

Are We Failing the Homeless and Uninsured Trauma Patient?
An Exploration in the Nurse Practitioner Role in Trauma, and Identification of
Disparity in Treatment and Barriers to Follow-up for the Acutely Injured

By

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Abstract

The purpose of this dissertation was to examine disparities in healthcare related to insurance status and homelessness through three scholarly projects. Within the projects, the nurse practitioner's role for trauma care in the homeless was reviewed. Two additional studies were conducted to identify if there is disparity in care for acutely injured patients based on insurance status at a national and/or a local level.

Project I described the Trauma and Homelessness Initiative, which showed that essentially all homeless persons are exposed to trauma and then outlined a basic program that can be utilized to help care for those persons. Nurse Practitioner attributes were then reviewed and show that the nurse practitioner is well positioned to implement and lead similar programs.

Project II was a secondary data analysis of a large national database (the National Hospital Ambulatory Medical Care Survey). Insurance status was associated with the number of patients returning to the emergency department within 72 hours of initial discharge for those who suffered an acute injury. When controlling for demographics and other variables studied, minority race and homelessness significantly associated with return visits.

Project III was an exploratory, retrospective chart review performed to determine if lacking insurance is associated with the occurrence an adverse event prior to being able to obtain surgical correction of an unstable ankle injury. In patients seen at one of two emergency departments within a single healthcare system, neither insurance status nor demographic factors were associated with an increase in adverse events. There were more patients admitted from the emergency department than expected, which could be one explanation for the lack of disparity found.

Evidence from these studies could provide nurses with knowledge about populations that face healthcare disparity. As primary patient care advocates and bedside healthcare providers, nurses, including advanced practice nurses, can use this knowledge to work toward providing the best care to all patients, regardless of their socioeconomic status or social situation.

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Chapter 1

Dissertation Proposal

As a family nurse practitioner in a busy urban emergency department (ED) at a safety-net hospital, I bear witness to the trauma endured by various populations from various mechanisms, as well as the difficulty that socioeconomically disadvantaged patients have navigating the healthcare system. Considering the lack of ability of the homeless or uninsured to access the healthcare system, emergency department and specialty colleagues at my site have begun tailoring plans of care for some acutely injured patients. These plans differ from what is considered standard practice. While the typical insured patient is often treated in an outpatient setting, patients in certain underserved populations may be treated as inpatients. Standard, outpatient treatment, that includes securing specialty care follow-up, paying for additional visits, returning for care, or accessing support services is, at times, viewed as a barrier that cannot be overcome for these disadvantaged patients.

The broad purpose of this dissertation is to examine how socioeconomic disadvantage, such as homelessness and lack of insurance, may affect trauma patients' healthcare and outcomes. While care of the trauma patient is generally best provided by a multidisciplinary approach, nurse practitioners working in the acute setting are often the first providers to establish and direct the plan of care for the patient. In addition, bedside nurses in the emergency department provide personal care and closely assess all patients while working as part of the healthcare team to advocate for and direct the patient's care. Regardless of provider types or specialty services involved, the role of the nurse is to act as a primary patient advocate and work with the healthcare team to ensure that all patients, regardless of socioeconomic status, get the best possible care. Nurse practitioners are also more accessible in rural areas that have fewer insured patients than other primary care providers (Graves et al., 2016), showing that nurse

practitioners do serve where needed, regardless of patient's ability to provide payment to the provider or healthcare system.

In the following chapters three distinct scholarly research projects are described along with the manuscript plans that were prepared for submission to peer-reviewed journals. The overall purpose of the research is to identify disparities in healthcare for trauma patients who lack insurance or experience disadvantages such as homelessness. This research will assist the general healthcare community, and nursing in particular, to identify and ultimately work to reduce disparity and provide the best care to all patients.

First, the Homelessness and Trauma Initiative, which identified that the homeless population universally experience trauma and explored ways to address trauma in this population (Cash et al., 2014), was reviewed. Current literature was examined in order to provide evidence to support that the nurse practitioner is well positioned to lead such an initiative. Second, a secondary analysis of national data from the National Hospital and Ambulatory Care Survey was conducted in an attempt to identify disparity factors for underserved populations. These two studies were initially completed and provide evidence of disparity and nurses' ability to make an impact. With this information at hand, a third, exploratory study was conducted at a local hospital looking at unstable ankle fractures as an example of an injury that can have very poor outcomes if proper surgical treatment is not provided. This descriptive study was a retrospective chart review examining whether lacking insurance, or other potentially disparate factors, leads to a decreased ability to access recommended follow-up care, surgery, or an increased incidence of adverse events in patients diagnosed with an ankle injury expected to require surgery. Identifying disparity in at-risk populations may provide insight that can allow for removal of barriers to healthcare for those suffering an unintentional traumatic injury. As a primary

advocate for all patients, nurses and nursing practice will benefit from a better understanding of the disparity in care that exists following trauma.

Problem and Significance

Health disparities are inequities in the burden of disease, injury, or death due to social status, race, sex, gender, sexual orientation, and/or income (Institute of Medicine, 2011). The Institute of Medicine identified health equity as one of six areas of priority focus for improving health care quality in the United States (Institute of Medicine, 2001) and the Healthy People campaign has addressed health disparity in each decade since its inception (Office of Disease Prevention and Health Promotion, 2014). Other institutions such as the office of the U.S. Surgeon General (U.S. Department of Health & Human Services, n.d.) and the Kaiser Family Foundation (Ubri & Artiga, 2016) have also called for reducing health disparities in the United States.

Those experiencing homelessness are one of the most vulnerable and disparate populations. The homeless have a higher incidence of emergency department utilization, are more likely to be admitted to the hospital at a younger age and have longer lengths of hospital stay than housed counterparts (O'Toole et al., 2010). Homeless persons have higher rates of physical illness, mental illness, and substance abuse (Weber, Lee, & Martsof, 2017), and have higher rates of medical illness, psychopathology, and substance use than the general population, which leads to a higher age-adjusted mortality rate (Schanzer, Dominguez, Shrout, & Caton, 2007).

Even without experiencing homelessness, those who are without insurance face disparity. Despite laws and regulations, such as the Emergency Medical Treatment and Labor Act (EMTALA), that mandate emergency departments to evaluate and stabilize all patients presenting

with injury or illness (Centers for Medicare & Medicaid Services, n.d.), acute trauma patients face health disparity. Patients without insurance often face poorer outcomes (Cone, Richardson, Todd, Betancort, & Lowe, 2003) and non-private insurance status is associated with differences in patterns of care in adults visiting the emergency department (Mannix, Stack, & Chiang, 2012).

In 2013 there were over 35 million uninsured Americans between ages of 19 and 64 (Kaiser Family Foundation, 2017) and in 2015 (after the U.S. Affordable Care Act) over 28 million Americans remained without health insurance (Kaiser Family Foundation, 2016). With uninsured patients facing an increased risk of mortality or complications from a traumatic injury (Baraga, Smith, Tanner, Kaplan, & Lesniak, 2012; Bell & Zarzaur, 2013; Chikani et al., 2015; Downing et al., 2011), a disparity in outcomes related to ability to pay is highly concerning.

Traumatic injury is common. Almost 100% of the homeless experience trauma or closely witness trauma (Cash et al., 2014). The U.S. Center for Disease Control and Prevention (n.d.) reported over 37 million injury-related visits to emergency departments for the year 2013. In 2011 there were about 421 visits to the ED for every 1,000 individuals in the general population (Weiss, Wier, Stocks, & Blanchard, 2014). Superficial injuries, such as sprains and strains, rank in the top 5 reasons for ED visits in patients 18-64 years old (Weiss et al., 2014). Most of these injuries are unintentional and affect populations that otherwise have low burden of disease (Weiss et al., 2014). Whether disparate portions of an otherwise healthy population are able to properly access healthcare needs to be examined.

Background and Supporting Literature

Trauma patients without insurance have increased rates of mortality and complications. Despite being younger and less severely injured, Salim et al. (2010) found that uninsured trauma patients at a southern California site had higher mortality rates than those with insurance.

Chikani et al. (2015) examined visit data on patients involved in traumatic injury through the Arizona State's Trauma Registry and determined that self-pay patients had a significantly higher risk of mortality for most mechanisms of trauma compared to other types of insurance and twice the mortality of those with private insurance. Examining the Florida Agency for Health Care Administration data set, Tepas, Pracht, Orban, and Flint (2011) found that there is a higher immediate mortality of the uninsured compared to those with insurance, and concluded behavioral and socioeconomic factors were the cause, not physiologic factors. Downing et al. (2011) examined data from the National Trauma Data Bank for patients aged 19 to 30 years of age and found a significant and substantial difference in survival between patients who were insured compared to those who were uninsured.

Evidence of insurance related disparities, regardless of type of injury, is abundant in the acute injury literature. Carrying insurance exerted a strong positive impact on mortality of both penetrating and blunt trauma patients, even when differences in likelihood of suffering each type of trauma were controlled for (Greene et al., 2010). Taghavi et al. (2012) found that of patients suffering penetrating trauma, as recorded in the Temple University Hospital trauma registry, those without insurance had shorter hospital stays and experienced a decreased rate of placement into rehabilitation facilities. This study, unlike so many others cited here, did not show a difference in the risk of in-hospital complications or mortality. For patients with spinal trauma sampled from the National Trauma Data Bank, Schoenfeld, Belmont, See, Bader, and Bono (2013) showed hospital stay, ICU days, and ventilator time were decreased and mortality was increased in those lacking insurance compared to those with private, commercial insurance. Baraga et al. (2012) found that in patients with anterior cruciate ligament injuries, those

receiving Medicaid and those with no insurance faced significantly greater delays in obtaining care in comparison to those with private insurance in south Florida.

While other factors, primarily race, receive much attention as the cause of disparity in healthcare, insurance status still correlates more with poorer outcomes than race. Haider et al. (2008) did show that race is associated with worse outcomes following trauma within insurance groups in patients 18 to 64 years of age as recorded in the National Trauma Data Bank (2001-2005). However, lack of insurance was a stronger predictor of worse outcomes than any racial group studied. Examining the Florida Agency for Health Care Administration data set, Tepas et al. (2011) found that there was a higher immediate mortality of the uninsured compared to those with insurance and concluded that race was not associated with increased mortality risk. In children too, it has been shown that non-white race and lack of insurance are independent predictors of increased mortality after trauma. Again, lack of insurance is a stronger marker of increased mortality than race (Hakmeh, Barker, Szpunar, Fox, & Irvin, 2010).

The homeless also face disparity following trauma. While some of this disparity in the homeless population may be related to lack of insurance (Kushel, Vittinghoff, & Haas, 2001), the homeless are at greater risk for injury and illness and have increased barriers to healthcare which are not explained by insurance status alone (Mackelprang, Qiu, & Rivara, 2015). As previously noted, the number of homeless persons directly affected by or closely witnessing trauma approaches 100% (Cash et al., 2014). Using the National Electronic Injury Surveillance System to identify homeless patients visiting the ED, Mackelpraing, Graves, and Rivara (2014) noted that injuries among homeless patients occurred most commonly to the lower extremities with sprains and strains, contusions and abrasions, and burns being the most common. These injuries were identified as tending to be due to circumstances related to being homeless, such as carrying

heavy bags and increased walking when many shelters require patrons to leave each morning with all their belongings, or such as burns from primitive or unsafe heating methods.

Using survey data from homeless and marginally-housed individuals in the San Francisco area, Kushel, Perry, Bangsberg, Clark, and Moss (2002) showed that this population visited the emergency department at a rate three times that of the general U.S. population. This is echoed by Mackelprang et al. (2015), who found a high rate of repeat emergency department visits and hospital admissions for homeless adolescents and young adults. Kay et al. (2014) showed that homeless patients suffering orthopedic trauma were more likely to use the emergency department for follow up and those that did present to a clinic, adhered to fewer follow-up appointments than did the general, non-homeless population. McMillan et al. (2015) examined a homeless population in Glasgow, Scotland in the United Kingdom and found that they were hospitalized with head injury at a rate five times that of the general population and the mortality rate was four times greater in the homeless compared to the general population. In younger patients, 15 to 34 years of age, the mortality rate was seventeen times higher than the general population.

Summary of Literature

There is a growing body of literature that links a lack of health insurance to an increased risk of trauma and that there is a disparity in care for trauma patients without insurance. This disparity seems to be related to lack of insurance more than other factors, including well-studied racial disparities. There are few well controlled prospective studies in this area. However, those existing studies, which are primarily retrospective chart reviews, generally agree on the existence of disparity of health outcomes based on ability to pay. Most studies have identified trauma in general as opposed to specific or orthopedic trauma. Furthermore, while there have been some studies assessing more specific types of trauma there is a paucity of research that links outcomes

of specific types of trauma to insurance status. It is unknown whether lacking insurance leads to worse health outcomes in patients suffering more isolated injuries, such as extremity trauma.

Homeless populations have a much higher rate of trauma than do the general population. These populations also have documented barriers to accessing healthcare with increased emergency department usage, failure to follow-up as expected, and lag behind the general population in the use of primary or specialty care providers. Homeless populations have barriers to accessing healthcare that reach beyond their lack of insurance status.

Additional research on the specifics of disparity in vulnerable groups such as the uninsured and the homeless will provide information important to closing disparity gaps. The nursing profession, which prides itself on advocating for patients, has great interest in providing the best healthcare to all patients and eliminating disparity. Nurses and advanced practice nurses are both prepared and well placed to take on leadership roles to continue to identify healthcare disparities in vulnerable populations and provide patient and community level interventions to improve the health and healing of these patients.

Purpose of Study

The purpose of this dissertation is to examine disparities in healthcare related to payer status and homelessness through three scholarly projects. Within the projects, the nurse practitioner's role for trauma care in the homeless was reviewed in addition to examining whether there is disparity in care for trauma patients based on payer status. National, publicly available data, as well as local, hospital-level data was examined. Each project was written with purpose and intent to submit for peer review in an academic journal publication.

Project I

The Trauma and Homelessness Initiative was utilized as an example of a program that provides a framework to care for vulnerable homeless patients who have suffered trauma. *The Trauma and Homelessness Initiative Service Framework* (Cash et al., 2014) outlines the initiative. Developed in Australia, the initiative intends to investigate the relationship between trauma and homelessness and develop an intervention to assist these people to cope with and move beyond these traumatic experiences so that they can eventually address underlying issues that perpetuate their homelessness. It focuses on trauma awareness and describes how nearly every homeless person has suffered or closely witnessed trauma, emphasizes safety for both the provider and the trauma-affected person, supports the development of opportunities for those affected to rebuild control, and uses a strengths-based approach to assist affected persons to enhance their own coping skills. The Trauma and Homelessness Initiative follows principles outlined by trauma-informed care. Trauma-informed care emphasizes physical, psychological and emotional safety for providers and survivors, creating an opportunity for those suffering trauma to rebuild a sense of control and empowerment (Hopper, Bassuk, & Oliver, 2010). The initiative proposes a model of recovery that incorporates principles and considerations for integrating trauma-informed principles and trauma specific considerations (Cash et al., 2014). Providers who follow the initiative are encouraged to promote recovery principles by instilling a sense of hope, safety and connectedness into patients, and develop core psychosocial stability skills including managing reactions, helpful thinking, and problem solving. Patients can then be integrated into specialist treatment and support for services such as alcohol and drug treatment, psychological treatments, or community mental health.

Nurse practitioners have been charged with providing clinical leadership (Carrier, Gardner, Dunn, & Gardner, 2007; Institute of Medicine, 2011; The National Organization of Nurse Practitioner Faculties, 2015), and are now being trained in organization and systems leadership (American Association of Colleges of Nursing, 2006). These leadership attributes, along with advanced clinical nursing education, have well positioned the nurse practitioner to lead this and similar initiatives. Nurse practitioner characteristics such as advanced health assessment, a focus on safety, patient empowerment, and using a strengths-based approach to recovering homeless trauma patients will be reviewed in support of the nurse practitioner leading healthcare teams.

Project II

There were over 28 million Americans without health insurance in 2015 (Kaiser Family Foundation, 2016) and over 37 million injury-related visits to emergency departments in 2013 (Centers for Disease Control and Prevention, n.d.). With such large numbers of people affected by these phenomena, there are likely many Americans that make injury-related emergency department visits and do not have third party coverage to pay for the charges incurred during the visit. These people may also need additional follow up to ensure proper healing, which may be a challenge if they do not have third party coverage.

The purpose of this descriptive correlational study is to determine whether payer status is associated with occurrences of repeat visits to the emergency department within 72 hours of an initial presentation for adult patients suffering from injury, while controlling for demographic features and triage level. The 72-hour return visit is utilized as a surrogate indication that proper care was not achieved during the original visit or proper continuance of care was not attained. Appendix A contains a complete list of variables and definitions that were used in this study. A

secondary data analysis was conducted using 2013 data extracted from the National Hospital Ambulatory Medical Care Survey (NHAMCS), which provides cross-sectional survey data for hospital ambulatory clinics.

This study was initially completed as a requirement for coursework for the PhD program. It serves well as a pilot study for the third project in this dissertation. Use of a national database to identify patients suffering injury and the 72-hour ED return visit as a marker of proper initial care for these patients provides evidence that there is indeed disparity in healthcare outcomes based on population characteristics. Although the study did not find a significant association between insurance status and 72-hour return visits, there were some trends, especially in patients with insurance types considered “other” that warrant additional study. In addition, being homeless resulted in 2.5 times greater chance of having a 72-hour return ED visit, although this result was not statistically significant. Factors such as sex and race showed a significant association with ED revisits. Allowing for limitations, this study leaves questions about the role of insurance status and other factors being barriers to follow-up or complete healing following ED visits for trauma. These findings support a need for additional testing and warrant studies looking at more specific injuries and more localized populations to further determine if there is healthcare disparity for acutely injured patients.

Project III

There is a lack of research that explores whether or not the current practice of stabilizing acute ankle injuries in the emergency department and instructing patients to follow-up with a specialist for further evaluation and surgical treatment factors into identified health disparities among those without a payer source. A descriptive study using retrospective medical record review was conducted focusing on ED visits for unstable ankle injuries that are generally treated

with surgery. Risks for poor patient outcomes including lower socioeconomic status and substance abuse were evaluated to determine if these populations face significant differences in securing suggested follow-up or experience more adverse events prior to receiving surgical correction of the injury. The hypothesis for this project is that uninsured patients, versus insured patients, experience a higher proportion of adverse events before surgical correction can be obtained after suffering an unstable ankle injury. A secondary hypothesis is that homeless patients disproportionately experience adverse events prior to surgery for unstable ankle injuries.

Research questions. Among patients who suffer an unstable (surgical) ankle injury, is payer status associated with a difference in the incidence of adverse events experienced prior to surgery? A secondary research question is: Do patients with an unstable ankle injury who are homelessness, or have alcohol or substance abuse disproportionately experience adverse events prior to surgery?

Theoretical considerations. While there is no formal theory that directly applies to this study, there are theoretical ideas guided by research that have been reviewed in developing this study plan. Eliminating health disparity has been a goal of the Healthy People campaign (Office of Disease Prevention and Health Promotion, 2014) and much research has been devoted to identifying and reducing health disparity, as seen in one recent review of research by Nasbitt and Palomarez (2016). Personal situations, such as payer status may create a disparity with the uninsured having poorer health than those who have insurance coverage. This finding should prompt the nursing and healthcare community to evaluate how treatment is delivered to uninsured patients.

Barriers to follow-up care are addressed by Andersen's Behavioral Model of Health Services Use, which proposes that the use of health services is determined by characteristics such

as demographics, enabling resources, and a need for healthcare (Andersen, 1995). Since its development in the 1960s, the Behavioral Model of Health Services Use has been used as a framework to examine variables such as marital status, sex, education, ethnicity, financial situation, payer status, and access to healthcare as enabling factors for patients to properly utilize healthcare services (Babitsch, Gohl, & vonLengerke, 2012). Babitsch et al. (2012) reviewed literature linked to Andersen's model. Under the tenants of enabling resources, payment source is a key consideration. Babitsch et al. found a lack of insurance coverage decreased the likelihood of using healthcare services and increased delay of health care in multiple population groups. Access to healthcare, especially in low income adults, is better in insured compared to uninsured populations (Brown et al., 2004).

Payer status as a factor in receiving proper healthcare and preventing poor health outcomes has been documented in trauma patients in various settings (Baraga et al., 2012; Bell & Zarzaur, 2013; Chikani et al., 2015; Downing et al., 2011; Schiraldi et al., 2015; Singer et al., 2013; Tepas et al., 2011). This body of evidence and guidance from Andersen's Health Services Use Model suggests that health outcomes for patients suffering ankle trauma may also be linked to payer status. A lack of insurance may prevent timely follow-up or may be a barrier to receiving surgery or follow-up treatment to stabilize and encourage healing, thus leaving the current practice of outpatient treatment of acute injury open for improvement.

Significance of study. Acute ankle injuries can have long term sequela including recurrent sprains of the injured ankle, feeling of "giving way", stiffness and swelling, or other symptoms that prevent patients from participating in everyday activities, even with sound treatment (Kaikkonen, Lehtonen, Kannus, & Jarvinen, 1999). For individuals who enjoy being active or whose livelihoods depend on standing or moving, failure to return to health following

this type of injury can cause significant harm. Current standard of care for treatment of patients with an unstable ankle injury presenting to the emergency department is to evaluate, place in a splint, and direct the patient to orthopedic follow-up (Koehler & Eiff, 2016). Those who face barriers to obtaining outpatient treatment may have poorer outcomes than others. Given this, standard practice may not be optimal for all patients. Navigating outpatient follow-up and outpatient surgery in the face of socioeconomic and payer source differences may result in significant health disparity in acute ankle injury or other trauma patients.

There is a lack of research into whether or not the current practice of stabilizing acute ankle injuries in the ED and instructing patients to follow-up with a specialist for further evaluation and surgical treatment creates health disparity among the non-privately insured. If this study reveals that there are barriers to proper healthcare for injuries, such as ankle fractures, steps should be taken to decrease this disparity. Furthermore, these injuries often occur in otherwise healthy patients and have potential for permanent disability if not properly cared for. As patient advocates, nurses need to be made aware of barriers that patients may face. Nurses, as part of the healthcare team, should advocate for all patients and be instrumental in developing strategies and plans to ensure proper return to health for all patients, even those that face socioeconomic disparity.

This study sought evidence as to whether the current outpatient treatment of unstable ankle fractures is the best plan of treatment for some vulnerable patient populations. Those lacking health insurance, the homelessness, and those struggling with alcohol or substance use at the time of their injury may be particularly at risk for worse outcomes. Nurses and healthcare institutions should examine if they are offering their non-insured patients the best possible treatment regimen and, if not, seek to find systems that improve care.

Definition of terms. The focus of this study is on emergency department treatment and care of unstable ankle injury in relation to insurance status and other characteristics of vulnerable patient populations. Terms of importance to this study are defined here. Specific variables under study are further identified and defined in the measures section of Manuscript III and Appendix B.

1. An unstable ankle injury is an injury where the ankle joint is displaced or can be displaced when it is subject to normal forces, leading to incongruity of the ankle joint (foot Education, n.d.). This may occur when either bone or ligamentous tissue is disrupted, weakening the joint.
2. Insurance status is defined as the type of financial coverage that pays for medical and surgical expenses.
3. Homelessness is a condition of being without a residence and is defined via the primary place that the patient spends most of his time for living and rest.
4. Alcohol and substance abuse are considered co-morbid conditions that are often associated with other socioeconomic conditions like homelessness and can impact risk taking behavior and decision making.
5. Delay in initial treatment occurs when patients do not present promptly to the study facility ED following injury.
6. The definitions of an adverse event occurring prior to surgery were determined with input from orthopedic specialists at the institution where data was collected. Multiple types of events may constitute an adverse event and include: 1) A re-injury at the site of initial injury is an adverse event. Depending on the nature of the re-injury, the surgical procedure may need to be altered and there could be a change in the course of treatment. 2) A delay in

surgery definition was agreed upon by the orthopedic staff to be greater than three weeks from the date of injury and reflects common practice at the study facilities. This allows time for physiological processes such as inflammation to recover as well as administrative tasks such as discussing the procedure and risks and benefits of surgical treatment with the patient and scheduling surgery. Delaying surgery results in an increased recovery period for the patient and a greater total treatment window where poor outcomes, such as risk of infection, are a possibility.

3) Any patient who is not seen for a follow-up visit or received surgery within an eight week time period will be considered to not be treated for their injury and are lost to follow up. This time period allows for the capture of surgery delayed longer than 3 weeks data, but does not extend indefinitely. With an injury associated with long term disability if not properly cared for, failing to obtain follow-up care for a patient is of concern.

4) Patients with these injuries may have mobility limitations and are at a higher risk of falls. This risk is extended if prompt terminal treatment is not initiated. Patient safety is paramount to nursing practice and will be considered an adverse event if new, traumatic injuries occur.

5) A pressure related skin breakdown can occur around temporary stabilization material such as splints or due to a patient's immobility. This additional injury is of concern and will be considered an adverse event of failing to promptly obtain proper terminal care.

6) A return visit to the ED prior to surgery indicates that there was a change in patient condition or they did not receive proper care or follow-up to support the patient to surgery. The ED should be the site of stabilization. Specialist care should continue the care of the patient, especially for these patients whose case will have been discussed with the specialist at the time of initial ED care.

Study Assumptions.

1. Given the potential for adverse events, it is assumed that it is best to properly treat all ankle fractures and that failure to obtain proper medical treatment is a potential detriment to the health of the injured individual.
2. Patients who present to the ED are most likely to follow-up within the hospital. This is because the hospital involved in this study provides the majority of care to uninsured patients in the area. This ED frequently sees patients with orthopedic injuries who were referred by other orthopedic providers or other hospital systems that would not follow-up with the patient due to their inability to pay.
3. It must be noted that loss to follow-up may mean that patients are seeking orthopedic follow-up and surgery at a different facility, though the involved researchers feel this to be a low number.
4. No true gold standard exists for determining what ankle fractures require surgery and how to determine if an injury meets criteria for surgery. The researchers assumed that the orthopedic specialist physicians and the involved orthopedic resident were qualified by training and experience to identify fractures that met criteria for surgical fixation. For the study, orthopedic researchers identifying surgical injuries have developed pre-determined guidelines to guide their determination for or against surgery.
5. There is also an underlying assumption that data recorded in the electronic medical record is accurate and appropriate for the patient's presentation. As a methodology, chart reviews are susceptible to validity issues because the information that constitute the data are not entered into any record for the purposes of research and cannot be verified for accuracy.

Research Method

Three separate scholarly projects or studies comprise this dissertation. Each has been crafted by this author with assistance from faculty. Each study was prepared for submission to a peer-reviewed, academic journal. This section will review the methods each study will follow and outline a plan for journal submission.

Manuscript I – Nurse Practitioners Could Lead Programs Based on the Trauma and Homelessness Initiative.

Homelessness affects metropolitan areas throughout the U.S. and homeless patients are vulnerable to barriers within the healthcare system. This population nearly universally faces trauma and must function within a healthcare system that has increasingly moved toward outpatient treatments and is often driven by the patient's ability to pay for services. This project was completed as a scholarly activity to examine the Trauma and Homelessness Initiative as an example of a program seeking to address healthcare concerns in a vulnerable population. Additionally, nurse practitioner training, characteristics, and skill sets were reviewed in support of the nurse practitioner leading programs like the Trauma and Homelessness Initiative to improve healthcare provided to vulnerable populations.

Publically available information on the Trauma and Homelessness Initiative was reviewed and attributes of the initiative were summarized. Characteristics and training of nurse practitioners were then investigated within the existing literature in an attempt to match attributes of the initiative with skills and attitudes of the nurse practitioner. This information supports the nurse practitioner as a member of the healthcare team well suited to develop, lead, and enact this and similar healthcare intervention programs. This information should also be viewed as evidence that nurse practitioners are well prepared and very able to serve in these types of leadership roles to the benefit of patients and populations. The Trauma and Homelessness

Initiative is utilized as an example of how the nurse practitioner can affect a positive change in their community by addressing the health disparity faced by the homeless population.

Ethical considerations. This project does not involve any human or animal subjects, but rather is a review of a program found through publicly available access and a review of publicly available literature on characteristics of the Nurse Practitioner. This is not an experimental project and therefore does not require any IRB approval and no ethical concerns are identified.

Manuscript II – Payer Associated with Emergency Department 72 Hour Return Visits: A Secondary Data Analysis of the National Hospital Ambulatory Medical Care Survey.

This study was initially prepared and completed prior to the dissertation phase of this PhD program. It has been modified to meet the journal requirements and the requirements of the dissertation. It serves as a preliminary study to Project III which is the study completed during the dissertation phase of coursework.

A secondary data analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) was utilized to explore the research question: Is insurance status associated with the occurrence of repeat visits to the emergency department within 72 hours of an initial presentation for adult patients suffering from injury when controlling for demographic features and triage level? This study was a descriptive, correlational design using return to the ED within 72 hours as an indication that proper care was not achieved during the original visit or proper continuance of care was not attained.

Sample and setting. The NHAMCS is a publically available dataset that provides cross-sectional survey data for hospital ambulatory settings. The NHAMCS data set for 2013 ED visits, the latest data available at the time the secondary data analysis was conducted, was utilized as the source of data. The data set included 24,777 ED visits at 298 hospitals in all 50

U.S. states and the District of Columbia. This study used the 6,880 patient emergency room visits related to injury or trauma abstracted from ICD-9 codes. Patients 18-64 years of age were included in this study, leaving a sample size of 3,397, exceeding the calculation of 136 needed to power the study.

Data collection. The primary sample units were selected from approximately 1,900 hospitals. These units were then stratified by socioeconomic and demographic variables and then selected with a probability proportional to their size. In this study the NHAMCS 2013 ED database for SPSS was downloaded from the publically available site, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/dataset_documentation/nhamcs/spss.

The following are variables that were evaluated as part of this study. ED revisits within 72 hours of initial ED presentation has been used as a marker for poor initial management by providers, poor compliance by patients, or progression of illness (Cheng, Shroff, Khan, & Jain, 2015). ED revisits was the dependent variable. NHAMCS retrieved this information as yes or no to the question, “Has the patient been seen in this ED within the last 72 hours and discharged?” and payer source (coded as private insurance, Medicare/Medicaid/Worker’s Compensation, Self-pay or No Charge, and Other sources of payment that may include state and local government reimbursement, payment by a private charitable organization, or liability insurance such as automobile insurance). Also, age, sex, ethnicity/race, and residence type that entails categories of private residence, nursing home, homeless, or other (may include, hotel, college housing, assisted living, or institutions such as prison, mental hospital, or group home for mentally or physically disabled) were collected as demographic variables. Triage level contained a large amount of missing data, thus analysis was conducted both with and without this variable included. A full list of variables and definitions are included in Appendix A.

Data analysis. The NHAMCS database was downloaded using SPSS version 22 for data analysis.

Power analysis. Power analysis was performed based on literature from Green (1991) and Knapp and Campbell-Heider (1989). Using standard parameters of $\alpha=.05$, $\text{power}=.80$ and an estimated medium effect size, it was determined that an N of 136 was needed to power this study.

Missing data. Missing data are expected in datasets concerning human subjects (Penny & Atkinson, 2011) and can be of critical concern in research with survey or longitudinal data (Partician, 2002). Removing study participants from analysis is generally discouraged based on the risk that there may be a systematic similarity among missing factors and thus can affect analysis. However removing about 5-10% of cases due to missing data is generally accepted because they can be considered missing at random (Bannon, 2015).

Triage level included a large amount (28%) of missing data. However, triage level gives an acuity level or degree of injury suffered. This can be an important data point. Therefore, data analysis was completed both with and without the triage level data included. Other missing data totaled less than 10% and the decision was made to use listwise deletion to deal with the missing data. The variable for Race was used as reported in the NHAMCS database only following multiple imputation of missing data. Thus, missing data was corrected for Race within the database.

Data analysis plan. Logistic regression was used to determine if insurance status or other variables are associated with emergency department return visits within 72 hours for patients with injury, controlling for age, sex, race, and residence type. Logistic regression was appropriate because it is used to find associations among binomial dependent variables (Polit &

Beck, 2012) such as a yes or no to emergency department revisits. Variables were entered stepwise with controlling variables of age, sex, race, and residence in block one, triage level in block two, and payer source in block three.

The assumption of multicollinearity was assessed prior to running the Logistic Regression analysis. It was determined that there were no indications that multicollinearity was of concern with the data. Cook's distance was utilized to examine for the presence of outliers. Sixteen participants had a Cook's distance greater than 1, indicating they may be outliers, however they were left in the analysis to reflect the true data.

Ethical consideration. All NHAMCS data are confidential based on Health Insurance Portability and Accountability Act and Section 308(h) of the Public Health Service Act. The National Center for Health Statistics (NCHS) also conducted a disclosure risk analysis to minimize any chance of inadvertent disclosure. The NHAMCS protocol has been approved by the NCHS Research Ethics Review Board annually since February 2003 and maintains waivers of the requirement to obtain informed consent from patients and patient authorization for release of patient medical record data (NHAMCS, n.d.). Any information that could be used to identify hospitals is seen only by those directly involved in the NHAMCS database and names and other identifying information for individual patients are never removed from the hospital. The NCHS has conducted extensive disclosure risk analysis to avoid inadvertent disclosure and has masked selected characteristics where appropriate. Some outlier values for variables such as age were top coded to increase confidentiality (NHAMCS, n.d.).

This study was approved by the University of Kansas Medical Center Human Research Protection Program IRB. Since this publicly available dataset contains no patient specific

information or identifying factors, non-human subjects status was granted. Data were secured on a password protected computer.

Conclusions. The current study failed to establish an association between private, public, or no payer sources and 72 hour return visits in ED patients with acute injury. Patients with other payer sources failed to show a relationship, but may warrant further study. Being Hispanic or “other” race or being homeless was associated with a higher rate of revisits. Homelessness indicated a statistically significant difference in revisits. Programs that could be led and run by nursing professionals, such as providing outreach to ensure follow-up for disparate groups or a means of gaining more complete treatment during an initial ED visit, may be necessary to provide the best healthcare to all populations.

Manuscript III – Insurance Status Does Not Affect Adverse Events While Awaiting Surgery for Ankle Trauma in One System

This study is reported in Manuscript III and sought to answer the research question: Among patients with an unstable ankle injury, is there a difference in the incidence of adverse events experienced prior to surgery based on payer status? A secondary research question is: Do patients with unstable ankle injury who are homeless, or alcohol and/or substance abuse disproportionately experience adverse events prior to surgery? The research hypothesis for this project was that lacking a third party payer source is associated with adverse events occurring before surgical correction can be obtained after an unstable ankle injury. A secondary research hypothesis was that homelessness is associated with adverse event occurrence prior to surgery for unstable ankle injuries.

Manuscript III is a report on a study designed and completed for the purposes of this dissertation. This study builds upon the idea that there is healthcare disparity among some

populations and that nurses and nurse practitioners are well prepared to take leadership roles in addressing these disparities as shown in Manuscript I. It was also designed to produce further evidence of possible disparate outcomes for populations of minority race or those who are homeless to support or refute the findings of Manuscript II. An exploratory, retrospective chart review was conducted to identify patients who presented to the ED for an unstable ankle fracture as determined by an orthopedic specialist. Data on adverse events was retrieved from the electronic medical record (EMR) in an effort to evaluate if some patients have a greater difficulty obtaining surgical treatment.

Sample and Setting. Sample charts were reviewed from patients presenting to the Truman Medical Center, Health Sciences District (HSD) and the Truman Medical Center Lakewood EDs with an acute ankle fracture that is generally treated surgically. Orthopedic specialists from Truman Medical Center assisted to identify fracture types where surgical fixation is the standard of care. All patients ages 18 years and over with ICD-10 codes that may include these fracture types seen in the ED at one of the two emergency departments between October 1, 2015 and May 1 2018 were reviewed for inclusion in the study. This time frame was chosen because October 1, 2015 is the date that the hospital system transitioned to using ICD-10 from ICD-9. It was expected that this time frame would provide enough cases to power the study. It was determined that additional samples were not needed, however additional subjects could have been obtained by extending the time frame prior to October 1, 2015 using comparable ICD-9 codes. Use of a different coding system could introduce variation into the data collection process therefore, use of only one coding system was preferred.

While random or stratified random sampling from a larger population would be ideal, there are restraints on resources, time, and scope of this dissertation. This convenience sample

from two facilities was selected from an extended time period in order to capture sufficient data on an injury that occurs with somewhat low frequency.

Data was collected from the electronic medical record of both emergency departments operated by Truman Medical Centers. Truman Medical Center, in the Kansas City Health Sciences District, is an inner-city, safety-net, non-profit hospital near the downtown area of Kansas City, Missouri. It serves as the primary teaching hospital for the University of Missouri, Kansas City, School of Medicine and operates the busiest trauma center in the city. Its mission statement specifically speaks of providing accessible healthcare regardless of a patients' ability to pay (Truman Medical Center, n.d.). As such Truman Medical Center, HSD serves many vulnerable populations including the homeless and those without health insurance. Subsidized care is available to qualifying patients who live within Jackson County, Missouri.

Truman Medical Center, Lakewood is a hospital located outside of the city center in a suburban area. Lakewood focuses on primary care services and provides easy access for acute and well care needs for all ages (Truman Medical Center Lakewood, n.d.). Many on-call services such as orthopedics are shared between the hospitals. The two facilities share an electronic medical record thus, all records for both facilities are housed in the same electronic storage. The Lakewood hospital also has programs in place to provide subsidized care to qualifying patients without the means to pay for healthcare delivered. Including Lakewood patients in this study allowed for a consistent orthopedic service evaluating and treating acute patients while increasing generalizability with a patient population more diverse than that seen at the city, safety-net hospital.

Data Collection. ICD-10 codes were identified with assistance from orthopedic specialists to capture the majority of patients who presented with an ankle injury in which standard-of-care is surgical fixation. These codes are listed in Appendix C. Truman Medical Center research staff assisted in the preparation of information to be submitted to Cerner, the electronic medical record vendor for the hospital, for the extraction of charts that contained the ED imputed ICD-10 codes previously identified. This information was used to generate a master list of charts that included patient identifying information for subjects who met inclusion criteria. Random identification codes were assigned to each chart and all identifying information was removed. This assigned code was utilized to identify charts during the data collection process to protect patient identity. The master list was utilized only by researchers when the chart required review. The master list has been stored separately from collected data.

Charts identified with nonspecific ICD-10 codes such as ‘ankle fracture’ may include injuries where standard-of-care may or may not be surgical fixation. Therefore, once the list of charts compiled from selected ICD-10 codes was received from Cerner, charts were reviewed by a fifth-year orthopedic resident and this dissertation author to determine if the injury met criteria to be considered surgical. Charts and X-rays reviewed for inclusion were selected from the master list of charts so that payer status or other variables were not available to the researchers while determining inclusion, thus reducing reviewer bias. A discussion of ankle stability and guidelines for determining which subjects were considered to have an unstable ankle injury are listed in Appendix D. Those charts that did not meet parameters to be considered surgical injuries were excluded. Open fractures present unique considerations for treatment compared to closed fractures and thus, were also excluded. Patients who lack ability to pay but reside outside of Jackson County, Missouri may not meet eligibility for financial support to undergo surgery at

Truman Medical Center. These patients have an increased likelihood to seek orthopedic follow-up closer to their place of residence and were excluded from this study. However, involved researchers decided that many of these patients did choose to stay with Truman Medical Center for surgical treatment and it was decided to include all patients despite county of residence.

Data were abstracted from selected medical charts by two student researchers. Students who are part of the UMKC School of Medicine, Emergency Medicine Interest Group and who expressed interest in participating in research qualified for participation as a data abstractor for this study. Two students were selected to serve as the abstractors. The students were blinded to the purpose of the study so as to reduce bias as suggested by best practices in research (Gilbert, Lowenstein, Koziol-McLain, Barta, & Steiner, 1996; Kaji, Schriger, & Green, 2014).

The selected students were each provided basic training regarding the chart review methodology (Appendix E) and were also provided education on how to abstract data from the charts and input it into a REDCap™ (Research Electronic Data Capture) database. Each student then abstracted information from the same preselected charts (approximately 20% of the charts included in the study) and input that data into a unique data collection instrument in REDCap™. The two abstractors did not have access to one another's data collection instrument. Datasets were compared for accuracy and a kappa value was calculated to determine their interrater reliability.

Interrater reliability is a determination of the extent to which two or more observers, such as clinicians, agree in their rating of an outcome. There are many measures for interrater reliability. These include but are not limited to Cohen's Kappa, Fleiss' Kappa, correlation analysis and proportion agreement. This study will utilize Cohen's Kappa as it adjusts for chance

agreements as well as actual agreement (Polit & Beck, 2012). Cohen's Kappa is also appropriate for two raters.

Polit and Beck (2012) suggest in their text that a kappa of .60 is minimally acceptable and that a kappa greater than .75 is very good. Therefore, it was determined that if the kappa for the student abstractors was .75 or greater, each student would proceed to abstract data from approximately half of the remaining charts. If the .75 threshold was not reached, the abstractors would be retrained and then sample a new set of charts equaling about 20% of the total and kappa would be calculated once again. If the reliability still failed to reach .75, then each student would abstract all included charts. Any charts that had a difference between the two abstractors would go to an arbitration process. Both abstractors and the primary study author would review all charts in dispute and agree upon the correct data, with the primary study author having the final say if there is not unanimous agreement. These steps are guided by Kaji et al (2014) in order to reduce bias in data collection.

As stated above, study data was collected and managed using REDCap™ electronic data capture tools hosted at University of Missouri Kansas City School of Medicine, Department of Biomedical and Health Informatics (Harris et al., 2009). REDCap™ is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. It is HIPPA-compliant and is specifically geared to support online or offline data capture for research studies and operations. REDCap™ was developed at Vanderbilt University in 2004, the consortium was formed in 2006 and is supported in part by the National Institutes of Health (REDCap, n.d.).

Measures. The dependent variable for this study is adverse events that occur prior to the patient receiving surgery. Time of surgery served as the time that patient charts were no longer reviewed as patients had begun the terminal treatment for the injury. Data reflecting different characteristics chosen to delineate a complication (re-injury at site of injury, delay in surgery, lost to follow-up, return ED visit, or pressure related skin injury) was collected. For the purpose of the primary research question, an adverse event was yes/no with yes being any one of these adverse events recorded in the EMR and no being none of these recorded in the EMR.

The primary independent variable is payer status. For the primary research question, subjects were grouped into a group of non-insurance which are self-pay and no charge patients. All others will be considered to be insured. Data was collected on categories of insurance including 1) private insurance, 2) Medicare, 3) Medicaid, 4) worker's compensation or liability insurance, 5) self-pay/no charge, and 6) other. Additional analyses looked at these categories to determine if there are different associations depending on insurance type.

Other variables collected include demographic data: 1) age in years, 2) biological sex, and 3) race/ethnicity grouped as white, black, Hispanic, or other. The race/ethnicity categories blend race with Hispanic ethnicity to best reflect the primary groups of ethnicities seen at the study institutions. Information regarding residency was collected for secondary analysis. Especially interesting was an examination of whether the homeless population is associated with occurrence of adverse events. Residency categories are: 1) private home, 2) nursing home, 3) homeless, and 4) other. Alcohol and/or substance intoxication at the time of injury was also collected as yes/no categories. Intoxication was recorded if there was mention of intoxication in the initial ED note or a new diagnosis associated with alcohol or illicit substance abuse was

coded at the time of the initial ED visit. Marijuana was not considered an illicit substance for this study. A full list of variables and definitions can be found in Appendix B.

The dependent variable of adverse events prior to obtaining surgery actually consisted of a number of potential adverse events defined here. 1) A re-injury at the affected site occurred if any injury to the same body part was recorded in any record after the initial ED visit and prior to surgery. This may be a re-injury of the initial coded problem or a new injury at the same site. 2) A delay in surgery was recorded if more than 21 days passed after the initial date of injury prior to surgery taking place. 3) Lost to follow-up was recorded if the patient was not seen for a follow-up visit and had not presented for surgery within an 8 week time period. 4) A new traumatic injury was considered if any new injury was recorded after the date of initial evaluation and prior to surgery. Since it would be difficult to determine with accuracy, researchers did not attempt to correlate the cause of a new injury with any progression of the original injury. 5) Pressure related skin breakdown was deemed if there was any notation or new ICD-10 code that indicated that there was a pressure ulcer, pressure sore, or other skin breakdown after injury but prior to surgery. 6) A return visit to the ED was notated if the patient returned to the ED prior to surgery for any problem or diagnosis related to the initial injury. Since many patients present for pain control, without any complication or unexpected outcome related to stabilization prior to surgery, a return visit was noted as for pain only if there was no indication in the chart that there was any other problem or additional intervention initiated.

Data Analysis. All data was imported from REDCap™ into SPSS for analysis. Descriptive statistics, such as mean, standard deviation, and frequency, were used to summarize characteristics of the study sample. The Chi-square (χ^2) Test of Association was used to test hypotheses about group differences in proportions (Polit & Beck, 2012) and is an appropriate

statistical method for evaluating associations between categorical independent and dependent variables. The primary independent variable of payer source was assessed for association with the presence of an adverse event prior to obtaining surgery. Secondary χ^2 tests were run to assess if an association exists between type of residence, alcohol use at time of injury, substance use at time of injury, and occurrence of adverse events.

Power analysis. Due to little existing literature related to the current topic, estimating sample size for testing differences in proportions between groups is complex (Polit & Beck, 2012). The effect size for contingency tables is influenced not only by expected differences in proportions, but also by the absolute values of the proportions (Polit & Beck, 2012). Healthcare providers seek to ensure that adverse events are minimized as much as possible, and thus the expectation is that adverse events will be low and that the proportions will be moderate to weak. Project II reported an approximate 5% rate of return visits within 72 hours to the ED following injury. Given that this study includes surgical ankle injuries that may be more severe than a general injury and return visits may occur longer than 72 hours after an initial visit as sampled in Project II, it was expected that there would be more subjects with an adverse event occurring. Since the return visit time period could be weeks until surgery, then double the number of return visits might be expected. With other complications also considered in this project that were not included in Project II, that number could double again. Therefore, the study was powered based on an effect size of .20 to .30. Using a small expected effect size helped to ensure that the study was had enough power.

Given the exploratory nature of this study a typical 80% power and $\alpha = .05$ significance criterion was utilized. Based on a power table published by Jacob Cohen (1988, p. 258) for χ^2 the N needed to power the project at a .30 effect size is 87 and the N needed to power the project

at a .20 effect size is 196. Therefore this study strived to sample at least 200 subjects to provide the power to find a difference between groups.

Missing data. Abstractors were instructed to completely review charts in order to ensure all data was captured in an effort to minimize missing data. However, some charts did not contain all data that this study sought. After data was collected and prior to analysis, the amount of missing data was assessed. It was planned that if the missing data constituted less than 5-10% of cases, it would likely be missing at random based on Bannon's (2015) suggestion, and listwise deletion would be used to remove missing data. If there were more than 10% missing data, listwise deletion would still be utilized to deal with missing data, but would be reported and be discussed as a possible bias within the limitations of the study.

Data Analysis Plan. Pearson's Chi-square Test of Association compares the differences between the observed and expected cell values in a contingency table (Hess & Hess, 2017). These tables express data to assess categorical association and provide a standard way of enumerating the numbers of people who were or were not exposed to some causal opportunity (Hess & Hess, 2017). This analysis method is appropriate for evaluating for the existence of an association between groups for this study.

The Chi-square statistic is computed by comparing observed frequencies and expected frequencies (Polit & Beck, 2012). Hess and Hess (2017) describe that the calculation for Chi-square has three parts. First, the expected values are calculated for each of the cells of the table from the observed values. Second, the Pearson χ^2 test statistic is calculated as observed minus expected values squared and divided by the expected values for each square and summed across the squares. Third, the Pearson test statistic is compared to the Chi-square probability for that

value in a standard table based on the degrees of freedom. The equation for the χ^2 statistic is (North Dakota State University, 2000):

$$\chi^2 = \sum (\text{observed value} - \text{expected value})^2 / \text{expected value}$$

The Chi-square analysis is based on the assumption that variables are independent of one another. Odds ratios can be calculated using the numbers in the χ^2 contingency table. For this project SPSS version 22 was utilized to compute the Chi-square analysis.

Descriptive statistics were examined to determine if demographic information is consistent among the different payer sources. A finding that demographics differ across groups can make data difficult to interpret. Had this occurred, a stratified random sample of subjects could have been selected from the total N in order to better distribute the demographics and run as a comparison against the total convenience sample to determine if the demographics affected the results. It was noted that using a sample of the total included charts may affect the power of the study.

The primary independent variable of payer source was analyzed with the dependent variable of presence of adverse events prior to surgery using χ^2 . Secondary independent variables of residency (i.e. homelessness), use of alcohol and substance abuse were compared against the dependent variable (presence of adverse events) as well. A regression model was considered to determine if there were variables that were associated with adverse events. However, due to the low number of adverse events the regression model failed.

Ethical Considerations. Permission was sought from the University of Kansas Medical Center Institutional Review Board (IRB) to rely on an external IRB for the study. This study was reviewed by the University of Missouri Kansas City (UMKC) IRB. Since this data is strictly a non-experimental retrospective chart review and no patient specific information or

identifying factors would be presented with any data analysis, exempt study classification was requested and granted. Permission was also granted by the Truman Medical Center Privacy Committee for use of EHR data at Truman Medical Center HSD and Truman Medical Center Lakewood.

While it is possible that some patients could be identified by the researchers based on the case or event, this study was not designed to assess individual outcomes. No individual outcome information or individual case information was presented as part of this study. Individual patient data was available only to the researchers actively reviewing charts during the data collection process. The medical record number (MRN) and name were the only patient identifying information collected for this study. This identifying information was used only to identify charts for review by researchers. The identifying information was not included in any data collection instrument, data analysis or presentation of data. MRN's were transformed into a random code. A master list linking patient identifiers to the research code was securely maintained within REDCap™ in an instrument separate from collected data. Any data obtained from the identified charts used in this study is not stored on any portion of any device that could be accessed by the public or other members of involved institutions. This data was accessible only by the researchers involved in data collection and analysis.

Limitations. Data entered into the EHR are collected by healthcare providers as part of their patient care responsibilities. These data are not collected with the methodological rigor that would be ideal for research. Therefore it must be understood that the information gained from these records may contain inaccuracies or information recorded in a way that did not translate well into the data collection procedure. The works of Gilbert et al. (1996) and Kaji et al (2014)

have been utilized to reduce bias in the chart abstraction process and provide the most reliable data possible from the chart review process.

It is also acknowledged that this was a small sample of the population at only two hospitals who share a corporate structure and share orthopedic on-call services for the ED. The information learned from this study cannot be generalizable to a large population outside of Truman Medical Center and Truman Lakewood Hospital and will require additional study in order to extrapolate findings to other institutions.

Summary

This dissertation examines how socioeconomic disadvantage, such as homelessness and lack of insurance, may affect trauma patients' healthcare and outcomes. Multiple organizations including the Institute of Medicine (2011, 2001), and the Office of Disease Prevention and Health Promotion (2014) have identified health disparities and called for the healthcare community to reduce these disparities. Nurses serve as the primary patient advocate and it is important for the nursing community to understand if and how certain populations have different outcomes after injury or how different populations may face barriers to treatments that provide the most positive outcomes after injury.

This dissertation consists of three separate projects, each compiled and completed with the intention to be submitted for publication to a peer-reviewed journal. All work is original work compiled and completed by the student author of this dissertation.

Project I is a revision of a minor synthesis paper that examined the Trauma and Homelessness Initiative Service Framework as a model of a community centered program that can help homeless patients, who suffer or closely witness trauma at a nearly universal rate, to adapt to traumas they have suffered. This program served as a surrogate to show that Nurse

Practitioners possess the characteristics to initiate and lead this, and similar, programs in their own communities.

Project II is a revision of a secondary data analysis of the National Hospital Ambulatory and Medical Care Survey completed during a quantitative research course. It is known that uninsured patients can suffer acute injury and frequently present to an Emergency Department. While there are requirements that EDs evaluate and stabilize all patients, regardless of ability to pay, there is evidence presented that a disparity in care and outcomes remains. This project looked at those patients presenting with an injury and utilized logistic regression to find an association among ability to pay affected the rate of return visits to the ED during the 72 hours following the initial visit. This re-visit is used as a surrogate for patients' not receiving or not perceiving that they received adequate care during the initial visit or if they were unable to access the recommended follow up treatment.

Project III is an exploratory, retrospective chart review examining records of patients who presented to the Emergency Department at a local hospital system after sustaining an unstable ankle injury. Current standard of practice is to stabilize the injury in the Emergency Department, and have the patient follow up with an orthopedic specialist for surgical correction of the injury. Only being admitted to the hospital was associated with a decrease in adverse events and it was found that Truman Medical Center admitted a higher number of patients from the initial ED visit that was expected.

By understanding how different populations may receive disparate care within the American healthcare system, nurses can better understand how to advocate for their patients. Nurses and nurse practitioners, as the front line healthcare providers, are well trained and have the ability to be a positive force for change and improvement in healthcare delivery.

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Chapter 2

Nurse Practitioners Could Lead Programs Based on the
Trauma and Homelessness Initiative

Abstract

Objective: Health disparities exist, especially for those of low socioeconomic status. Homeless populations have difficulty accessing healthcare and disproportionately burden the healthcare system. This article explores whether Nurse Practitioners' roles are well positioned to provide care to decrease disparity and provide optimal care to vulnerable populations.

Design: The Trauma and Homelessness Initiative is discussed as a program that well matches the training and scope of Nurse Practitioners. The Initiative and Nurse Practitioner characteristics are compared to elicit commonalities.

Sample: The Trauma and Homelessness Initiative uses trauma-informed care to instill a sense of hope, safety, calm, connectedness, and self-efficacy to rehabilitate the homeless population after trauma. Nurse practitioners are holistic providers who can lead and implement such a program.

Results: Nurse practitioners' training in medicine and clinical leadership backed by nursing theory and strong commitment to quality and safety well prepare the advanced practice nurse and well align with the principles of the Trauma and Homelessness Initiative.

Conclusion: Utilizing programs like the Trauma and Homelessness Initiative, the nurse practitioner is well positioned to lead, and may strive to both treat and develop teams to support health of all populations, especially those populations that have difficulty accessing and navigating healthcare.

Health disparities are inequities in the burden of disease, injury, or death due to social status, race, gender, sexual orientation, and/or income (Institute of Medicine, 2011). The Institute of Medicine identified the resolution of health disparities as one of six areas of priority focus for improving health care quality in the United States (Institute of Medicine, 2001) and the Healthy People campaign has addressed health disparity in each decade since its inception (Office of Disease Prevention and Health Promotion, 2014). Other institutions such as the U.S. Surgeon General's Office (U.S. Department of Health & Human Services, n.d.) and the Kaiser Family Foundation (Ubri & Artiga, 2016) have also called for reducing health disparity in the United States.

The homeless population is one of the most vulnerable and disparate populations. Homeless populations have a higher incidence of emergency department utilization, are more likely to be admitted to the hospital at a younger age, and have longer lengths of hospital stay than housed counterparts (O'Toole et al., 2010). Weber, Lee, and Martsof (2017) found that homeless persons have higher rates of physical illness, mental illness, and substance abuse. Schanzer, Dominguez, Shrout, and Caton (2007) have shown homeless persons to have higher rates of medical illness, psychopathology, and substance use than the general population leading to a higher age-adjusted mortality rate for the homeless.

This paper will identify the nurse practitioner as well positioned to take a leadership role in finding ways to ensure that homeless individuals who have suffered trauma are properly cared for throughout the course of their healing. The Trauma and Homelessness Initiative outlines a program to identify and aid recovery in homeless individuals who have suffered trauma. This initiative will serve as an example of programs that could benefit from nurse practitioner leadership.

Nurse Practitioner Competency

As early as 1976, literature was showing that nurse practitioners were proving to be positive providers of healthcare when a published report demonstrated that patients were more satisfied with their family nurse practitioner than their physician during similar visits (Linn, 1976). In the acute care setting, and more recently, literature reviews support the role of the nurse practitioner. Nurse practitioners were found to be cost-effective and to see more patients across the spectrum of emergency presentations than some medical colleagues (Williams, 2017). While another review did not identify a benefit in cost-effectiveness of nurse practitioners in the emergency department, it did identify that nurse practitioner services do have a positive impact on patient satisfaction and waiting times (Jennings, Clifford, Fox, O'Connell, & Gardner, 2015). Since homeless individuals are more likely to utilize the emergency department than other populations (O'Toole et al., 2010), the acute care or family nurse practitioner is well positioned to identify trauma in homeless individuals.

Swartwout (2016) explains that nurse practitioners are trained as leaders by meeting the National Organization of Nurse Practitioner Faculties competencies, which include seven leadership competences. Nurse practitioners have identified themselves as having leadership efficacy (Samuel & White, 2015). The Specialist Clinical and Advanced Practitioner Evaluation (SCAPE) study looked at nurse practitioner leadership in Ireland and showed that nurse practitioners demonstrate professional leadership by developing policy, engaging in education outside of providing healthcare services, and engaging in professional organizations as well as providing empirical evidence for role modeling, motivating, coaching and mentoring, developing protocols, improving procedures, and helping to define priorities (Elliott et al., 2013). Nurse practitioner led initiatives have indeed been shown successful, as in an initiative to improve

cardiovascular health in underserved community populations (Murphy, Coke, Staffileno, & Robinson, 2015). Thus the nurse practitioner is well prepared to lead programs such as the Trauma and Homelessness Initiative.

The Trauma and Homelessness Initiative

The Trauma and Homelessness Initiative was developed in Australia with the intent to investigate the relationship between trauma and homelessness and develop a framework for trauma-informed practice (Cash et al., 2014a). Information on the Trauma and Homelessness Initiative for this paper is compiled from the *Trauma and Homelessness Service Framework* (Cash et al., 2014a) and the accompanying *Worker Guidebook* (Cash et al., 2014b). Four studies were undertaken in this initiative and established that some form of trauma is nearly universal for the homeless population. All homeless participants experienced some form of direct trauma or closely witnessed a traumatic event and 97% experienced more than four traumatic events. The framework claims that long-term homelessness, trauma exposure, mental health difficulties, and social disadvantage represent a cluster of vulnerability for the homeless population. These characteristics occur together and each potentially drives the others.

The Trauma and Homelessness Initiative uses the concept of Trauma-Informed Care as a base to build services that help with recovery within the homeless population. A consensus-based definition of trauma-informed care comes from Hopper, Bassuk and Oliver (2010, p. 82) who state that “Trauma-informed care is a strengths-based framework that is grounded in an understanding of and responsiveness to the impact of trauma, that emphasizes physical, psychological and emotional safety for both providers and survivors, and that creates opportunities for survivors to rebuild a sense of control and empowerment.” This definition forms the basis of the program to assist recovery in homeless persons who have suffered trauma.

Trauma-informed care contains four main themes. *Trauma Awareness:* As supported by the Trauma and Homelessness Initiative, nearly all homeless persons have suffered trauma or closely witnessed a traumatic event. Training, supervision and organizational changes can ensure that staff perspectives on understanding the presenting symptoms and behaviors are better understood and may be related to trauma. *Emphasis on Safety:* Building physical and emotional safety for both service users and providers is important to developing an environment and a trust that will allow providers to better care for traumatized persons. Roles, responsibilities, and boundaries should be clear to both parties while privacy, confidentiality, and mutual respect should be maintained. Cultural differences and diversity should be respected. *Opportunities to Rebuild Control:* Control is often lost during traumatic situations. Empowering persons to regain some control by emphasizing the importance of choice, creating predictable environments, and allowing individuals to rebuild a sense of efficacy and personal control over their lives can promote recovery. Service users should be included in the design and evaluation of such services. *Strengths-Based Approach:* Service users are assisted by identifying their own strengths and developing or enhancing their own coping skills. Focusing on the future and utilizing skills-building to further develop resiliency helps to promote these strengths and move toward recovery.

The model of recovery for people experiencing long-term homelessness under the Trauma and Homelessness Initiative consists of promoting recovery principles, developing core psychosocial stability skills, and engaging/providing specialist treatment and support. There is a connection between homelessness, social disadvantage, mental health difficulties, and trauma exposure, as explained in the *Trauma and Homelessness Initiative Framework* (Cash et al., 2014a). Beginning with promoting recovery principles, service providers should work to instill a

sense of hope, safety, calm, connectedness, and self-efficacy in order to move on to more specific attributes of recovery. Developing core psychological stability skills includes managing reactions, using helpful thinking, establishing healthy social connections and developing effective problem solving techniques. Specialist treatment and support can include alcohol and drug treatment, psychological treatments and community mental health treatments.

Nurse Practitioners as Leaders for Trauma and Homelessness

The holistic nature of the Trauma and Homelessness Initiative which includes supporting and empowering the service user along with achieving multidisciplinary care when needed using a strengths-based approach are some of the values held dear to the core of the nursing community. Nurses have already been identified as bringing holistic, strength-based ideals into group therapy models (Fogger & Lehmann, 2017). There is a case that advanced practice nurses, including the nurse practitioner, are well positioned to coordinate and lead efforts to treat homelessness from a trauma based perspective. Nurse practitioners are uniquely positioned to take into account both medical and general nursing needs of these service users who face the multiple concerns of homelessness, trauma exposure, mental health difficulties, and social disadvantage. Nurse practitioners are also already aware of impacts of homelessness and trauma, as evidenced by a qualitative study exploring grief (White & Ferszt, 2009). Even though they were not evaluating for it, these authors still identified the homeless population as having loss and trauma. This section will show evidence that the nurse practitioner can and should lead this and similar initiatives.

The Future of Nursing report (Institute of Medicine, 2011) has identified the need for increased leadership from nurses and Carryer, Gardner, Dunn, and Gardner (2007) identify one of the core roles for nurse practitioners as providing clinical leadership. The Doctorate of

Nursing Practice, which is the preferred educational degree for nurse practitioners, has included in its essentials of doctoral education for advanced nursing practice a core essential of Organization and Systems Leadership for Quality Improvement and Systems Thinking (American Association of Colleges of Nursing, 2006), and the National Organization of Nurse Practitioner Faculties (2015) recognizes the importance of nurse practitioners receiving education to become high quality leaders as well as high quality clinicians and healthcare contributors. These factors are driving nursing curricula to train nurse practitioners as leaders, which positions the nurse practitioner to provide care and coordination over a program like the Trauma and Homelessness Initiative.

Nurse practitioners are trained in advanced health assessment and taught to integrate nursing science with knowledge from ethics, the biophysical, psychosocial, analytical, and organizational sciences as the basis for the highest level of nursing (American Association of Colleges of Nursing, 2006). This emphasis on both assessment and integration of knowledge positions the nurse practitioner to both be aware of and assess for trauma in any population, including the homeless population. Unlike many areas of healthcare that are individual patient focused, nurses and nurse practitioners receive training and are experts in community health and population-based nursing. This community prospective affirms their ability to recognize characteristics of a larger population, such as trauma experiences in a homeless population.

Nurse practitioners have long had a focus on safety. Recent literature demonstrates that hospitals employing more nurse practitioners make a positive change on patient safety (McConnell et al., 2015). Moreover, nurse practitioners have been studied in leadership roles over programs that could parallel the Trauma and Homelessness Initiative. As an example, it has been shown that instituting a nurse leader for ensuring the safety and quality of care for patients

using intrathecal baclofen pumps improved patient safety. Furthermore, when the nurse practitioner developed an educational program for others on the team there was improved quality and safety (Buxton, Morgan, & Rogers, 2017). These examples show that nurse practitioners can improve safety and can teach others to do so, driving the Trauma and Homelessness Initiative forward.

Trauma informed care highlights the importance of providing opportunities to rebuild control. Nurse practitioners have long been on the forefront of empowering patients and encouraging shared decision making between providers and patients rather than an authoritarian type of medical practice where the provider simply dictates how health should be maintained. Nurse practitioner models in primary care emphasize the importance of empowering patients to make their own decisions (Dontje, Corser, Kreulen, & Teitelman, 2004). This directly supports the nurse practitioner as a strengths-based provider and provides opportunities for the homeless to rebuild control.

A strengths-based approach is not a new concept in nursing literature. In 2008 there was a push to move from a deficit-based to a strengths-based approach to community nursing in Canada (Lind & Smith, 2008). This article points out that identifying the actions people take in the interest of their own health led to success of healthy living campaigns. A prior nursing knowledge of the ability of the patient to support himself and an ability of the nurse to identify and encourage these behaviors allow the nurse practitioner to promote a strengths-based approach to encourage long term, positive patient outcomes.

The principles of recovery including hope, safety, calm, connectedness, and self-efficacy, are skills that the Trauma and Homelessness Initiative suggest must be met in order to begin the recovery process (Cash et al., 2014a). These are self-thinking types of techniques that

individuals must learn to begin to move past their trauma. Assisting these individuals to change their thinking and coping requires trust in a healthcare provider in order to build the individual's skills in these areas. Patients and communities have long demonstrated trust in nurse practitioners (Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2009; Benkert, Peters, Tate, & Dinardo, 2008). Nurse practitioners seek to improve self-care, looking forward to the future. They seek positive connections to family when serving patients suffering from events such as grief (White & Ferszt, 2009) demonstrating that these values are ingrained in nursing culture.

As part of recovery, individuals are to develop core psychosocial stability skills including managing reactions, helpful thinking, healthy social connections, and problem solving. While literature is not strong on nurse practitioners in this exact role, there is support that nurse practitioners already seek to instill these values into their patients. In a qualitative study examining nurse practitioners' interactions with grieving patients, nurse practitioners identified several methods of assisting them through grief (White & Ferszt, 2009). The identified characteristics of coping with emotions and situations, connecting with family, increased willingness or ability to seek out social supports, better concentration, and decreased focus on negative thoughts all align with the Trauma and Homelessness Initiative's model of recovery.

After grasping basic recovery principles and psychosocial stability skills, individuals who have suffered trauma are set to engage in specialist treatment and support. Nurse practitioners, who have the holistic and caring views of nurses in general, along with the advanced education related to pharmaceuticals and treatments for substance abuse, psychological treatments, and community health, can provide strong leadership in these areas. Nurse practitioners have been directly called upon to lead group therapy for those recovering from addiction (Fogger &

Lehmann, 2017), and nurse practitioners are expected to deliver strong therapeutic interventions and guide individuals through complex health and situational transitions (American Association of Colleges of Nursing, 2006). Encouraged to take a team-based approach to healthcare, most nurse practitioners are familiar with the process of referring patients to a variety of specialist providers. Nurse practitioners already provide excellent community nursing and care to the homeless population (Mullin & Ambrosia, 2005).

Implications for Nurse Practitioners

Nurse practitioner leaders, among others, are resisting unsupported calls that physicians should lead healthcare teams (Golden & Miller, 2014; Olmstead, 2012). Nurse practitioners are being prepared at the academic level to become leaders (American Association of Colleges of Nursing, 2006) and should be using their position as advance practice clinicians to take a lead role in improving patient and community health.

Programs like the Trauma and Homelessness Initiative provide ripe opportunities for nurse practitioners to showcase their leadership ability. Nurse practitioners already play a strong role in providing care for the homeless (Mullin & Ambrosia, 2005). The holistic approach that permeates nursing culture should propel the advanced practice nurse to address the nearly universal trauma that the homeless population faces.

The *Trauma and Homelessness Worker Guidebook* (Cash et al., 2014b) provides a strong outline and starting point that can be used by the nurse practitioner to either provide care to homeless individuals, or educate and guide other members of the healthcare team in improving health in this community. The Nurse practitioner-led team must recognize the physical or emotional trauma suffered by homeless individuals. The nurse practitioner in her role in primary care, mental health, or specialized practice can begin by working with, or directing a qualified

team, to build trust with the affected individual, and instill the principles of recovery including hope, safety, calm, connectedness, and some degree of self-efficacy. The team can then move onto working with affected individuals to build psychosocial stability skills such as problem-solving, managing emotions, helpful thinking, and social connections. The workbook (Cash et al., 2014b) provides suggestions for promoting these skills that nurse practitioners and the healthcare team members can build upon to individualize treatment for specific individuals and communities. This prepares individuals to enter and succeed in specialized care such as alcohol and drug, or psychological treatments. As nurse practitioners are already expected to work as part of a healthcare team and are familiar with referral of patients to specialized care, their leadership roles are suited to addressing trauma in the homeless community.

Conclusion

This paper has shown that physical or emotional trauma is nearly universal in the homeless population. Nursing provides holistic care and the nurse practitioner is well positioned to recognize and address trauma in the homeless community. Nurse practitioners have both the nursing skills to provide healthcare services and the leadership skills to lead a team providing healthcare to both individuals and communities. Nurse Practitioners are well positioned to lead, and should be utilizing programs such as the Trauma and Homelessness Initiative to treat and develop teams to support health. This should serve as a call to action for the nurse practitioner to embrace their advanced practice role to both provide excellent healthcare and take responsibility for leading a team approach to improving health.

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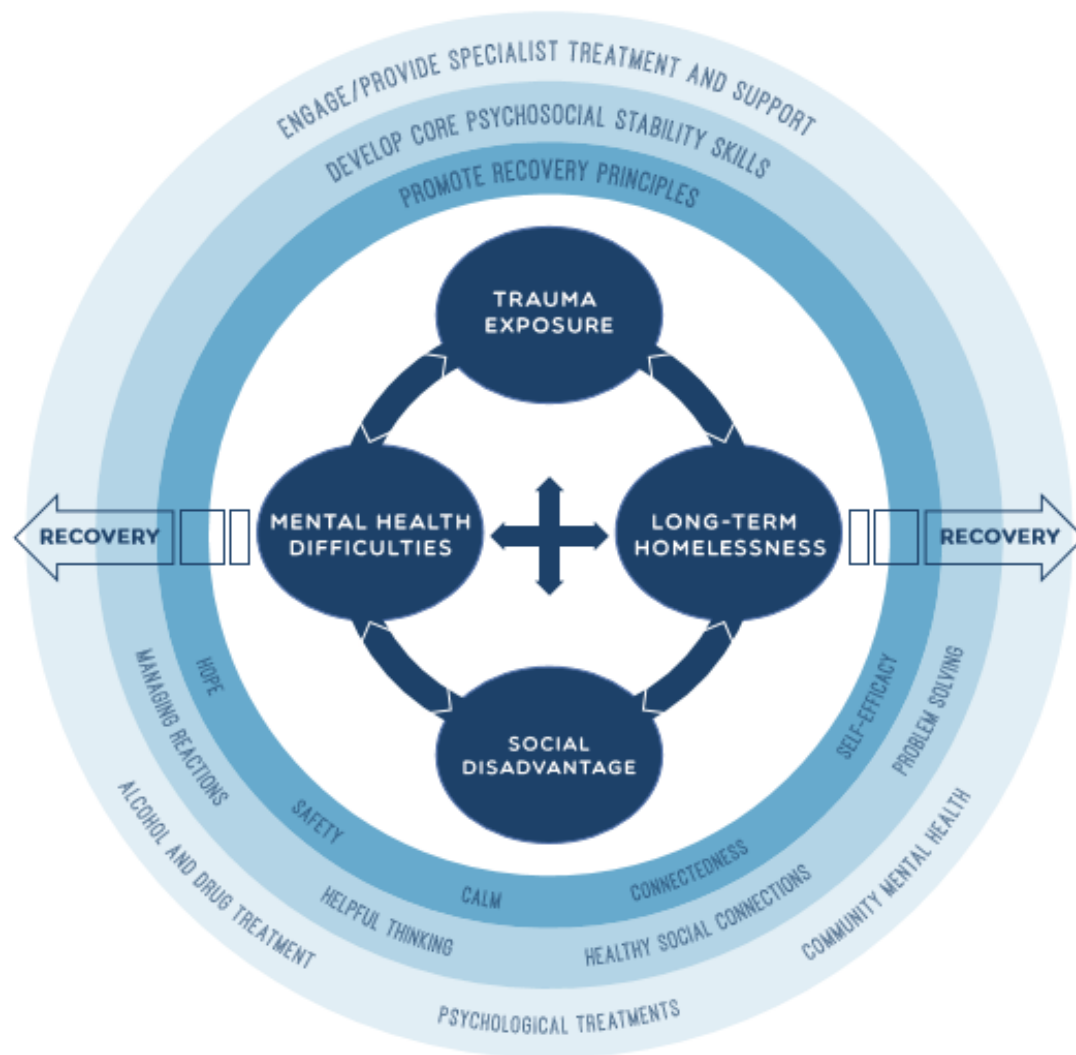


Figure 2-1. The Trauma and Homelessness Initiative's model of recovery for people experiencing long-term homelessness (Cash et al., 2014a)

Chapter 3

Payer Associated with Emergency Department 72-hour Return Visits:

A Secondary Data Analysis of the National Hospital Ambulatory Medical Care Survey

Abstract

Introduction: Disparity in health outcomes associated with factors such as race or socioeconomic status exists, highlighting needed improvement in care for some vulnerable populations. This study's purpose was to examine the association of payer source on 72-hour ED return visits for patients with acute injury.

Methods: This study conducted a secondary data analysis of the 2013 National Hospital Ambulatory Medical Care Survey. The sample included 3,399 ED patients 18-64 years with acute injury. Multivariate logistic regression was performed.

Results: Subjects mean age was 39 years (SD=13.5), were slightly more male (52%), and primarily white (62%) residing in private residences (96%). Payer sources included private insurance (36.3%), Medicare/Medicaid/Worker's Compensation (33.2%), and Self-Pay/No-Pay (22.9%). Regression Analysis did not show any statistically significant difference in expected ED revisits in insurance groups when compared to private insurance. Homeless patients did have an increased odds of ED revisit both when including triage level (OR=3.41, 95%CI [1.12-10.41], p=.03) and without triage level (OR=2.90, 95%CI[1.07-7.80], p=.04) in analysis. Patients with Hispanic (OR=2.28, 95%CI [1.46-3.57], p<.001), and other races (OR=4.84, 95%CI [2.68-8.72], p<.001) were more likely to have return visits compared to those with white race when triage level was not included in analysis.

Discussion: This study could not find that payer source is associated with increased revisits, but there may be disparity in healthcare for the homeless and minority race populations. Emergency nurses, and the whole healthcare community, need to continue to work to provide effective services to all in these populations without disparity.

Unplanned 72-hour return visits to the Emergency Department (ED) has become an indicator for quality of care and patient safety (Chan et al., 2016). These revisits have also frequently been reviewed for the purpose of quality improvement (Easter & Bachur, 2012) and presented as a screening tool to uncover systems-wide and provider-level errors (Shy et al., 2015). The resulting cause of ED return visits are generally categorized as illness-related factors where there is disease progression, patient-related factors where follow-up instructions are not adhered to, or provider-related factors where medical or nursing staff did not properly manage the patient on the initial visit (Kelly, Chirnside, & Curry, 1993). While it has been reported that 1% may be an acceptable rate of ED return visits (Nunez, Hexdall, & Aguirre-Jaime, 2006), the actual rate is often reported as high as 4% (Chan et al., 2016).

The U.S. Center for Disease Control and Prevention (n.d.) reported over 37 million injury-related visits to EDs for the year 2013. In 2011 there were about 421 visits to the ED for every 1,000 individuals in the population. Superficial injuries, and sprains and strains, as examples of injury, rank in the top 5 reasons for ED visits in patients 18-64 years old. At the same time, United States emergency rooms are becoming overburdened with patients, many of whom seek ED care because of convenience or because federal regulations do not allow EDs to turn patients away for lack of insurance.

In 2013, it was reported that over 35 million Americans between ages of 19 and 64 remained uninsured (Kaiser Family Foundation, 2017), despite the high risk of injury this population incurs. Over 28 million Americans remained without health insurance in 2015 (Kaiser Family Foundation, 2016). Uninsured patients are at increased risks of mortality or complications developing from traumatic injury (Baraga, Smith, Tanner, Kaplan, & Lesniak, 2012; Teresa M Bell & Beln L Zarzaur, 2013; Chikani et al., 2015; Downing et al., 2011)

indicating that there is disparity in outcomes related to ability to pay. Past studies (Baraga et al., 2012; Teresa M Bell & Ben L Zarzaur, 2013; Teresa M Bell & Beln L Zarzaur, 2013; Chikani et al., 2015; Downing et al., 2011) have generally looked at the severely injured patient or patients with specific types of trauma. To the authors' knowledge, no studies have examined the relationship between payer source and ED revisits for the broad category of acutely injured ED patients. Return to the ED within 72 hours can serve as an indication that proper care was not achieved during the original visit or proper continuance of care was not attained.

The purpose of this study is to determine whether payer source is associated with occurrence of return visits to the emergency department within 72 hours of an initial presentation for adult patients suffering from injury while controlling for demographic features of age, gender, race, and residence type.

Methods

Design

We conducted a secondary data analysis of the 2013 National Hospital Ambulatory Medical Care Survey (NHAMCS) for ED visits with a descriptive, correlational design to examine the relationship between payer sources and 72-hour ED revisits as a surrogate for ED visit outcomes, while controlling for demographic variables.

Sample and setting

The 2013 NHAMCS used a national probability sample of visits to emergency departments of general and short-stay hospitals. The 2013 Emergency Department data set was the latest data provided for EDs at the time of this project. It collected information from 24,777 ED visits in the calendar year of 2013 (NHAMCS, n.d.). Hospitals were selected to cover all 50 U.S. states and the District of Columbia, and included a sample of 369 hospitals with emergency

departments, of which 298 participated in the NHAMCS (NHAMCS, n.d., pp. 8-9). Federal, military and Veterans Administration hospitals were excluded.

ICD-9 codes E800-E999.9 or codes 800-999 (NHAMCS, n.d.), representing various types of accidents and injuries identified 6,880 ED visits used for data analysis in this study. Within these codes, patients coded for injury were selected. Patients aged 18-64 years were selected to eliminate Americans likely to be covered by Medicare and younger persons likely to be covered by their parents insurance or state plans to insure children. This left a sample size of 3,935. Additionally patients admitted to the hospital, and thus deemed unlikely to make a return ED visit due to their ED treatment, were removed for a final sample size of 3,399

Within the NHAMCS database, missing values for the variable of race were imputed to estimate missing data. Other variables' missing values were less than 10% (Age and Sex 0%, Residence type 2%, Payer source 7%); therefore, we used listwise deletion to eliminate cases with missing values. The variable of triage levels at ED had a large amount of missing values, approximately 28%, leaving the concern that the missing values in triage levels could be systematic rather than at random. However, this triage variable is important to control for severity of illness when patients visited EDs. Therefore, we conducted data analyses both without and with the variable of triage levels. Sample size was 3,399 with triage level excluded. When triage level was included and listwise deletion removed missing data, the sample size was 2,503.

Measures

ED revisits were identified in the NHAMCS database as return visits within 72 hours, regardless of the reason for the revisit (NHAMCS, n.d.). Age was provided in years and those 18-64 years old were included in this study. Sex was recorded as male or female. The variable

for race used a mixed race and ethnicity category and was divided into non-Hispanic white, non-Hispanic black, Hispanic, or other race. Imputation for race was performed by NHAMCS using a model-based single, sequential regression method, based on multiple variables such as demographics of age, sex, race and ethnicity, triage level, payer source, grouped ICD-9 codes, and ED characteristics (NHAMCS, n.d.). Residence was identified as a private residence, nursing home, homeless, or other (which may include hotel, college housing, assisted-living center, or institution such as prison, mental hospital, or group home for mentally or physically disabled). NHAMCS used a 5-level triage score, which was condensed into three categories of immediate/emergent, urgent, and semiurgent/nonurgent for this study. Payer sources were classified into private insurance, Medicare/Medicaid/Worker's Compensation, self-pay/no-pay, and other (which may include state and local government reimbursement, payment by a private charitable organization, or liability insurance such as automobile insurance).

Data analysis

SPSS Statistics version 22 (IBM Corp, Armonk, New York) was used for data analysis. Along with descriptive summaries, bivariate analyses were completed with Chi-square (χ^2) test and nonparametric Mann-Whitney U test. Post-hoc analysis after significant χ^2 statistics was performed to further evaluate group differences. Prior to conducting regression, multicollinearity was checked and there were no indications that multicollinearity was of concern. Logistic regression was used to determine if payer source, or other variables, is associated with ED return visits within 72 hours for patients with injury, controlling for age, sex, race, and residence type both with and without the triage level variable included.

The NHAMCS protocol has been approved by the National Center for Health Statistics Research Ethics Review Board annually since February 2003 and maintains waivers to the

requirement to obtain informed consent of patients and patient authorization for release of patient medical record data (NHAMCS, n.d.). This study was reviewed by the Human Research Protection Program Institutional Review Board at the authors' institution for approval and granted non-human subjects designation. Only de-identified, publically available data were utilized in this study.

Results

The mean patient age for the study sample was 38.58 (SD=13.5). Males were slightly higher sampled (52%) than females. Participants were primarily white race (62%) with black race (21%), Hispanic race (13%) and other race (4%) less well represented. Most (96%) participants resided in private homes and a small number (1%) were recorded as homeless. Payer source included private insurance (36%), Medicaid/Medicare/Worker's Compensation (33%) and self-pay/no-pay (23%). There were very little changes in demographics when cases with missing values in triage level were removed. Table 1 presents a full descriptive summary of demographics for the sample both without and with the deletion of triage missing cases.

Table 2 presents the bivariate analyses and showed that 72-hour ED revisit status differed by payer source, ($\chi^2(3, N=3399) = 12.23, p=.007$) only when the sample included missing cases for the triage level variable. Post-hoc analysis showed that "other insurance" participants had a statistically significant increase in 72-hour ($p = .013$). About 8.1% of patients with "other insurance" had 72-hour ED revisits, while only 4.3% of patients with private insurance, 3.8% of those with Medicare, Medicaid, and Worker's Compensation, and 3.2% of those with self-pay or no-pay had ED revisits. ED revisits statistically differed by race both without ($\chi^2(3, N=3399) = 39.72, p<.001$) and with ($\chi^2(3, N=2503) = 33.53, p<.001$) triage level data included. Minority races showed more ED revisits compared to White. About 11.2-14.9% of patients with other

race revisited ED within 72 hours, while only 3.1% of white patients revisited ED. Post-hoc analysis also supported that “other race” and White had a statistically significant association with ED revisits. ED revisits also statistically differed by residence type both without (χ^2 (3,N=3399) = 8.10, p=.044) and with (χ^2 (3,N=2503) = 8.63, p=.035) triage level. Homeless patients (11.1-11.4%) and those in other residence types (7.3-8.6%) had more ED revisits than those in private homes (3.8-4.0%). Although the overall differences in ED revisits among residence types were significant, differences among specific residence groups (cell differences) were not statistically different according to post-hoc analysis. Males (4.9%) had more revisits only when triage level was included (χ^2 (1,N=3399) = 4.70, p=.030). Age and triage level had no statistical differences in 72-hour ED revisit status.

According to multivariate logistic regression (see Table 3), payer source did not have a statistically significant association with 72-hour revisits. Homeless patients showed a significant association in revisits with an increased odds of revisits without adjusting for triage level (odds ratio [OR] = 2.90, 95%CI [1.07-7.80], p=.036) and with adjusting for triage level (OR =3.41, 95%CI [1.12-10.41], p=.032) compared to those with private residences. When compared to white race patients, Hispanic patients had a 2.28 (95%CI [1.46-3.57], p<.001) increased odds of having a revisit only prior to adjusting for triage level and other races had a 4.83 (95%CI [2.68-8.72], p<.001) times greater without triage level adjustment and 5.50 (95%CI [2.88-10.50], p<.001) times greater odds of revisits with the triage level adjustment. Age, sex, and triage level did not have any statistically significant association with revisits.

Discussion

This study examined whether payer sources had an impact on quality of care in patients visiting the emergency department with an acute injury, using 72-hour ED revisits as a surrogate for quality of care. Regression analysis was run both with and without the adjustment of the triage level variable due to the large amount of missing values in this variable. Multivariate logistic regression indicated that payer source did not have increase in ED revisits compared to those with private insurance. Being homeless did show an increase in ED revisits compared to having a private residence both with and without adjustment for triage level. Those included in the other race group had increased revisits both with and without the triage level adjustment, and those included in the Hispanic race group had increased revisits only without the triage level adjustment compared to those in the white race group.

Previous studies have shown that patients on Medicaid had difficulty obtaining proper care for cruciate ligament injuries (Baraga et al., 2012), uninsured trauma patients were more likely to experience failure to rescue (Bell & Zarzaur, 2013), and self-pay patients have a higher risk of mortality following a traumatic injury (Chikani et al., 2015). The current study does not support the idea that payer source affects outcomes following acute injury using ED revisits as a marker.

Widespread and persistent disparities in healthcare based on race and ethnicity are well recorded (Fiscella & Sanders, 2016), which holds true for EDs. Those of black race in the United States fare worse in out-of-hospital cardiac arrests regardless of how other factors are controlled for (Shah, Shah, & Bhopal, 2012), black and Hispanic children face healthcare disparity in emergency departments (Riera & Walker, 2010), and minorities generally have poorer outcomes in the ED (Blanchard, Haywood, & Scott, 2003). Controlling for

socioeconomic status and other demographic factors does not close the disparity gap (Blanchard et al., 2003; Riera & Walker, 2010). This study supports these racial disparities, finding that Hispanics, and other minority races are more likely to re-present to the ED than those considered white race.

Limitations

Using secondary data analysis to answer questions is a way for researchers to ask questions with reduced time and cost of gathering independent research (Mainous & Hueston, 1997). However, there are limitations associated with performing a secondary data analysis. Notably, using a study originally planned for another question means methods may differ than methods that would be ideal for the secondary analysis study (Doolan & Froelicher, 2009). In this study, the researchers have been careful to review methods used in collecting data and ensure that they are appropriate for answering the current research question and consider limitations. Although ED return visits are generally defined in the literature as returns to the ED within a time frame (usually 72 hours) for the same chief complaint (Nunez et al., 2006; Wu et al., 2010), the NHAMCS database does not allow users to link ED revisits with the diagnosis or reason for visiting the ED initially. Therefore, in this study, the initial visit and the revisit might not be related. Data used for a secondary data analysis may also not be completely up to date, given that data has previously been collected (Doolan & Froelicher, 2009). Indeed, data for this current study was collected in 2013. With the evolution of the insurance industry under the Affordable Healthcare Act, the same study conducted with current data could differ from that of 2013.

Missing data also provided limitations to the current study. Patient acuity is an important variable to control for, as patients with different acuities can have very different presentations

and outcomes in the ED. However, triage level in the original database had much missing data (27%). In attempt to explore the impact of acuity the study was completed both with and without triage level data included.

It should be noted that validity and reliability of the NHAMCS data have been called into question when patient scenarios that are unlikely to occur in emergency departments were identified in the dataset (Cooper, 2012; Green, 2013). NHAMCS reliability and validity are supported by researchers within the CDC that maintain the database (McCaig & Burt, 2012; McCaig et al., 2013). While the NHAMCS dataset does work to select a good sample of the population and weights minorities in an effort to match the general population, this is a sampling of the population and external validity can never be fully appreciated without sampling the entire population. The sample population is also intended to represent the United States and likely provides a good estimation of the U.S. population given the controlled sampling methods, but may not be applicable to populations in other countries. As a retrospective study of a national data set, causality cannot be proven, nor should it be implied by these findings.

Implications for Emergency Nurses

This study, like others, shows that there is disparity in healthcare based on race with some minorities making more return visits to emergency departments than the majority white race and showing that the homeless population had increased ED revisits. Being aware of these potential disparities in care, prepares the emergency nurse to recognize potential areas where care for certain patients may be improved upon and act to ensure that all patients are provided high quality emergency healthcare services. Providers should be encouraged to provide equal or increased care to minorities and the homeless who show an increase in revisits in an effort to decrease burden on high volume EDs. Healthcare institutions may want to consider outreach or

follow-up programs to ensure that minority and homeless populations are receiving proper care and follow-up. These results may also indicate that minorities and homeless persons require more complete treatment during their initial ED visit, which may include hospitalization or immediate surgery, if they are unable to obtain needed follow-up services outside of the ED.

Conclusions

The current study utilized a large data set to explore disparity among payer sources and does not indicate that patients without insurance or other payer sources have increased rates of 72-hour revisits in ED patients suffering acute injury compared to those with private insurance. Homeless persons did have increased ED revisits compared to those with private housing and some races had increased revisits compared to those considered white race. Age, sex, triage level, and type of residence were not associated with higher revisit rates. Institutional or regional specific prospective research on this topic may provide for more locally useful information in deciding treatment plans to decrease racial and socioeconomic disparities in ED care indicated by increased revisits.

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Table 3-1

Characteristics of all patients included both with and without triage level data included.

Variable	Patients Without Triage Level Variable Included (N=3,399) n(%)	Patients With Triage Level Variable Included (N=2,503) n (%)
Payer Source		
Private	1234 (36)	876 (35)
Medicare/ Medicaid/ Worker's	1127 (33)	821 (33)
Comp		
Self Pay/No Pay	779 (23)	591 (24)
Other	259 (8)	215 (9)
Sex		
Male	1756 (52)	1287 (51)
Female	1643 (48)	1216 (49)
Race		
White	2119 (62)	1565 (63)
Black	710 (21)	492 (20)
Hispanic	451(13)	352 (14)
Other	119(3)	94 (4)
Residence		
Private	3256 (96)	2395 (96)
Nursing Home	17 (1)	14 (1)
Homeless	44(1)	36 (1)
Other	82 (2)	58 (2)
Triage Level		
Immediate/ Emergent		152 (6)
Urgent		804 (32)
Semi-urgent/ Nonurgent		1547 (62)
	Mean (SD)	Mean (SD)
Age	38.6 (13.6)	38.2 (13.5)

Table 3-2

Characteristics of Payer Sources and Demographics for Patients with and without Emergency Department Visits for Acute Injury.

Variable	Without the Triage Level Variable (N=3,399)				With the Triage Level Variable (N=2,503)			
	Patients With 72Hour Revisits n(%)	Patients Without 72Hour Revisits n (%)	χ^2 Statistic	p value	Patients With 72Hour Revisits n(%)	Patients Without 72Hour Revisits n (%)	χ^2 Statistic	p value
Payer Source			12.23	.007			3.82	.281
Private	53 (4.3)	1181 (95.7)	0.07	.995	4.5	95.5	0.64	.895
Medicare/ Medicaid/ Worker's Comp	43 (3.8)	1084 (96.2)	0.55	.908	3.5	96.5	0.81	.851
Self Pay/No Pay	25 (3.2)	754 (96.8)	2.37	.499	3.4	96.6	0.81	.838
Other	21 (8.1)	238 (91.9)	10.82	.013	6.0	94.0	2.56	.482
Sex			4.70	.030			2.06	.151
Male	86 (4.9)	1670 (95.1)			59 (4.6)	1228 (95.4)		
Female	56 (3.4)	1587 (96.6)			42 (3.5)	1174 (96.5)		
Race			39.72	<.001			33.54	<.001
White	66 (3.1)	2053 (96.9)	16.00	.001*	48 (3.1)	1517 (96.9)	10.24	.018
Black	29 (4.1)	681 (95.9)	0.01	.999	21 (4.3)	471 (95.7)	0.09	.994
Hispanic	31 (6.9)	420 (93.1)	9.61	.222	18 (5.1)	334 (94.9)	1.21	.745
Other	16 (13.4)	103 (86.6)	26.01	<.001*	14(13.9)	80 (85.1)	30.25	<.001*
Residence			8.10	.044			8.63	.035
Private	130 (4.0)	1326 (96.0)	6.60	.086	92 (3.8)	2303 (96.2)	5.29	.146
Nursing Home	1 (5.9)	16 (94.1)	0.12	.989	0 (0)	14 (100)	0.64	.898
Homeless	5 (11.4)	39 (88.6)	5.76	.124	4 (11.1)	32 (88.9)	4.84	.194
Other	6 (7.3)	76 (92.7)	2.07	.557	5 (8.6)	53 (91.4)	3.24	.356
Triage Level							0.40	.820
Immediate/ Emergent					5 (3.3)	147 (96.7)	0.25	.891
Urgent					31 (3.9)	773 (96.1)	0.09	.953
Semi-urgent/ Nonurgent					65 (4.2)	1482 (95.8)	0.25	.864
	Mean (SD)	Mean (SD)	U Statistic	p value	Mean (SD)	Mean (SD)	U Statistic	p value
Age#	38.62 (13.5)	37.67 (12.6)	223440	.495	38.35 (11.9)	38.11 (13.5)	118260	.669

Note. #, this indicates the result from Mann-Whitney U test. *, this p value significant after Bonferroni adjustment. p-value for individual variables calculated with post-hoc analysis after having significant χ^2 .

Table 3-3

Logistic Regression of Payer Source on ED 72 hour Return Visits

Variable	Without the Triage Level Variable (N=3,399)			With the Triage Level Variable (N=2,503)		
	OR	95% CI	p-value	OR	95% CI	p-value
Payer Source						
Private [#]						
Medicare/ Medicaid/ Worker's Comp	0.772	0.51-1.18	.230	0.668	0.40-1.11	.120
Self Pay/No Pay	0.652	0.40-1.07	.090	0.682	0.388-1.20	.183
Other	1.518	0.87-2.64	.140	1.084	0.55-2.14	.816
Age	0.996	0.98-1.01	.498	1.00	0.98-1.02	.890
Sex						
Male [#]						
Female	0.720	0.51-1.02	.065	0.803	0.53-1.21	.295
Race						
White [#]						
Black	1.396	0.89-2.20	.151	1.488	0.87-2.54	.145
Hispanic	2.281	1.46-3.57	<.001*	1.698	0.97-2.99	.066
Other	4.835	2.68-8.72	<.001*	5.499	2.88-10.50	<.001*
Residence						
Private [#]						
Nursing Home	2.203	0.29-17.04	.449			
Homeless	2.896	1.07-7.80	.036*	3.406	1.12-10.41	.032*
Other	1.342	0.56-3.24	.513	1.984	0.73-5.17	.181
Triage Level						
Immediate/ Emergent [#]						
Urgent				1.207	0.48-3.36	.630
Semi-urgent/ Nonurgent				1.498	0.59-3.83	.399

Note. OR=odds ratio, CI=confidence interval, #Reference group, *p<.05

Chapter 4

Payer Source Does Not Affect Adverse Events While Awaiting Surgery
for Ankle Trauma in One System

Abstract

Introduction: Ankle injuries that are not properly cared for can have devastating effects on a patient's health and ability to maintain an active lifestyle. Recommended outpatient surgery may be difficult for many groups of patients to obtain, including those without insurance or racial minorities. Patients of low socioeconomic status also have worse outcomes following trauma. The purpose of this study was to examine if payer source was related to the number of adverse events that patients face prior to receiving surgical treatment following an emergency department (ED) visit for an acute ankle injury.

Methods: A retrospective chart review was conducted at two medical centers within the same healthcare system. The sample included 192 patients presenting to the ED with an unstable ankle injury between October 1, 2015 and May 1, 2018. Chi-square and t-test analyses were used to determine differences in rates of adverse events occurring while awaiting surgery.

Results: Few (4%) patients were listed as being self-pay. Neither Medicare ($\chi^2_{(1)} (N=192) = 2.389, p = .122$), Medicaid ($\chi^2_{(1)} (N=192) = .084, p = .772$), other insurances ($\chi^2_{(1)} (N=192) = .567, p = .452$), or private insurance ($\chi^2_{(1)} (N=192) = .000, p = .982$) was associated with a difference in rates of adverse events. Likewise, sex ($\chi^2_{(1)} (N=192) = .402, p = .526$), race ($\chi^2_{(3)} (N=192) = 2.504, p = .475$), and all other demographic variables failed to show a difference in occurrence of adverse events. Those admitted to the hospital did show a lower rate of adverse events compared to those sent home from the ED ($\chi^2_{(1)} (N=192) = 5.452, p = .020$). Sampled patients were admitted to the hospital at a high rate (49%).

Conclusion: The sampled facilities did not have adverse event rates that differed based on payer source or demographic features, indicating that these facilities, with hospital-based subsidy

programs and higher than normal admission rates, may be proactively managing treatment of their vulnerable populations to reduce health disparity based on payer status or demographics.

Acute ankle injuries can have long term sequela including recurrent sprains of the injured ankle, instability with sensations of “giving way”, stiffness and swelling, or other symptoms that prevent patients from participating in everyday activities, even with sound treatment (Kaikkonen, Lehtonen, Kannus, & Jarvinen, 1999). Especially for individuals who enjoy being active or whose livelihoods depend on standing or moving, failure to return to health following this type of injury can cause significant harm. Along with prolonged instability and potential permanent loss of or decrease in mobility, ankle fractures that do not heal in proper alignment are seven times more likely to develop ankle arthritis, which can cause pain and stiffness requiring long term treatments (American Academy of Orthopaedic Surgeons, 2015).

Current standard of care for treatment of unstable ankle fractures in the emergency department (ED) is to evaluate and splint, and then have the patient present for outpatient orthopedic follow-up (Koehler & Eiff, 2016). However, those who face barriers to obtaining outpatient treatment may have poorer outcomes than others, indicating this standard of practice may not be optimal for all patients. Navigating outpatient follow-up and outpatient surgery in the face of socioeconomic and payer source differences may result in significant health disparity in acute ankle injury patients. Researchers have identified barriers to ED patients obtaining follow-up. Health systems often do not maintain accurate telephone numbers (Aaland, Marose, & Zhu, 2012) and making follow-up appointments can be difficult or appointments may not be available (Vieth & Rhodes, 2007). Patients relying on Medicaid or those without any payer source (Asplin et al., 2005; Magnusson, Hedges, Vanko, McCarten, & Moorhead, 1993) and minority race populations (Lee et al., 2013) have increased difficulty securing follow-up.

Trauma patients without insurance have increased rates of mortality and complications, (Baraga, Smith, Tanner, Kaplan, & Lesniak, 2012; Chikani et al., 2015; Downing et al., 2011)

indicating that there may be disparities in accessible care for trauma patients. Understanding barriers to proper care may provide information that could lead to achieving more health equality as dictated by Healthy People 2020 (Office of Disease Prevention and Health Promotion, 2014) and other groups (U.S. Department of Health & Human Services, n.d.; Ubri & Artiga, 2016). To these authors' knowledge, no studies have assessed follow-up rates or disparities that affect the surgical ankle fracture patient.

There is a lack of research that explores whether or not the current practice of stabilizing acute ankle injuries in the emergency department (ED) and instructing patients to follow-up with a specialist for further evaluation and surgical treatment leads to health disparity among the non-insured. The purpose of this study is to explore whether, among patients who suffer an unstable ankle injury, ability to pay is associated with an increased incidence of adverse events experienced prior to surgical correction? This study also examined secondary reasons, including whether demographic factors such as sex or race, being homeless, or intoxication at the time of injury, for relationship to health care disparity

Methods

Design

A retrospective chart review was conducted with data abstracted from the electronic health record (EHR) at two EDs at two hospitals within a single health system to examine the relationship between payer sources and adverse events while awaiting surgery in patients suffering acute, unstable ankle fractures.

Sampling and Setting

Data were collected from the EHRs of two emergency departments within a single health system where the same orthopedic team serves as consultant for both EDs. One ED is an urban, safety-net, non-profit hospital near the downtown area of a large Midwest, U.S. city. It serves as the primary teaching hospital for an adjacent medical college and its mission speaks to providing accessible healthcare regardless of a patient's ability to pay. As such, it treats many vulnerable populations including the homeless and those without private health insurance.

The second site lies in a suburban area and focuses on primary care services and provides easy access for acute and well care needs for all ages. The two facilities share an EHR system. Subsidized care is available to qualifying patients who live within the same county as the hospitals and meet income requirements.

ICD-10 codes were identified to capture patients who presented to the EDs with a closed ankle injury for which standard of care is typically surgical fixation. Table 1 shows a full list of codes used. All EHRs from patients presenting to either of the two EDs between October 1, 2015 and May 1, 2018 and meeting one of the identified ICD-10 codes were obtained. A master list of charts that included patient identifying information was obtained and subsequently stored within a REDCapTM database. All study data were collected and managed using REDCapTM electronic data capture tools (Harris et al., 2009). Random codes were assigned to each chart and all identifying information was removed. The master list with patient identifying information was stored separately from data collected.

A 5th year orthopedic resident predetermined guidelines that would indicate that surgery would typically be recommended for the treatment of an ankle injury and reviewed X-rays of each subject to determine if surgical fixation would likely be recommended. Guidelines for

surgical injuries included lateral malleolus injury with joint subluxation, lateral malleolus injury with medial clear space widening on stress or standing view X-ray, displaced medial malleolus fracture, bimalleolar fractures, trimalleolar fractures, or high fibular fractures with a positive stress exam. Those that were determined to be surgical were included. Data were abstracted from the selected charts by two researchers who were blinded to the purpose of the study. Cohen's kappa scores were calculated to check interrater reliability and the lead researcher trained abstractors to ensure as much consistency between the abstractors as possible. Kappa scores for all variables were found to be $>.75$ for all variables except for alcohol intoxication, isolated injury, and delay in surgery. Abstractors were coached on properly recording these variables and these variables were reviewed by the lead researcher to ensure they were accurate prior to analysis.

There were 552 medical records with ankle injuries per the selected ICD-10 codes, of which 255 were identified as unstable after X-ray review. On chart review, 13 were not actually acute ankle injuries or EMR data was not available. An additional 20 patients presented directly to orthopedics or podiatry and were not ED patients, 3 of which suffered injuries while hospitalized. For 30 patients, surgery was not recommended, despite their injury. The most common reasons for not having surgery recommended were co-morbid conditions that increased surgical risks or physician preference at the time of initial evaluation. A final sample of 192 cases was used in this study.

Measures

This study considered any ankle injury as found above that is expected to require surgical intervention to promote proper healing as an unstable ankle injury. The dependent variable was any adverse event that served as an additional injury or problem with obtaining surgical

intervention. Time of surgery served as the time that patient charts were no longer reviewed as they had begun terminal treatment for the injury. Adverse events were 1) re-injury at the original site, 2) delay in surgery greater than 3 weeks, 3) lost to follow-up where no records up to 8 weeks post-injury were found to indicate surgery was ever performed, 4) return ED visits prior to surgery, 5) new traumatic injury, and 6) new pressure ulcer at the site of injury or elsewhere on the body.

The primary independent variable was payer source and was grouped into categories of 1) private insurance, 2) Medicare, 3) Medicaid, 4) worker's compensation/liability insurance, 5) self-pay/no-charge, and 6) other, for which the majority of 'other' patients were included in the hospital provided subsidy plan. It is important to note that the subsidy plan can be applied retroactively, so many of these patients were likely self-pay at the time of the initial ED visit and retroactively converted to the subsidy plan. Patients who presented to the ED as self-pay, and had the subsidy applied retroactively were queried as "other insurance" and did not remain self-pay. Other variables collected were the demographic data of age in years, biological sex, and race/ethnicity grouped as white, black, Hispanic, or other. Residency information was collected and grouped as 1) private home, 2) nursing home, 3) homeless, or 4) other and the county and state of residence was included. Alcohol and drug (excluding marijuana) intoxication at the time of injury was collected; identified by healthcare provider notes or a diagnosis code related to alcohol or drug intoxication within the ED chart during the same initial visit for injury.

Data Analysis

SPSS version 22 (IBM Corp, Armonk, New York) was used for data analysis. All data were imported from REDCapTM into SPSS for analysis. Prior to collecting data a power analysis identified 196 as a target sample size for this study. Descriptive statistics were examined

individually and the Chi-square (χ^2) Test of Association was applied to categorical independent and dependent variables. The primary independent variable of payer status was examined on each variable in a 2x2 table to determine if the dependent variable was statistically different when the independent variable of an adverse event occurring was present compared to when not present. Secondary outcomes were also examined via χ^2 techniques for categorical data and with the t-test statistic for continuous level data. Significance level was set at less than or equal to .05. Bonferroni adjustments in levels of statistical significance were applied when appropriate after comparing multiple variables against the dependent variable.

Ethical Considerations

The involved academic institution's Institutional Review Boards reviewed all study protocols and permission was granted from the hospital's privacy committee to use the EMR data. The study was granted exempt classification since only medical records were utilized and risk to patients was negligible. All data were secured within REDCapTM and patient identifiers were stored separately from the data collected. Patient identifier information was accessed only when it was necessary to review information about the patient within the medical record and utilized only by researchers tasked with reviewing patient charts. Data collection that involved the use of patient identifying information was always conducted in a private location to prevent possible casual observation of patient information that could occur in a public venue.

Results

There were 192 patients seen in one of two EDs within this single hospital system who sustained an acute ankle fracture that required surgical repair. The mean age of patients was 43.63 (SD=14.1) years and 55% were male. White race was predominant at 46%, with fewer black (34%), Hispanic (11%), or other (9%) races represented. The majority resided in private

homes (91%) and approximately 9% were homeless. Fifteen percent were identified as intoxicated with alcohol at the time of initial visit and 5% with other substance intoxication. The ankle injury was an isolated injury in 84% of patients and 49% were admitted to the hospital directly from the ED. Among the 38% of patients with “other insurance” listed, almost all had a hospital-specific subsidy applied either at the time of ED visit or applied to their account retroactively. Other payer classifications were represented as 18% with private insurance, 12% with Medicare, 16% with Medicaid, 11% with Worker’s Compensation or Liability insurance, and 4% remained self-pay.

Fifteen percent of all patients sustained an adverse event prior to surgical treatment. Within the adverse event category 14% had a re-injury at the site of initial injury, 21% had a delay in surgery, 52% were lost to follow-up, 7% had a new traumatic injury, and 7% developed a pressure related injury. Related to payer source, the rate of adverse events ranged from 10% in the Worker’s Compensation/Liability group to 25% in the Medicare Group. There were no statistically significant differences in payer types noted between those with adverse events and those without adverse events. There was no statistically significant association between any other demographic variable and having an adverse event, except for those “not admitted to the hospital” who had a 2.755 increased odds of having an adverse event compared to those admitted directly to the hospital during their initial ED visit ($\chi^2_{(1)} (N=192) = 5.452, p = .020$). Those individuals who sustained multiple injuries at the time of ED visit had 5.814 increased odds of having an adverse event compared to those having an isolated injury, although this was not statistically significant ($\chi^2_{(1)} (N = 192) = 3.613, p = .057$). All demographic variables, as well as the results of the comparisons by adverse event/no adverse event, are shown in Table 2.

Discussion

This study, conducted at two EDs within a single hospital system, failed to identify any differences in rates of adverse events prior to obtaining surgery in patients with acute ankle injuries requiring surgical correction regardless of type of insurance coverage. This is in contrast to previous studies in which acute trauma patients had increased rates of mortality and complications when they did not have private insurance (Baraga et al., 2012; Chikani et al., 2015; Downing et al., 2011). Furthermore, previous research shows that obtaining follow-up care can be difficult (Aaland et al., 2012; Vieth & Rhodes, 2007), which seems paramount to patients who are often discharged with the intent to secure outpatient surgical services. Previous research also indicated follow-up was particularly difficult to obtain for those on Medicaid and without insurance (Asplin et al., 2005; Lee et al., 2013; Magnusson et al., 1993).

The current standard of care for ankle fractures such as those focused on in this study is to treat patients on an outpatient basis (Koehler & Eiff, 2016). However, among the patients sampled at these facilities, nearly half (49%) were admitted to the hospital at the time of their initial ED visit. This is in stark contrast to previously reported admission rates of 17% for ankle fractures in Finland (Somersalo et al., 2014) and 31% in Italy (Tarantino et al., 2010). It is not clear within the literature what the typical rate of admission for unstable ankle injuries is in the United States. We did not expect that the number of patients admitted from the EDs would be this high in this study. Although one of the two sites is a major, inner city-trauma center, 84% of patients had isolated ankle injuries, thus severity of illness does not readily explain the high admission rate. Because this facility serves a high volume of patients considered vulnerable, health care providers here may be more likely to admit patients for social reasons or to prevent adverse events in comparison to other institutions. Indeed, being admitted at the time of the ED

visit was the only statistically significant finding in this study, showing fewer adverse events occurred when patients were directly admitted from the ED.

This healthcare system and the orthopedic group that ultimately makes admission decisions for these patients treat a large number of low-income, racially diverse, and other vulnerable patient populations. These health care providers may proactively and aggressively treat these patients, thereby decreasing the odds of the patients receiving disparate care. The orthopedic clinic has also committed to following up with all patients that present through the facility's EDs to assist patients to get coverage or hospital-based subsidy, or even making the exception to provide surgery to those who cannot pay. Anecdotally, patients frequently report that other local facilities will not provide them surgical or follow up services due to their financial/insurance status, despite identifying that their injury needs additional care.

This study also sampled a lower number of self-pay patients than was expected. This study found only about 4% were listed as self-pay compared to national database reports of about 16% in 2010 (Watts, Bryan, & Tarwater, 2014). This is likely because the institution has a subsidy program. Patients who live within the same county and qualify may obtain reduced or no cost services despite a lack of insurance. This subsidy program can be applied to ED visits retroactively, thus a large portion of patients who would be self-pay at other facilities were likely marked as 'other insurance' in this instance. The EHR does not allow users to separate patients identified initially as self-pay from those that had the subsidy applied after the ED visit. Despite this, neither the remaining self-pay patients nor the 'other insurance' category, which includes the subsidy program patients, had a statistically different rate of having adverse events.

Although not statistically significant, Medicare patients had 2.389 increased odds of having an adverse event prior to receiving surgical treatment. This may be a reflection of age-

related decreased ability to heal following injury rather than related to payer status. Patients with an isolated injury had 5.814 decreased odds of having an adverse event. Again, although this finding is not statistically significant, it may suggest that multi-trauma patients may be at higher risk than those with isolated ankle injuries.

Currently there is a widespread call to reduce healthcare disparities (Office of Disease Prevention and Health Promotion, 2014; U.S. Department of Health & Human Services, n.d.; Ubri & Artiga, 2016). The findings of this study indicate that this single hospital system may provide appropriate care for vulnerable populations and that this institution is meeting goals to minimize healthcare disparity based on payer source and patient demographics for this cohort of patients.

Limitations

This study is limited in its ability to generalize beyond this health system. Given that only a single system was used for data collection in this study, along with the atypical rates of patients admitted to the hospital from the ED and those with self-pay status, these results may be difficult to extrapolate to any larger population. This may be result of efforts within this health system to decrease disparity and may well be unlike many other facilities.

This was a retrospective chart review. Data collected in EHRs are collected by healthcare providers as part of their routine care for patients and are not collected with the methodological rigor that researchers use in collecting data. Therefore, it must be understood that the information gained from these records may contain inaccuracies or information recorded in a way that does not translate well into the research data collection procedure. Abstractors were trained prior to reviewing charts and were retrained if problems arose along the way (e.g. properly identifying patients as self-pay or hospital subsidized discount plans). Also, abstractors

used standardized forms with precise definitions and were blinded to the purpose of the study; all methods recommended to strengthen the chart review process (Gilbert, Lowenstein, Koziol-McLain, Barta, & Steiner, 1996; Kaji, Schriger, & Green, 2014).

The sample of 192 records did not meet the pre-study power calculation need of 196. Including other facilities or utilizing a national database may help to strengthen future research in this area and provide for increased generalizability. This study was limited in scope by examining only outcomes prior to surgical intervention. Another question of concern to patients would be adverse event occurrence until complete healing of the injury. Factors such as surgical complications, poor wound healing after surgery, hardware failure, and acute or chronic pain are important patient centered outcomes not examined in this study. The research could also be expanded to include other common surgically-treated fractures such as upper extremity, vertebral, or hip fractures.

Conclusion

This retrospective chart review showed that patients who present to one of two EDs within the same hospital system did not show differences in sustaining adverse events prior to receiving surgical treatment based on payer status or demographic variables. This is not consistent with other research and may indicate that this health system has implemented progressive policies and procedures to decrease health disparities among unstable ankle fracture patients who fall into vulnerable population categories.

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Table 4-1

ICD-10 codes used to capture patients with an unstable ankle injury.

Ankle Fracture	Bimalleolar Fracture	Lateral Malleolus Fracture	Medial Malleolus Fracture	Pilon Fracture	Trimalleolar Fracture	Distal Tibial Articular Fracture	Syndesmotic Injury
S82.843A	S82.841	S82.63XA	S82.53SA	S82.873	S82.851	S82.3	S93.439A
	S82.842	S82.64XA	S82.51XA	S82.871	S82.852	S82.30	S93.431
	S82.843	S82.65XA	S82.52XA	S82.872	S82.853	S82.301	S93.431A
	S82.844	S82.66XA	S82.53XA	S82.873	S82.854	S82.301A	S93.432
	S82.845	S82.61XA	S82.54XA	S82.874	S82.855	S82.302	S93.432A
	S82.846	S82.61XA	S82.55XA	S82.875	S82.856	S82.302A	S93.439
	S82.846	S82.63XA	S82.56XA	S82.876	S82.851A	S82.309	S93.439A
	S82.842A				S82.852A	S82.309A	
	S82.844A				S82.853A	S82.39	
	S82.845A				S82.854A	S82.391	
					S82.855A	S82.391A	
					S82.856A	S82.392	
						S82.392A	
						S82.399	
						S82.399A	

Table 4-2

Demographics and Chi-Square calculated p-values for subjects with and without adverse events prior to obtaining terminal (surgical) treatment for acute ankle injuries.

Variable	All n (%)	Patients With Adverse Events n (%)	Patients Without Adverse Events n (%)	χ^2 Statistic	P value	Odds Ratio
Payer Source						
Private	35 (18)	5 (15)*	29 (85)	0.000	.982	1.012
Medicare	24 (12)	6 (25)*	18 (75)	2.389	.122	2.212
Medicaid	31 (16)	4 (13)	27 (87)*	0.084	.772	1.182
Workers Comp/ Liability	21 (11)	2 (10)	19 (90)*	0.485	.486	1.704
Self/No Pay	8 (4)	2 (15)*	6 (75)	0.727	.394	2.012
Other	74 (38)	9 (12)*	65 (88)	0.567	.452	1.386
Sex						
Male	107 (55)	17 (16)*	89 (84)	0.402	.526	1.302
Female	86 (45)	11 (13)	75 (87)			
Race						
White	88 (46)	12 (14)	76 (86)*	0.117	.732	1.152
Black	66 (34)	12 (18)*	54 (82)	1.045	.307	1.529
Hispanic	21 (11)	1 (5)	20 (95)*	1.826	.177	3.75
Other	17 (9)	3 (18)*	14 (82)	0.141	.708	1.285
Residence						
Private Home	176 (91)	24 (14)	151(86)*	1.520	.218	2.111
Nursing Home	0					
Homeless	10 (5)	2 (20)*	8 (80)	0.248	.618	1.499
Other	6 (3)	4 (67)*	2 (33)	1.748	.186	3.077
ETOH Intoxication						
yes	29 (15)	3 (10)	26 (90)*	0.493	.483	1.570
no	163 (85)	25 (15)	138 (85)			
Drug Intoxication						
yes	9 (5)	2 (22)*	7 (78)	0.442	.506	1.724
no	183 (95)	26 (14)	157 (86)			
Isolated Injury						
yes	163 (84)	27 (17)	135 (83)*	3.613	.057	5.814
no	30 (16)	1 (3)	29 (97)			
Admitted Hospital						
yes	95 (49)	8 (9)	86 (91)*	5.452	.020**	2.755
no	98 (51)	20 (20)	78 (80)			
	Mean (SD)	Mean (SD)	Mean (SD)	t test statistic		
Age [#]	43.77 (14.0)	44.57(11.8)	43.62 (14.4)	-.330	.742	

Note. * Higher odds of event occurring. ** Statistically significant with $p < .05$. # this statistic indicates t-statistic.

Chapter 5

Summary

Inequalities in the burden of disease, injury, death, or health outcomes after illness or injury based on social status, race, sex, gender, sexual orientation and/or income lead to health disparities in the United States healthcare system (Institute of Medicine, 2001). The Institute of Medicine (Institute of Medicine, 2001), the Healthy People campaign (Office of Disease Prevention and Health Promotion, 2014), the National Institute of Nursing Research (2000), the U.S. Surgeon General (U.S. Department of Health & Human Services, n.d.), and the Kaiser Family Foundation (Ubri & Artiga, 2016) are call for a reduction in, or elimination of, health disparities in the United States.

The United States is unique among similar nations in that there is no universal payment system for the cost of healthcare for its citizens, with 28 million people remaining uninsured in 2015 (Kaiser Family Foundation, 2016). Patients without third party payer coverage often face poorer outcomes (Cone, Richardson, Todd, Betancort, & Lowe, 2003). Emergency Departments (EDs) bear a burden of cost to treat the uninsured due to the Emergency Medical Treatment and Labor Act (EMTALA), which mandates EDs to evaluate and stabilize all patients with injury or illness regardless of ability to pay (Centers for Medicare & Medicaid Services, n.d.). Non-private insurance status is associated with differences in patterns of care in adults visiting the ED (Mannix, Stack, & Chiang, 2012).

Homeless patients have a higher incidence of ED utilization and are more likely to be admitted to the hospital at a younger age (O'Toole et al., 2010). Homeless populations have higher rates of physical and mental illness, and substance abuse (Weber, Lee, & Martsolf, 2017). Homeless persons, along with other socioeconomic and racial minority classes, are among the most vulnerable populations that nurses serve.

The purpose of this dissertation was to examine how socioeconomic disadvantage, such as homelessness and lack of insurance, may affect trauma patients' healthcare and outcomes. Nurse practitioners working in the acute care setting are often the first providers to establish and direct the plan of care for many acutely injured patients and bedside nurses provide personal care and closely assess all patients, especially in the emergency department setting where patients must be evaluated regardless of ability to pay for medical care or socioeconomic status.

In Chapter 2 homeless persons are identified as trauma victims and nurses and nurse practitioners are presented as well positioned to utilize programs to assist these patients toward healing. The Trauma and Homelessness Initiative was used as an example of a program that serves a vulnerable population. The goals of the Trauma and Homelessness Initiative are compared to nurse practitioner attributes found in literature and training. There is a parallel in the aims of the initiative and nurse practitioners that supports that nurse practitioners (and nurses in general) are well positioned to both implement and lead such a program.

Chapter 3 is a report of a secondary data analysis using publically available data from the National Hospital Ambulatory Care Survey (NHAMCS) to determine whether payer source is associated with occurrence of return visits to the emergency department within 72 hours of an initial presentation for adults suffering an acute injury. Homelessness, along with being a minority race, was identified to have an increased odds ratio of returning to the ED within 72 hours after an initial visit. The 72-hour return visit could indicate that proper care was not provided during the initial visit, that patients did not follow the prescribed treatment plan, or that suggested follow-up was not attained (Kelly, Chirnside, & Curry, 1993). This can be an indication that the care for these vulnerable populations could be improved.

Chapter 4 is a description of a retrospective chart review completed at Truman Medical Center that explored whether patients who suffer an unstable ankle injury had an increased association between adverse events experienced prior to surgery and payer status or patient demographic features. There were no differences in adverse events encountered by acute ankle injury patients prior to receiving surgical treatment regardless of payer status, race, residence type or other demographics. Patients admitted to the hospital had a significantly decreased risk of having an adverse event while awaiting surgery and this facility admitted many more patients than would be expected in most facilities. These study results affirmed to healthcare providers at Truman that these patients are attended to without disparity.

These separate manuscripts have been compiled to broaden the literature on healthcare disparity by seeking to identify healthcare disparity in patients at a socioeconomic disadvantage such as the homeless and those who lack private insurance. I have determined that there is national data to indicate that healthcare disparity exists, and that local efforts have the potential to mitigate this disparity. I have also determined that nurses and nurse practitioners can be instrumental in improving care provided to disparate populations.

Summary of Final Results

As nurses take heed of problems with health disparity and work to seek ways to decrease disparity among low socioeconomic populations, formal programs to assist these populations can prove valuable in addressing disparity. In Chapter 2, I explored the Trauma and Homelessness Initiative to explore health determinants for one particularly vulnerable population, the homeless. This commentary revealed that nearly all homeless persons are either the direct victim of, or close witness of, trauma. The Homelessness and Trauma Initiative is a program that can be used by nurses and nurse practitioners to assist vulnerable patients. Specifically, the traits of the nurse

practitioner identified in literature and nurse practitioner attributes instilled during nursing education were compared to the goals of the trauma and homelessness initiative. In comparing the two, there is much overlap in the goals of the Trauma and Homeless Initiative and the characteristics that define the nurse practitioner. These findings align nurse practitioner's abilities with this initiative. Thus, nurse practitioners are well suited to both lead and implement programs like the Trauma and Homelessness Initiative.

Although claiming that nurses and nurse practitioners can lead programs to improve outcomes in vulnerable populations is important, it is also important to identify where healthcare disparities for vulnerable populations exist. Two separate studies were used to look for disparities in outcomes in ED patients to provide a broad perspective of differences in outcomes based on payer status and socioeconomic factors. Chapter 3 was a report of a secondary data analysis using the National Hospital Ambulatory Medical Care Survey (NHAMCS), a large publically available database, to explore whether acutely injured ED patients had different outcomes measured by a 72-hour return visit rate. The sample was comprised of 3,399 patients identified from across the United States who visited the ED for acute injury and were discharged to home in 2013. The 72-hour return variable was used as a surrogate to identify poor assessment and treatment plans delivered during the initial visit, patient failure to follow the prescribed treatment plan, or a failure of patients to secure follow up or continued care after an ED visit (Kelly et al., 1993). Bivariate and regression analyses were run with and without triage level included in the analysis. Bivariate statistics were analyzed with chi-square and post hoc analysis showed that those classified as "other race" were more likely to make return visits. Those identified as white race were less likely to make return visits, but this did not hold true when triage level acuity was included in the analysis. Logistic regression found an association

between being homeless and having increased 72-hour re-visits to the ED. Regression also showed that there was an increased number of re-visits for patients of Hispanic race when triage level data were not included and that those classified as “other” race had increased re-visits both with and without including triage level data.

Chapter 4 is the report of a retrospective chart review, which serves as a second study seeking to identify disparities. Subjects were a group of patients who were seen at one of the two EDs operated by Truman Medical Center in Kansas City, MO. All patients with an acute ankle injury identified as an injury that would typically be treated surgically who presented to the EDs between October 1, 2015 and May 1, 2018 were considered for inclusion in the study. The project was overseen by the dissertation chair and an orthopedic physician at Truman Medical Center. An orthopedic resident assisted to identify injuries expected to need surgery and medical students served as chart abstractors to maintain blinding during the data collection process. One hundred, ninety-two 192 patients were identified as presenting to the ED with an unstable ankle injury that had surgery recommended. In contrast to the national level data examined in Chapter 3, this study did not find a difference in adverse events patients faced while awaiting surgery to repair an acute ankle injury based on payer status or other demographics. The only difference seen was that patients directly admitted to the hospital from the ED had fewer adverse events prior to receiving surgery. There was also a high odds ratio (5.8) of patients with multiple injuries having more adverse events, but these results were not statistically significant.

While the retrospective chart review study was not consistent with the secondary data analysis study, the localized sample of patients does provide some insight into health disparity at the studied health system. Truman Medical Center has a subsidy program that allows patients who live within Jackson County, MO and meet income requirements to receive free or reduced

healthcare services regardless of the patient's lack of ability to pay. Orthopedic providers at Truman, who ultimately make admission decisions for the patients sampled, also admit more patients to the hospital from the ED than what has been reported in the literature elsewhere. These steps, along with the culture at a facility that serves many vulnerable populations, provide insight to nurses and the more general healthcare institution, that healthcare disparities can be mitigated. While it should not be implied that similar programs could eliminate health disparities across the field of healthcare, it is a good indication that policies in place at this facility are indeed helping alleviate the disparity problem for at least one segment of their patient population.

Implications for Practice and Future Research

Patients presenting to the United States healthcare system are a diverse group varying in ancestry, culture, race, political beliefs, and socioeconomic status. The quality of healthcare provided to any patient should not be associated with that individual's background or experience. Evidence for different health outcomes based on socioeconomic or demographic factors confirm that disparities exist in our delivery of healthcare to a broad population.

In Chapter 2, we explored the Trauma and Homelessness Initiative as an example of an intervention that nurses and nurse practitioners are well positioned to both utilize and lead in order to decrease health disparity. While this commentary indicated that nurse practitioners have the attributes to be effective, a prospective study evaluating nurse practitioner led interventions could provide further evidence. Examining success of interventions led by nurse practitioners compared to similar interventions led by other healthcare providers could assist the nurse practitioner in establishing themselves as independent healthcare providers if results show that nurse practitioners offer the same or better outcomes than other providers such as physicians.

Only by owning and leading healthcare interventions and being successful in their efforts will nurse practitioners continue to verify their ability to provide the best healthcare.

Although testing the effectiveness of nursing interventions is important to successful nursing practices, the first step in progress toward eliminating health disparities is to know where they exist by identifying and documenting them (Milburn, Beatty, & Lopez, 2019). In this dissertation I have shown that, at a national level, disparity exists in the emergency department, at least in regard to race and homelessness. Nurses should be aware that there are disparities in healthcare. By identifying and acknowledging that in the emergency department minority races and homeless patients are more likely to return to the ED, nurses can focus follow-up care and instructions on these disparate populations. Since 72-hour revisits are often associated with failure to properly carry out healthcare instructions or an inability to obtain follow-up care, healthcare systems may find it useful to provide additional support to vulnerable populations. Systems could implement “follow-up” nurses or other case management workers to ensure that patients are receiving proper follow-up care and do not feel the need to return to the emergency department. These follow-up personnel could directly assist patients to overcome barriers to continued care. It may also be necessary to provide more complete and terminal treatment in the ED, or provide for hospital admission from the ED in order to obtain more terminal care for these patients who may face barriers to follow-up care.

The secondary data analysis found that, in a generally injured patient that is not admitted to the hospital, rates of return visits to the ED within 72 hours do not change based on payer status. While this marker of health outcomes does not indicate disparity, other social factors that extend from difficulties paying for services may be quite disparate. For instance, not having the ability to pay for service could lead to a large financial burden following an injury that could

result in income loss, failure to invest for future financial stability, inability to further education or job training, loss of property, or bankruptcy. These financial struggles could lead to further social problems such as withdrawal from activities with friends, struggles within marriages or families, or lead to feelings of anxiety or depression. Findings that indicate there is no acute disparity in health outcomes do not rule out disparity for all populations. Such findings could be the focus of future research. Longer term markers of outcomes related to an acute injury could be the focus of future research. The current results also could be verified by examining a similar population against other health care outcomes such as mortality, chronic issues such as pain or even patient satisfaction with the visit.

While there is an argument that progress in implementation of effective interventions is lacking (Milburn et al., 2019), the findings that Truman Medical Center's efforts to ensure acute ankle fracture patients are provided with surgical services could indicate effectiveness of their policies to decrease health disparity, at least for this cohort of patients. While all systems face different challenges that lead to health disparity, Truman has long been committed to providing care to vulnerable populations and may have a structure in place that could be a model for other institutions seeking to decrease health disparity. The primary differences at Truman are the availability of alternative payment sources for patients that live within Jackson County, MO, a lower threshold for admitting surgical patients who face socioeconomic barriers to follow-up care, and a culture of healthcare workers that provides care without bias.

The findings that Truman Medical Center provides care without disparity should encourage further research within this localized population. Expanding this research to include longer term, patient centered outcomes, such as return of full pre-injury function, chronic pain, or post-surgical wound infections could provide additional information about health disparities at

this facility. Including other types of patients, or patients managed by teams within the hospital other than the orthopedic group could further support or refute the idea that this facility is indeed providing care without disparity. I have also made the claim, which is supported by other researchers at Truman, that there may be a culture at Truman where a large part of the patient population is considered to be vulnerable. Given this large group of vulnerable patients, a culture may be instilled within healthcare providers to better treat all patients more equally than may be the case in environments where fewer patients present who could be considered part of a vulnerable population. Studies to examine attitudes and beliefs toward vulnerable populations or how these populations are treated may help to strengthen this claim. Data could be expanded to include other, similar healthcare facilities that treat a similar population to determine if it is the norm in the area to provide non-disparate care. Additional research using a larger sample size and including a broader population would provide for an evaluation of the generalizability of the current findings. This study could also lay the groundwork for a prospective study that could bolster the rigor of the research.

Given the current debates about healthcare in U.S. politics, these data could be an indication to support policy change to decrease health disparities. The current corporate and profit driven systems of healthcare that seem to dominate the industry will continue to support healthcare to those who have private insurance or the means to pay for services. This profit driven approach can only lead to increases in healthcare disparity. The evidence supported by this dissertation indicates that healthcare disparity does exist and that there may be ways to decrease disparity. Policy makers should be aware that decisions can be made to improve healthcare for vulnerable populations and that barriers can be overcome, but there needs to be incentive to do so. For example, I have identified that 72-hour return visits to the ED are higher

for some groups of patients. One suggestion to reduce this is to provide additional nursing or case worker follow-up to ensure that there are not barriers to continuing prescribed treatment after the ED visit and suggested follow-up is obtained. However, this is a labor service that currently has no reimbursement attached, thus policy would need to incentivize institutions to add this position to their payroll. I have also suggested that a hospital lead subsidy program may be one factor in reducing healthcare disparities. Policies that help to provide funding for poorer patients without ability to pay could be one way to decrease disparity beyond the small population studied.

Author's Research Summary

Personally, this dissertation is likely the culmination of my long progress toward a terminal academic degree. My academic experiences have taken me from classrooms, to farms, and to science labs, and onto hospitals, clinics and simulation labs. I have spent much time as a student, both on one of many campuses and online, and have served as instructor and adjunct instructor in a variety of settings including classrooms, labs, barns, and online. I have been bestowed degrees from colleges of agriculture and schools of medicine and nursing. This degree will allow me to advance toward developing an academic arm of my nursing career. While I have always considered myself a stronger teacher than a researcher, gaining this research focused degree has positioned me well to continue to advance science.

My biomedical research background has directed me toward quantitative study and this will continue to be the focus of my research trajectory. As a nurse, I have enjoyed research that is patient centered, as opposed to the basic science research I was exposed to in previous graduate studies. Incorporating the work I have done on this dissertation, especially in chapter 4, into my current position as a Nurse Practitioner in the ED at Truman Medical Center seems

prudent. Given the excitement that this study can bring to the institution by indicating that we are serving some patients without disparity, I think it is important to continue to explore this as suggested above. Opportunities to mentor nursing students, medical students, and residents to complete studies to generalize these results to the rest of the hospital's population is a shorter-term goal to expand on this research and incorporate teaching into my current clinical practice. I hope to continue to ask and seek answers that improve patient health outcomes and decrease barriers to receiving the best care. My hope is to continue to bring research to the patient level and to the bedside to inspire change in policy or practice that will advance healthcare.

Conclusions

This study underscores the importance of focusing on vulnerable populations and identifying health disparity in an attempt to move toward eliminating such disparities. Previous research indicates that disparity is an important healthcare phenomenon that deserves focus. The research presented in this dissertation via three separate research projects has identified first that trauma is nearly universal in the homeless population, a particularly vulnerable population. Nurse practitioners and nurses have the attributes and training to use programs such as the Trauma and Homelessness Initiative to assist in managing the health of these populations and lead in this service.

I have also identified that, in a United States national sampling of the population of patients presenting to the emergency department with an acute injury and discharged home from the ED, there are demographic groups that have increased return visits to the ED within 72 hours, which may be a manifestation to barriers within healthcare that prevent proper follow-up. An additional study assessed disparity at a single health system and failed to identify any disparity in patients suffering an acute ankle injury that required surgical fixation for healing. There were no

statistical differences between payer source groups or demographic groups in rates of adverse events occurring prior to obtaining surgical treatment. These notably negative findings however, are quite encouraging in that this health system is managing its vulnerable populations well and has decreased healthcare disparity for at least one group of its patients. This research has shown that those who were admitted to the hospital had a decreased likelihood of having an adverse event while awaiting surgery. Improved outcomes with admission, coupled with the finding that there was a higher rate of admissions from the ED than is believed to be standard, may be a cause of the decreased disparity seen. There may be aspects of the policies at this health system that could serve as an example to others in the healthcare industry looking to reduce healthcare disparity.

Nurses are the front line individuals caring for and establishing relationships with patients. Regardless of the financial structure of the health system, emergency department nurses in particular are tasked for caring for all patients who present for care, regardless of ability to pay or socioeconomic status because of laws that require emergency departments to evaluate all comers. By acknowledging that disparity exists among patient groups and working to decrease this disparity, we can continue to provide the best care for all patients. At the same time we can embody the traits of compassion and caring that define a nurse in knowing that our profession is providing the very best nursing care to all aspects of the diverse populations we serve.

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Appendix A

Variables and Definitions for Project II

Variable	Theoretical Definition	Operational Definition
Re-visits to Emergency Department within 72 hours	Patient who make a second visit to the ED within 72 hours of discharge from the ED. This has been used as a surrogate for poor initial management of the patient, or poor patient compliance with medical advice.	<p>Patients who returned to the ED within 72 hours for any reason as reported in the NHAMCS data set.</p> <p>1=Yes 0=No</p> <p>Nominal Level Data</p>
Payer Source	Type of insurance coverage that pays for medical and surgical expenses	<p>Payer source as reported by the NHAMCS data set</p> <p>1=Private Insurance 2=Medicare/Medicaid/Workers' Compensation 3=Self-Pay/No Charge 4=Other [Other sources of payment not covered by the above categories, such as TRICARE, state and local governments, private charitable organizations, and other liability insurance (e.g., automobile collision policy coverage).]</p> <p>Nominal Level Data</p>
Age	Time of person's life since birth	<p>Age in years as reported by the NHAMCS data set.</p> <p>Age in years 93 and older are reported as 93</p> <p>Ratio Level Data</p>
Gender	Reproductive sex of the person	<p>Gender of patient as reported by the NHAMCS data set</p> <p>1=male</p>

		2=female Nominal Level Data
Race	A social construct that presumes to link people to a common origin, often inferred by a person's outward appearance.	Identified by respondent. With missing data imputed. As reported by the NHAMCS data set 1=Non-Hispanic White 2=Non-Hispanic Black 3=Hispanic 4=Non-Hispanic Other Nominal Level Data
Residency of patient.	Where the patient normally lives	As reported by the NHAMCS data set 1=Private Home 2=Nursing Home 3=Homeless 4=Other Nominal Level Data
Patient's triage level	Score of severity of patient illness or injury generally assigned by trained nurses	As reported by the NHAMCS data set using a level 1 through 5 with 1 being the highest acuity requiring the most timely and intensive allocation of department resources. 1=Immediate/Emergent 2=Urgent 3=Semi-urgent/non-urgent Nominal Level Data

Appendix B

Variables and Definitions for Project III

Variable	Theoretical Definition	Operational Definition
MR (Medical Record Number)	Numerical identifier assigned to patients by a healthcare institution	MRN as recorded in the patients EMR <i>To be used only to identify the patient to review the EMR for purposes of this study. Will not be attached to data when analyzed or shared with anyone except for the data collector and primary investigator.</i>
Patients Last Name	Family name given to denote identity.	Last name as recorded in the patients EMR <i>To be used only to identify the patient to review the EMR for purposes of this study. Will not be attached to data when analyzed or shared with anyone except for the data collector and primary investigator.</i>
Age	Time of person's life since birth	Age in years as reported by the EMR. Age <18 excluded. <i>Ratio Level Data</i>
Sex	Reproductive sex of the person	Sex of patient as reported by the EMR male* female <i>Nominal Level Data</i>
Race	A social construct that presumes to link people to a common origin, often inferred by a person's outward appearance.	As reported by the EMR Non-Hispanic White* Non-Hispanic Black Hispanic Other <i>Nominal Level Data</i>
Payer Source <i>Primary Independent Variable</i>	Type of insurance coverage that pays for medical and surgical expenses	Payer source as reported by the EMR Private Insurance* Medicare/Medicaid Workers' Compensation/Liability Self-Pay/NoCharge Other

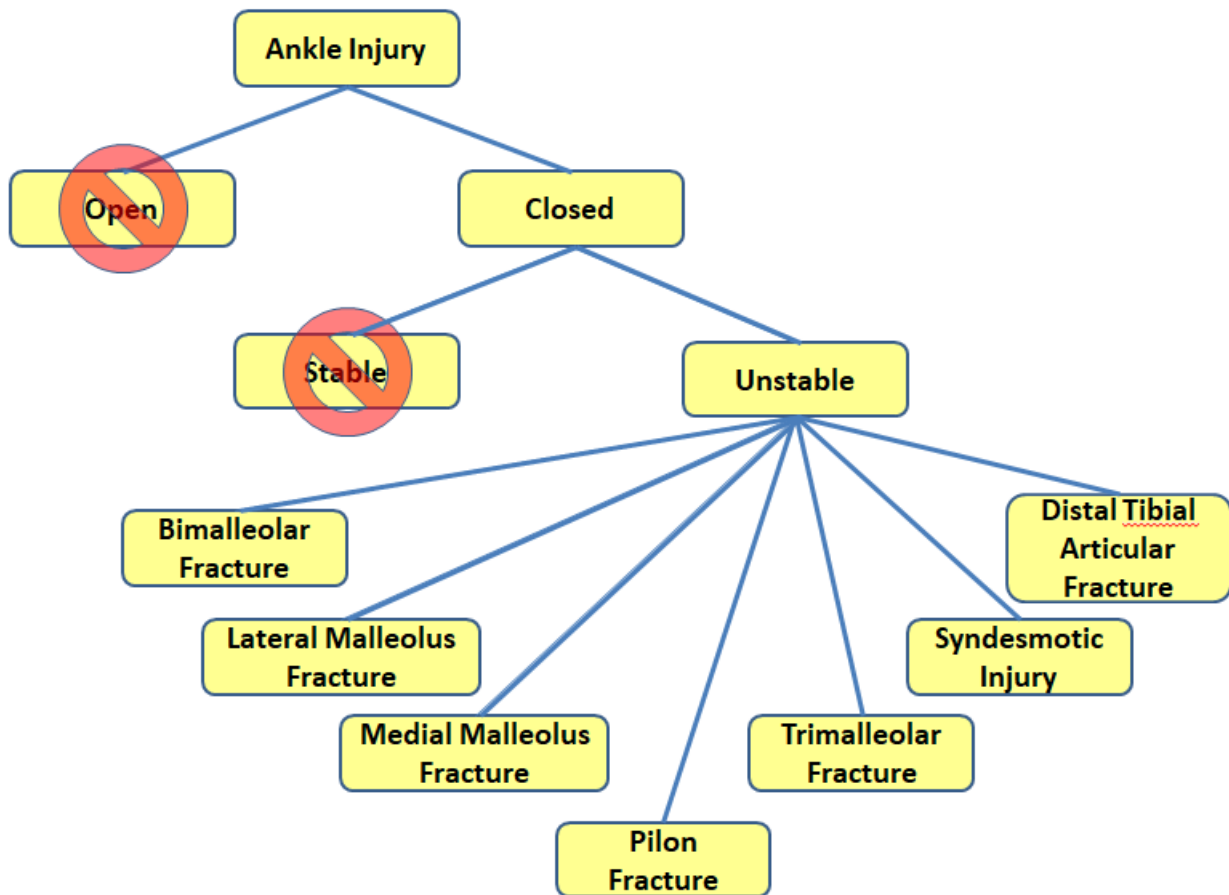
		<p>* For the primary research question the categories will be 1) Insurance (all categories except for self-pay/no charge) and 2) self-pay/no charge</p> <p>* Secondary analysis will look at insurance categories.</p> <p><i>Nominal Level Data</i></p>
Residency of patient.	Where the patient normally lives	<p>As reported by the EMR</p> <p>Private Home* Nursing Home Homeless Other</p> <p><i>Nominal Level Data</i></p>
Days Elapsed prior to Initial ED Evaluation.	The amount of time that passes between the date-of-injury and an initial evaluation.	<p>As reported in the EMR.</p> <p>Days from injury elapsed prior to initial evaluation.</p> <p><i>Ratio Level Data</i></p>
ETOH Intoxication	Patients who are altered due to use of alcoholic beverage.	<p>As reported within the EMR.</p> <p>No*</p> <p>Yes = Looking at the visit note for the initial visit for current injury, yes will be checked if there is a notation in the note related to alcohol intoxication or if an intoxication, a lab value blood alcohol level of 80mg/dl or higher, or abuse ICD code is entered at the time of this visit.</p> <p><i>Nominal Level Data</i></p>
Illicit Substance Abuse	Patients with regular use or dependence on an illicit drug.	<p>As reported within the EMR.</p> <p>No*</p> <p>Yes = Looking at the visit note for the initial visit for current injury, yes will be checked if there is a notation in the note related to drug use or intoxication or if an intoxication, a lab result showing presence of illicit substance, or abuse ICD code is entered at the time of this visit for any illicit</p>

		<p>substance except for marijuana only. Yes, Marijuana Only = if only marijuana is noted in the chart</p> <p><i>Nominal Level Data</i></p>
Isolated Injury	Where there other significant injuries sustained during the same traumatic event?	<p>Other injuries noted on initial ED visit as occurring at the same time as the Ankle Injury.</p> <p>- Exclude minor injuries not treated besides basic first aid such as RICE recommendations such as...</p> <p>Abrasions Contusions Sprains</p> <p>yes no*</p> <p><i>Nominal Level Data</i></p>
Re-injury of Site	Re-injury or re-dislocation of site of original injury prior to surgical repair.	<p>Any notation in the EMR after injury and before surgery that there was new or worsening of injury site.</p> <p>no* yes</p> <p><i>Nominal Level Data</i></p>
Delay in Surgery	Failure to undergo recommended surgery within acceptable timeframe.	<p>Failure to document surgical procedure in EMR within 3 weeks of initial date of injury. Greater than 3 weeks defined as 22days since date-of-injury or more.</p> <p>no* yes</p> <p><i>Nominal Level Data</i></p>
Lost to Follow-up	Failure to return for recommended surgical procedure after being diagnosed with fracture.	<p>Failure to document surgical procedure in the EMR within 8 weeks following initial date of injury</p> <p>no* yes</p> <p><i>Nominal Level Data</i></p>
Return ED visit	Any return visit to the ED for a	Record of ED visit with primary cc

	primary reason related to the injury, prior to surgical intervention.	<p>being related to affected site for any reason as recorded in the EMR.</p> <p>no*</p> <p>yes – for pain only</p> <p>yes – for any problem other than pain = any indication by provider notation or patient complaint of any complication other than pain alone. If any intervention is completed other than pain control measures</p> <p><i>Nominal Level Data</i></p>
New Traumatic Injury	Any new traumatic injury suffered following the initial diagnosis, prior to recommended surgical intervention.	<p>Any notation in the EMR of repeat ED visit for new injury (not to same site) or another injury recorded related to a traumatic event.</p> <p>no*</p> <p>yes</p> <p><i>Nominal Level Data</i></p>

Appendix C

ICD-10 Codes Identified to Select Charts to be Reviewed

**Exclusion:**

Open Fractures

Inclusion Codes

S82.843A Ankle Fracture

Bimalleolar Fracture

- S82.841 Displaced bimalleolar fracture of right lower leg
- S82.842 Displaced bimalleolar fracture of the left lower leg
- S82.843 Displaced bimalleolar fracture of unspecified lower leg
- S82.844 Nondisplaced bimalleolar fracture of right lower leg
- S82.845 Nondisplaced bimalleolar fracture of left lower leg
- S82.846 Nondisplaced bimalleolar fracture of unspecified lower leg
- S82.841A Displaced bimalleolar fracture of right lower leg, initial encounter for closed fracture
- S82.842A Displaced bimalleolar fracture of left lower leg, initial encounter for closed fracture
- S82.844A Nondisplaced bimalleolar fracture of right lower leg, initial encounter for closed fracture
- S82.845A Nondisplaced bimalleolar fracture of right lower leg, initial encounter for closed fracture

S82.63XA Lateral Malleolus Fracture

- S82.64XA Nondisplaced fracture of lateral malleolus of right fibula, initial encounter for closed fracture
- S82.65XA Nondisplaced fracture of lateral malleolus of left fibula, initial encounter for closed fracture
- S82.66XA Nondisplaced fracture of lateral malleolus of unspecified fibula, initial encounter for closed fracture
- S82.61XA Displaced fracture of lateral malleolus of right fibula, initial encounter for closed fracture
- S82.62XA Displaced fracture of lateral malleolus of left fibula, initial encounter for closed fracture
- S82.63XA Displaced fracture of lateral malleolus of unspecified fibula, initial encounter for closed fracture

S82.53SA Medial Malleolus Fracture

- S82.51XA Displaced fracture of medial malleolus of right tibia, initial encounter for closed fracture
- S82.52XA Displaced fracture of medial malleolus of left tibia, initial encounter for closed fracture
- S82.53XA Displaced fracture of medial malleolus of unspecified tibia, initial encounter for closed fracture
- S82.54XA Nondisplaced fracture of medial malleolus of right tibia, initial encounter for closed fracture
- S82.55XA Nondisplaced fracture of medial malleolus of left tibia, initial encounter for closed fracture
- S82.56XA Nondisplaced fracture of medial malleolus of unspecified tibia, initial encounter for closed fracture

S82.873 Pilon Fracture

- S82.871 Displaced pilon fracture of right tibia
- S82.872 Displaced pilon fracture of left tibia
- S82.873 Displaced pilon fracture of unspecified tibia
- S82.874 Nondisplaced pilon fracture of right tibia
- S82.875 Nondisplaced pilon fracture of left tibia
- S82.876 Nondisplaced pilon fracture of unspecified tibia

Trimalleolar Fracture

- S82.851 Displaced trimalleolar fracture of right lower leg

- S82.852 Displaced trimalleolar fracture of left lower leg
- S82.853 Displaced trimalleolar fracture of unspecified lower leg
- S82.854 Nondisplaced trimalleolar fracture of right lower leg
- S82.855 Nondisplaced trimalleolar fracture of left lower leg
- S82.856 Nondisplaced trimalleolar fracture of unspecified lower leg
- S82.851A Displaced trimalleolar fracture of right lower leg, initial encounter for closed fracture
- S82.852A Displaced trimalleolar fracture of left lower leg, initial encounter for closed fracture
- S82.853A Displaced trimalleolar fracture of left lower leg, initial encounter for closed fracture
- S82.854A Nondisplaced trimalleolar fracture or right lower leg, initial encounter for closed fracture
- S82.855A Nondisplaced trimalleolar fracture or left lower leg, initial encounter for closed fracture
- S82.856A Nondisplaced trimalleolar fracture or left lower leg, initial encounter for closed fracture

S82.3 Distal Tibial Articular Fracture

- S82.30 Unspecified fracture of lower end of tibia
- S82.301 Unspecified fracture of lower end of right tibia
- S82.301A Unspecified fracture of lower end of right tibia, initial encounter for closed fracture
- S82.302 Unspecified fracture of lower end of left tibia
- S82.302A Unspecified fracture of lower end of left tibia, initial encounter for closed fracture
- S82.309 Unspecified fracture of lower end of unspecified tibia
- S82.309A Unspecified fracture of lower end of unspecified tibia, initial encounter for closed fracture
- S82.39 Other fracture of lower end of tibia
- S82.391 Other fracture of lower end of right tibia
- S82.391A Other fracture of lower end of right tibia, initial encounter for closed fracture
- S82.392 Other fracture of lower end of left tibia
- S82.392A Other fracture of lower end of left tibia, initial encounter for closed fracture
- S82.399 Other fracture of lower end of unspecified tibia
- S82.399A Other fracture of lower end of unspecified tibia, initial encounter for closed fracture

S93.439A Syndesmotic Injury

- S93.431 Sprain of tibiofibular ligament of right ankle
- S93.431A Sprain of tibiofibular ligament of right ankle, initial encounter
- S93.432 Sprain of tibiofibular ligament of left ankle
- S93.432A Sprain of tibiofibular ligament of left ankle initial encounter
- S93.439 Sprain of tibiofibular ligament of unspecified ankle
- S93.439A Sprain of tibiofibular ligament of unspecified ankle, initial encounter

Appendix D

Defining Ankle Stability

Written by John Krumme, MD and Edited by Adam B. Dobbins, MS

Since Lange-Hansen published his classification on ankle fractures in 1948, orthopedists have continued to try to quantify and understand which ankle fractures can be considered stable and treated with protected weight-bearing versus the fractures that are unstable requiring open reduction internal fixation surgery (Lange-Hansen, 1948). Lange-Hansen (1948) described four mechanisms of ankle fracture that are still widely utilized, including supination-eversion (supination-external rotation) (SER), supination-adduction (SA), pronation-abduction (PA), and pronation-eversion (pronation-external rotation) (PER). There are also various stages of these injuries SER 1-4, SA 1-2, PA 1-3, and PER 1-4.

Several biomechanical and epidemiological studies have been utilized to determine stability in the variety of rotational ankle fracture (Clarke, Michelson, Cox, & Jinnah, 1991; Earll, Wayne, Brodrick, Vokshoor, & Adelaar, 1996; Fowler, Pugh, Litsky, Taylor, & Frency, 2011; Knutsen et al., 2016; Pakarinen, Flinkkil, Ohtonen, & Ristiniemi, 2011). These studies have suggested that deltoid ligament integrity has been the major factor in differentiating between a stable and unstable ankle fracture. These have been shown biomechanically by Clarke et al. (1991) where sectioning the deltoid ligament increased tibio-talar contact pressures where displacement of the lateral malleolus appeared to not have significant effect. This is has been applied to current practice where Lange-Hansen type injuries that are associated with a medial malleolus or injury to the deltoid ligament are more commonly considered an operative injury (Pakarinen et al., 2011).

It can be difficult to determine when the deltoid is insufficient based on clinical exam and non-weightbearing ankle x-rays. Therefore, differentiating between a stable SER2 injury and an unstable SER4 injury can be difficult. Several acceptable methods include manual stress external rotation radiographs, gravity stress radiographs, and weight-bearing radiographs (Egol, Amirtharajah, Tejwani, Capla, & Koval, 2004; Gougoulas & Sakellariou, 2017; Nortunen et al., 2017; Pakarinen et al., 2011; Seidel, Krause, & Weber, 2017; Yde & Kristensen, 1980). There has been continued debate about the optimal way to evaluate for instability in the isolated oblique fibular fracture at the level of the syndesmosis (Seidel et al., 2017). Though MRI and CT have been studied to determine stability of the ankle following fracture, stability can usually be noted with plain radiographs (Marzo et al., 2017; Nortunen et al., 2014; Phillips et al., 1985; Seidel et al., 2017). At the study site institution, non-weightbearing ankle x-rays with gravity stress radiographs are routinely used to determine instability of the tibio-talar joint when presented with an isolated lateral malleolus fracture though there is debate about whether this method has a higher false positive rate (Egol et al., 2004).

Instability will be confirmed by a senior orthopedic resident. The resident will draw on more than four years of training at the study institution to determine, based on examinations of radiographs obtained at the initial ED visit, which patients would normally be advised to have surgical repair. Below are listed basic indications to guide this decision. An experienced orthopedic surgeon will be available for consultation for any cases that are undiscernible by the senior resident. For project III, fracture patterns that will be considered stable (thus meeting exclusion criteria) are:

- Isolated lateral malleolar fractures such as SA1, SER1-2 without talar shift on initial radiographs or isolated lateral malleolar fracture with negative stress test, SER2

- Isolated nondisplaced medial malleolar fractures (PA1 or PER1 without displacement) or avulsion type fractures.

Fracture patterns that will be considered unstable (thus meeting inclusion criteria) are:

- Bimalleolar fractures SER4, PER4, PA3, and SA2
- Trimalleolar fractures
- High fibular fractures and positive stress test
- Lateral malleolar fracture and positive stress test (SER4)
- Displaced medial malleolus fractures (PER1 or PA1 with displacement)
- Lateral malleolus fractures with any lateral subluxation of the talus (SER4).
- Unstable syndesmotic Injury identified as tibiofibular clear space greater than 6mm or medial clear space greater than 3 on a mortise view or any more than 2mm of laxity on a stress view when compared to a non-stress view.

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Appendix E

Instructions for Abstractors

The Retrospective Chart Review as a methodology for gathering research has become a popular way to review large amounts of information captured in Electronic Medical Health Records. Data are imputed in real-time as patients are seen by healthcare staff or scribes and can be available for research purposes. This prerecorded data makes up to a reported 25% of all scientific studies in peer reviewed medical journals and 50% of emergency medical services journals, which shows how often this methodology is used.

This Method is alluring to researchers because the data are already collected, which saves time, and can address questions that prove to be difficult to collect data in a prospective trial, such as rare diseases or where exposures to research methods could be harmful. Charts can often be obtained with little or no cost and generally can be designated as a non-human subjects trial, easing the burden of gaining IRB support.

It is important to remember that data generated in medical records are not gathered for research purposes and thus there are limitations with this data. In order to provide the best analysis of this potentially flawed data, it is important that a strict set of guidelines be followed to ensure that there is validity in the results and that bias is minimized. Please review the attached articles by Gilbert et al. and by Kaji et al. to familiarize yourself with best practice methods for completing a retrospective chart review.

Since you are the abstractor retrieving data from the charts, we have not informed you of the purpose of this study or given you the research question. Our intention is to blind you from the study goals so that you will not be biased during your data collection tasks.

Please study and keep available at all times the Variables and Definitions sheet I will provide to you. This will give you guidance and definitions for each variable and what data to collect on them. Record the data directly on the Abstractor Log that I will provide for you. The log may be partially filled out when you receive it. Please take a moment to verify any information that is already completed and complete each box on the form in its entirety. If you have questions about a specific chart, please check the box at the top for “Needs Review”, and I will review it with you to help ensure proper abstraction.

We will have a training session, where we will complete several abstraction forms using patients who have a similar type of injury, but will not be a part of this study. I will work directly with you on these so that you fully understand the process. Also know that I will be reviewing about 10% of the charts you abstract to ensure that data is collected in line with the requirements of the study. This is a quality control measure for the study and strengthens the methods.

Please contact me at any time if you have questions. Thank you for taking the time to assist with this data collection. Once the data collection is complete, I am happy to discuss the research question, design of the study, and how the data will be used if you want to further your

understanding of this research. If you are interested, you are welcome to engage in the data analysis as well.

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