

NURSE-INITIATED PROTOCOLS IN THE
EMERGENCY DEPARTMENT

by

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A scholarly project submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Nursing Practice

in

Family and Individual Health

MONTANA STATE UNIVERSITY
Bozeman, Montana

April 2019

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DEDICATION

First and foremost, I dedicate this doctoral scholarly project to my husband Brad and my three children Andrew, Isaiah, and Zachariah. Without your unwavering support, constant encouragement, and relentless love I would not have finished this program. Brad, you have kept me sane in this crazy journey and I am so thankful for all you have done for me and our family. Boys, thank you for your support and patience with me during these last few years of late nights, early mornings, and countless hours spent at the computer. I also would like to dedicate this project to my mother, Ann. Mom, thank you for cooking dinner, running errands, helping with the boys, and standing in when I was unavailable or needed a break. In addition, I would like to dedicate this to the rest of my family. Thank you, Dad and Diane, for always believing in me and encouraging me along the way. Thank you, siblings Chad, Nicole, and Stacey, for loving me even when I have been absent! And, thank you, Stacey, for your countless hours helping me study and listening to me vent! I would also like to thank my study group and new lifelong friends that I met along the way, Anna Weber, Kaci Popp, and Leigh Gipe.

ACKNOWLEDGMENTS

I would like to express the utmost gratitude to my DNP committee chair Dr. Cole, and my committee members Dr. Jennifer Sofie, Dr. Stacy Stellflug, and Dr. Laura Larson. I have truly learned so much from each and every one of you. You all have the gift of teaching and you have all been insurmountable to my education. Your dedication and passion for teaching are evident in your daily interactions with your students.

I would also like to acknowledge Heather Johnson for all of her help on this project and the countless hours we spent writing and re-writing the different protocols and Jessica Reed for her help with EPIC and making the order sets readily available for the nurses. I would also like to recognize Dr. Jim Bentler and Dr. Douglas Parker for their help, knowledge, expertise, support, and approval of this project. To Samantha Kaufman for allowing me free range of developing and implementing protocols that I saw fit and for her unwavering patience.

I would also like to acknowledge Laurie Rugemer, M.S., lead statistician, Dr. Megan Higgs, PhD., director of Statistical Consulting and Research Services, and contributions from Noah Benedict, M.S. Research reported in this publication was supported by Institutional Development Awards (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Awards P20GM103474, 5U54GM104944, U54GM115371, and 5P20GM104417. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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ABSTRACT

Emergency departments are overcrowded. Overcrowding has resulted in resources being stretched beyond their capacity, leading to decreased patient satisfaction, increased numbers of patients leaving without being seen, and exorbitant wait times. The purpose of this project was to implement nurse-initiated protocol order sets for specific chief complaint in an attempt to decrease length of stay in a local emergency department (ED) and improve flow. Additionally, protocol order sets would allow nurses to more rapidly and legally initiate medical interventions for patients with specific chief complaints. Three chief complaints were identified as common reasons why people seek emergency care: abdominal pain, chest pain, and ankle trauma. Protocols were created to allow nurses to initiate interventions prior to a physician seeing the patient. Retrospective chart audits were done prior to the intervention. Thirty charts with a chief complaint of abdominal pain were reviewed post implementation of nurse-initiated protocols. In the audit, nurse order mean times for abdominal pain were registration-to-order time 28.3 minutes (SD=25.5 minutes), registration-to-result time 79.4 minutes (SD=28.4 minutes), and registration-to-disposition time 221.4 minutes (SD=68.2 minutes). Results of the nurse-initiated protocol study showed a decrease in registration-to-order time of 15.7 minutes and a decrease in registration-to-results time of 20.7 minutes. There was an increase in time for registration-to-disposition of 33.5 minutes. Although overall length of stay was not decreased in the study, there was a decrease in registration-to-order times and registration-to-result times. The reduction in time to initiation of patient care suggests there is a potential for future implementation and evaluation of nurse-initiated protocols.

CHAPTER ONE – GENERAL INTRODUCTION

Background

Emergency departments (EDs) are an integral part of healthcare. According to the Centers for Disease Control and Prevention [CDC, (2012)], 130.4 million people sought emergency services. As a result of increased numbers of patients in the ED, quality measures such as patient satisfaction have decreased while wait times have steadily increased. Wait times in American EDs have steadily risen from 2003 to 2009 (CDC, 2012). Average wait times in the United States EDs increased 25%, from 46.5 minutes to 58.1 minutes (Hing & Bhuiya, 2012). In 2017, the CDC estimated 48,137,000 patients waited between 15–59 minutes to see a provider, while 38,885,000 patients saw a provider in fewer than 15 minutes. In an effort to improve healthcare in America, the Institute of Medicine (IOM) has identified six aims to improve quality care including safe, effective, patient-centered, timely, efficient, and equitable delivery (2001). The IOM (2001) defines timely care as “reducing wait times and sometimes harmful delays for both those who receive care, and those who give care” (p.3). Nurses in EDs have an opportunity to serve a vital role in improving care in the ED. One-way ED nurses can work to expedite patient care is by implementation of standardized protocols.

The American College of Emergency Physicians (ACEP) has defined standardized protocols as a set of pre-approved orders that included “a specifically defined patient population and clinical scenario(s) in which these orders may be carried out by nursing staff without any additional physician or advanced practice provider input,

approval, or order, with written or verbal” (2015, p.1). Nurses in EDs are often the first healthcare personnel patients encounter when presenting to an ED. As such, nurses have an opportunity to initiate care and interventions via protocols prior to patient seeing a provider. The addition of nurse-initiated protocol order sets offers a cost-effective and patient-centered intervention to improve care provided in an ED (Douma, Drake, O’Dochartaigh, & Smith, 2016). Nurse-Initiated Protocols can provide the benefits of decreased length of stay, increased patient safety, and decreased overcrowding (CDC, 2017).

ED overcrowding is a prevalent problem across the United States (CDC, 2017). According to the National Center for Health Statistics Data Brief: “EDs are experiencing higher patient volume and overcrowding, and patients seeking care are experiencing longer wait times” (Garcia, Bernstein, & Bush, 2010, p. 1). Overcrowding of EDs pose significant threats, “crowding has a variety of undesirable consequences, including increased patient wait times, decreased ability to protect patient privacy and confidentiality, impaired evaluation and treatment, and difficulties delivering person-centered care” (Moskop, Geiderman, & Bookman, 2009, p. 607). Researchers have found a negative relationship between ED crowding and patient outcomes; ED crowding has been associated with “higher rates of individuals leaving the ED without being seen” (Carter, Pouch, & Larson, 2013).

In 2008, the Centers for Medicare and Medicaid Services (CMS) revised their previous statements on standing orders and supported the use of pre-approved standing orders to offer expedited and improved care in the ED. The Emergency Nurse Association

(ENA) has supported the use of triage protocols in the ED as well. The following position statement was released by the ENA in 2015:

1. The use of protocols is an important strategy to expedite care, improve patient flow, and increase patient safety. 2. Emergency nurses collaborate with interprofessional colleagues to develop, approve, and evaluate evidence-based protocols within the emergency nursing scope of practice to assure they are consistent with current best practices. 3. Emergency nurses, as licensed healthcare providers, are among those who qualify under CMS regulations to use computerized provider order entry (CPOE) programs to enter orders directly into the medical record (p. 1).

Implementation of nurse-initiated protocol orders could optimize the flow of patients in the ED as census and wait times increase (ACEP, 2015). Nurse-initiated protocol orders could be implemented to target specific high-volume chief complaints to improve utilization of evidence-based practice for both diagnosis and treatment of specified conditions (ACEP, 2015).

Significance

ED overcrowding causes problems for patients and staff, including increased waiting times, increased ambulance diversion, increased length of stay, increased medical errors, increased patient mortality, and increased harm to hospitals due to financial losses (Salway, Valenzuela, Shoenberger, Mallon, & Viccellio, 2017). The project lead is an employee of this South Central, MT hospital. For the last six years, management has talked about creating and implementing nurse-initiated protocols. However, no one has taken the initiative to begin this. Through personal observation and conversations with staff, it was identified that the Project Site ED may benefit from nurse-initiated protocols as the Project Site ED has experienced significant wait times related to

overcrowding, boarding of patients, and decreased throughput times. ED nurses are in a unique situation in which they often see the patient before the physician. Burgess and Kynoch (2017) explain:

ED nurses have a specialized set of skills and knowledge that enable them to rapidly and safely care for and treat acutely unwell, undiagnosed patients. Evidence suggests that nurses with the correct training and support are willing to and have the ability to operate in advanced scopes of practice, as they gain fulfillment from contributing to treatment decisions and want to positively influence the outcomes of their patients. These interventions have been shown to have an impact on a number of outcomes, from reducing waiting time to be seen, reducing time to analgesia or treatment, improved patient satisfaction and decreased ED LOS (p.873).

Emergency Severity Index

In 2002, the Emergency Nurse Association (ENA) and the ACEP formed a Joint Triage Five Level Task Force to review the literature and make recommendations for standardization of a triage system to be used in EDs across the United States. The standardized triage system developed by the Joint Triage Five Level Task Force was called the Emergency Severity Index or ESI. The ESI provided guidelines to quickly identify patients who cannot wait to be from those that can wait. The ESI uses a brief nurse assessment and vital signs to assign patients an acuity Level of 1-5. An acuity Level of 1 “Resuscitation” would indicate a patient is in need of immediate, lifesaving intervention without delay; a Level of 2 designates “Emergent” care needed as there is a high risk of deterioration or signs of a time critical problem; an acuity Level of 3, “Urgent,” suggests the patient is stable but multiple types of resource are needed to investigate or treat. Acuity Levels of 4 and 5 in the ESI are lower acuity; Level 4 is “Less Urgent,” noting a stable patient with only one type of resource anticipated and finally a

Level 5 is “Non-urgent” indicating a patient that is stable with no resources anticipated except oral or topical medications. The use of the ESI has not been shown to inhibit or delay care and instead may improve the timeliness of care for those who need it most (Gilboy, Tanabe, Travers, & Rosenau, 2012). The national average for time spent in triage is seven minutes (Sayah, Rogers, Devarajan, Kingsley-Rocker, & Lobon, 2014). The benefits of the ESI have been recognized by both the ACEP and the ENA. Adoption of the standardized triage system has been widespread. In 2003, the Board of Directors of each organization released a position statement saying:

the ACEP and ENA believe that quality of patient care would benefit from implementing a standardized emergency department (ED) triage scale and acuity categorization process. Based on expert consensus of currently available evidence, ACEP and ENA support the adoption of a reliable, valid, five-level triage scale (Gilboy, Tanabe, Travers, & Rosenau, 2012, p.1)

Based on these recommendations, the ED discussed in this project adopted the use of the ESI early on. Providers and nursing staff believed in the benefit afforded by the ESI as well as the potential ability to decrease wait time for patients who need care.

Setting

The Project Site ED is a 23-bed level II trauma center located in South Central Montana. In addition, the Project Site ED has a two-bed trauma bay and two recliners located in a general area for patients with a low acuity who do not need to be monitored. The Project Site ED is a part of a 255 staffed bed hospital that provides medical care to a geographically large service area. The hospital also contains a 24-bed ICU and 4 bed PICU. Average daily census of the hospital is approximately 100 patients

(S. Kaufman, personal communication, January 10, 2018). The ED uses a “pull till full” philosophy meaning, if a bed is open and available, a patient should be brought back immediately to the waiting bed. According to the Project Site ED, nurse manager, Samantha Kauffman and IT (2018), peak times in the emergency department are from 0900–0100 (Personal communication, January 10, 2018). Average wait time in the Project Site ED is > 22 minutes, longest wait times can be over 3 hours. On average, patients spend 136 minutes in the ED before being discharged home, 224 minutes in the ED before being admitted to the hospital, and 307 minutes in the ED before being physically transferred to their hospital room (Propublica, 2018).

Nurses are assigned a patient ratio of 3:1. During peak times, from 0900–0100 there are two physicians on staff, one clinical supervisor, one triage nurse, and six staff nurses. Once a patient is roomed in the ED, it is not unusual for the nurse to assess the patient before the physician. Once a nurse assesses the patient, the nurse may decide to place an intravenous line (IV) and draw labs. Of note, the blood will be held in the lab until the physician places orders in the electronic health record (EHR). According to the nurse manager at the Project Site ED, the time from triage to orders being placed by the physician in the EHR is approximately 45 minutes (S.Kaufman, personal communication, January 10, 2018). The time elapsed between orders being placed and lab work results being finalized is dependent on the test ordered. In the Project Site ED, it takes 15 minutes for a complete blood count (CBC) and 40 minutes for a complete metabolic panel (CMP) (S.Kaufman, personal communication, September 15, 2017). Nurse-initiated protocol orders would allow nurses to order lab tests shortly

after collecting specimens thus allowing results be available prior to the physician assessing the patient (Douma, Drake, O'Dochartaigh, & Smith, 2016). Having the test results early gives the physician more information about the status of their patient, which might lead to earlier medical decision making and decrease treatment time (Stauber, 2013).

Project Site Current Practices

The ED that served as the implementation site for this project is no different from its counterparts nationwide. The ED struggles with keeping wait times to a minimum and improving patient throughput all the while striving to provide evidence-based care. Pre-protocol intervention at the Project Site ED was for the patient to have a quick registration. Quick registration included gathering of pertinent demographic information including but not limited to the patient's name, birthdate, social security number, and chief complaint. Upon completion of quick registration, the patient was escorted by a registration specialist to the triage nurse for ESI scoring and triage.

After the patient was triaged, they were roomed according to acuity, bed availability, nurse ability, and charge nurse assignment. Patients with an ESI acuity of 1, 2, or 3 were put on a cardiac respiratory monitor with pulse oximetry if required as outlined by hospital/department standards of care and policy. Patients with an ESI acuity Level 1 typically do not present to the triage area but instead enter the ED through emergency medical services. If a patient with an acuity Level of 3 is triaged before a patient with an acuity Level of 2, the patient with the higher acuity would be roomed

first. The protocols were designed to expedite care for patients with an acuity of 2, 3, and 4.

Once a patient is roomed, there are no guidelines to direct what happens next. In the Project Site ED, a common practice is the primary nurse will initiate care for a patient with an ESI acuity of 1, 2 or 3. For patients with an ESI acuity of 1, 2 or 3 and a chief complaint of chest pain or abdominal pain, the nurse will initiate care by placing an IV and collecting blood for lab analysis. However, starting an IV and collecting blood without an order can be considered practicing outside of the nursing scope and/or practicing medicine without a license. Implementing protocols to start care would allow the nurses to initiate medical interventions without having to consult the provider prior to initiation, thus improving outcomes such as reducing time to analgesia or treatment, improved patient satisfaction, and decreased ED length of stay (Burgess & Kynoch, 2017).

Stakeholders

Identification of stakeholders prior to implementation was a critical facet of this quality improvement project. Stakeholders include the Project Site hospital as a whole, the Senior Leadership team, the Critical Care Service Line Director, the ED Nurse Manager, the Medical Director, staff physicians, and staff nurses. Stakeholders also include the patients that are being treated at the Project Site hospital in Billings and the surrounding area. Without the support of these stakeholders, nurse-initiated protocols are not possible. Senior leadership approval is needed for all protocol changes. Physician buy-in is needed for nurse-initiated protocols to be successful, and nurse buy-in is needed

so that the protocols are used. Patients and patient satisfaction are also instrumental in the success of this project. Nurse-Initiated Protocols in the Project Site ED will also update the policy and allow nurses to start IVs and draw blood for chest pain and abdominal pain patients.

Summary

ED overcrowding is a problem. The purpose of this quality improvement project is to create protocols that allow nurses to order specific interventions based on chief complaints to expedite care and decrease overall length of stay in the ED, which is supported by both the ACEP and ENA. Nurses have the education and training needed to initiate patient care.

CHAPTER TWO – REVIEW OF LITERATURE

Review

Triage nurses frequently enter orders in the electronic health record (EHR) at triage, although there has not been extensive research in the topic area. A review of current literature was completed through CINAHL, Google Scholar, PubMed, Joanna Briggs, Web of Science using mesh terms “emergency,” “nurse,” “protocols,” “throughput times,” and “standard/standardized orders.” Articles were limited to a year range of 2007–2018. Inclusion criteria for studies were for all patients seeking treatment in an emergency setting, including adult patients, peer-reviewed journals, and studies written in English. Outcome measures were patient wait times and length of stay.

Researchers have shown nurse-initiated protocols decreased length of stay, a reduced time waiting for analgesics, decreased turnaround time for radiographic and lab results, and a reduced time to treatment, and disposition (Douma, Drake, O’Dochartaigh, & Smith, 2016). Recurring ED protocols found in the literature included 12 lead EKG, labs and aspirin administration for patients with chest pain, a chest x-ray for patients with a suspected pneumonia, urinalysis and urine pregnancy for patients with urinary tract infection symptoms and abdominal pain, acetaminophen or ibuprofen for treatment of fever in children, ondansetron for patients with nausea and vomiting, and radiographs for orthopedic injuries (Douma, Drake, O’Dochartaigh, & Smith, 2016; Hwang, Payton, Weeks, & Plourde, 2016; Retezar et al., 2010; Robinson, 2013).

A recent study by Douma, Drake, O'Dochartaigh, and Smith (2016) examined the effect of six nurse-initiated protocols on timeliness in the ED for 143 patients. The protocols observed were acetaminophen for pain and fever, suspected hip fracture, suspected ischemic chest pain, vaginal bleeding during pregnancy, lower abdominal pain, and upper abdominal pain. For patients requiring acetaminophen, the protocol decreased time to administration of the medication by 186 minutes. A protocol for ischemic chest pain protocol was shown to reduce the time from triage to receipt of a troponin level by 79 minutes. Researchers found a decreased length of stay (LOS) for patients with a chief complaint of a hip fracture, vaginal bleeding during pregnancy, or both abdominal pain protocols. Length of stay using nurse-initiated protocols for suspected hip fracture, suspected ischemic chest pain, and abdominal pain was found to be reduced between 131 minutes and 247 minutes.

An integrative review conducted by Robinson (2013) examined total length of stay (TLOS) in eight studies of ED patients receiving protocol orders placed at triage by a nurse. The study showed a mean time savings of TLOS ranging from 2.45 minutes to 74 minutes when using nurse-initiated protocols at triage.

A retrospective cohort study by Retezar et al. (2016) audited 15,188 patients with nurse-ordered protocols entered at triage. The protocols implemented included chest pain, shortness of breath, abdominal pain, and genitourinary chief complaints. Results showed a 16% overall reduction in length of stay when a full set of triage orders were used compared to partial order sets or no orders at triage.

Hwang, Payton, Weeks, and Plourde (2016) conducted a respective cohort study of patients in a 66-bed level I trauma center in which they looked at patients with a chief complaint of “chest pain, chest pressure, dyspnea, arm or shoulder pain or paresthesia, syncope, near-syncope, and palpitations” (p.1–2). A total of 155 patients had protocol orders implemented while 161 patients with chest pain served as the control group. The researchers found a decrease of 26 minutes from provider evaluation to disposition in the experimental group.

Ho, Chau, Chan, and Yau (2018) conducted an unblinded randomized controlled trial with a protocol (n=56) or usual practice group (n=56) using nurse-initiated radiographic-test protocol using the Ottawa Ankle Rules. Researchers found the nurse-initiated radiographic-test protocol reduced unnecessary ankle and foot radiographic-test request and shortened patients LOS in the ED by 13 minutes.

Researchers have demonstrated implementation of nurse-initiated protocols at triage provides improved patient flow. Protocols studied and reviewed here showed an overall decrease in length of stay. Nurses are in a unique position to initiate care in the ED resulting in decreased overall length of stay in the ED and overall improved patient-centered care.

CHAPTER THREE – THEORETICAL UNDERPINNING

Transformational Leadership Theory

The implementation of nurse-initiated protocols in the ED as a quality improvement project was guided by the Transformational Leadership Theory. Transformational leadership is evident when a leader engages others to “raise one another to higher levels of motivation and morality” (Barker, 2006, p.16). Transformational leaders identify change, inspire a vision of the future, motivate others, and deliver while building strong relationships with others (Business Dictionary, 2017). The theory was chosen for this project because it fosters a team approach that is consistent with the culture of compassion at the Project Study Site, “we’re motivated by a passion for providing great patient care and inspired by a commitment to better our community. We humbly recognize the trust our patients place in us, as well as our dependence on one another to succeed. This helps us be our very best at what we do” (SCL Health, n.d.). This theory was chosen to guide the project in a team approached way, to look beyond individual interests and focus on the needs of the ED as a whole.

Transformational leadership was introduced in 1978 by James McGregor Burns. Transformational leadership differs from other leadership theories in that it is focused on the needs and values of the followers rather than the leader. The basic principles of transformational leadership have included vision, organizational trust, and self-esteem. Barker (2006) explained the first strategy of transformational leadership is to “provide a

vision of a possible and desirable future for the organization” (p.4). The vision should coincide with the values or vision statement of the organization. The next strategy is organizational trust; organizational trust is the creation and building of positive and productive relationships among staff and leadership. The last concept of Transformation Leadership Theory is self-esteem. The concept of self-esteem has required leaders to have a high regard for themselves to motivate and transform their team. Spahr (2015) explained transformational leadership “inspires people to achieve unexpected or remarkable results. It gives workers autonomy over specific jobs, as well as the authority to make decisions once they have been trained” (para. 1).

Transformational leadership theory has been noted to possess both strengths and weaknesses. Strengths of transformational leadership include being very team-oriented and encouraging of people working together toward mutual goals. The leader should be able to inspire and motivate the team to reach desired goals by setting a positive example. The team works together and to create rapport, however, each team member is responsible for their own behavior. Weaknesses of transformational leadership include requiring an existing structure to fix. The premises serving as the foundation of transformational leadership theory can be ineffective in the initial stages or in ad-hoc situations (Spahr, 2015).

CHAPTER FOUR – METHODS

MethodsApproval Process

Institutional Review Board (IRB) exemption was granted through Montana State University—Bozeman and St. Vincent Healthcare prior to the start of this project. The project was granted IRB exemption as there is minimal risk to the patient. Identified risks could include but are not limited to unnecessary tests being ordered, additional tests being ordered by physician increasing time in department, and decreased physician-nurse relationship.

Model for Improvement

There are many different care models that can help incorporate evidence into practice. The Iowa Model of Evidence-Based Practice to Promote Quality Care, also known as the Iowa Model, was chosen because it provides a step-by-step guide on how to bring the evidence into practice. The Iowa Model has been used in numerous academic settings and healthcare institutions and has been cited by nurses as being intuitive (Brown, 2014).

The Iowa Model is centered on a problem-focused trigger or knowledge-focused trigger that identifies an area where evidenced-based practice change may be warranted. After priority has been determined, a group or a team is formed to dissect the problem. The team should be made up of interdisciplinary stakeholders and not just nurses. After the team is formed, research of current literature is done. If there is

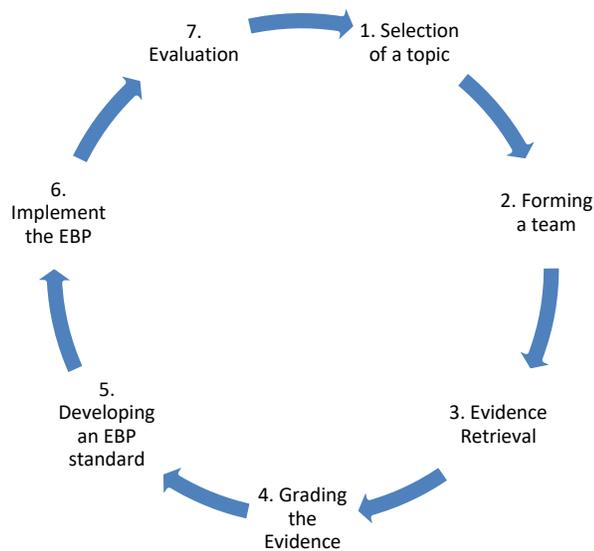
sufficient research, then a pilot practice change can be implemented or an actual research study may be conducted. If the change from the pilot is feasible, then a practice change can be implemented (Brown, 2014).

The Iowa Model is important because it helps guide the direction from when a problem is identified to when a practice change is made. The Iowa Model promotes literature reviews to ensure that integration of best research evidence and clinical expertise are combined to deliver optimal patient care and outcomes (Sullivan, 2006, p. 176).

The Iowa Model has seven phases:

1. Selection of a topic that will contribute to improving care with available data and evidence, with commitment of staff that is of high priority.
2. Form a team that will be responsible for development, implementation, and evaluation that includes stakeholders.
3. Evidence retrieval after a brainstorming session using reputable sites.
4. Grade the evidence.
5. Develop an Evidence-Based Practice Standard.
6. Implement the Evidence-Based Practice.
7. Evaluate (Doody & Doody, 2011).

Figure 1. Iowa Model (Adapted from Doody & Doody, 2011)



Study Design

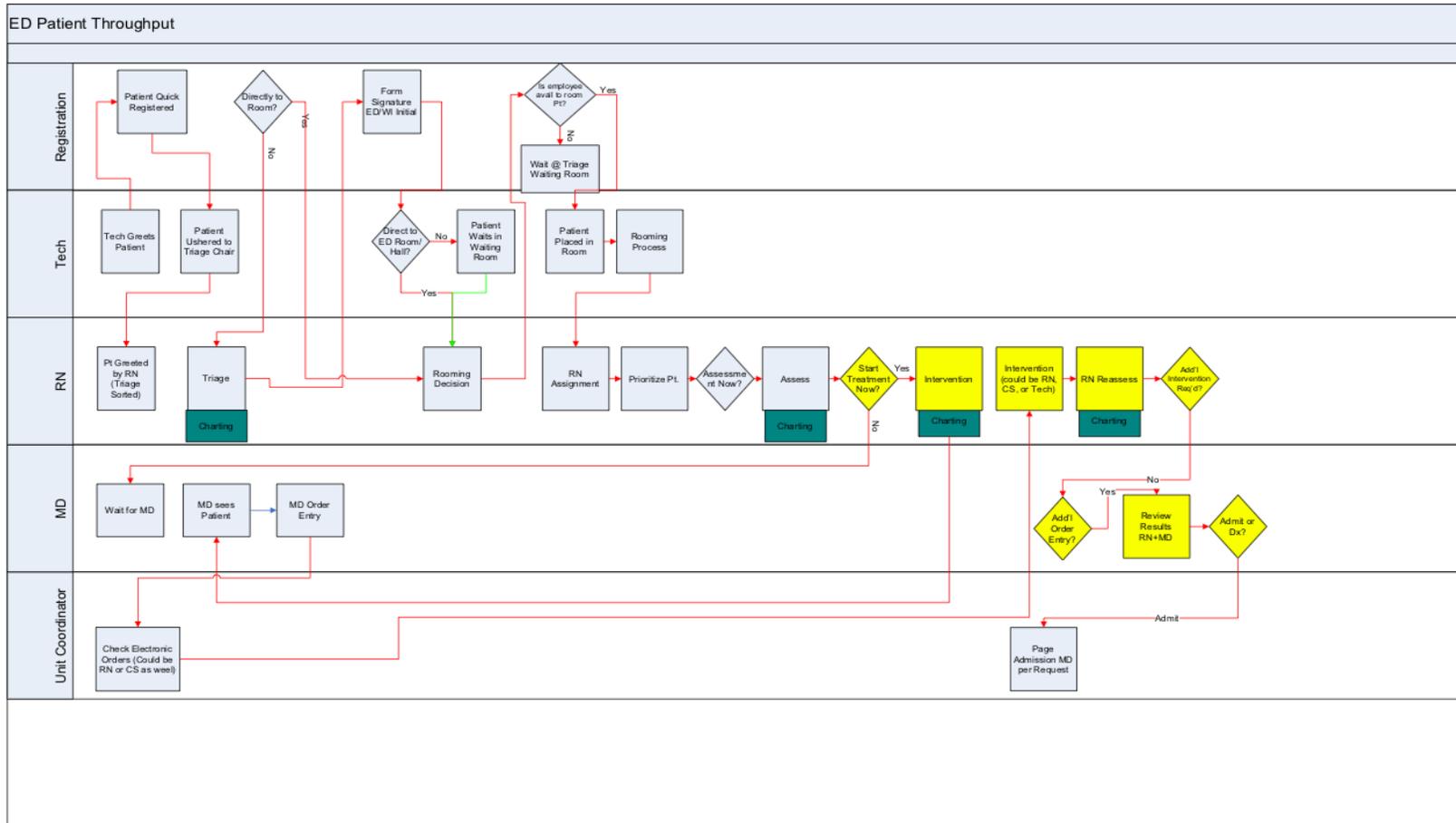
An informal survey of nurses and physicians in the Project Site ED was conducted to assess the milieu and its readiness for change. Results from the survey suggested there was overwhelming support for nurses to use their knowledge and assessment skills to implement nurse-initiated protocols. Physicians also expressed support of nurse-initiated protocols.

At the Project Site ED, leadership, physicians, and nurses had identified a need for change as wait times become increasingly longer. Specifically, patient wait time was recognized as a consistent issue. In an attempt to better understand the problem, a close look at the current status of flow through the ED was necessary. To accomplish this goal, a map was used to identify the flow of an average patient within the ED. Examination of the map allowed the team to identify areas in patient care that could be improved upon. By identifying and making improvements to the areas noted on the map,

it was hoped that wait times could also be decreased. Nurses are equipped with knowledge and skills that can allow them to successfully begin patient care when guided by evidenced-based protocols, thus decreasing overall waiting time for patients. A spark was ignited within the team to improve throughput times and increase teamwork in the department.

In collaboration with the hospital's Lean Facilitator, flow of an average patient stay in the ED from triage to disposition was mapped. Triage is the area in the lobby where patients check in and make first contact with a nurse. Disposition is defined as the point in time when the physician decides to admit the patient to the hospital, transfer to a higher level of care, or to discharge the patient home. Figure 2 depicts an average ED visit or throughput at the Project Site ED and provides a visual representation of workflow in the ED including who is responsible for each action. The yellow boxes are used to indicate key points in time when treatment may begin. The yellow boxes were also identified as areas in which time could be saved.

Figure 2. Emergency Department Throughput



Protocols

Abdominal pain, chest pain, and ankle trauma were three common reasons identified in the literature review to seek emergency care with standard treatment orders, and thus were chosen as pilot protocols. Protocols were developed by the project lead, an expert physician, and the clinical supervisor. There was no pre-existing protocol for ankle trauma. There were pre-existing protocols for chest pain and for abdominal pain. The pre-existing protocol for chest pain included an EKG for patients presenting with chest pain, over the age of 18 years. The pre-existing protocol for abdominal pain included a urinalysis and a urine pregnancy for female patients aged 12–60, unless having a previous hysterectomy, for chief complaints of abdominal pain. See Appendix A for new protocols.

A team was convened consisting of the ED medical director, clinical supervisors, the unit manager, and the practice council (comprised of floor nurses and techs) to develop evidence-based protocols that would best suit the needs of the department, increase collegiality between nurses and physicians, and reducing wait times for the patient.

Communication Plan

A communication plan was created by the team to provide stakeholders with general project information, a timeline of deliverables, and a go-live date. The communication plan identified overall communication objectives, audience, message, channel, and timing to achieve goals (MindTools, n.d.). Barker (2006) explained communications is a key part of developing organizational trust. Leaders need to know

what to communicate and when to communicate it. The information communicated must be “open, accurate, honest, and timely” (p.21). Project information was presented to the physicians during a staff meeting and to the nurses at skills day to create a shared vision for development and implementation of the project. Order sets were built within the EHR for increased accessibility for nurses to enter orders. Protocols were e-mailed to all staff and hard copies were available at the triage desk as well as within the department care areas. The protocols were also uploaded into the institution’s policy electronic catalog. The nurse-initiated protocols were disseminated in a way to increase visibility and ensure ease of access for all parties providing care in the Project Site ED.

Chart Audits

Retrospective chart audits of 100 ED patient charts was completed in the late fall 2017 to early spring 2018. Inclusion criteria for audit included patients with a chief complaint of abdominal pain, chest pain, or ankle pain/trauma. Prior to implementation of the chart audit, it was decided the following numbers of charts would be audited: 40 chest pain, 40 abdomen pain, and 20 ankle pain/trauma chart. The number of charts to audit was decided beforehand. The clinical supervisor recommended 40 chart audits for abdominal and chest pain as she has previous experience with chart audits and it gives a variety of conditions in the Project Site ED including different days, different staff, varying hospital, and ED census. There are fewer patients seen with ankle pain or trauma than chest or abdominal pain as these patients can be seen in a walk-in clinic. Audits were done every two days and then the third day was skipped. After

charts were sorted by chief complaint, a random number generator was used based on how many patients were seen that day to choose the chart to audit. For example, if 20 patients with a chief complaint of abdominal pain checked in on one of the audit days, a random number generator was set for 1–20 and a number was randomly chosen, and that chart was audited. Use of a random number generator to identify charts allowed for selection of charts with increased variability in factors such as time of day, wait times, ED and hospital census, physician on duty, and different staffing matrices related to time of day.

After implementation, chart audits were conducted differently as the sample size for charts available for audit was less. The criteria for nurses to use protocols orders was set at age 50 and older (compared to age 18 and older for physicians), which decreased sample size. Originally, the abdominal pain protocol was designed for patients over 15 years of age but when the protocol went under physician review, it was changed to age 50 years of age or older. The physicians expressed concern that patients under the age of 50 may not need as many lab tests, as younger patients are typically healthier. The charts selected for nurse-initiated protocols were not random. Nurses were asked to log in a binder when protocols were used. All of the nurse-initiated protocol charts were audited. Audits were conducted on patient charts with a chief complaint of abdomen pain and ankle pain. An unexpected delay in approval for the chest pain nurse-initiated protocol resulted in exclusion of this diagnosis from the project. Additionally, during the project implementation phase, no patients were seen

with ankle pain/trauma, thus ankle pain/trauma nurse-initiated protocol was not audited post-implementation.

Thirty post-implementation abdominal pain protocols were audited. The nurses were asked to record when they used a protocol on a flowsheet in a binder. The binders were placed in the Project Site ED in various locations for ease and convenience. The information gathered on the flowsheet included date, time of day, chief complaint, sex of patient, and the initials of the nurse caring for the patient. Collection of the data on the flowsheet allowed for the charts pertinent to the project to be identifiable for later audit.

Approval Process

The protocol approval process is multi-layered. The protocols were designed using current literature from the literature review. A team comprised of a clinical supervisor, nurse manager, staff nurses, a pharmacist, and several physicians developed protocols that would be beneficial and applicable to the Project Site ED. The protocols were presented to the practice council. The practice council is department specific governing body which approves new practices that shape patient care. After the practice council approved the protocols, the next step was to present the protocols to the ED doctors at their staff meeting. During review of the protocols at the physician meeting, the physicians decided to change the age of the abdominal pain protocols and restrict the use of the abdominal pain protocol to patients 50 years of age and older. The physicians had no reason, other than level of comfort, with restricting protocols to patients age 50 or older. After the protocols were approved by the doctors, the protocols had to be approved

by the Medical Executive Committee (MEC). The MEC is the final step in the approval process. See Appendix A for protocols.

SWOT

In an attempt to identify and mitigate potential problems a Strength, Weakness, Opportunity, and Threat (SWOT) analysis was completed prior to implementation of protocols. Paterson (2014) explained that “the assessment of internal organizational strengths, weaknesses, opportunities, and threats (SWOT) is a widely- used planning framework to support capital structure planning” (p. 120). The SWOT analysis should include both financial and business risk assessment. There is a financial risk to allowing nurses to enter protocol orders if the nurse orders protocols on patients that the physician would not have placed orders on. There is a business risk involved as the culture of the department is being changed. If staff is unhappy with the changes implemented, there is a potential for increased staff turnover. There is a risk that the providers and the nurses will not work together with the addition of the protocols. Staff turnover is a huge financial burden to organizations. Table 1 outlines the SWOT identified prior to implementation of to Nurse-initiated protocols in the Project Site ED.

Table 1. SWOT Analysis

	Helpful	Harmful
Internal	<p>Strengths:</p> <ul style="list-style-type: none"> • Increased efficiency allowing patients to be seen and treated quickly • Improved flow of the department/ increased throughput times • Decreased overcrowding • Decreased number of patients who leave before being seen • Increased patient satisfaction 	<p>Weaknesses:</p> <ul style="list-style-type: none"> • Requires staff buy from both physicians and nurses • Nurse may order a test that the physician would not have ordered- increasing patient costs • Duplicated orders • Potential for staff turnover
External	<p>Opportunities:</p> <ul style="list-style-type: none"> • Build collaborative relationships between professions • See more patients • Build rapport between physicians and nurses • Increased rapport between lab and ED nurses • Decreased time for results to be available from lab 	<p>Threats:</p> <ul style="list-style-type: none"> • Staff resistance • Culture change • Not used by nurses • Rejected by physicians • Staff turnover

CHAPTER FIVE – RESULTS

Results

Fifteen physicians work in the ED at the Project Site ED; however, one physician retired between pre and post protocol implementation. Seventeen nurses out of 40 nurses used the protocols. Forty chart audits were done examining current practice of physician orders on patients with acute or chronic abdominal pain ages 18 and over. A total of thirty patient charts were identified and included in the post-implementation phase of this project examining patients 50 years of age or older with a chief complaint of acute abdominal pain occurring less than one week.

The mean time from the time the patient is triaged to order placement of orders in the EHR by the provider was 44.0 (SD=29.4) in minutes. The mean time post-implementation from the time the patient was triaged to order being placed by a nurse using nurse-initiated protocols was 28.3 (SD=25.5) in minutes. There was a decrease of 15.7 minutes from triage to order placement in the EHR when nurse-initiated protocols were implemented.

The mean time from the time the patient is triaged to order to test results in the EHR by the provider was 100.1 (SD=33.6) in minutes. The mean time post-implementation from the time the patient was triaged to test results in the EHR by a nurse using nurse-initiated protocols was 79.4 (SD=28.4) in minutes. There was a decrease of 20.7 minutes from triage to test results in the EHR when nurse-initiated protocols were implemented.

The mean time from the time the patient is triaged (door) to disposition (decision to admit or discharge home) by the provider was 187.9 (SD=58.1) in minutes. The mean time post-implementation from the time the patient was triaged to disposition using nurse-initiated protocols was 221.4 (SD=68.2) in minutes. There was an increase of 33.5 minutes when nurse-initiated protocols were implemented.

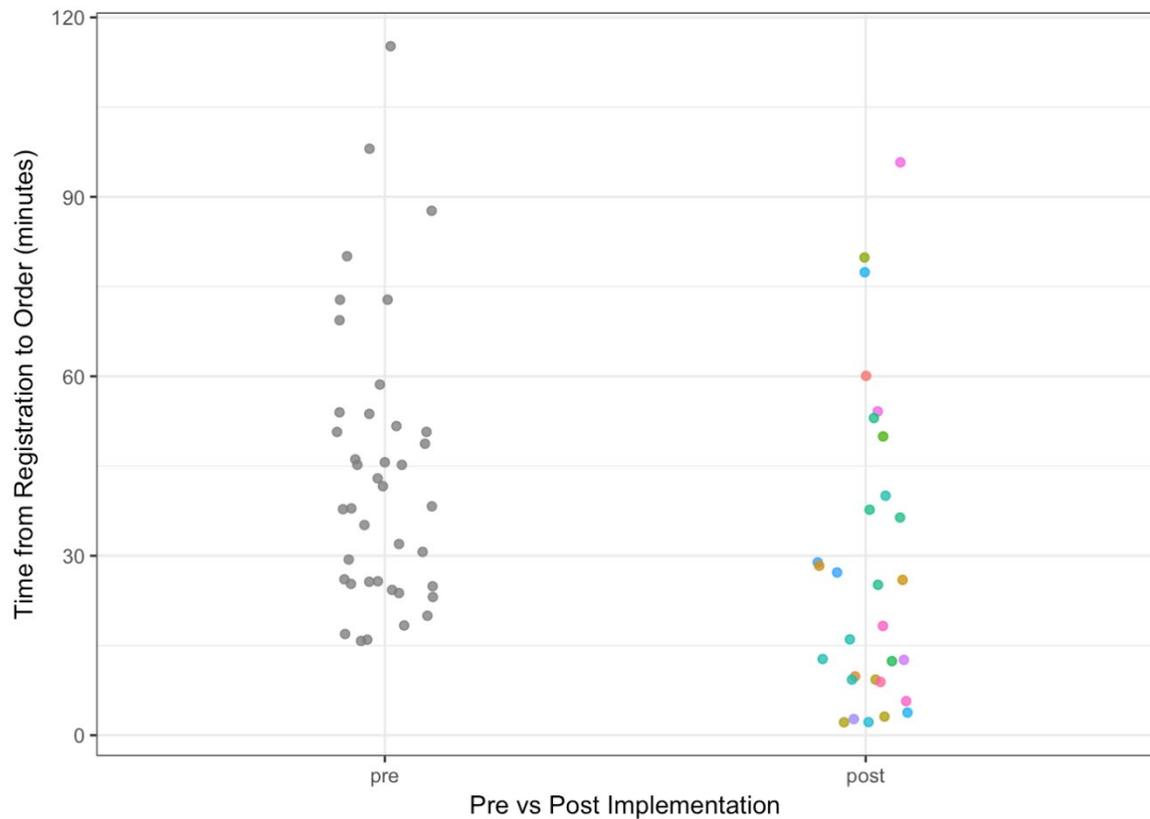
Table 2. Time to Task at Various Points in the Project Site Emergency Department

	M (in minutes)	SD
Time from Triage Door to Placement of Order in EHR		
Pre Nurse-Initiated Protocol Implementation	44	29.4
Post Nurse-Initiated Protocol Implementation	28.3	25.5
Time from Triage Door to Finalized Laboratory Results		
Pre Nurse-Initiated Protocol Implementation	100.1	33.6
Post Nurse-Initiated Protocol Implementation	79.4	28.4
Time for Triage Door to Disposition of Patient from Department		
Pre Nurse-Initiated Protocol Implementation	187.9	58.1
Post Nurse-Initiated Protocol Implementation	221.4	68.2

Figure 3 depicts registration-to-order times for pre-implementation or physician ordered in grey and post-implementation or nurse-ordered in color. The colored dots represent individual nurses ordering the protocols. There were 17 nurses total who used the protocols. Figure 3 shows that registration-to-order times are clustered at or below the

15-minute mark. There are no physician orders before the 15-minute mark. This should be noted because the mean time to get a CBC result back is 15 minutes (S.Kaufman, personal communication, September 15, 2017).

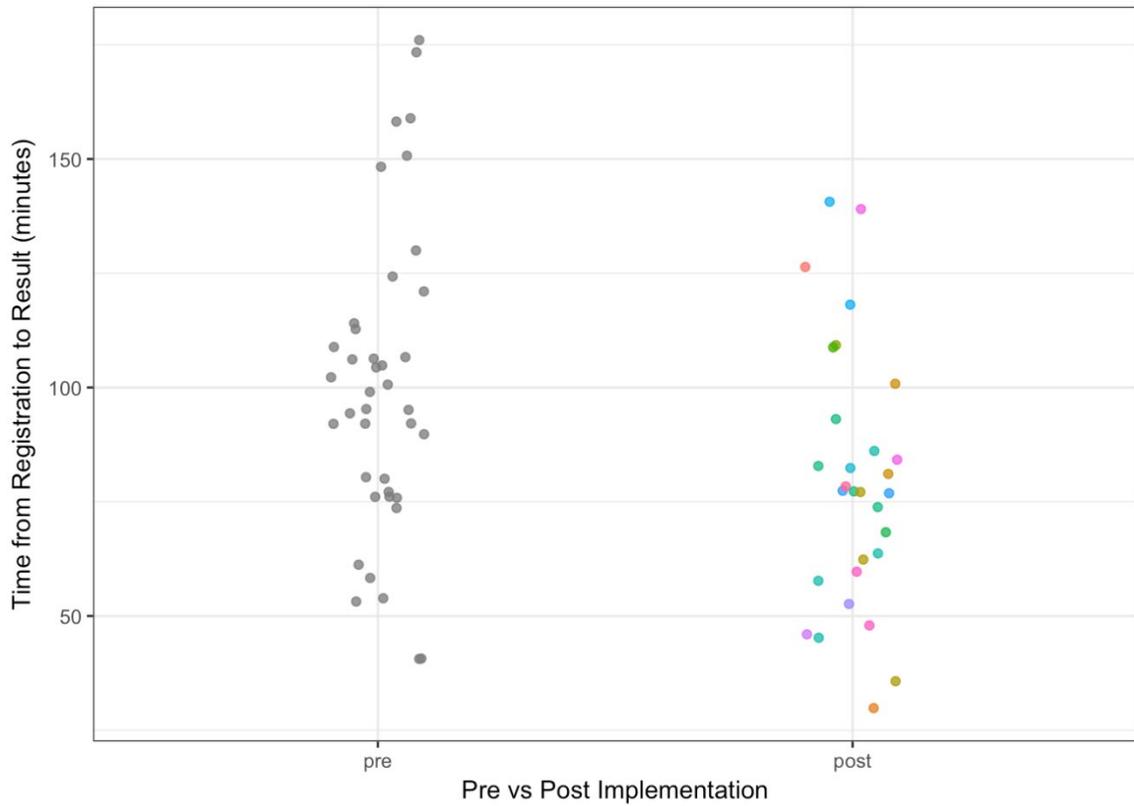
Figure 3. Registration to Order Times, Provider versus Nurse



Rugemer, 2018

Figure 4 depicts registration-to-result times for pre-implementation or physician ordered in grey and post-implementation or nurse-ordered in color. The colored dots represent individual nurses ordering the protocols. There were 17 nurses total who used the protocols. Figure 4 shows that post implementation of protocols got test results back faster than pre-implementation physician ordered.

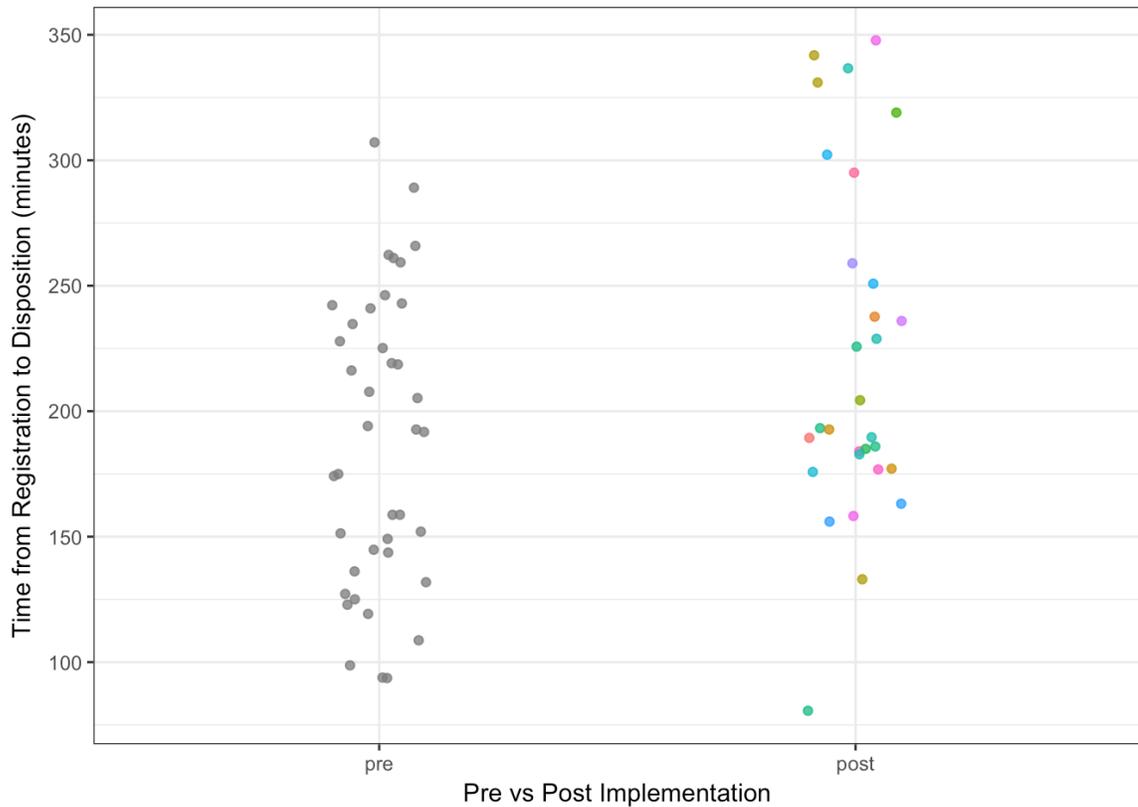
Figure 4. Registration to Result Times, Provider versus Nurse



Rugemer, 2018

Figure 5 shows registration-to-disposition times pre and post-implementation. This figure shows that registration-to-disposition time is faster when the physician puts orders in. There are many different factors here that could account for this.

Figure 5. Registration to Disposition Times, Provider versus Nurse



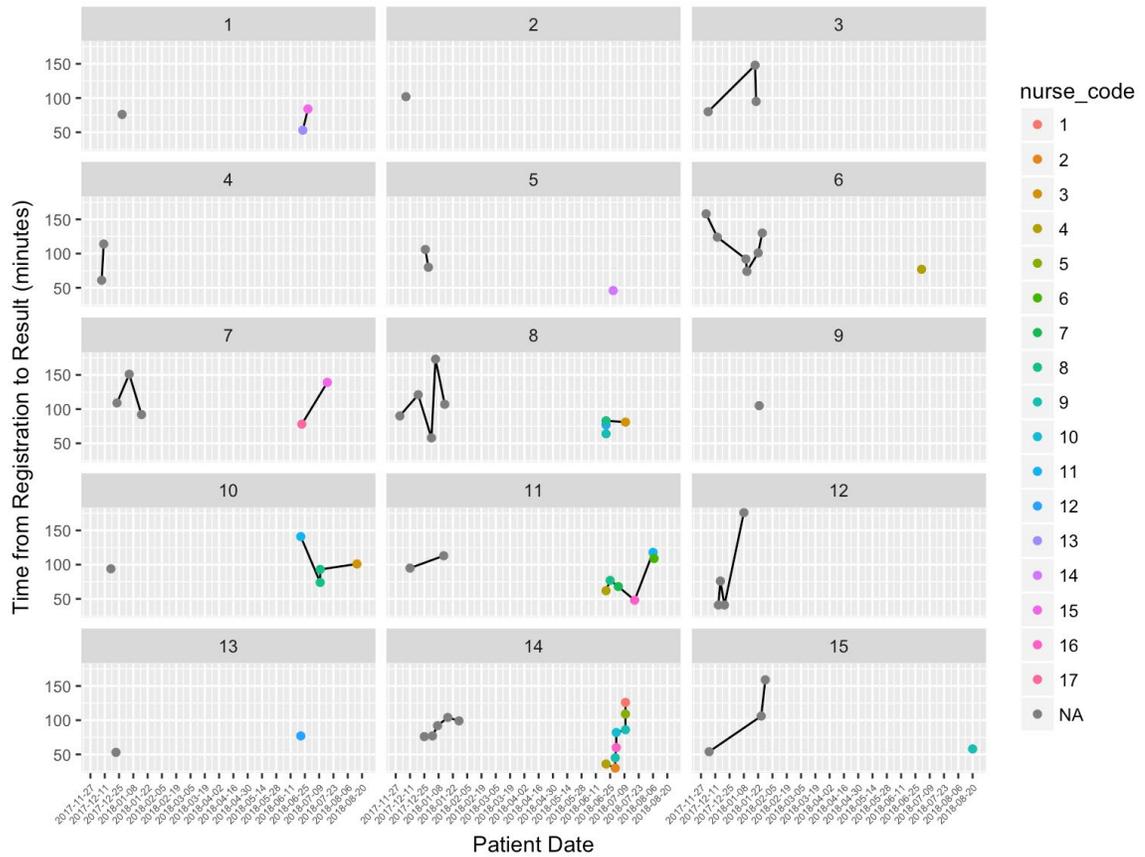
Rugemer, 2018

Figure 6 displays the observed wait times by date on the x-axis, faceted into panels by different providers numbered with differing colors for nurse in the post-implementation period, with minutes on the y-axis. The grey dots represent pre-implementation abdominal pain patients by physician thus why they are on the left side of the graph. The colored dots represent when and which nurses used a protocol. It is important to see here that the protocols were not implemented equally among providers. There are no post-implementation orders ever entered for physicians 2, 3, 4, 9, or 12. One physician retired between pre- and post-implementation. While some providers, 7, 8, 11, and 14 had multiple nurse-implemented protocol sets used. Figure 6 depicts an overall

picture of the study and shows in detail chart audits by provider, nurse, and date.

Information to be gleaned from this figure is that the nurse-initiated protocols were not implemented equally between providers, and some days multiple nurse-initiated protocols were entered.

Figure 6. Audits by Physician, Nurse, and Date



CHAPTER SIX – DISCUSSION

DiscussionOutcomes

Although our primary outcome of interest was wait times, there were other outcomes that occurred from these nurse-initiated protocols including, but not limited to, increased patient satisfaction from decreased LOS, increased nurse satisfaction from increased autonomy, increased physician-nurse relationships, better flow of the department, and for legality of starting care before being seen by a physician. In addition to several positive outcomes related to the project, there was also the potential for some negative outcomes. These include, but are not limited to, ordering of unnecessary tests, additional tests ordered by physicians potentially resulting in increased time in the ED, and decreased physician-nurse relationship when the nurse does not follow the protocols or the physician does not think that patient needs to have protocol orders entered.

Strengths

There were many strengths related to this quality improvement project. Various multidisciplinary people came together as a team to create protocols that reflected evidenced-based practice protocols that were applicable to the study ED. Registration-to-order and registration-to-result times were both decreased. This led to initiating care earlier on patients, which was consistent with what is found in the literature.

Although starting an IV and sending blood work to the lab before having an order is a common practice, having this protocol in place legally covered nurses for the care they started before receiving an order from the physician and there is now a policy. In addition, for those who implemented the protocol, it appeared to increase nurse and physician communication. Nurses noted an increase in their autonomy and reported feeling empowered to put in orders. Physicians that were in support of the implementation of the nursing protocols reported an advantage to having labs prior to seeing the patient or shortly thereafter. Another impact this study had was to increase the rapport between lab and the nurses. The nurses were able to put orders in right after blood was drawn and sent to the lab. As a result, the lab technician spent less time holding blood, checking for orders, or calling the department. Although overall length of stay was not decreased in the study, there was a decrease in re-to-order times and registration-to-result times, which are both positive outcomes that show potential for improving the overall length of stay (LOS) in the future.

Limitations

There were limitations to this study. Only two of the three protocols were implemented. The ankle trauma protocol sample size over the study duration was too small to compare pre and post protocol interventions. Due to circumstances that persisted throughout the study time frame, the chest pain protocol was not approved within the time frame needed to gather enough data. The protocol was submitted to the responsible clinical supervisor. However, PolicyTech (the software used for policies) was updated, which created confusion because the clinical supervisor assumed she had taken the

necessary steps for the policy to be approved and hadn't. The protocol was finally submitted in May but was rejected as the Heart Care Coordinator disagreed with the age parameters. The chest pain protocol is still in the process of being approved.

The biggest barrier to this quality improvement project was resistance exhibited by both physicians and nurses with implementing protocols. Of the fifteen physicians involved in this study, four physicians were reluctant to implement the new process. On the first day that the protocols were implemented, the physicians working felt that they were efficient enough at seeing patients that they didn't need nurse intervention to enter the protocols at triage. This led to hesitation on the nurse's part to enter protocols for certain physicians. The attitude of the physicians impacted the ability of nurses to implement the protocols throughout the duration of the study. In order to be a successful project, it is imperative that the protocols can be used when appropriate and not only at certain times or for certain reasons. Due to this initial drawback, it was decided that the protocol orders would not be ordered at triage but rather by the primary nurse after the patient has been roomed. This change in the process was altered from what is in the literature.

Nurses were also hesitant to enter protocol orders. Seventeen out of 40 nurses recorded using protocols. The nurses were requested to write in a log when they used the protocols. This number may not be an accurate representation if nurses implemented protocols but did not record them. Due to the age restriction on abdominal pain, there were not as many patients eligible to be included in the study. Not all the nurses used the protocols. It is difficult to understand if the nurses who did not log protocols were not

comfortable using them, did not have an opportunity to use them, or did not log them once implemented.

Inferences

Inferences about casual mechanisms should be made with caution. The pre- and post-implementation protocols that were compared had differences. The physician-ordered abdominal pain charts audited patients that were 18 years of age and older. The abdominal pain protocols implemented were on patients 50 years or older. It is difficult to compare the outcomes of these patients because there are many differences. Patients over the age of 50 often have more medical co-morbidities than younger patients, which makes their care and treatment plans more complicated. These complications may contribute to the longer disposition time. Abdominal pain patients that were admitted often had imaging studies of their abdomens which can also lead to longer overall LOS in the ED.

Pre-implementation chart audits were done in November and December. These months tend to be slower than the summer months when the nurse protocols were implemented. Higher census times means the physicians are seeing more patients. This can lead to patients having to wait longer for a disposition. Finally, the study was limited to one ED in Billings, MT and may not be representative of all EDs, particularly in states where medical boards prohibit the use of nurse-initiated care in the ED.

Conclusions about the potential effect on patient wait times related to the implementation of the nurse-initiated protocols should be made with caution due to variables of the design. Ideally, wait times between standard practice and nurse-initiated

protocols should be compared while holding as many variables as possible constant (day, physician, nurse, severity, etc.). Another option increasing validity of the study would be to randomly assign patients to control or experimental groups during the same time periods as well as collecting additional data to determine variance between groups prior to analysis. Doing this may be logistically difficult and beyond the scope of this quality improvement project. The difference in design between pre and post-implementation makes it difficult to form recommendations based on the investigation. There are a few main things to consider:

1. Because implementation of the nurse-initiated protocols was not randomly assigned to abdominal patients, causal statements (i.e. that the implementation of nurse-initiated protocols caused a decrease in wait times) is not justified based on the design alone.
2. The difference in method of selection of records should be taken into account. The pre-implementation participants consisted of one abdominal patient randomly chosen from each selected day, while the post-implementation participants were all abdominal patients from a specific time period post-implementation. This results in one observation per day pre-implementation, and often would not reflect the extreme wait times (either short or long) depending on the number of records for the day. The post-implementation includes all records where the protocol was implemented, sometimes with multiple cases per day. This introduces more dependence among the records (because of similar conditions at the time of the

case), but also allows for the extremes to be included in the data (the short and long wait times).

Summary of Findings

Literature shows that nurse-ordered protocols can be an efficient way to manage overcrowded EDs and decrease length of stay (Douma, Drake, O'Dochartaigh, & Smith, 2016; Hwang, Payton, Weeks, & Plourde, 2016; Retezar et al., 2016; Robinson, 2013). Although the results of this study did not show the same results as the literature, more research could be done at the Project Site ED. One of the reasons nurse-initiated protocols may have led to increased length of stay was because the protocols were implemented during high census times. These diverging results are likely due to a number of limitations, barriers, and individual idiosyncrasies. This study was designed as a quality improvement project, not a research project. A well- designed and executed research study may show different results. Despite the protocols not decreasing length of stay in the ED, management would like to go forward with increasing the number of protocols that nurses can enter in the future and a policy was created for nurses to start IVs and draw labs on patients with chest pain and abdominal pain. We are hopeful that as it becomes part of the culture to enter protocols based on chief complaint, physician and nurse acceptance and adherence will increase and the protocols will be sustainable. The chest pain protocol is in the final stage of being approved. More protocols are in the development stage for future use, including wound infiltration and hip trauma.

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APPENDICES

APPENDIX A

PROTOCOLS

PROTOCOLS

- I. Acute Ankle Injury: In individuals 18 years old and older with chief complaint of acute ankle trauma that meet Ottawa Ankle Rules (OAR):
 - Obtain an AP, lateral and mortise view of the ankle in patient
 - Palpate 5th metatarsal. If pain present, order foot x-ray (3 view)
 - Palpate affected knee/leg, if tender over proximal fibula, order 2 view knee x-ray

- II. Abdominal Pain: For individuals 50 years of age and older with acute abdominal pain (onset less than 1 week):
 - Insert and maintain IV
 - Administer 1000ml bolus of normal saline over 2 hours
 - Complete blood count (CBC)
 - Complete metabolic panel (CMP)
 - Lipase
 - Nothing by mouth (NPO)
 - Urinalysis (UA)
 - Additional orders will be placed for women of child bearing age (50-60 years old) who have not had a hysterectomy: urine pregnancy test (UPT).

- III. Chest Pain: For individuals 50 years of age and older who present to the emergency with a chief complaint of chest pain that is suspected to be cardiac in nature:
 - EKG

- Insert and maintain IV
- Obtain troponin every three hours times two
- CBC with differential
- CMP
- Chest x-ray
- Aspirin 325 mg by mouth if not contraindicated*

*Contraindications in which aspirin should not be given as a standing order

- patients who are receiving CPR and/or intubated
- patients who are allergic to aspirin or any non-steroidal anti-inflammatory drug (NSAID)
- patients with a past medical history of gastrointestinal bleeding
- patients who are pregnant, or lactating females
- patients who are currently taking warfarin (Coumadin), dabigatran (Pradaxa), rivaroxaban (Xarelto), apixaban (Eliquis), edoxaban (Savaysa), enoxaparin (Lovenox), or fondaparinux (Arixtra).

*In these cases the physician caring for the patient is to be consulted regarding aspirin administration

APPENDIX B

EVIDENCE TABLE

Citation: (i.e., author(s), date of publication, & title)	Conceptual Framework	Design/Method	Sample/Setting	Major Variables Studied and Their Definitions	Measurement of Major Variables	Data Analysis	Study Findings	Strength of the Evidence (i.e., level of evidence + quality [study strengths and weaknesses])
<p>Douma, M.J., Drake, C.A., O'Dochartaigh, D., & Smith, K.E. (2016). A pragmatic randomized evaluation of a nurse-initiated protocol to improve timeliness of care in an urban emergency department</p>	NA	Computer-randomized, controlled evaluation of 6-nurse-initiated protocols to test whether timeliness of care increased	Canadian ED with 55 beds. Nurse's recruited: 3-5 yrs experience (n=12); 6-8 yrs experience (n=10); 10 or more yrs experience (n=8)	Protocols for: - acetaminophen for pain and fever for patients older than 3 months *suspected hip fracture *suspected ischemic chest pain *lower abd pain *upper abd pain *vaginal bleeding during pregnancy	Minutes to - medication -x-ray -troponin level -LOS	Statistical analysis occurred in a blind fashion Bonnet and Price method for CI's 143 pts enrolled. Control group (n=67) protocol group (n=76)	acetaminophen protocol reduced the median time by 186 minutes hip fx protocol reduced time to x-ray by 257 minutes ischemic chest pain protocol troponin lab result time reduced by 114 minutes vaginal bleeding LOS was reduced by 232 minutes lower abdominal pain LOS reduced 181 minutes upper abdominal pain LOS reduced 131 minutes	
Ho, Chau, Chan, Yau (2018)	NA	Unblinded RCT	the protocol (n = 56) or usual practice (n = 56)	Primary outcome proportion of radiographic-test	LOS, registration to discharge, registration to triage,	Statistical analysis, sample t tests, chi-square tests	Decrease in reg to discharge - 13 minutes	Strengths: RCT Weakness: not blinded

				requests. Secondary outcomes: proportion of fractures detected and patients' LOS and waiting times.	triage to consultation, consultation to discharge		Reg to triage -.9 minutes Triage to consultation 2.4 minute increase Consult to discharge - 14.6 minutes	
Robinson, D. July 2013 An Integrative Review: Triage Protocols and the Effect on ED Length of Stay	NA	Integrative review. Sample was collected thru a systemic search of CINAHL, Medline, Cochrane, Mosby's Nursing consult and National Guideline Clearinghouse from 1992-2010	lower- and middle-acuity patients (acuity levels 3 and 4) in emergency departments	ED LOS: how long the patient was in the emergency department Location of ancillary departments Turnaround times Registration practices	LOS in mins	Each study was graded for the level of evidence-based on the hierarchy depicted by Melnyk and Fineout-Overholt1	4 were evidence level II 3 were evidence level IV 1 was evidence level VI When protocols were initiated in triage, the mean time savings for TLOS ranged from 2.45 to 74 minutes support for using protocols in triage	Limitations: paucity of information available on LOS and using protocols at triage. Evidence does not include meta-analysis or systemic reviews strong indication of the need for additional randomized controlled trials Inform Practice Feasible
Rowe, B., Villa-Roel, C., Guo, X., Bullard, M., Ospina, M., Vandermeer, B., Innes, G., Schull, M., & Holroyd (2011) The role of triage nurse ordering on mitigating overcrowding in emergency departments: a systematic review	NA	Electronic databases, controlled trial registry websites, conference proceedings, study references, experts in the field, and correspondence with authors were used to identify relevant studies N=14	Interventional studies in which TNO was used to influence ED overcrowding metrics, LOS and PIA were included	ED LOS TNO PIA Arrival to physician time Proportion of radiographs ordered by nurses	time in minutes Mulrow and Oxman and Jadad et al and has accepted validity and reliability A standard quality-rating tool developed EPHPP was used	LOS: consistent results were observed when pooling the results from three non-RCTs (mean difference =)51 minutes; 95% CI =)56.3 to)45.5 minutes PIA: -3	TNO intervention was associated with a 37-minute reduction in the overall ED LOS TNO interventions applied to injured subjects suspected of having a fracture, ED LOS was	Limitations: Small number of studies addressed the effect of TNO intervention Variable research methodologies Incomplete reporting insufficient data, anticipated subgroup

		Systematic literature review			to appraise the methodologic quality of the studies.	minutes Proportion of radiographs was the same	reduced by 19 minutes	comparisons and sensitivity analyses were not always possible Inform Practice Feasible
Ho, C., Chau, C. & Cheung, N. (2015) Effectiveness of emergency nurses' use of the Ottawa Ankle Rules to initiate radiographic tests: improving healthcare outcomes for patients with ankle injuries: a systematic review	NA	Systematic review on extent of which ED nurses' use the Ottawa Ankle Rules to initiate radiographic tests Preferred Reporting Items for Systematic Reviews and Meta-analysis checklist N=1603 charts	Patients ≥1 year old visiting EDs or urgent care departments with ankle injuries	Keywords in English and Chinese: ankle, malleoli, ligament, foot, midfoot, injury, sprain, fracture, trauma, decision rule, guideline, protocol, Ottawa, and nurse De 2014-Jan 2015 Ovid, Medline, EMBASE, ProQuest Health and Medical Complete, EBMed reviews, SPORTDiscus, CINAHL Plus, British Nursing Index, Scopus, Health Sciences; SAGE full text, BioMed Central and Scirus.	critical appraisal checklists for experimental studies and comparable cohort or case-control studies drawn from the Joanna Briggs	Review Manager 5.2 statistical heterogeneity of the combined studies was assessed using the I^2 measure. I^2 represents the percentage of total variation between studies caused by heterogeneity rather than by chance	initiating radiographic tests by emergency nurses based on the OARs at triage can reduce patients' length of stay in emergency departments OARs to initiate x-ray improves healthcare outcomes Minimized unnecessary x-rays Reduced pt LOS	Limitations: only English and Chinese languages examined Inform Practice Feasible
Retzar, R., Bessman, E. Ding, R., Zeger, S., & McCarthy, M.	NA	Retrospective cohort study	N=188 pts	Triage nurses initiating full or partial	Median treatment time of pts w/ triage standing	25% received full triage	Pts who did not receive partial or full triage	Limitations: not randomized

(2010) The effect of triage diagnostic standing orders on emergency department treatment time				triage standing orders for pts with chest pain, SOB, Abd pain or genitourinary complaints	orders to those with room orders, using multivariate linear regression	orders 56%partial triage standing orders 19% room orders	orders median ED time 282 mins vs 230 mins for those that did Triage orders were associated with a 16% reduction in treatment time	One study center INFORM practice Feasible
ENA: Use of protocols in the emergency setting	Position statement	NA	ED	NA	NA	NA	ENA: Use of protocols in the emergency setting	Inform only
National Clinical Guideline Centre (2014)	Practice guidelines	Practice guidelines	Acute ankle trauma in people older than 5	Best practice	N/A	N/A	X-rays for those who meet OAR	Grade: High Strength: high score on AGREE II analysis Weakness: not a study

Legend:

AAEM: American Academy of Emergency Medicine

ACEP: American College of Emergency Physicians

Abd: abdomen/abdominal

CMS: Centers for Medicare and Medicaid Service

ED: emergency department

ENA: Emergency Nurse Association

EMR: electronic medical record

EPHPP: Effective Public Health Practice Project

ESI: emergency severity index

LOS: length of stay

LWBS: Left without being seen

OAR: Ottawa Ankle Rules

PIA: physician initial assessment

Pt: patient

TIR: time from roomed to discharged

yrs: years

TLOS: total length of stay

TLP: triage liaison physician

TRACY: Triage-based allocation and clinical treatment