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Identifying Gaps in Care in the Geriatric Trauma Patient with Rib Fractures

Kathy A. Crystal
Grand Valley State University

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Kathy A. Crystal

Kirkhof College of Nursing

Grand Valley State University

Advisor: Rebecca Davis PhD, RN

Advisory Team: Tricia Thomas PhD, RN and

Gaby Iskander M.D., M.S.

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Abstract

Introduction: Rib fractures in the geriatric patient can be life altering. Across the country trauma centers are caring for an increased volume of geriatric patients aged 65 years and older (Ali-Osman et al., 2018). The geriatric patient with thoracic injury has the second highest mortality rate among the trauma population in the United States (Mentzer et al., 2017). The assessment of the patient is key to identify critical changes due to high risk of adverse events from rib fractures. Despite efforts to standardize the assessment and care provided to the patient with rib fractures, a lot of variation occurs. Research supports the provision of a standard assessment and discharge process for the geriatric trauma patient (GTP) with rib fractures to improve outcomes. **Objective:** This project focused on conducting a gap analysis of process and outcomes measures in this population at the specific site of interest in the emergency department (ED), inpatient setting and outpatient setting to determine needs for improvement. Then, after the data analysis, evidenced based recommendations were given to appropriate leadership staff. **Methods:** The development of a dashboard displayed key measures identifying areas of outliers for the ED, inpatient and outpatient setting. **Results:** Through the development of the dashboard it was identified that when compared to the evidence the large urban hospital needs improvement in the consistent use and documentation of the incentive spirometer (IS) by the nurses, and more consistency with evaluation of the GTP using the FRAIL assessment and standard of care for follow-up post-discharge. **Conclusions:** The dashboard was effective at displaying areas in need of evidence-based improvement at the organization of focus for the GTP with rib fractures.

Keywords: trauma clinic, follow-up, geriatric trauma, rib fracture care

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A rib fracture injury in the Geriatric Trauma Patient (GTP) can be life threatening, with a mortality rate of 20% or higher (Brasel et al., 2017). The geriatric population commonly has brittle bones and osteopenia resulting in rib fractures occurring more easily (Shi, Esquivel, Staudenmayer, & Spain, 2017). Medical care for the GTP is costly with an estimated $67 billion predicted to be spent in 2020 due to falls (DeLa'O, Kashuk, Rodriguez, Zipf & Dumire, 2014). The GTP is at high risk for falls from ground level or from a height, which are often associated with rib fractures (Barry & Thompson, 2018). GTPs with two or more rib fractures have a 2-5 times higher rate of mortality than do younger trauma patients (Shi et al., 2017). It is recommended that patients with just one rib fracture receive medical treatment for their injury, but sometimes they do not (Karadayi, et al., 2011).

Morbidity and mortality after rib fractures is related to patients' poor breathing effort as a result of pain and damaged lungs. This results in impaired gas exchange, pneumonia, and other problems (May, Hillermann & Patil, 2016). The most common interventions for patients with rib fractures include pulmonary hygiene, cough assessment, ambulation, and pain control (Brasel et al., 2017). Pain control is important to prevent poor lung expansion leading to pneumonia (Karadayi et al., 2011). More education is needed for the physicians and nurses who care for the GTP with rib fractures to prevent adverse outcomes; with a focus on pain management, incentive spirometry assessments, and cough evaluation (Leininger, 2017).

GTPs with rib fractures have had worse outcomes and longer hospital lengths of stays (HLOS), increased ventilator days, more frequent respiratory failure, more pneumonia diagnoses, and an increased incidence of effusions than do younger patients (Witt & Bulger, 2017). There is minimal information on the outcomes of patients once they leave the hospital, but most

recently there is an increased focus on trauma clinic follow-up and outcomes after hospitalization (Leukhardt et al. 2010; Tuyp, Hassani, Thurston, Fyvie & Constable, 2018). According to Theriot (2016), poor follow-up for the trauma patient can affect the patients' health and result in unnecessary returns to the Emergency Department (ED).

Mortality due to rib fractures increases for those aged 65 years and older. Patients with rib fractures have an increased risk for acute respiratory distress syndrome, pneumothorax, pneumonia, empyema, increased HLOS, and increased intensive care unit (Shenvi, 2015). Rib fractures are often overlooked by providers; without proper follow-up treatment, there is an increased risk of morbidity and mortality (Karadayi et al., 2011). Determining the adherence to evidence-based recommendations related to the GTP with rib fractures is important in order to make improvements in care for this population. Thus, the purpose of this project is to do an analysis of recommended care practices and patient outcomes to identify gaps in care for the GTP with rib fractures in the ED, inpatient setting, and outpatient setting.

Ethics and Protection of Human Subjects

The protection of human subjects while doing a project is important for safety and to ensure privacy. The process and project must be compliant with the HIPAA and other privacy rules. An application for review and approval or exemption of this project was submitted to the organization's and University Institutional Review Board. See Appendix A**.** The project was determined to be non-research.

Assessment of the Organization

Geriatric trauma patients (age 65 and older) with rib fractures often have poor outcomes, including increased mortality and morbidity rates than do younger patients (Witt & Bulger, 2016). A larger inner-city health system, including ED, inpatient and trauma service, provides

care for this population. In order to determine how care is provided and to identify opportunities for improvement for this population, an organizational assessment of the clinic and inpatient hospital was completed. An organizational assessment is a systematic approach to identify the performance and factors that affect the performance of an organization (Reflect & Learn, n.d.). An organizational assessment also helps determine the activities the leadership team prioritizes for change and how the people collaborate as a team (Reflect & Learn, n.d.).

Organizational Assessment Framework: Burke & Litwin

The Burke and Litwin Model, a casual, open-system feedback approach to organizational assessment was used to evaluate the small urban clinic and the large inner-city hospital (Burke & Litwin, 1992). The Burke and Litwin Model represents how variables are inter-related within an organization and impact the internal and external environment and individual and organizational performance through a feedback loop process in a cause-and-effect relationship (Reflect & Learn, n.d.). This model involves 12 key components with transformational and transactional dynamics. The variables are viewable in Figure 1 in Appendix B (Burke & Litwin, 1992). The findings from the organizational assessment at the site of focus identified the need for improved organizational and individual performance, systems involving policy, standard work and recognizing the external environment factors to improve care for the GTP with rib fractures.

Key Stakeholders

Key stakeholders involve groups or individuals invested in a project and the outcome to implement a change (Moran, Burson, & Conrad, 2014). Including key stakeholders is vital while making a change within an organization to maintain sustainability and success. The key stakeholders for this project include the student's mentor, who is the trauma medical director, nine additional trauma physicians, trauma residents, five trauma advanced practice providers, a

medical assistant, a registration clerk, an office manager, nurses, a trauma program manager, a trauma database coordinator, ED nurses and physicians, a manager and medical director, the inpatient nurses and managers, and the patients with rib fractures aged 65 years and older.

The trauma program manager and trauma medical director are responsible for generation of policy change and reporting with benchmarking for the trauma services. In the clinic, the physicians and advanced practice providers perform the assessments, the medical assistant gets the patients' vital signs and chief complaints, and the registration clerk schedules the appointments. The trauma program manager and trauma database coordinator organize the quality data. The process of discharge at the large inner-city hospital is performed by the nurses and providers with medical social workers who coordinate transport and acceptance to rehabilitation if required.

In the ED, patients are assessed and evaluated by the ED nurse and physician. The physician determines whether patients can be discharged or admitted, and whether the trauma team should be consulted. In the inpatient setting, the nurses perform daily assessments and the admitting physician evaluates the patient daily for discharge readiness; and determine appropriate discharge medications and follow-up. The ED manager and medical director, inpatient manager, intensive care unit manager, mentor and trauma clinic staff, informational technologists, and clinical nurse specialists from ED and trauma helped the DNP student with the project. The trauma database coordinator was a key person to collaborate with for the inpatient data variables.

Current Practice

An analysis of the small urban clinic and large inner-city hospital was done using the SWOT analysis and Burke and Litwin model. At the site of focus there is a need to improve the

outcomes for the GTP with rib fractures. The Burke-Litwin Model was used to analyze the organization and identify gaps in care for this population (Burke & Litwin, 1992).

The organizational assessment involved observational analysis of the care for the GTP with rib fractures and reviewing data from chart audits. Both processes allowed the DNP student to identify areas of need for this population.

The observation in the small urban clinic involved watching 5 different providers assess 7 different GTP with rib fractures. The following findings were observed: the providers asked about pain but did not ask for a numeric value; incentive spirometer values were self-reported, as the provider did not watch the patients use the incentive spirometer; and none of the patients were instructed to follow-up in the clinic again.

In the large inner-city hospital, 4 different providers were observed assessing 5 different patients. All of the providers asked patients to use the incentive spirometer during the visit and recorded the value, which is best practice. Also, 4 out the 5 patients were asked to give a numeric pain number, 3 out of the 5 patients did not have the incentive spirometer within reach upon entry into the room and only 1 out of the 5 providers assessed the patient's cough for strength.

A retrospective chart audit for this population over a six-month time-frame from November 2017 to April 2018 was completed. Charts of patients 65 years and older who were diagnosed with isolated rib fractures and admitted to the trauma service were reviewed. Over the six-month period, a total of 30 patients were identified to meet the inclusion criteria. The DNP student collected the variables of age, gender, mechanism of injury, injury severity score (ISS), number of rib fractures, incentive spirometer level at discharge, pain regimen at discharge and mortality. Further analysis included whether the patient had an unplanned primary care provider

visit, urgent care or emergency room visit, hospital readmission or return to the small urban clinic for a follow-up appointment. The information was analyzed to identify trends in the population.

Of the patients' charts reviewed, 57% (n=17) were male, and 43% were female (n=13). The average age was 80.7 years. This patient population had a common mechanism of injury by ground level fall that led to fractured ribs.

In a different study focusing on geriatric trauma patients with rib fractures about 58% of the rib fracture injuries were due to a fall (Shi, Esquivel, Staudenmayer, & Spain, 2017). However, at the current hospital, 97% of the rib fractures were due to a fall, with 87% falling from the ground level; 10% falling from a height such as stairs or embankment; and the remaining 3% having a rib fracture as a result of a motor vehicle accident. About 63% were discharged to a sub-acute rehabilitation (SAR) center, 17% were discharged home without formal assistance, 13% were sent home with assistance, and 3% were sent to assisted living facilities. One patient (3%) died prior to discharge due to complications from the rib fracture.

Many of the patients (about 53%) had return visits to the urgent care, emergency room, primary care provider or to the hospital as an inpatient readmission. One patient (3%) returned to urgent care; 11 (37%) returned to the ED; 4 (13%) had an unplanned primary care visit; and 8 (27%) patients were readmitted within 90 days of discharge (see Figure 2, Appendix C). Common reasons for return visits to ED (some patients returned for more than one reason) included pain (n=4, 25%), respiratory decline (n=6, 37.5%) and other reasons, including development of a hematoma, infection or weakness with a low hemoglobin (n=6, 37.5%). Two (25%) of the patients who were readmitted to the hospital were diagnosed with pneumonia.

Alarmingly, 4 (13%) expired after discharge and 1 (3%) expired during the admission (See Figure 3, Appendix C).

Another factor analyzed in the chart audits was whether the patient followed-up with a provider in the system or at the trauma clinic post-discharge. Only 8 (27%) patients followed up in the clinic. This is a problem since rib fractures can result in a high mortality and morbidity rate (Kozar et al., 2016). The discharge instructions for 16 (53%) stated the patients should follow-up in the trauma clinic within one to two weeks. What is unknown is whether the patients had follow up with another provider not associated with the clinic in another city or with their primary care provider. Thus, there are many areas of need to improve care for this population. The assessment of care for this population showed that there are concerning outcomes regarding morbidity and mortality. Patients experienced high readmission rates to the ED and hospital, which is a focus of improvement for the organization.

SWOT Analysis

A SWOT analysis, as shown in (Figure 4, Appendix D), was performed at the small urban clinic and large inner-city hospital. An analysis of the organizations' strengths, weaknesses, opportunities and threats regarding current process followed while caring for the GTP with rib fractures was evaluated. The strengths of an organization involve identifying what is going well (Bull et al., 2016). The weaknesses of an organization focus on what could be going better and can be fixed (Rouse et al., 2018). Opportunities involve outside organizational factors that the organization has no internal control, but affects process flow. The threat to an organization includes external factors that can cause trouble to the organization (Rouse, Pratt, & Tucci, 2018).

Strengths. The small urban clinic has many strengths. Only trauma physicians, trauma advanced practice providers, the trauma medical assistant, and registration clerk operate the clinic. This allows for a key number of providers to be involved in the patients care and prevent too much variation. This clinic is linked to a large entity that is national ranked allowing for resources and support for quality improvement.

Another strength is recently a trauma resident team developed an inpatient rib fracture protocol. This protocol has put emphasis on the importance of properly caring for the patient with rib fractures by providing a higher level of care that is evidence-based. This verifies that the hospital also agrees that the care of the rib fracture patient is important. The trauma service also has a robust registry with a collection of many variables that is available for data pulls in a timely manner.

Weaknesses. A major weakness for this organization is that data collection for non-admitted trauma patients or outcomes after discharge are not tracked. This makes gathering data challenging. There is no standard process on how to assess and discharge the GTP with rib fractures and who and how they should follow-up. The Electronic Health Record (EHR) used on the inpatient setting produces generic discharge instructions for the trauma patient. The instructions do not vary much based-on age, co-morbidities or diagnosis. The instructions can be confusing to the patient as to whether follow-up should be done or not. Actually, one patient (as determined in a chart review) went to the wrong office because the instructions were not clear. There are weaknesses at the clinic too, including the lack of a standardized protocol and assessment plan for the GTP with rib fractures; as well as a method to identify patients that should have more than one follow-up visit. The lack of standardization makes providing evidenced based care difficult.

Opportunities. This clinic serves trauma patients and evaluates patients post-discharge from the large inner-city hospital. Evidence supports that appropriate follow-up is needed to ensure pain control, incentive spirometry use and strength of cough are evaluated to prevent pneumonia and even mortality in the GTP with rib fractures (Shenvi, 2015). The lack of follow-up or unclear discharge instructions may be related to unnecessary ER, urgent care, and primary care provider (PCP) visits and readmissions to the hospital (Theriot, 2016).

The trauma environment across the nation is focusing more and more on the GTP. There is a push to improve follow-up post-discharge care for this population. The American College of Surgeons (ACS) (n.d.) is a governing body for the trauma patients and sets requirements and regulations for centers to care for a trauma patient. The clinic can respond to this national push by improving patient follow-up for this population and collect data to define areas of need for improvement.

Threats. A threat to an organization involves being resistant to change and includes the difficulties with collaboration (Bull et al., 2016). Lack of patient follow-up must be addressed to prevent poor outcomes and unnecessary readmissions. One factor that may affect this follow-up is the discharge to a sub-acute rehabilitation facility, resulting in difficulty with transportation to and from the clinic. Another threat is that during my project time, the clinic was being re-located to a smaller building which may affect scheduling for patients. Follow-up is important for this population and should be stressed at discharge. Another threat is that the 10 trauma surgeons work at different times in the clinic and may not agree on which GTP with rib fractures should have follow-up or how often the follow-up should occur. Also, the documented assessment varies between providers, which makes identifying consistency in care difficult. Lastly, the site

has recently changed to a new EHR. The system is in the optimization phase, which may delay the development of a data report from the EHR for this project.

Evidence-Based Initiative

To determine best practices a review of the literature must be conducted. Initially, the review focused exclusively on recommendations for best practices for the GTP with rib fractures, but there were limited articles available. The search broadened to focus on literature about the geriatric trauma patient and also the rib fracture patient of any age.

Method

The method used to identify evidence-based practice for the GTP with rib fractures was a systematic scoping review of the literature. A scoping review involves synthesizing and mapping research topics to identify gaps in care for a population (Pham, Rajic, Greig, Sargeant, Papadopoulos & McEwen, 2014). A comprehensive electronic search was conducted in the CINAHL Complete and was limited to research studies, both qualitative and quantitative, systematic reviews and meta analyses and evidence-based practice guidelines that are in the English language published from 2010 to 2018. The keywords used were *trauma clinic, follow-up, geriatric trauma* and *rib fracture care* as separate keywords to identify common complications and standards of care for this population. The wild card and Boolean operators (OR, AND) were also used to deepen the search for the most current literature. This literature review was conducted to address the following questions: 1) What are evidence based standards of care for the geriatric trauma patient that positively impact patient outcomes?; 2) What care is evidence based for adult patients with rib fractures that positively impacts outcomes?; and, 3) What type of follow-up care improves outcomes for adult trauma patients?

PRISMA Review. The search resulted in 703 studies. No duplicated were identified. Each article was screened using inclusion and exclusion criteria according to PRISMA criteria (Moher, Liberati & Tetzlaff, 2009) (see Appendix E). Review of titles and abstracts resulted in removal of 518 articles that did not meet inclusion criteria. An additional 166 articles were excluded after in-depth examination of the content, as did not meet inclusion criteria. This resulted in 19 articles included in the literature review.

Summary of Results

These literature reviews were done to answer three questions. The focus was on geriatric trauma, rib fracture care, and trauma clinic follow-up. This was done because there is very minimal research focusing on the GTP with rib fractures and exact standards of care for follow-up. With review of each of these topics, the goal was to determine an evidence-based method to improve mortality and morbidity, improve trauma clinic follow-up rates, decrease return ED visits, and reduce hospital readmissions.

Geriatric Trauma Summary Results. The results from the literature focused on geriatric trauma protocols that were successful at improving certain outcomes of care when implemented at verified level 1 and level 2 trauma centers. There were 5 articles included in the literature review, which were retrospective studies or integrative reviews. The studies overall supported the proposition that standardized care for the GTP is important (DeLa'O et al., 2014). In addition, one article focused using a FRAIL questionnaire and were able to identify GTPs at risk for long-term mortality and declined functional status (Maxwell, Dietrich & Miller, 2018). Three articles specifically focused on the need for geriatric specific protocols and found improved outcomes such as HLOS, mortality and morbidities rates (Cortez, 2018; Olufajo et al., 2015; DeLa'O et al., 2014). In addition, Bortz (2015) found that involving nurses' knowledge

and using the Nurses Improving Care for Healthsystem Elders (NICHE) approach improved outcomes for the GTP, indicating the importance of involving a team of care that is skilled in geriatric specific care. Bortz focused on a variety of areas to identify ways to improve care for the GTP while inpatient. The volume of GTPs is increasing in numbers; and poor understanding and lack of standardization of this population can lead to less than optimal outcomes. The articles referenced in this review are found in Appendix H.

Rib Fracture Summary Results. Research in this part of the review focused on care guidelines that had improved outcomes for adult patients with rib fractures. A total of 8 studies of retrospective cohort studies and integrative reviews were included to guide this project. Flarity et al. (2017) established a clinical practice guideline (CPG) for rib fracture care in the adult patient aged 18 years and older admitted to the trauma service at a level 2 trauma center, and compared patient outcomes before and after implementation. The CPG included close monitoring of pulmonary status, prompt initiation of analgesia for pain control and early identification of respiratory decline. This researcher found that reduced HLOS, reduced narcotic usage and improved pulmonary function in patients after the CPG was implemented. Witt and Bulger (2018) found through a meta-analysis review of the literature that implementing a bundled clinical pathway including multi-modal pain management, catheter-based analgesia, adequate pulmonary hygiene interventions and assessments, and operative stabilization of the ribs can improve outcomes in adults aged 18 and older.

The use of an IS with a patient with rib fracture is simple measure of pulmonary status and can be guided by nursing, physical therapy and/or physicians (Witt & Bulger, 2018). Brown and Walters (2012) examined documentation of IS volume assessments to identify and guide patient care, and found that documentation is poor. Tracking is important to identify patients at

risks, determine appropriate levels of care, evaluate appropriate pain interventions, screen for discharge and heighten awareness by the nurses these patients to detect declines early and prevent poor outcomes (Brown and Walters, 2012). An integrative review by Kourouche et al. (2018) found that the IS was an appropriate intervention to assess for respiratory deterioration and those patients with a lower IS on admission had increased rates of acute respiratory failure. Additionally, they found that care bundles for the patient rib fractures focusing on documentation reminders, patient education, respiratory support and monitoring, multimodal analgesia implementation and surgical intervention when indicated improved outcomes such as preventing deterioration and reduced problems with pain.

There were two studies that examined interventions specifically for geriatric patients with rib fractures. Singh et al. (2016) found through a retrospective cohort study focusing on trauma patients aged 65 years and older with rib fractures that the implementation of a geriatric co-management team resulted in decreased mortality from 15% to 8.7%. The co-management team consisted of a geriatrician, nursing, social work, physical therapy and pharmacy. Sahr et al. (2013) found with a triage and rib fracture protocol for those patients aged 65 years and older with 3 or more rib fractures, there was an improved HLOS from 10.24 days to 8.74 days after the protocol was implemented. The protocol involved referring all patients aged 65 or older with three or more rib fractures to a trauma specialist. Leininger (2017) and Winters (2009) reviewed the literature and determined that pain should be assessed using the numeric pain scale. In addition, they found that a multi-modal approach to pain management should occur based on EAST (spell out EAST) guidelines with use of an epidural for initial treatment of pain. They found that opioids could be used for low-risk inpatients. The use of standards and guidelines can

improve outcomes for the GTP with rib fractures. The articles for this review are available in Appendix I.

Trauma Clinic Follow-up Results. The studies reviewed focused on a variety of variables with goals to learn more about the follow-up of trauma patients post-discharge. Two studies examined barriers to trauma clinic follow-up specific to demographics and poor documentation. These studies found that patients who were aged 35 years and older, of Caucasian race, insured by Medicaid/Medicare, post blunt trauma, discharged to a rehabilitation center, poorly written discharge instructions and those with lengthy hospital stays were less likely to follow-up than those without these characteristics (Leukhardt et al., 2010; Stone et al., 2014). Another study by Fletcher (2017) successfully found that a trauma clinic model can successfully improve compliance and improve follow-up rates after identifying that weather, certain mechanisms of action, patient demographics and length of stay in the hospital were factors associated with who followed up and who did not.

Aaland, Marose and Zhu (2012) discovered that patient education at discharge and improving physician orders could improve the follow-up rate at a trauma clinic to almost 100%. In another study, the use of a Re-Engineered Discharge (RED) tool kit was used to improve compliance with trauma clinic follow-up appointments decreased ED visits, hospital readmissions and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHP) but was found to have improved trauma clinic follow-up rates and decreased ED visits but increased hospital readmission rates (Theriot, 2016). The literature review information is available in Appendix J.

Conclusion. The evidence supports that standard protocols for interventions improve care. Geriatric trauma protocols provided structure for this population and improved outcomes

with mortality, morbidity, hospital cost, and HLOS. Standard protocols for rib fracture care helped caregivers to identify respiratory declines sooner; as well as decrease ICU and hospital LOS, morbidity and (Flarity et al., 2017). Structured process improved clinic follow-up rates post-discharge. Limitations exist as to how and when the GTP with rib fractures should follow-up after discharge. There was strong evidence that the geriatric protocols and rib fracture protocols can improve outcomes. Even though there was no literature related to transition of care for the GTP with rib fractures, a standard protocol may help to improve outcomes.

Phenomenon Conceptual Model

The phenomenon of rib fractures in the GTP aged 65 years and older was analyzed through the Disablement Process Framework (Verbrugge & Jette, 1994). The Disablement Process framework focuses on how acute and chronic conditions affect the function of the body with daily life activities and environmental factors, which then speed up or slow down the impairment (Verbrugge & Jette, 1994). This framework focuses on a main pathway that results from pathology, impairments and functional limitations (see Appendix I).

A physiological or chemical change within the body can result from disease or injury that can be chronic or acute in nature (Verbrugge & Jette, 1994). For the GTP, the acute injury is the rib fractures, but may progress to a chronic issue resulting in chronic pain and functional decline without proper treatment (Singh et al., 2018). Impairments may affect a particular body system either physically or mentally, and are identified through imaging or blood tests (Verbrugge & Jette, 1994). This coincides with the diagnosis of rib fractures in the GTP. The patient requires an x-ray to evaluate for the injury. Then the diagnosed rib fractures can alter the GTP's respiratory drive and can result in pain (Witt & Bulger, 2017).

Functional limitations result in restricting normal performance whether physical or mental in nature based on age and gender (Verbrugge & Jette, 1994). For the GTP with rib fractures there may be limitations with the ability to take a deep breath due to the rib fractures causing pain (Witt & Bulger, 2017). The rib fractures can be so severe the patient may need to be on a ventilator for respiratory support. This results in physical injuries or health problems that prevent the patient from doing normal activities of daily living (Verbrugge & Jette, 1994). The GTP with rib fractures may become so impaired after injury that he/she may not be able to return home, but rather live at an assisted living or long-term care facility for recovery (Kozar et al., 2015).

The risks factors involve predisposition characteristics such as age, lifestyle, social habits, psychological or environmental factors that increase one's risk for functional disability (Verbrugge & Jette, 1994). For example, as a person ages the risk for falling increases, which increases risk for rib fractures (Barry & Thompson, 2018). Appropriate interventions are needed for those patients with disability and can occur simultaneously (Verbrugge & Jette, 1994). The interventions involve with internal and external factors. The extra-individual factors are those including medical care or therapeutic interventions provided, such as surgical intervention, medication prescription or special equipment needed (Verbrugge & Jette, 1994). For example, the GTP with rib fractures may need surgical intervention, will have respiratory care, be prescribed pain medications and require external support with health care providers outpatient to prevent complications (Witt & Bulger, 2017).

The intra-individual factors are internal and exist within the patient. These include behavior and social habits, involvement in peer support groups or prayer and other extra-

curricular activities (Verbrugge & Jette, 1994). This may include purposeful social isolation by the GTP with rib fractures due to pain and fear of falling to prevent further injuries.

Exacerbators can be good or bad for a disability. One way the exacerbation can go wrong is if there is a reaction to a medication prescribed or complications from surgery (Verbrugge & Jette, 1994). For example, if a GTP with rib fractures has surgical rib plating procedure, but gets an infection afterwards may result in delay in recovery (Witt & Bulger, 2017). Also, society may stigmatize the disability and prevent normal social intervention and participation (Verbrugge & Jette, 1994). For example, the GTP with rib fractures who now has to use a cane or walker may avoid certain events to avoid being viewed as crippled.

To understand the pathology and disabilities for the GTP with rib fractures is important prior to implementing an evidenced-based change for this population. This population fits with this framework well. The GTP with rib fracture may restrict breathing efforts (disability) due to pain which reduces lung expansion and may result in pulmonary infection (impairment) which can further result in his/her ability to function and care for self with daily activities (disability). The GTP with rib fractures has a pathological impairment caused by an injury and is on his/her way to the disablement process. To prevent disablement for this population this project will focus on concepts from this phenomenon, such as extra-individual factors, impairments and functional limitations, in hopes to improve outcomes for this population.

Project Plan

Purpose of Project

The purpose of this DNP project was to perform a gap analysis of process and outcome data variables for the ED, inpatient setting, and outpatient setting for the population of interest. The student defined specific outcome and process measures that were reported on a dashboard for the

specific departments to review. The goal was to emphasize the needs to improve care for this population based on the data analysis. This project sought to answer the clinical question: Does an analysis of data with focus on specific process and outcome measures in the ED setting, inpatient setting, and outpatient setting identify the gaps in care for the GTP with rib fractures and need further implementation of standard care to improve those outcomes?

Objectives:

A gap analysis of process and data outcomes in the ED, inpatient and outpatient setting met the following objectives and tasks:

- Identified evidenced based care for GTPs with rib fractures
- Collected baseline data on current care practices and outcomes for GTPs with singular rib fractures.
- Identified measures that need improvement based on the literature and national and state comparisons
- Performed cost benefit analysis of hospital readmissions and return ED visits
- Created a sustainability plan for data abstraction and analysis by January 31, 2019
- Developed a recommended evidenced based improvement plan to each department based on the gap analysis findings by March 2019

Design for Evidence-based Initiative

This is a DNP student quality improvement project. This project focused on data analysis to emphasize the gaps of care for the GTP with rib fractures. Improvements to an organization related to process and measures are important for quality improvement. A quality improvement project focuses on a systematic approach to change that is measurable to identify improvement

with specific patient populations or systems (U.S. Department of Health and Human Services Health Resources and Services Administration, 2011).

Setting and Required Resources

This DNP project took place at a local small urban trauma clinic and large inner-city hospital. The organization is a certified level 1 trauma center and provides care to about 2000 admitted injured patients each year. This project involved collaboration with the Clinical Nurse Specialists, trauma database coordinator, informational technology, ED manager and medical director, mentor and inpatient managers. These key stakeholders were valuable to determine which variables will be pulled easily through a current process or may need a report developed in the EHR. Data points that are not able to be pulled through a report will be done manually. Through collaboration with the team an efficient process was developed to obtain those results. Also, an administrative approval has been given to student by the IRB and is included in Appendix C. Additional emails have also been included for clarifying questions to be sure this project still maintains a quality improvement approach

Participants

The participants for this project include both staff and patients. The patients aged 65 years and older with diagnosed isolated rib fractures are the population of focus. Patients were included based on whether they were admitted from the ED or discharged. The staff included are those who care for this patient population. The participants also included, nurses, ED physicians, trauma physicians, trauma residents, trauma advanced practice providers, and the medical assistant and registration clerk from the trauma clinic.

Model Guiding Implementation

The Institute for Healthcare Improvement Model for Improvement was used to implement the scholarly DNP project. This process works to accelerate improvement methods and not interfere with current organizations change model (Institute for Healthcare Improvement (IHI), 2018). This model focuses in two parts with three focused questions and then the Plan-Do-Study-ACT (PDSA) cycle (IHI, 2018). See Appendix J for model view. Prior to implementations these steps occurred:

Form the Team. A team must be formed with key stakeholders in order to successfully perform the gap analysis in order to identify need for change and then make a recommended evidenced based change to improve outcomes for the GTP with rib fractures. Currently, the team consists of the DNP student, mentor (Trauma Medical Director), inpatient manager from the ortho-trauma unit, ED nurse manager, ED Medical Director and intensive care unit manager, trauma database coordinator, and information technologists. From the expertise of these key stakeholders and data analysis the gaps in care were identified for the GTP with rib fractures.

Setting Aims. The aim of the project was to define the population of focus with a time specific and measureable approach (IHI, 2018). The goal is to determine the ultimate accomplishment. With the GTP patient the goal will be to thoroughly analyze which measures are the gaps in care for this population and important to each individual unit.

Establishing Measures. This is the step to define quantitative measures based on the literature review to determine if the change is successful and leads to positive outcomes (IHI, 2018). The measures will focus on process measures, such as appropriate documentation of the incentive spirometry and outcome measures such as decrease ED return visits and hospital readmissions. This step is used to determine if the analysis identified and brought attention to

the necessary needs of the population of focus in order to make appropriate change. By identifying the measures and finding that outliers exist compared to other hospitals or the evidence will drive change.

Selecting Changes. This step involves determining what change can be made in result of the outcome findings (IHI, 2018). This involves analyzing the data, comparing the results to the evidenced based literature and determining what the unit is currently doing. The managers for each unit were given the dashboard with the process and outcomes measures trending over time to determine which ones are important to follow-up on. Eventually, the focus was on gaining knowledge and receiving feedback from the trauma specialists, ED providers and nurses. The feedback from the care providers is important. These key stakeholders have the front-hand knowledge on what will work and what will not.

Testing Changes. This step involves implementation and reviewing the change throughout the process (IHI, 2018). The PDSA cycle is used for testing change. Parts of this process will occur after the gap analysis is done; thus, it was not implemented during this project timeframe.

Plan. This step involves planning and determining how data will be collected and what the possible prediction will be (IHI, 2018). This part can be done with focus on the gap analysis. The goal is to determine who, what, when, where and what data is to be collected. In this step, the organizational assessment was done to determine the needs for the organization. The population of focus is the GTP with rib fractures. The goal was to perform a gap analysis to determine which measures are outside the benchmarks for this population. The analysis occured in the ED, inpatient and outpatient setting. The variables collected were based on each departments' needs and the evidence. Once the identified data was abstracted and analyzed

process improvement recommendations were suggested. The desired goal was to improve outcomes for the GTP with rib fractures.

Do. This step involves carrying out the implementation (IHI, 2018). This will be done after the project is completed and the gap analysis is finished. The gap analysis will help to identify any problems after implementation of a change. At this time, the data will only be analyzed.

Study. This step involves studying the process after implementation involving the data and results with comparison to desired plans (IHI, 2018). For example, if the protocol was not being followed then a new process will need to be implemented to identify the barriers to improve this problem.

Act. At this step, the modifications will be implemented and will be looped back to the plan in order to follow the loop process again for implementation (IHI, 2018). This process will not occur during this project time-line, but potentially after this project is done.

Implementing Changes. After using the PDSA cycle and refining the change this process can be expanded to a whole population (IHI, 2018). The goal is to identify the gaps with the data analyzed in order to encourage change in those specific departments.

Spreading Changes. This involves spreading the change to entire populations or an organization (IHI, 2018). For example, if successful the evidenced based changes could spread to the GTP with rib fractures who also have other injuries.

This project strictly focused on a data analysis in different settings to identify gaps in care. At this time, the implementation phase was not done. The goal will eventually include a standard protocol to assess, educate and discharge the GTP with rib fractures. This matches with

the evidence because standard protocols within an organization and has been found to improve outcomes for a population.

Implementation Steps and Strategies

The objective of the DNP project was to develop a standard process to analysis data for a gap analysis specific to the GTP with rib fractures. The focus was on both process outcomes, such as use of IS documentation, and outcomes measures such as ED return visits and hospital readmissions. The plan was to implement a standard process to formulate a dashboard to analyze data in ED, inpatient and trauma clinic for physicians and nurses to review in order to make recommendations on improving standards of care for the population of focus

Then in November 2018, the student began to work with the clinical nurse specialists and trauma data base coordinator and information technologists to determine ways to formulate and analyze the data. Communication occurred through face-to-face meetings and follow-up emails as needed. This project affects care processes in the ED, inpatient setting, and outpatient setting. Once the dashboards were finalized the student presented the data at the trauma committee meeting, ED management meeting, and inpatient management meetings on a monthly basis. The meeting focused on sharing the dashboard with the management teams to bring awareness about the outcomes for this population and brought attention to the need for change. The project was implemented in January 2019, which included a data analysis of 12 months of data from November 2017 to October 2018.

The student set standards for how the data is abstracted, analyzed and presented for this population. The presentation of the data is in a format that is easily readable to the nurses, physicians and other providers involved with caring for this population. The student audited the charts on a monthly basis to identify and analyze the data for this population. These results were

provided monthly to the key stakeholders in each department for staff to review the measures and ask questions as they would like. In the long-term eventually the data was presented in a quarterly basis.

Measures

Measurements are important to have when implementing a project to determine of the objectives of the project are being met. The data measures are specific to each key area (IP, ED, and outpatient). The measurements for the ED included: baseline IS documented in the appropriate location in the EHR, ED return visits within 30 days related to rib fractures complications, and ED return visits within 31-60 days due to rib fracture complications. In the inpatient setting measures included unplanned or return admissions to the ICU, mortality, pneumonia occurrence, and accurate documentation of the IS every 4 hours by inpatient nurses. The outpatient measures include mortality rate within 12 months, hospital readmission within 30 days and within 31-90 days. See Appendix K for definitions.

Data Collection Procedures

Data were collected from three different departments at the site of focus. The student collected the data for the ED, inpatient setting and outpatient setting. These data points were collected by the student through auditing the EHR. The goal was to have reports developed to avoid lengthy manual labor in order to obtain sustainability.

The data for the inpatient setting is collected by the trauma registrars. For the variables that are not collected by the trauma registrars, a form was developed that included those extra variables for collecting data during a chart abstraction (See Appendix K). A report was developed from the trauma registry to allow for data pull by the trauma database coordinator for inpatient variables. The data was analyzed weekly in the beginning of the project and then

expanded to monthly. The sample size in 6 months was 30 patients; the prediction was that there would be at least 15 patients in 3 months.

Data Management

The data was managed by the DNP student and the trauma database coordinator. The data was generated through trauma registry data pulls, chart reviews, and electronic health record data pulls. The inpatient data was scrubbed for identifiers, other defining characteristics, and inclusion criteria by the database coordinator. The student also scrubbed the data for the ED, inpatient, and outpatient variables. The data was organized on computerized on Excel sheets within the organizations' m-drive with password protection. The Excel Forms allowed for easy transfer to a dashboard format. All data was de-identified, and available to the DNP student and project mentor.

Analysis

The goal of the dashboard was to determine the most efficient way to pull specific data variables from the EHR in order to tract and trend outcomes for the GTP with rib fractures in the ED, inpatient setting and outpatient setting. Unfortunately, not all the variables could easily be pulled from a report tool. Those variables needed to be individually abstracted, but in a way that was time efficient.

The data was presented in a dashboard format. In the beginning the data was analyzed weekly and then monthly. The results were evaluated and compared to recommended benchmarks across the country, state, and organization. The data was presented in counts and also in percentages. A line-plot was used to present the data graphically to observe trends over time.

Fortunately, the trauma service has a robust registry that collects data on each trauma patient who is admitted to the hospital. This allowed for an easy way to abstract data points such as inpatient mortality, hospital length of stay, unplanned ICU readmits or admissions and complications such as pneumonia. The data was analyzed and collected through a team effort with the DNP student and the trauma database coordinator. The DNP student then took the data and input it into an excel sheet throughout the project work.

The ED variables such as return visits and outpatient data points such as mortality and hospital readmissions must be done manually. The DNP student did the chart auditing for these two departments. This could be a time-consuming process, but the DNP student worked with a quality specialist to identify a way to abstract readmissions in a more timely manner

Resources and Budget

The budget for this project is detailed in Appendix L. The majority of this project cost was associated with time spent data abstracting. The DNP student was the project leader. The DNP student donated her time to abstract the data. Other costs are associated with the time the information technologist spends developing a report that can have data pulled from the EHR. Also, more costs were associated with the time it takes the trauma database coordinator to pull the inpatient reports and scrub the data. The DNP student analyzed and pulled the data reports for the ED, inpatient and outpatient settings. This time was donated as well. This project was initially presented as a proposal defense on October 17, 2019. See Appendix L for Budget detail

Sustainability

The focus on improving geriatric trauma care has become a goal for many level 1 and level 2 trauma centers across the country (ACS, n.d.). Most recently the trauma team at the large inner-city hospital has focused specifically on improving care for the GTP with rib fractures.

The trauma medical director is the mentor of this project and is very supportive. Throughout this project the ED manager, ED medical director and inpatient manager for the general medical floor and intensive care unit have been key in supporting this project as well. There is a strong support to improve outcomes for the GTP with rib fractures across the country and at the site of focus for this project.

The sustainability plan for this project was achieved in many ways and involves three different foci. First, the variables and outcomes were concise and limited to important measures valuable to each department. This also allowed for key variables to be collected, which made abstracting more efficient. Second, most of the data variables were pulled through a report system in a cumulative manner. Lastly, those variables that were not able to be pulled through a generated report had an assigned person to strategically collect those results in a non-laborious manner. A process that involves minimal manual labor, efficient and concise and easily transferrable to a dashboard maintains sustainability.

Results

This project was started because the GTP with rib fractures has a high mortality and morbidity rate. In order to improve outcomes for this population evidenced-based and standardized care needs to be established. This project was also initiated in order to bring awareness about the risks for the GTP with rib fractures and to improve outcomes for this population. The literature shows a patient with just three rib fractures has a 20% mortality rate and an increased risk of pneumonia compared to the younger population (Brasel et al., 2017). With that being said, improved care is important to prevent adverse outcomes for this patient population. Studies have found the PIC (pain, incentive spirometry, cough) assessment should be used to assess the patient with rib fractures. This involves assess pain for adequacy, incentive

spirometer tracking for trending and identify declines early, and strength of cough (Brasel et al., 2017).

During this project, process frameworks were used to organize the approach. The IHI model was used to organize the set-up of the project. This involved forming a team, setting the aims, establishing the measures, and selecting the change. The Disablement Process theory was used to gain a better understanding of how rib fractures affect the GTP. A SWOT analysis was used to determine areas in need of improvement and areas of strength at the organization of focus. The Burke-Litwin model was also used to thoroughly analyze the needs for the GTP with rib fractures at this organization. The purpose of this project was to identify the gaps in care at the center of focus to give recommended evidenced based change, improve outcomes in order for key stakeholders to implement appropriate change.

Methods. This project focused primarily on data analysis. A 12-month collection of data was done with focus on key measures such as ED return visits within 30 days and 31-90 days, hospital readmissions within 30 days and 31-90 days, pneumonia complication, unplanned ICU admits, and occurrence of FRAIL assessment done on day of admission. The FRAIL assessment stands for fatigue easily, resistance-can the patient walk up one flight of stairs, ambulation-can the patient walk 1 block, illnesses- does the patient have multiple (>5) illnesses, loss of weight- has the patient lost more than 5% of her/his body weight in the past 6 months to a year with results of 1-2 equaling pre-frail and 3-5 is equal to frail (Maxwell, Dietrich & Miller, 2018). Additional, measures included baseline IS documentation done in the ED, IS documentation at least every 4 hours while inpatient, trauma clinic or PCP follow-up within 2 weeks, and mortality within 12 months.

Intervention. The intervention was the development of a dashboard. This allowed for the

data to be analyzed and visualized in a simple manner to identify gaps in care for the GTP with rib fractures. This dashboard was formulated from an excel form and converted over to graphs for visualization using pivot tables and charts. The graphs automatically updated as the data was put into the excel sheet on a monthly basis. The initial findings showed that the IS use was poorly documented by nursing both in the ED and inpatient setting. In addition, the FRAIL assessments were minimally documented on admission, the mortality was higher than desired, the ED return visits were high; and hospital readmissions were high prior to the rib fracture protocol implementation. These findings were given to the leadership teams in the ED, inpatient setting and trauma service group in order to choose how to approach those issues and implement evidence-based change to improve outcomes for the GTP with rib fractures.

Approach. The approaches to improve outcomes for this population were to recommend evidence-based recommendations by attending different meetings to report project steps, goals and plan to the key stakeholders. This was done in the following ways:

- The student attended the trauma service meeting on November 20, 2019. At this meeting, many specialties are involved such as all the trauma surgeons, trauma database coordinator, trauma program manager, neurosurgery liaison, trauma orthopedic surgeon liaison, ortho-spine surgeon liaison, plastic surgeon liaison, who all may encounter the GTP with rib fractures.
- The student attended the ED physician leadership meeting on January 7, 2019.
- The student attended the ED nurses meeting on January 9, 2019. This meeting included many of the ED charges nurses and ED supervisors. During the ED meeting one of the nurses asked what is an IS. This made awareness that more education is needed when caring for the GTP with rib fractures related to appropriate pulmonary hygiene.

- The student also attended inpatient nurses' meetings for the general medical unit on January 15, 2019 and January 17, 2019. The nurses on this unit take care of majority of the GTP with rib fractures sometime during that patient's hospitalization.
- Lastly, the student attended the intensive care unit nurses' meetings on January 21, 22, 23 and 24, 2019.

Measures. The measures chosen for this project included ED return visits and hospital readmission because these measures were high for this population and important measures followed by the organization as a whole. Also, unplanned ICU admits was chosen due to this center being a high-outlier compared to other trauma centers in the state and country. FRAIL assessment is shown in literature and should be used for the GTP, thus, used with this population, and was also utilized to drive the rib fracture protocol. Pneumonia should be tracked since this population is at high risk for this infection according to the literature. Appropriate documentation of the IS is also important in order to identify clinical decline early and prevent longer hospital stays according to the literature.

Analysis. The methods to analyze the data were quantitative. The data was analyzed by viewing the data in an excel form and on graphs. For example, if there were 6 GTP with rib fractures seen in the month of March and 50% had a return ED visit with 30 days this is considered a high rate. Each month the data findings were compared to the previous month in hopes to make improvements.

Results. Mid-way through the project analysis the resident team developed and implemented a rib fracture protocol for physicians to follow to determine appropriate admission unit, pain plan and discharge process. The dashboards for the ED, inpatient and trauma service are available in Appendix N. Through the data analysis, many opportunities for improvement for

the GTP with rib practices were identified. The data was compared pre and post protocol. The dashboard was given to the key stakeholders in each service area or unit including trauma services, general medical unit, ED and ICU with pertinent measures to follow for the GTP with rib fractures on a monthly basis. See Appendix N to view the dashboards.

The documentation of the IS by inpatient nurses at least every 4 hours was 0%, IS use was never documented by the ED nurses. The FRAIL assessment was not done at all prior to the initiation of the rib fracture protocol in May 2018 and done only intermittently in 17 (33%) patients post-protocol. The ED return rate within 30 days throughout the 12 months ranged from 0-80% in the first 6 months, overall, the ED return rate was 48% (n=10); as 80% and as low as 0% and in the first 6 months was 10 (48%), and post-protocol was 7 (18%). The ED return visit rate within 31-90 days for the first 6 months was 4 (19%) and the last six months was 3 **(**7.5%). The hospital readmission rate within 30 days for the first 6 months was 6 (29%) and post-protocol was 2 (5%). The hospital readmission rate for 31-90 days for the first six months was 3 (14%) and the last 6 months was 0%. The pneumonia rate and unplanned ICU admission was low for the whole 12 months at only 5 (8%) and 3 (5%). The percentage of follow-up at the trauma clinic in the first 6 months was 6 (29%) and 3 (7.5%) for follow-up to the PCP within 2 weeks post-discharge. For the second 6 months the trauma clinic follow-up was 8 (39%) and the PCP follow-up was 10 (25%). Mortality for the first 6 months was 8 (39%) and the last 6 months was 7 (17.5%). The total number of patients reviewed over the 12 months was 70. As a result of the findings in this project, the following recommendations were made:

1. Obtain a baseline IS in the ED for the GTP with rib fractures prior to discharge or transfer to the inpatient bed and document the result in the EHR.
2. Consult the trauma service for all GTP with rib fractures

3. Assess and document the IS in the EHR every 4 hours while caring for GTPs with rib fractures while hospitalized. This will allow for tracking and trending of the patient's respiratory status and identify a clinical decline sooner for appropriate intervention.
4. Imbed the IS documentation into the vital signs section in the EHR for nursing and physical therapy to easily document, track and trend this assessment. This allows the nurse to assess and document IS when vital signs are done and allows the physicians to view this data point in a graph to track and trend within the EHR.
5. Follow-up to trauma clinic or PCP within 2 weeks post-discharge to assess for appropriate pain management and respiratory improvement. This was recommended in hopes to decrease the rate of ED visits and hospital readmissions for this patient population.
6. Care providers should complete the FRAIL assessment in the ED per the existing rib fracture protocol.
7. Embed specific measures into the initial data abstraction process by the trauma registrar or trauma process improvement nurse in order to simply data collection. The recommendation was to add the IS documentation in the ED and inpatient setting and FRAIL assessment into the trauma registry. This was done by February 15, 2019.
8. To more easily identify ED return visits and hospital readmissions a standard abstraction process was also recommended. The trauma registrars are often several months behind in abstracting charts. The trauma registrar will insert ED return visits and hospital readmissions within 30 days and 31-90 days along with whether the patient followed-up in the trauma clinic or by their PCP within 2 weeks of discharge into the registry for an easy data pull.

- In addition, the process improvement abstraction sheet was updated in order to pull the IS data from the ED, inpatient and the FRAIL assessment into the trauma registry in real time. See Appendix M to view the abstraction sheet.
- Continued education to the nursing staff on best practice care for the GTP with rib fractures is necessary. The ED education team started to review the use of the IS with the nursing staff in order to standardize education provided to the patient. See Appendix P for the education provided to ED staff in a newsletter. In the inpatient setting the student was informed the RNs are teaching the nurse aides how to assess and document the use of the IS by the patient in the EHR.

Discussion

The care of the GTP with rib fractures can result in many complications if care provided is not standardized and provided in an appropriate manner. This project was successful due to the key stakeholders being supportive, the awareness and focus on rib fracture patients by the organization, and the residency team developing a rib fracture protocol.

The leadership teams in the ED were very supportive. After the student's presentation at the leadership physician meeting and ED nurse meeting immediate implementation of education related to the IS was done. See Appendix P for review of the education given to nursing via the ED newsletter 2 weeks after the student presented.

Key stakeholders allowed the student to attend meetings within the department to educate and inform the nurses and physicians in the inpatient setting, ED, and trauma service meeting. According to the literature, rib fractures in the GTP can have a high mortality rate and result in complications such as hospital readmissions, long-term pain problems and even mortality (Flarity et al., 2017). Based on the data review none of the nurses were documenting the

patient's IS according to the recommended literature guidelines of Q2 until pain control then Q4 thereafter. The barriers to this could be lack of understanding of the importance of the IS and heavy patient loads throughout the shift.

The use of data is valuable to bring awareness about the need for change. The visualization and use of the dashboard helped the staff to understand the measures that were being followed and the areas in need for improvement. The data also helped to drive the 'why' behind the importance of standardizing care for the GTP with rib fractures. This dashboard will continue to be provided to the staff on a monthly basis in order to identify if improvement has occurred post-implementation.

Limitations. This project brought awareness about the complications that the GTP with rib fractures are encountering. With that being said there are limitations to this project. First, the data was analyzed based on what was documented in the EHR and may not reflect the true care given to the patient. Also, the organization had switched to a new EHR not too far ahead of when the student began the project. The system was currently in the optimization phase with focus only on EHR changes that involved safety, financial or policy needs. This limited the student's chances to have a modification occur within the EHR system in a timely manner.

Dissemination of the Results

The plan for dissemination of the results involved attending leadership and nursing meetings in the ED, inpatient and trauma service departments. The dashboard and recommendations were presented at the trauma committee meeting on November 20, 2018. The student presented at the ED physician leadership meeting the ED nursing meeting. Inpatient nurses' meetings and the ICU nursing meetings were attended. This project will also hopefully be submitted to the National Trauma Quality Improvement Poster Presentation in Texas at the end of 2019. Then

submission to scholarly works will also occur. The results were presented as an oral presentation on March 25, 2019.

Reflection of DNP Essentials

As a DNP student it is important to utilize the DNP essentials to drive the project. The DNP student must be proficient in the 8 DNP essentials prior to graduation and were utilized throughout the project planning and implementation. Each essential is reviewed in further detail.

Essential I: Scientific Underpinnings for Practice

According to the AACN (2006) essential I focuses on using theory to guide practice to improve delivery of health care for the healthy and sick, assess and evaluate outcomes and implement new practices. This project focused on the evidence to determine the best care to be given to the GTP with rib fractures. Also, frameworks such as the Disablement Process and IHI Model for Improvement were utilized to guide (IHI, 2018; Verbrugge & Jette, 1994).

Essential II: Organizational and Systems Leadership

DNP essential II focuses on how the organization functions and the leadership within the system to minimize disparities in health care and promote safety (AACN, 2006). Leadership support is key in order to begin, make change and maintain change. The student demonstrated this DNP essential by presenting at key stakeholder meetings across all settings. The project plan was presented and detailed to the parties. The student also performed an organizational assessment to learn how this hospital and clinic functions. This information was then utilized to determine the needs for the GTP with rib fractures. The student also assessed for strengths, weaknesses, threats and opportunities in this organization and creating a budget plan. IRB approval was also achieved and deemed non-research.

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

According to the AACN (2006) the DNP student should be able to translate and disseminate evidence-based research into practice. The goal was to find relevant and applicable evidence related to the GTP with rib fractures using the PRISMA method in order to provide evidence and evaluated the selected variables. The project included driving change based on the evidence. This project is quality in nature with the goal to improve care and outcomes for the population of focus. Data was collected from the EHR and extrapolated into an excel sheet, which was analyzed and also translated to graphs for a dashboard.

Essential IV: Information Systems Technology

The ability to use an EHR to obtain information technology, analyze and display data as a DNP student is important. The student needs to be able to utilize the technology, but also understand the legal, ethical and regulations that involve using the system to evaluate outcomes for programs, care given and systems (AACN, 2006). The student used the organization's EHR to gather the data with excel used to formulate the dashboard. Any time the data was analyzed or communication was done confidentiality measures were taken to project patient information. The student also attended an advanced excel dashboard class in order to enhance skills to formulate the dashboard. The dashboard was constructed using the existing information systems within the organization.

Essential V: Advocacy for Health Care Policy

DNP students' need to understand health care policy specific to where they practice and both state and national policies. This essential focuses on policy change in relation to decisions within an institute, governmental level or at the organizational level (AACN, 2006). The student participated at the Advocacy for Nurse Practitioners in order to understand current policy and laws, which is important to identify in order to know if these policies would affect the project

plan. All the literature supports that standardizing care for the GTP with rib fractures is key to improving outcomes and this organization has room for improvement. There were no policy changes due to this project, but rather practice changes. With this organization being a level I trauma center, it is important to provide high-quality care for the trauma patient in order to maintain certification.

Essential VI: Interprofessional Collaboration

This essential focuses on the collaboration between healthcare teams with student establishing interprofessional teams (AACN, 2006). The DNP needs to be a leader and be able to collaborate with multiple interdisciplinary teams to make an impact and receive support when implementing a change. In order for this project to be successful the DNP student met with nurses, physicians, residents, interns, physical therapists, managers, statisticians, Clinical Nurse Specialists, data base coordinator, and respiratory therapists. The collaboration with these specialties allowed for key measures and identification of evidence-based implementation process to be successful.

Essential VII: Clinical Prevention and Population Health

The DNP student needs to promote health and reduce risk and illness, and understand the epidemiology, environmental, bio-statistical regards to a populations' health (AACN, 2006). This project specifically focused on the GTP with rib fractures and to improve outcomes such as morbidities with pneumonia, unplanned ICU readmissions. Rib fractures in this population are a serious problem and result in poor outcomes and quality of life. Proper treatment is important to improve outcomes and ability to return to baseline post-injury.

Essential VIII: Advanced Nursing Practice

The DNP role is diverse and has the ability to analyze a complex system, design and implement best practice for a patient population, develop a sustainability plan, maintain

professional relationships with many different specialties, in order to improve outcomes of care and standardize processes of care (AACN, 2006). The student for this project was able to meet this essential. An organizational assessment was done at the place of focus for this project with a comprehensive analyze of the evidence in order to design and implement a process that focuses on the GTP with rib fractures to improve outcomes. The relationships developed with the key stakeholders resulted in the evidence-based recommendations to be accepted with plans for implementation within each department.

Implications for Practice and Further Study in the Field

This project is the first step of a multi-phase project to improve care for the GTP with isolated rib fractures. The evidence-based recommendations were given to the nurses, physicians and leadership in the ED, inpatient setting and trauma service department. Further implementation needs to occur after the recommendations were given in order to improve outcomes for the GTP with rib fractures. After the implementation phase is done the analysis of the data will need to be reviewed to determine if the measures improved based on the new interventions. Actually, multiple projects can stem from this single project. Those projects would include, but not limited to:

1. Baseline IS documentation by the ED nurse
2. Documentation of the IS by the inpatient nurse at least every 4 hours
3. Utilization of the FRAIL assessment on admission with documentation of the findings by the nurse or physician to determine appropriate admission unit and further needs for the patient
4. Implementation of follow-up within 2 weeks of discharge to the trauma clinic or PCP office to determine if ED return visits and/or hospital readmission decrease

It is important after implementing a new practice that measures are monitored to make sure a difference is being found and that those changes are based on evidence. If those measures are not improving then further analysis needs to be done to determine barriers. There is hope that a future DNP student or champion nurse will lead the evidence-based recommendations in order to implement and monitor the change.

Conclusion

Rib fractures in the GTP can be life threatening and prevent that person from returning to baseline (Brasel et al., 2017). Many GTP with rib fractures are cared for at the hospital of focus for this project. The goal was to provide evidence-based care in order to improve outcomes and prevent morbidity and mortality for this population. An organizational assessment was done to determine how this population is cared for in this organization compared to what is reported in the literature using the Burke-Litwin model. Frameworks such as the IHI model and the Disablement Phenomenon theory were used to understand the severity of the patient population injuries and the process to implement change. Collaboration with key stakeholders and leadership, in depth analysis of data and the development of the dashboard resulted in findings that revealed necessary evidence-based recommendations specific to the organization to improve outcomes for this population.

This quality improvement project analyzed key process and outcomes measures for specific departments within the site of focus in order to identify needs for improvement. There was a total of 70 cases reviewed during the data analysis. It was found from this analysis that IS documentation and FRAIL assessment is poorly done at this institution. This finding determines that evidence-based change needs to occur.

This project is sustainable for many reasons. The key stakeholders and leadership are

supportive of the project and want to improve care for the GTP with rib fractures. The resident team has developed a rib fracture protocol to improve care for this population. This defines that the organization is also focusing on rib fracture care, which coincides with this project. According to Beckers Hospital Review (2013), the cost of a hospital readmission for pneumonia can be as much as $23,400 and for all-cause readmissions the average cost is $11,200. The average cost of a return ED visit can be upwards of $20,000 with an additional $1,000 if the patient required transport by an ambulance (Hunt, 2018). Providing best practice care for the GTP with rib fractures will result in an immense cost savings (See Table 1, Appendix L). Therefore, improving and providing appropriate process and outcomes measures for the GTP with rib fractures is a must to prevent morbidity and mortality.

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Appendix A

IRB Approval Letter from Organization

IRB Approval Letter from Organization

NON HUMAN RESEARCH DETERMINATION

June 20, 2018

Kathy A Crystal
[redacted]

SH IRB#: **2018-204**

PROTOCOL TITLE: **Identifying Gaps in Care for the Geriatric Trauma patient with Rib Fractures Post-Discharge**

SPONSOR: Investigator

Dear Ms. Crystal,

On June 19, 2018, the above referenced project was reviewed. It was determined that the proposed activity does not meet the definition of research as defined by DHHS or FDA.

Therefore, approval by [redacted] not required. This determination applies only to the activities described in the IRB submission and does not apply if changes are made. If changes are made and there are questions about whether these activities are research involving human subjects, please submit a new request to the IRB for a determination.

A quality improvement project may seek publication. Intent to publish alone is insufficient criterion for determining whether a quality improvement activity involves human subject research. However, please be aware when presenting or publishing the collected data that it is presented as a quality improvement project and not as research.

Please be advised, this determination letter is limited to IRB review. It is your responsibility to ensure all necessary institutional permissions are obtained prior to beginning this project. This includes, but is not limited to, ensuring all contracts have been executed, any necessary Data Use Agreements and Material Transfer Agreements have been signed, documentation of support from the Department Chief has been obtained, and any other outstanding items are completed (i.e. CMS device coverage approval letters, material shipment arrangements, etc.).

Your project will remain on file with the Office of the IRB, but only for purposes of tracking research efforts within th[redacted] If you should have questions regarding the status of your project, please contact the Office of the IRB at 616-486-2031 or [redacted]

Sincerely,

[redacted]

cc: Kathy A Crystal[redacted]

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Appendix B

Burke-Litwin Theory for Organizational Assessment

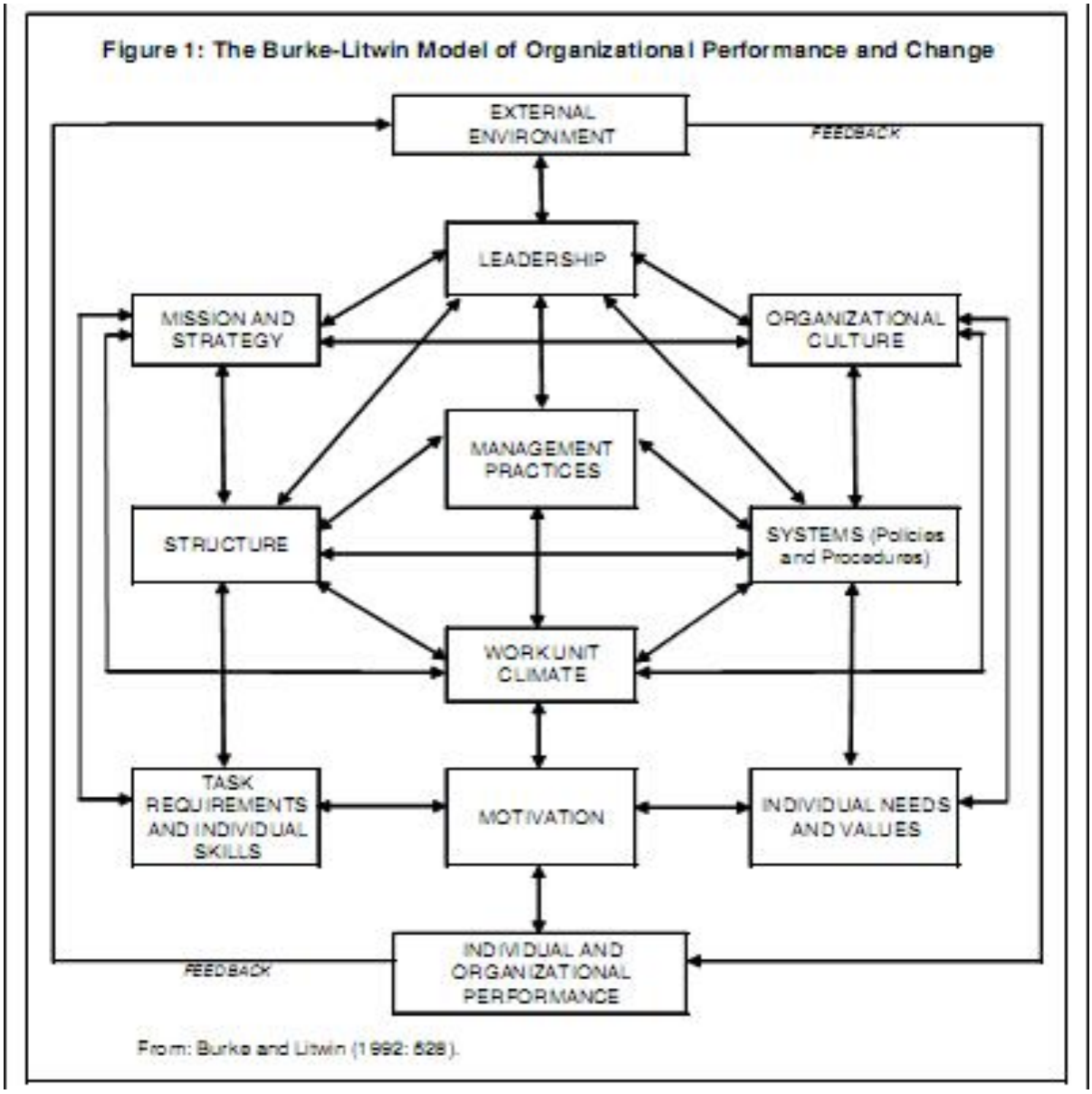


Figure 1. A model of organizational performance and change. Reprinted from "A Causal Model of Organizational Performance and Change." By W.W Burke and G.H Litwin, 1992, *Journal of Management, 18*(3), 528. Copyright 1992 by Southern Management Association

Appendix C

The Rate of Unplanned Emergency Room, Urgent Care, Primary Care Provider Visits and Hospital Readmissions for the GTP with Isolated Rib Fractures

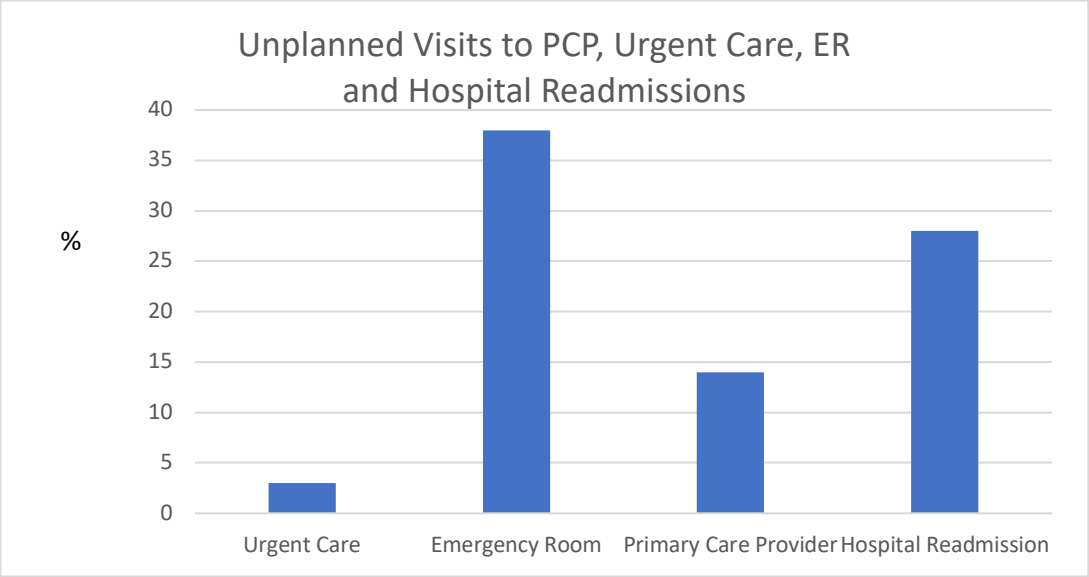


Figure 2. The percentage of unplanned Emergency Room, Urgent Care, Primary Care Provider Visits and Hospital Readmission for the 29 patients evaluated through the chart audit over six months.

Mortality and Survival Rates for the Geriatric Trauma Patient with Isolated Rib Fractures

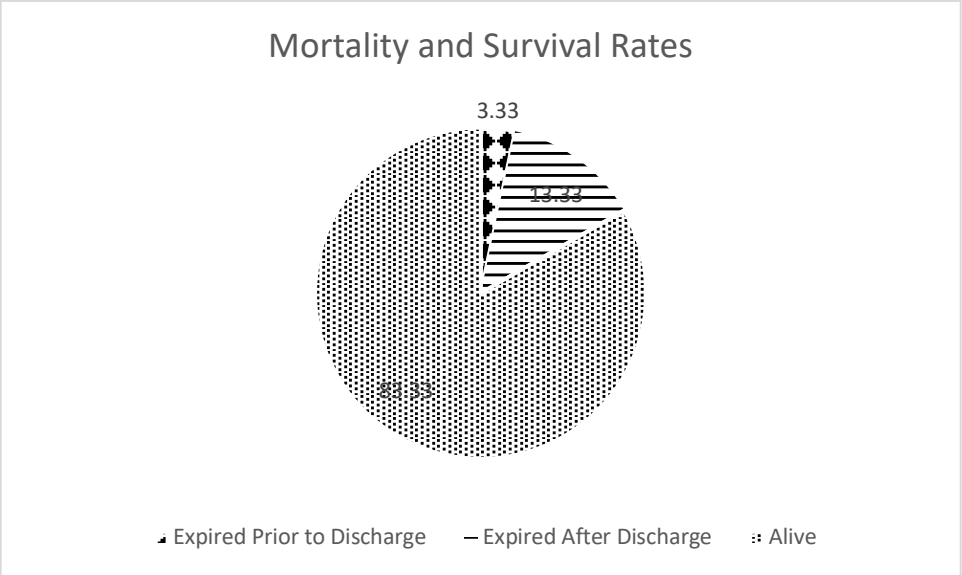


Figure 3. The percentage of geriatric trauma patients with rib fractures mortality rate prior to discharge, after discharge, and survival rate over six months at the health system.

Appendix D

SWOT Analysis of Proposed Project

Strengths	**Weaknesses**
• Trauma Physicians who are educated and experts at caring for trauma patients work in the clinic • MA is educated and experts at caring for the trauma patient • Trauma APPs are educated and experts at caring for the trauma patient • Consistent team that cares for the trauma patients • Part of a LICH that is national recognized and certified as a trauma center • Low staff turn-over • New rib fracture protocol to focus on improving care for the admitted trauma patient with rib fractures is making care for this population a priority • Robut trauma registry to pull data for admitted GTP with rib fractures	• Trauma physician may be assigned to work in the clinic once per month • The discharge summaries are generically generated from the EHR system with standard for follow-up at the SUC inconsistent • Assessments done for this population is provider dependent and variable
Opportunities	**Threats**
• National attention is given by the American College of Surgeons, governing body, to improve care for the geriatric trauma population • Decrease unplanned PCP, ED and readmissions to the hospital post-discharge • Assess and improve functional ability by providing appropriate resources post-discharge	• Not all providers enjoy caring for geriatric patients. There may be push-back from those physicians when caring for this population • The clinic is small and may not have the bandwidth to follow-up with all geriatric trauma patients with rib fractures • The clinic may be moving to a smaller building during the project implementation which may cause delay in patient follow-up • New EHR within the past year in which the organization is in the optimization phase and may result in delay in the development of a report for ER and outpatient data

Figure 4: SWOT analysis of the Urban Clinic and Large Inner-City Hospital

Appendix E

PRISMA Flow Diagram of Literature Search for Geriatric Trauma Protocols

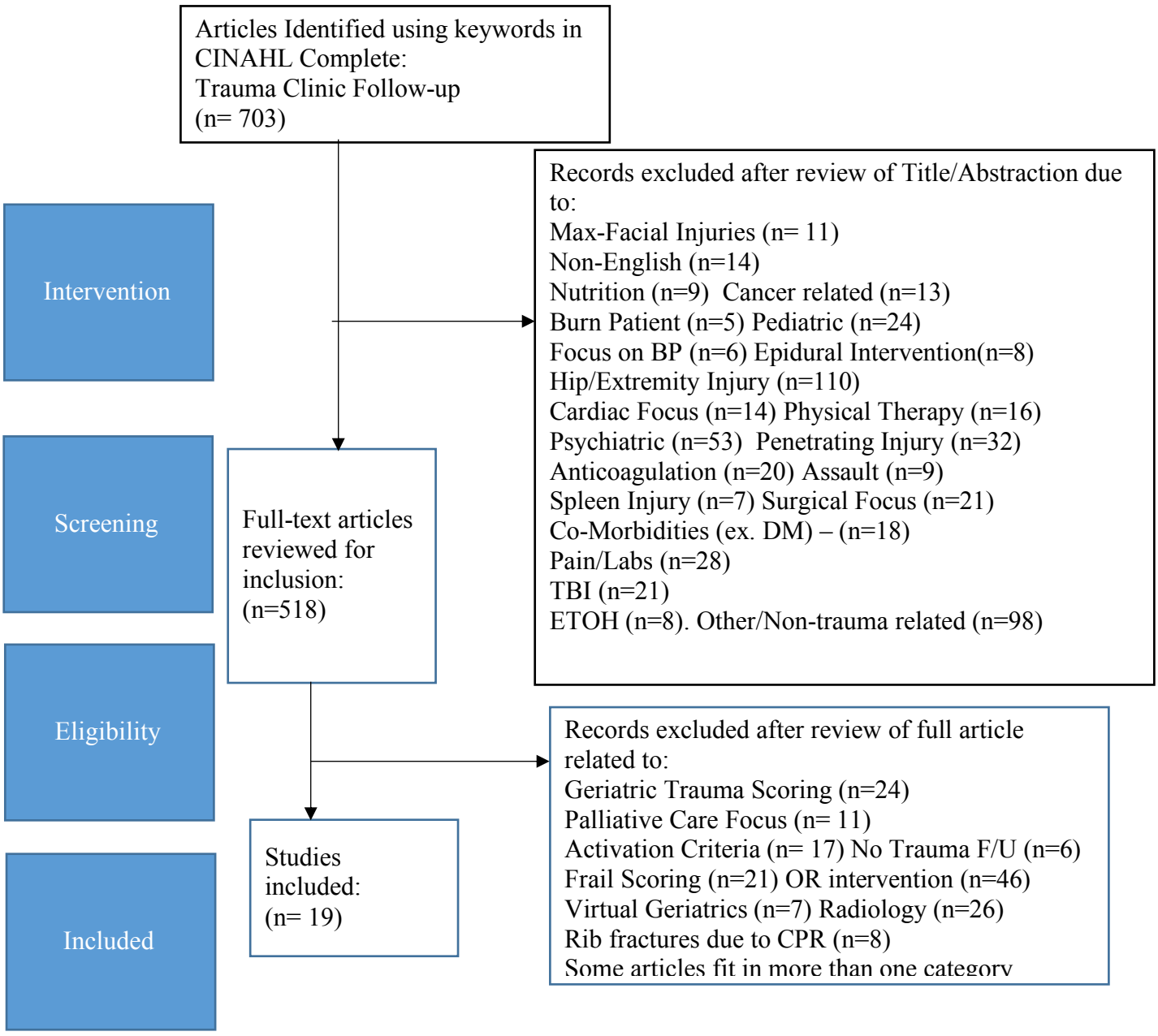


Figure1. Flow diagram of search selection process. Adapted from Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009) Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. https://doi.org/10.1371/journal.pmed.1000097

Appendix F
Geriatric Trauma Protocol Literature Review

Author (Year) Purpose	Design (N)	Inclusion Criteria	Intervention vs Comparison	Results	Conclusion
DeLa'O (2014) Implementing geriatric clinical pathways to improve outcomes	Retrospective Cohort pre-and-post implementation	Admitted trauma patients aged 65 years and older	Compared patients aged 65 years and older before and after the Implementation of a geriatric multi-disciplinary approach improves throughput and is cost savings	A dedicated geriatric trauma multi-disciplinary team improves throughput and reduces cost along with reduces length of stay	A geriatric trauma team multi-disciplinary approach is recommended at a trauma center
Olufajo (2016) Integrating geriatric consults into geriatric trauma care	Preintervention and postintervention cohort study	Admitted trauma patients aged 70 years and older	Compared patients aged 70 years and Older pre-and-post Implementation of geriatric consults to improve advanced care planning, mortality and ICU re-admits	After intervention geriatric consults Increased to 100% from 3.26%, advanced Care planning with DNR status increased To 38.22% from 10.23%, mortality Decreased to 5.24% from 9.30%, ICU Readmits went from 8.26% to 1.96%.	The implementation of geriatric consults for the geriatric trauma patient improves mortality rates, ICU re-admission rates and end of life planning
Cortez (2018) The goal was to implement a geriatric trauma protocol to improve outcomes for that population based on the American College of Surgeons	Quality Improvement project: Cohort study with pre-and-post implementation	Geriatric trauma patients admitted to the trauma center	Implementation of a geriatric trauma protocol to standardize care for this population	After education, the trauma residents had an 9.2% increase in provider knowledge. The authors also had a decreased length of stay of 5.03 days from the 6.58 prior to	Organized treatment and standardized care for this population can improve outcomes

recommendations with increased education provided to the trauma residents				the protocol implementation.	
Maxwell (2018) The use of a frail screening tool to identify geriatric patients at risk for complications and predict mortality and 1-year functional status post-discharge	Pre-and-post Implementation Cohort study	Geriatric patients aged 65 years and older admitted through the Emergency Department at a trauma center	Implementation of a frail screening tool to identify geriatric trauma patients at higher risk for mortality and functional decline	The authors found that geriatric patients with a higher preinjury FRAIL score had a higher likelihood of dying within one year of discharge.	The FRAIL tool is useful in predicting 1 year functional status and mortality
Bortz (2015) Incorporated geriatric Education to nurses Called Nurses Improving Care for Healthsystem Elders (NICHE) to improve outcomes, reduce healthcare cost and decrease hospital complications	Quality improvement project with pre-and-post implementation cohort study	Nurses caring for the admitted geriatric trauma patient aged 65 years and older	Provided education to nurses about geriatric care and implemented multi-disciplinary rounds	Post-implementation falls decreased from 26.7% from 61.5%, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) improved on topics of transition of care and pain control. Also, improved HLOS for the geriatric patient of 4.9 days compared to the hospital population days of 5.3.	Implementation of education to nurses following the structured NICHE program and doing multi-disciplinary rounds can improve outcomes for the geriatric patient

Appendix G
Rib Fracture Care Literature Review

Author (Year) Purpose	Design (N)	Inclusion Criteria	Intervention vs Comparison	Results	Conclusion
Winters (2009) reviewed literature for guidelines to care for the patient with rib fractures aged 65 years and older	Literature review	Guidelines and literature supporting standardized care for the patient aged 65 years and older with rib fractures	Identified Guidelines from Eastern Association for the Surgery of Trauma (EAST) and the literature supporting the guidelines to treat patients with rib fractures	Effective pain control and management of rib fractures is important to prevent morbidity and mortality for those patients with rib fractures and should be based off clinical guidelines	Guidelines to standardize care for the patient aged 65 years and older with rib fractures is important to prevent poor outcomes
Brown (2012) focused on the importance of documentation of incentive spirometer (IS) use by nursing in order to identify change in respiratory status for a patient with rib fractures	Literature review	Stressed the importance of assessing and documenting the use of the IS by nursing to identify early decline in patients with rib fractures	Identified the standard of care for assessing a patient with rib fractures	Effective assessment and documentation of a patient with rib fractures using the IS can help to identify patients at risk for respiratory decline, determine appropriate care interventions, identify appropriate pain interventions and begin screening for discharge.	The use of guidelines and standards of care and improve outcomes for the patient with rib fractures and prevent poor outcomes

Flarity (2017) Utilized clinical practice Guidelines to guide care for the patient with rib fractures to improve hospital length of stay	Cohort study pre-and-post implementation	Patients admitted to a trauma center with rib fractures	Implemented a clinical practice guideline to standardize care for the patient with rib fractures with focus on monitoring pulmonary function, pain management and early detection of respiratory decline	The group that was cared for after the guideline was implemented had a decrease length of stay by 2 days.	The use of a care guideline can be utilized to improve outcomes for the patient with rib fractures
Leininger (2017) Focus on rib fracture guidelines, education need for providers in order to provide best care for the elder patient with rib fractures	Literature Review (informative)	Geriatric trauma patients with rib fractures aged 65 years and Older	Identified appropriate guide-lines including pain and respiratory assessments in addition to education to providers about rib fracture care	A rib fracture protocol can be implemented at a trauma center with the appropriate development steps to improve outcomes for the GTP with rib fractures	A rib fracture protocol for the Geriatric patient can improve outcomes such as HLOS, morbidity and mortality rates
Sahr (2013) Clinical pathway to care for geriatric patients aged 65 years and older with rib fractures to decrease hospital length of stay	Retrospective Review cohort study (pre-and-post implementation)	Trauma patients aged 65 years and older with 3 or more rib Fractures	Implementation of a rib fracture protocol to appropriately triage geriatric patients with rib fracture in the ER	After implementation of the rib fracture Protocol for the geriatric patient with Rib fractures the HLOS went from an Average of 10.24 days to 8.74 days	The implementation of a geriatric rib fracture protocol can decrease HLOS

Singh (2016) Implementation of a Geriatric co-management program for patients aged 65 years and older with rib fractures	Retrospective cohort study	Geriatric trauma patients aged 65 years and older with multiple rib fractures with or without other injuries	Implementation of a geriatric co-management program for geriatric patients with rib fractures admitted to a trauma service	Mortality rate for the geriatric co-Management group went from 15% to 8.7% after implementation	Implementation of a multi-disciplinary approach to geriatric care involving a geriatric service can improve outcomes such as mortality rates
Witt (2017) Clinical strategies to Reduce complications For the patient with rib Fractures	Meta-analysis	Trauma patients admitted to a trauma center with rib fractures	Reviewed current guidelines and literature to identify standards of care for the patient with rib fractures	Implementation of multimodal approach to pain management, catheter analgesia, pulmonary hygiene including incentive spirometer evaluation and operative stabilization are standard ways to improve outcomes for the patient with rib fractures and control pain.	A multi-disciplinary and guided approach to with an algorithm to approach rib fracture care can improve outcomes for the patient with rib fractures
Kourouche (2018) A review of the literature to identify guidelines and care practices to develop a care bundle for patients with blunt chest injures	Integrative review	Trauma Patients with rib fractures, pneumothorax, hemothorax, flail chest, sternal fractures, lung contusions, bony or non-bony injuries of the chest	Reviewed studies that focused on treatment interventions for patients with blunt chest injuries	The analysis of literature to assess clinical guidelines for the treatment of patients with traumatic chest injuries to standardize care and improve outcomes for patients	Outcomes for patients with blunt chest injuries can optimize outcomes when care is provided in a care bundle that is standardized

Appendix H

Trauma Clinic Follow-up

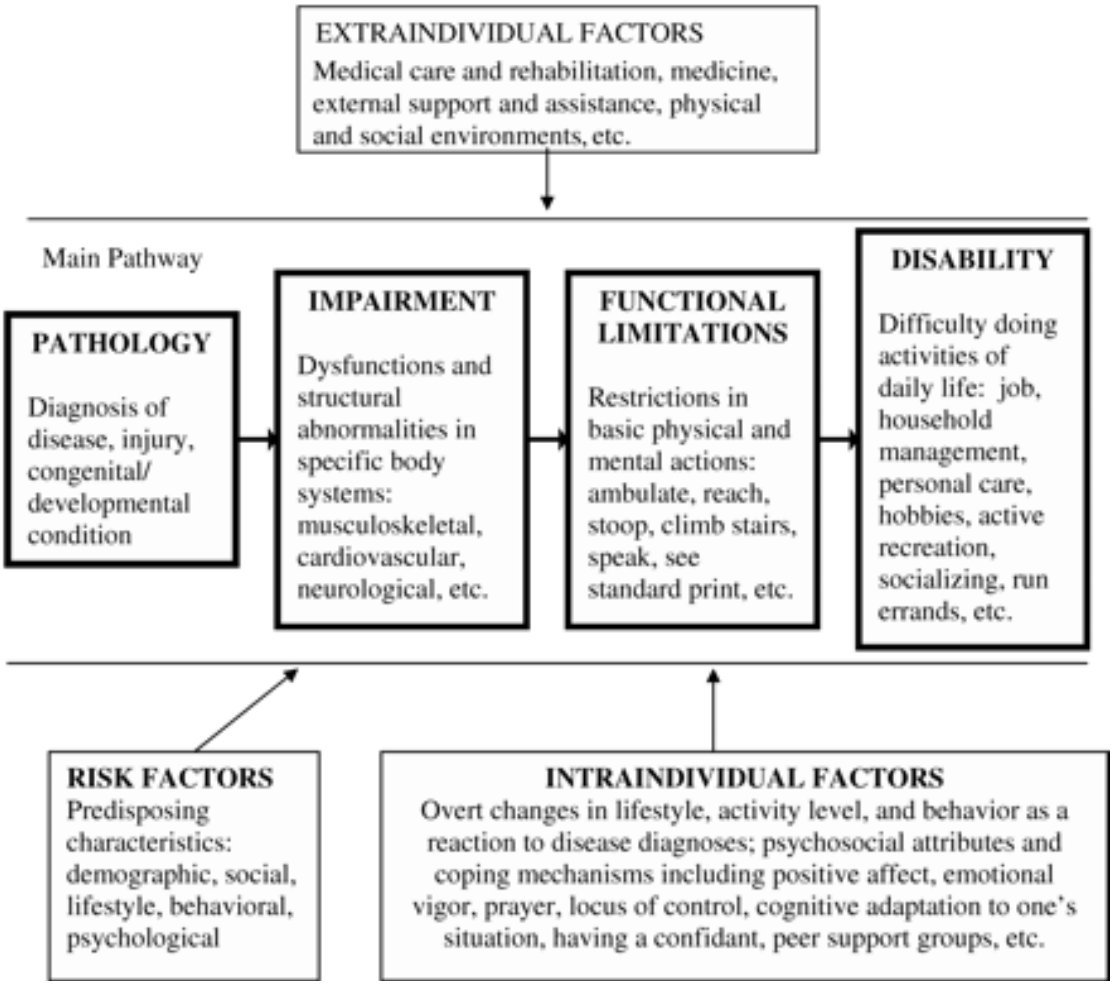
Author (Year) Purpose	Design (N)	Inclusion Criteria	Intervention vs Comparison	Results	Conclusion
Leukhardt (2010) Determine risk factors associated with failure to follow-up after traumatic injury and determine in those patients who did not follow-up if the information was within the electronic health record.	6-year retrospective analysis	Admitted trauma patients	Determine failure to follow-up based on income, poverty level, education status and demographics	Lower income, high poverty levels, lower education, older age, lower injury severity scores, nonwhite race, blunt injury mechanism, within 25 miles from clinic and discharge home without assist predicted failure to follow-up	Trauma process Improvement programs should Target patients at risk for not following up and develop a structured outpatient note.
Stone (2014) Identify factors associated with compliance for trauma clinic follow-up and define that trauma clinic follow-up is poor	2-year retrospective comparative study	Admitted trauma patients	Compared patients compliant with Follow-up within 4 weeks of discharge to Patients who were not compliant	Factors affecting follow-up included age greater than 35, white race, Medicaid/ Medicare insured patients, blunt mechanism, lengthy hospital stays and disposition to rehab center.	Follow-up at the trauma clinic is low and more research needs to focus on ways to improve compliance and long-term outcomes for trauma patients.
Tuyp (2018) Identify predictors of hospital readmissions and interventions and patient satisfaction post	1-year Retrospective and prospective patient satisfaction surveys	Admitted trauma patients to a Level 1 center	Identify patient satisfaction rates and needs Required at the Trauma clinic visit. Also, outcomes of the readmissions.	Patients were Medicaid increased the odds of readmission and patients required various interventions at the follow-up appointment from wound care,	Interventions need to target the high risk patients to prevent re-admissions. Also, trauma clinic follow-up is

trauma clinic follow-up				referrals and braces. Also, patients were satisfied with the follow-up trauma clinic visit.	helpful for trauma patients to meet needs post-discharge.
Fletcher (2017) Identify follow-up compliance rates at a trauma clinic and identify factors associated with trauma patients' adherence to the appointment	Prospective, Comparative, Descriptive Study	Admitted trauma patients age 15 years and older with the exception of those patients discharged to an inpatient rehab or long-term care center	Implementation of a new protocol in which trauma patients received clinic appointments prior to discharge	A trauma clinic follow-up model Resulted in an increase in follow-up appointments with an 80% compliance rate.	Pre-discharge education and focus on transportation issues to follow-up appointments should be focused on to improve compliance to appointments.
Aaland (2012) Explore reasons why trauma patient's fail to follow-up to trauma clinic appointments	1-year retrospective analysis	Admitted trauma patients excluding those who expired	Identify external and internal factors that affect follow-up care at a trauma clinic. Provide appointment date and time at discharge.	Common internal factors for failure to Follow-up include physician not writing the order for the follow-up or the nurse not following through. Internal factors include demographics not updated in the chart resulting in wrong phone numbers. Also, compliance with follow-up improved to 87.2%	Long-term follow up of discharged trauma patients is needed to identify outcomes and needs. Improved education at discharge about follow-up, updating, patient demographics prior to discharge and education to

				after implementation of providing an appointment at discharge.	physicians and nurses are needed
Theriot (2016) Providing appropriate information at discharge decrease post-discharge complications	Prospective cohort design with a convenience sample (dissertation)	Admitted trauma patients	Educating patients on discharge, utilizing a Re-Engineered Discharge (RED) Tool kit, determining barriers in discharge follow-up and doing reminder calls to improve patient follow-up.	The post-discharge follow-up rate increased to 85% from 58%, the ER visits decreased to 13% from 24.3%, hospital readmissions increased to 12% from 4%- due to not preventable factors and the Healthcare Providers and Systems (HCAHP) did not improve by 10%	Nurse Practitioners, physicians, social workers, and case managers play an important role in educating patients about discharge plans and with the appropriate information provided a decrease in post-discharge complications can occur.

Appendix I

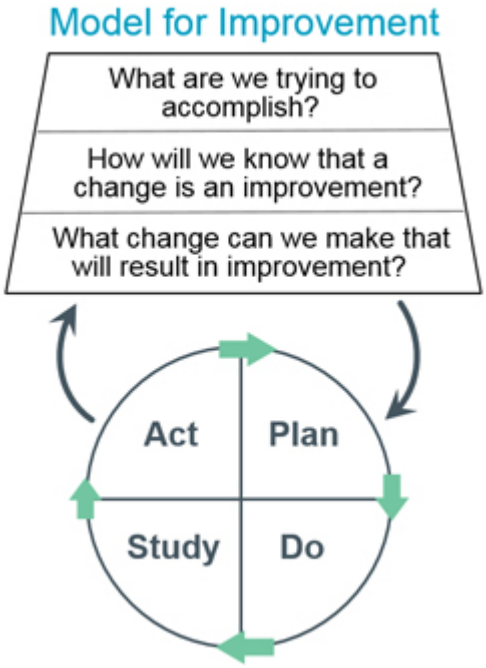
Phenomenon: Disablement Process Framework



A model of the Disablement Process. Adapted from "The Disablement Process" by L.M. Verbrugge and A.M. Jette, 1994, *Journal of Social Science and Medicine,* 38(1), 1-14.

Appendix J

Implementation Model: Institute for Health Care Improvement Model



A model of the Disablement Process. Adapted from Langley, G. L., Moen, R., Nolan, K. M. Nolan, T. W., Norman, C. L. & Provost, L. P. (2009). *The improvement Guide: A practice approach to enhancing organizational performance.* (2nd edition). San Francisco: Jossey-Bass Publishers.

Appendix K
Process and Outcomes for ER, Inpatient and Outpatient Setting

	Concept Measured	Definition	When Measured	Who Measures
ED Process Measures Outcomes	Baseline IS documentation documented in the HER	The IS documented in the EHR in the appropriate location by nursing prior being transferred to the admitting unit.	At ED discharge	Pull from trauma registry
	FRAIL documentation prior to admission by the trauma resident, intern or medical student	Assessment of the patient's FRAIL score on a scale of 0-5, with 1-2 being pre-frail and 3-5 being frail prior to being admitted from the ED	During ED stay	Pulled from Trauma registry
ED Patient Outcomes	Unplanned ED return Visit with 30 days	Patient returns to ED within 30 days of discharge from ED or hospital readmission due to respiratory or pain issues from the rib fractures	Monitored after 30 days of discharge	Trauma Registrar
	Unplanned ER return visits within 31-90 days	Patient returns to ER at 31 -60 days after discharge from ER or hospital admission due to respiratory or pain issues from the rib fractures	Audited after 31-90 days from discharge	Trauma Registrar
Inpatient Process Outcomes	Documentation of incentive spirometer by inpatient RN	Documentation of the IS volume in EHR every 4 hours by the inpatient nurse	During hospital stay	Pulled from trauma registry
Inpatient Outcome Measure	Unplanned or return admission to the ICU	Patient admitted to ICU after being admitted to a general medical bed	Throughout hospital stay	Pulled from trauma registry

	Mortality	Patient expires during hospitalization	On day of discharge	Pulled from trauma registry
	Pneumonia	Patient develop pneumonia during hospital admission based on CDC criteria	Throughout hospital stay	Pulled from trauma registry
Outpatient: Outcome Measures	Mortality	Patient expires after discharge within 12 months	After discharge for up to 12 months	PI nurse
	Hospital readmission within 30 days of discharge	Patient admitted to the hospital within 30 days of discharge	After discharge up to 60 days	Trauma registrar
	Hospital readmission within 31-90 days	Patient admitted to the hospital within 31-60 days of discharge	After discharge up to 120 days	Trauma registrar
	Trauma Clinic follow-up	Patient follows-up at the clinic within 2 weeks of discharge	After 2 weeks of discharge	PI nurse
	Primary Care Provider follow-up	Patient follows up at PCP office within 2 weeks of discharge	After 2 weeks of discharge	PI nurse

Appendix L

Cost Analysis for Improving Care for the GTP with Rib Fractures

	Cost/hour	Time to Spend on Project	Total	
Trauma Database Coordinator	$22.06/hour	2 hours/month for 4 months	$176.50	
Hospital Information Technologist	$30.67/hr	20 hours to build reports	$613.42	
Clinical Nurse Specialists	$43.52/hr	2 hour/month for 4 months	$348.22	
Student	Time donated	Time donated	Time donated	
Total			$1,138.14	Savings in December 2017
Cost of One Hospital Readmission for Pneumonia	n/a	n/a	$23,400	(3 re-admissions) * $23,400
Cost of ED One Return Visit	n/a	n/a	23,000	(4 ED return visits) * $23,00
Total			$46,400	
		Savings	$45,261.86	$161,061.86

Table 1: Wage estimates obtained from Glassdoor (2018). *Search salaries and compensation.* Retrieved from https://www.glassdoor.com/Salaries/index.htm; Beckers Hospital Review (2013). Six stats on the cost of readmissions for CMS-track conditions. Retrieved from https://www.beckershospitalreview.com/quality/6-stats-on-the-cost-of-readmission-for-cms-tracked-conditions.html

Appendix M

Process Improvement Abstraction Form

Patient Name: Age: Mech:
MRN: Injuries:
TBN:
Room #:

Admit Service:
Consults: ortho____ NSx_____ palliative_____ O/S____Med ____SICU_____PRS_____other _____

Patient Arrival: _____ @ _____

MTQIP:

CPR performed: Y or N
First Intubation: Never, Scene, ED, OR, ICU, other
Surgical Procedure: Y or N
Emergent Operation: Y or N
Death occurred in 1st OR: Y or N
Cdiff: Y or N
TBI: Yes □ No □
Pupillary 30 minute: Both Rx, One Rx, Neither Rx, ND
Highest GCS _____ Highest motor GCS_____
GCS qualifier for highest GCS:
S, T, TP, L, eye obstruction, obs to eye and I, unknown
Midline shift: Y, N, Not imaged, ND _____
Beta Blocker (48hours): Y or N
1st INR: _____ or NA 1st PTT: _____ or NA
1st Cerebral monitor: Date_____ @ _____ or NA
2nd Cerebral Monitor: Date _____ @ _____ or NA
TBI Therapy Type _____ date _____@ _____ or NA

Trauma Activation 1, 2, Eval or DA
Underactivation/overactivation/NA
Tf from: _____
Blood Transfusion (24hr): Y or N MTP
TXA: Date _____@_____ or N
lowest SBP _____ or NA
Requested RN_____ done ____
1st angio: _____ or NA
Surgery hem control: _____ or NA

Operative/Procedures
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

VTE prophy < 48 hours: Yes □ No □ LVX □ HSQ □ Date/Time _____
If not, why? _____
Rib Fractures? Y or N FRAIL score ED: Y or ND; score ____ Baseline IS ED: Y or ND vol: _____

Trauma Event Tracking

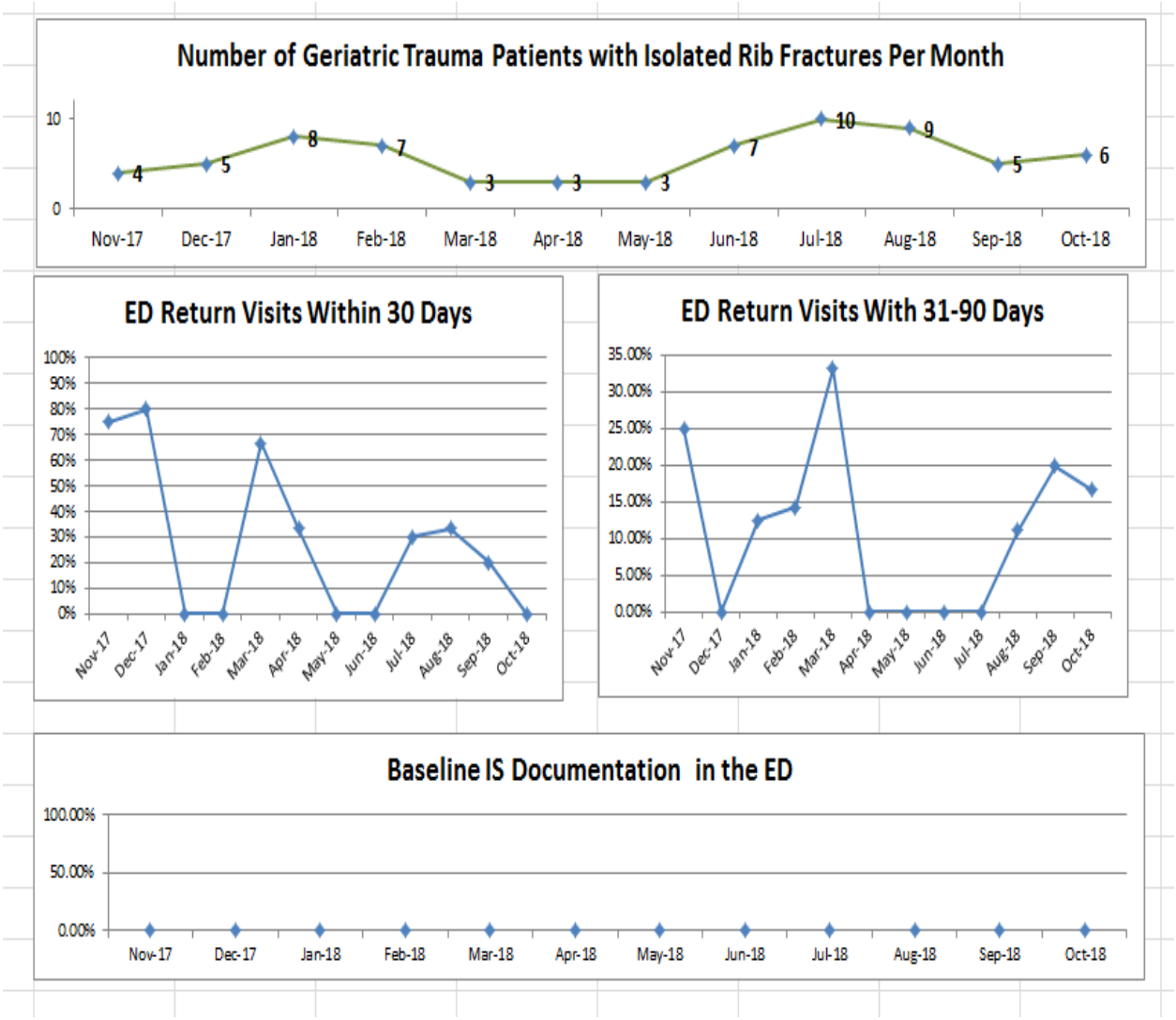
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
A IS	A IS	A IS	A IS	A IS	A IS	A IS
A IS	A IS	A IS	A IS	A IS	A IS	A IS
A IS	A IS	A IS	A IS	A IS	A IS	A IS
A IS	A IS	A IS	A IS	A IS	A IS	A IS

Process improvement form used to abstract trauma data with the rib fracture data added to track the documentation of the IS.

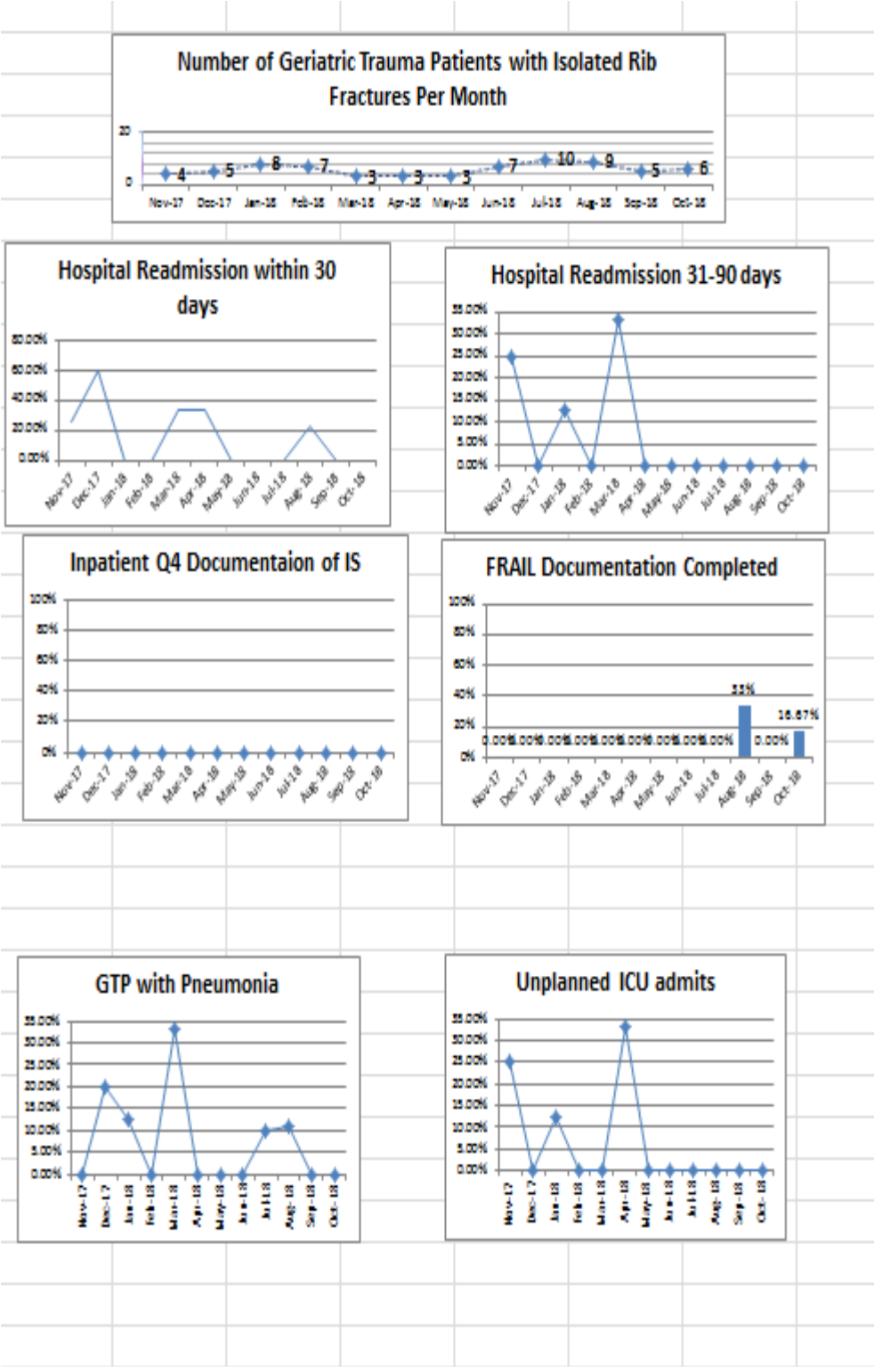
Appendix N

Dashboards for the ED, Inpatient and Trauma Service Departments

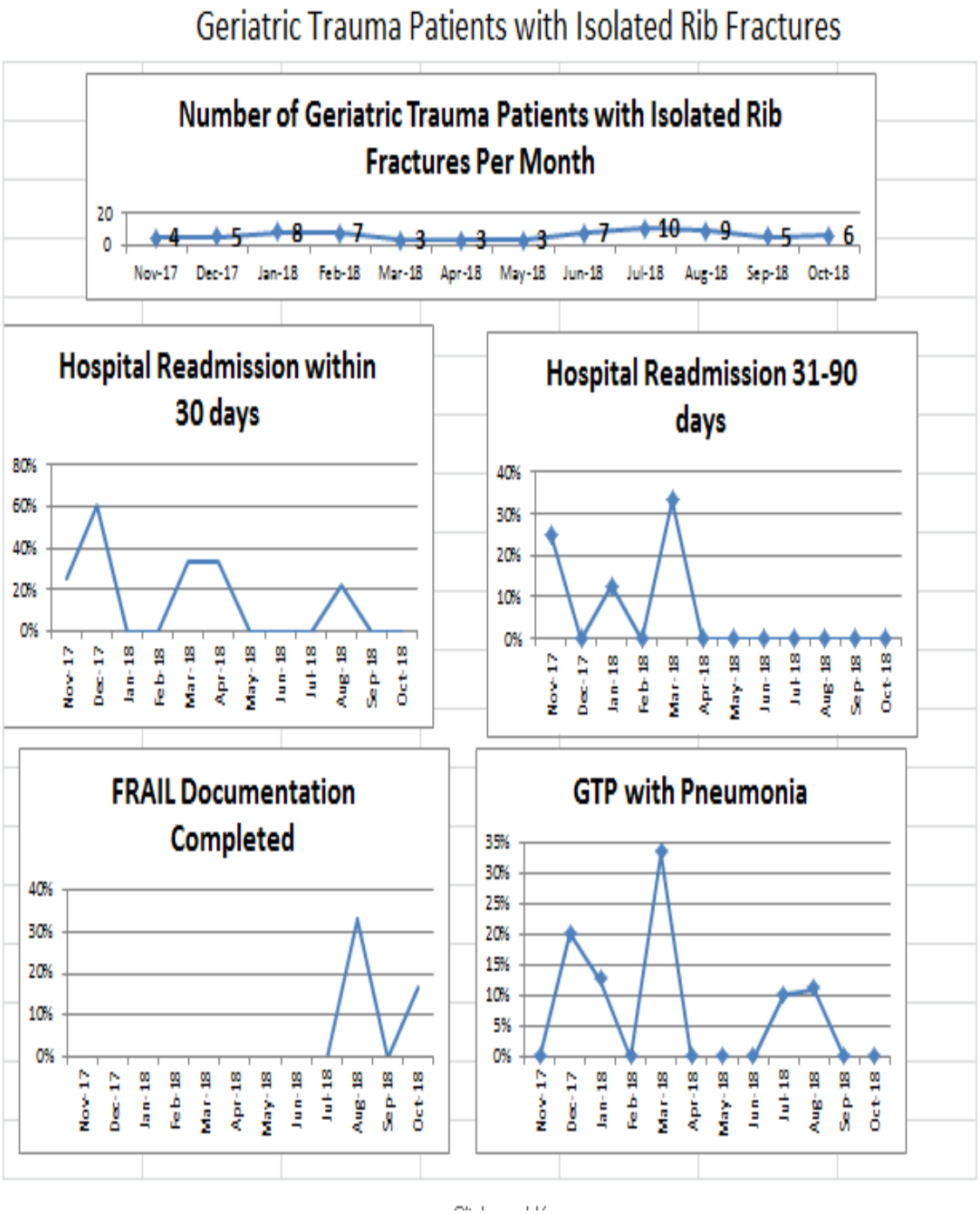
ED Dashboard

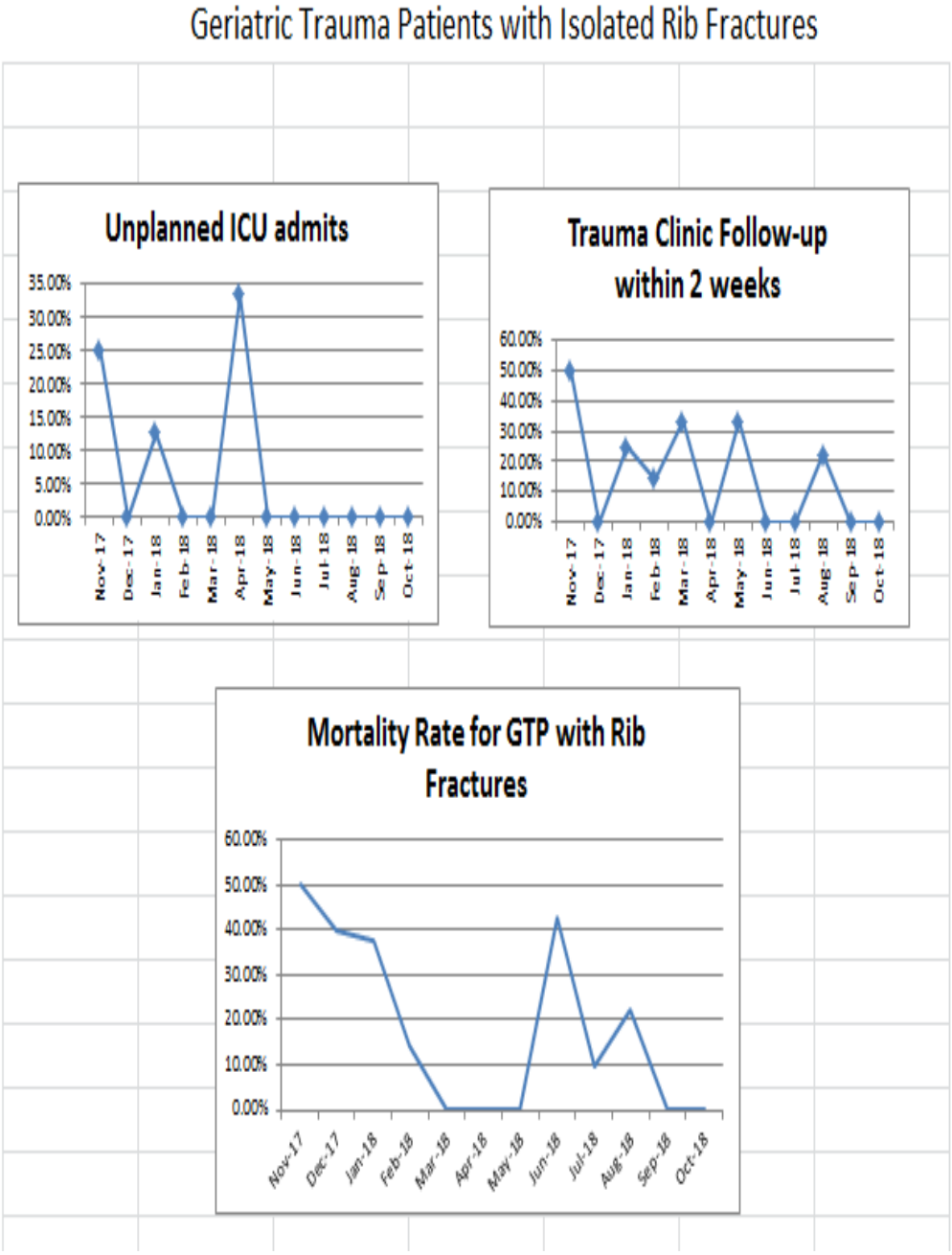


Inpatient Dashboard for GMB Unit and ICU



Trauma Service and Outpatient Dashboard


Geriatric Trauma Patients with Isolated Rib Fractures
Number of Geriatric Trauma Patients with Isolated Rib Fractures Per Month
20
0
4 5 8 7 3 3 3 7 10 9 5 6
Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18
Hospital Readmission within 30 days
80%
60%
40%
20%
0%
Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18
Hospital Readmission 31-90 days
40%
30%
20%
10%
0%
Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18
FRAIL Documentation Completed
40%
30%
20%
10%
0%
Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18
GTP with Pneumonia
35%
30%
25%
20%
15%
10%
5%
0%
Nov-17 Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18


Geriatric Trauma Patients with Isolated Rib Fractures
Unplanned ICU admits
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Trauma Clinic Follow-up within 2 weeks
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Mortality Rate for GTP with Rib Fractures
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18

Appendix O

FRAIL Assessment Tool

Fatigue: Are you Fatigued	Yes= 1 point	No= 0 point
Resistance (can you climb a single flight of stairs?)	Yes= 0 point	No= 1 point
Ambulation (can you walk one block?)	Yes= 0 point	No= 1 point
Illnesses (more than five?)	Yes= 1 point	No= 0 point
Loss of weight (more than 5%?)	Yes= 1 point	No= 0 point

Scoring of the Frail Assessment Tool:
No Frail: 0
Pre-Frail 1-2
Frail: 3-5

Maxwell, C. A., Dietrich, M S., & Miller, R. S. (2018). The FRAIL questionnaire: A usefule tool for bedside screening of geriatric trauma patients. *Journal of Trauma Nursing*, 25, 242-247. doi: 10.1097/JTN.0000000000000379

Appendix P
ED Education about Incentive Spirometer

DID YOU KNOW?

Incentive Spirometry

An incentive spirometer is a device used to help patients practice breathing deeply, while providing visual feedback on the patient's respiratory effort. Incentive spirometers help increase lung volume and help to prevent or reverse the alveolar collapse that can lead to atelectasis and pneumonia.

This device is beneficial for patients who are postoperative and patients with rib fractures/trauma. ESPECIALLY geriatric patients! Patients age 65 and older have an increased rate of pneumonia by 27% compared to the younger population.

Instruct the patient:

1. Close their lips tightly around the mouthpiece
2. Inhale as slowly and deeply as possible
3. Hold entire volume of inspiration for at least 5 seconds. Ball should rise and remain in between arrows
4. Slowly breath out
5. Using spirometer, take 10 breaths every 1-2 hours while awake

How to chart in EPIC :

Bulger, E. M., Arneson, M. A., Mock, C. N., & Jurkowich, G. J. (2000). Rib fractures in the elderly. *Journal of Trauma*, 48, 1040-1046.

Restrepo, R. D., et al. (2011). AARC clinical practice guideline: Incentive spirometry: 2011. *Respiratory Care, 56*, 1600-1604. Accessed March 2015 via the Web at http://rc.rcjournal.com/content/56/10/1600.full.pdf (Level I)

Education initiated by an ED RN champion related to use of the incentive spirometer and documentation by the ED RN. Education was done after the student made the evidence based recommendation to document baseline IS in the ED.