acuity rating using ESI.

1. _____
I think I picked up a bug overseas," reports a 34-year-old male who presented in the emergency department complaining of frequent watery stools and abdominal cramping. "I think I am getting dehydrated." T 98°F, RR 22, HR 112, BP 120/80, SpO2 100%. His lips are dry and cracked.

2. _____
"This is so embarrassing," reports a 29-year-old male. "For the last 12 hours, I have had this thing stuck in my rectum. I have tried and tried to get it out with no success. Can someone help me?" The patient denies abdominal pain or tenderness. Vital signs are within normal limits. Pain 4/10.

3. _____
EMS arrives with a 67-year-old female who lives alone. The patient called 911 because she was too sick to get herself to the doctor. The patient has had a fever and cough for 3 days. She reports coughing up thick green phlegm and is concerned that she has pneumonia. She denies shortness of breath. Past medical history HTN, T 102°F, RR 28, HR 86, BP 140/72, SpO2 94%.

4. _____
"My pain medications are not working anymore. Last night I couldn't sleep because the pain was so bad," reports a 47-year-old female with metastatic ovarian cancer. "My husband called my oncologist, and he told me to come to the emergency department." The patient rates her pain as 9/10. Vital signs are within normal limits.

5. _____
A 48-year-old male tells you that he has a history of kidney stones and thinks he has another one. He has right costovertebral angle pain that radiates around to the front and into his groin. He is nauseous but tells you he took a pain pill, and right now he has minimal pain. He denies vomiting. T 98°F, RR 16, HR 80, BP 136/74, SpO2 100%. Pain 3/10.

6. _____
"After my pediatrician saw my son's rash, he said I had to bring him to the emergency department immediately. He has this rash on his face and chest that started today. He has little pinpoint purplish spots he called petechiae. My son is a healthy kid who has had a cold for a couple of days and a cough. My pediatrician said he had to be sure nothing bad is going on. What do you think?"

7. _____
The overhead page announces the arrival of the Code STEMI. Paramedics arrive with a 62-year old male with a history of a myocardial infarction 4 years ago who is complaining of chest pressure that started an hour ago. The field EKG shows anterior lateral ischemic changes. Currently, the patient's heart rate is 106, RR 28, BP 72/53, SpO2 is 95% on a nonrebreather mask. His skin is cool and clammy.

8. _____
A 46-year-old asthmatic in significant respiratory distress presents via ambulance. The paramedics report that the patient began wheezing earlier in the day and had been using her inhaler with no relief. On her last admission for asthma, she was intubated. Vital signs: RR 44, SpO2 93% on room air, HR 98, BP 154/60. The patient is able to answer your questions about allergies and medications.

9. _____
A 56-year-old male with a recent diagnosis of late-stage non-Hodgkin's lymphoma was brought to the ED from the oncology clinic. He told his oncologist that he had facial and bilateral arm swelling and increasing shortness of breath. The patient also reports that his symptoms are worse if he lies down. Vital signs: BP 146/92, HR 122, RR 38, SpO2 98% on room air, temperature normal.

10. _____
EMS arrives with a 28-year-old male who was stabbed in the left side of his neck during an altercation. You notice a large hematoma around the wound, and the patient is moaning he can't breathe. HR 110, RR 36, SpO2 89%.

Post-Knowledge Assessment Answer Key

1. ESI level 3: Two or more resources, From the patient's history, he will require labs and IV fluid replacement—two resources.

2. ESI level 3: Two or more resources. An x-ray is needed to confirm placement in rectum. Then IV sedation and analgesia may be used to enable the physician to remove the foreign body in the ED, or he may be admitted for surgery. In this situation, two or more resources are required.

3. ESI level 3: Two or more resources. This elderly patient may have pneumonia. Labs and a chest x ray are required, in addition to IV antibiotics. If vital signs are outside the accepted parameters, they may be considered high risk and meet ESI level-2 criteria.

4. ESI level 2: Severe pain or distress. This patient needs aggressive pain management with IV medications. There is nothing the triage nurse can do to decrease the patient's pain level. The answer to "Would you give your last open bed to this patient?" should be yes.

5. ESI Level 3: Two or more resources. The patient is presenting with signs and symptoms of another kidney stone. At a minimum, he will need a urinalysis and CT scan. If his pain increases, he may need IV pain medication. At a minimum, two resources are required. If the pain level was 7/10 or greater and the triage nurse could not manage the pain at triage, the patient could meet level-2 criteria.

6. ESI level 2: High risk. Rashes are difficult to triage, but the presence of petechiae is always a high-risk situation. Even if the patient looks good, it is important to recognize that petechia can be a symptom of a life-threatening infection, meningococcemia.
7. ESI level 1: Requires immediate lifesaving intervention. This patient is experiencing another cardiac event that requires immediate treatment. His vital signs and skin perfusion are suggestive of cardiogenic shock, and the patient may require fluid resuscitation or vasopressors to treat hypotension.

8. ESI level 2: High-risk. An asthmatic with a prior history of intubation is a high-risk situation. This patient is in respiratory distress as evidenced, by her respiratory rate, oxygen saturation, and work of breathing. She does not meet the criteria for ESI level 1, requires immediate lifesaving intervention.

9. ESI level 2: High risk. This patient is demonstrating respiratory distress with his increased respiratory rate and decreased oxygen saturation. Symptoms are caused by compression of the superior vena cava from the tumor. It is difficult for blood to return to the heart, causing edema of the face and arms.

10. ESI level 1: Requires immediate lifesaving intervention. Depending on the exact location penetrating neck trauma can cause significant injury to underlying structures.

Based on the presenting vital signs, immediate actions to address airway, breathing, and circulation are required. Intubation might be necessary due to the large neck hematoma, which may expand.

Appendix E

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Appendix F

ESI PowerPoint Presentation

(See attached)