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## Impact of Utilizing the Nurse Practitioner Role in Trauma, and the Effect it has on Healthcare Utilization and Patient Satisfaction

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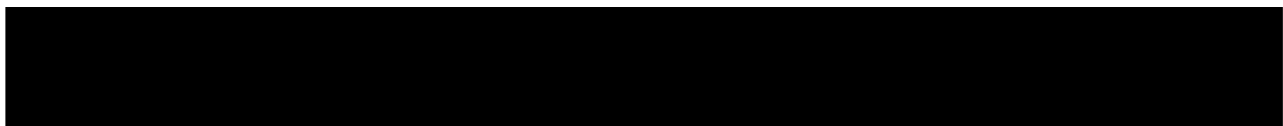
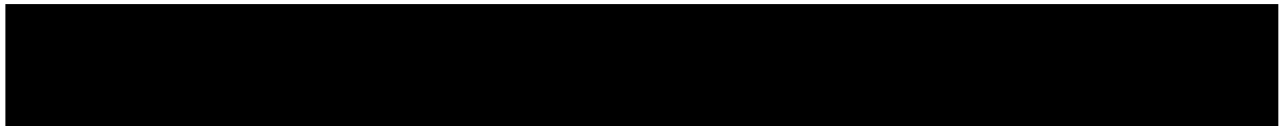
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A Scholarly Project  
Submitted to the  
Faculty of Liberty University  
In Partial Fulfillment of  
The Requirements for the Degree  
Of Doctor of Nursing Practice  
by  
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Liberty University  
Lynchburg, VA  
March 2018

Scholarly Project Committee Approval:



Liberty University

IMPACT OF UTILIZING THE NURSE PRACTITIONER ROLE IN TRAUMA, AND THE  
EFFECT IT HAS ON HEALTHCARE UTILIZATION AND PATIENT SATISFACTION

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By

Jason A. Pillkerton

March 2018

## Abstract

The addition of Nurse Practitioners (NPs) on the trauma service at night was examined to see if it has positively impacted healthcare utilization and satisfaction in trauma patients. This four-month evidence-based, quasi-experimental project took place on the Trauma Medical Surgical Unit (TMSU) at a level II trauma center in California. Retrospective analysis of medical records and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) satisfaction surveys were performed for those trauma patients located on the TMSU 60-days prior to NPs starting at night and 60-days after. The measured outcomes were LOS, readmissions within 30-days of discharge, LOS after readmission, and HCAHPS survey questions seven, eight, and nine, which are relevant to provider-patient interactions. Pre-intervention population results were; 5.99 days LOS (mean=5.99, SD=4.49), 5.15 days LOS with outliers removed (mean=5.15, SD=3.02), 3.22 for each HCAHPS question measured (question 7 mean=3.22, SD=1.11, question 8 mean=3.22, SD=1.08, question 9 mean=3.22, SD=0.94), and two-readmissions to equal five-days LOS after readmission. Post-intervention population results were; 6.36 days LOS (mean=6.43, SD=6.02), 5.10 days LOS with outliers removed (mean=5.10, SD=3.03), 3.83, 3.94, and 3.72 respectively for each HCAHPS question measured (question 7 mean=3.83, SD=0.38, question 8 mean=3.94, SD=0.24, question 9 mean=3.72, SD=0.46), and zero-readmissions. Use of trauma NPs at night improved healthcare utilization and patient satisfaction, resulting in a cost-savings.

*Keywords:* trauma, nurse practitioner, healthcare utilization, patient satisfaction

IMPACT OF UTILIZING THE NURSE PRACTITIONER ROLE IN TRAUMA, AND THE  
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Impact of Utilizing the Nurse Practitioner Role in Trauma, and the Effect it has on Healthcare  
Utilization and Patient Satisfaction

Human injury related to trauma has occurred ever since God created humans in His own image and placed them on earth to live on the land and will continue to occur until the end of time. Therefore, it is safe to say that as long as people are roaming the earth, injury from trauma will continue to occur. In the United States (US) alone, traumatic injury accounts for 41 million Emergency Room (ER) visits yearly, of which 2.3 million require acute hospitalization for their injuries (Noffsinger, 2014). These significant figures suggest that humans are going to continue to sustain traumatic injury that will often require the expertise of providers who understand the dynamics of trauma and can adequately provide care to this patient population.

Trauma is the leading cause of death in people 45 years of age and younger and is the fourth leading cause of death for all ages ("The American Association for the surgery of trauma," n.d.). Furthermore, the US alone spends approximately \$400 billion annually on traumatic injuries (Olufajo et al., 2016). The significance here is that with this many people getting injured by a traumatic mechanism, trauma centers across the US will need an abundance of resources to care for these patients, which most importantly includes a significant number of trauma providers. Sise et al (2011) states, "optimal care of the injured at a level II trauma center requires the commitment of significant resources, both human and capital" (p. 560). Currently, in the US there is a shortage of qualified emergency and trauma physicians, which often leaves smaller hospitals without sufficient resources to care for injured patients (Gillard et al., 2011). Mower-Wade and Pirrung (2010) states, "trauma centers are faced with gaps in patient coverage" (p. 69). Furthermore, evidence suggests that for optimal care to be provided to these trauma patients, 24-hour coverage by trauma providers is essential (Gillard et al., 2011). With a shortage of qualified

physicians to provide trauma care, minimal resource incentives available to attract new trauma physicians, and a mandatory regulatory reduction in the number of resident hours, there is a decreased ability to provide care to these trauma patients (Gillard et al., 2011). Nationwide, this leaves a large gap between the provider coverage that is required for quality care to be given to these patients, and the minimum provider coverage that is often available.

In attempt to close the gap in trauma provider coverage, trauma centers are utilizing Nurse Practitioners (NPs) in the trauma provider role. NPs have a long history of filling gaps in the delivery of healthcare (Noffsinger, 2014). In 1990, a study showed that NPs could be effectively utilized on the trauma service, as evidenced by a decrease in overall Length of Stay (LOS) of those trauma patients who received care from NPs (Spisso, O'Callaghan, McKennan, & Holcroft, 1990). According to the Society of Trauma Nursing (STN), NPs can handle these roles, and due to the shortage of qualified trauma physicians, and health policy issues such as the Affordable Care Act (ACA), the role for NPs in trauma has quickly evolved (Resler, Hackworth, Mayo, & Rouse, 2014).

In the acute care setting, the role of the NP has a holistic background, which allows them to provide patient-centered care that is directed at the whole person and their surrounding environment (Sangster-Gormley, Frisch, & Schreiber, 2013). The uniqueness to the care that NPs provide is described as a contributing factor to both successful patient outcomes and care that is cost-effective (Sangster-Gormley, Frisch, & Schreiber, 2013). Although there are proven benefits to the care NPs provide, there will be some opposition to any plan that includes the utilization of NPs on the trauma service. However, Mower-Wade and Pirrung (2010), states, "the trauma Advanced Practice Nurse (APN) role is continuously evolving to meet the demands of patient care related to volume, staff needs, and patient/family needs" (p. 69). This will be significantly

impactful to the outcomes of trauma patients, the ability to provide adequate trauma provider services, the advancement of the nursing profession, and the role of the NP.

### **Background**

There is a large Magnet® hospital in California that has been serving the medical needs of acute trauma patients in the region for over 30 years. This facility's trauma service offers daily 24-hour in-house trauma surgery coverage. However, this level II trauma center has noticed a constant decline in the number of physicians that are proficient in trauma surgery, as several have either retired, changed organizations, or changed specialties. This undoubtedly has been compounded by the current shortage in the US of qualified trauma physicians (Gillard et al., 2011). In addition, this medical facility does not use residents to offset their shortages, causing there to be a significant gap in trauma provider coverage at this institution.

For several years, these gaps in coverage were evident on both the day and night shifts. However, this facility began utilizing NPs two years ago during the daytime hours to care for those trauma patients on the Trauma Medical Surgical Unit (TMSU), and results have been positive. Trauma surgeons have expressed gratitude for their assistance, the workload of the day shift trauma surgeon has been reduced, and gaps in trauma provider coverage during the day appears to have been lessened. However, glaring gaps on the trauma service during the night shift remained, as coverage at night has historically been provided by a single trauma surgeon. Even though the expectations and workflows for the two shifts are similar, at night one trauma surgeon has similar responsibilities that up to two trauma surgeons and one NP have during the day.

Prior to bringing NPs onto the trauma service to care for patients on the TMSU during the day, there was minimal organizational knowledge of the benefits that NPs could bring to this

service. However, with the positive reviews that the day shift NPs have received and the favorable support by the trauma physicians; organizational stakeholders have allowed the trauma service to be staffed at night with a NP in attempt to lessen the gaps in trauma provider coverage during the night shift. Morris et al (2012) states, “loss of resident availability, non-physician providers (NPs) have been used in many health systems to help meet the consistent demand of patient care” (p. 474).

This trauma center hired its first NP to work on the night shift in June 2017, and in September 2017, one NP began working 12-hour shifts during the night, 3 days per week. California is a state that offers NPs a restrictive scope of practice. According to the California Board of Registered Nursing (BRN), NPs must practice under standardized protocols and procedures that are jointly developed by NPs and their supervising physician’s (“State of California Board of Registered Nursing,” 2011). Therefore, workflows and duties during the night shift for the trauma NP are centered around working in close contact and constant collaboration with the night shift trauma surgeon. This allows for two professions to come together to provide care for those patients that are on the TMSU.

Early reports have been extremely positive, which has prompted this medical organization to hire two others in October 2017 to provide full seven-day coverage on the night shift. Even though feedback has been positive for the trauma service since NPs began working alongside trauma surgeons during the night, data is required to examine if the addition of the night shift NPs have been impactful on improving the healthcare utilization and satisfaction of the patients on the trauma service. To assist with quantitatively understanding the impact of using NPs at night, the project leader utilized the Iowa conceptual model for evidence-based practice as the structured framework for this project.

### **Problem Statement**

This trauma center has the desire to improve healthcare utilization and satisfaction of the trauma patients that are cared for at this medical facility. In the 2<sup>nd</sup> quarter of 2017, trauma patient LOS and readmissions that occur within 30-days of discharge had increased over the 4<sup>th</sup> quarter of 2016. In addition, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) satisfaction scores have decreased in the 2<sup>nd</sup> quarter of 2017 when compared to the last quarter of 2016. These results have prompted the need to initiate a workflow process review to closely look at the trauma service, as it is perceived that gaps in night shift trauma provider coverage have contributed to the identified triggers of increased LOS, increased readmissions that occur less than 30-days from discharge, and decreased HCAHPS scores.

With a shortage in the US of qualified trauma physicians, adding another physician to the trauma service is not currently a practical solution. Therefore, attempts to fill the gaps in provider coverage on the trauma service will be through changing workflows and adding more NPs to work in trauma. This proposed solution was initiated two years ago on the day shift and just a few months ago on night shift, which coincided with the commencement of this project. Since October 2017, there has been 24-hour 7-day per week NP coverage on the trauma service. This project evaluated if the addition of NPs on the trauma service, with specific focus on the addition of NPs on the night shift, have improved healthcare utilization and patient satisfaction in the trauma patients who are cared for on the TMSU.

### **Purpose**

Following the Iowa conceptual model for evidence-based projects, the model prompts the project leader to identify triggers or organizational priorities. This guides the development of the project purpose, as well as assists in devising the Population, Intervention, Comparison,

Outcome (PICO) question. Based on the organizational triggers identified above, this evidence-based project was developed because of the need to understand if the gaps in coverage on the night shift of the trauma service could negatively affect healthcare utilization and the satisfaction of trauma patients. The purpose of this project was to examine whether the addition of NPs on the night shift of trauma service could positively impact the healthcare utilization and satisfaction of the trauma patients that are cared for on the TMSU.

### **PICO Statement**

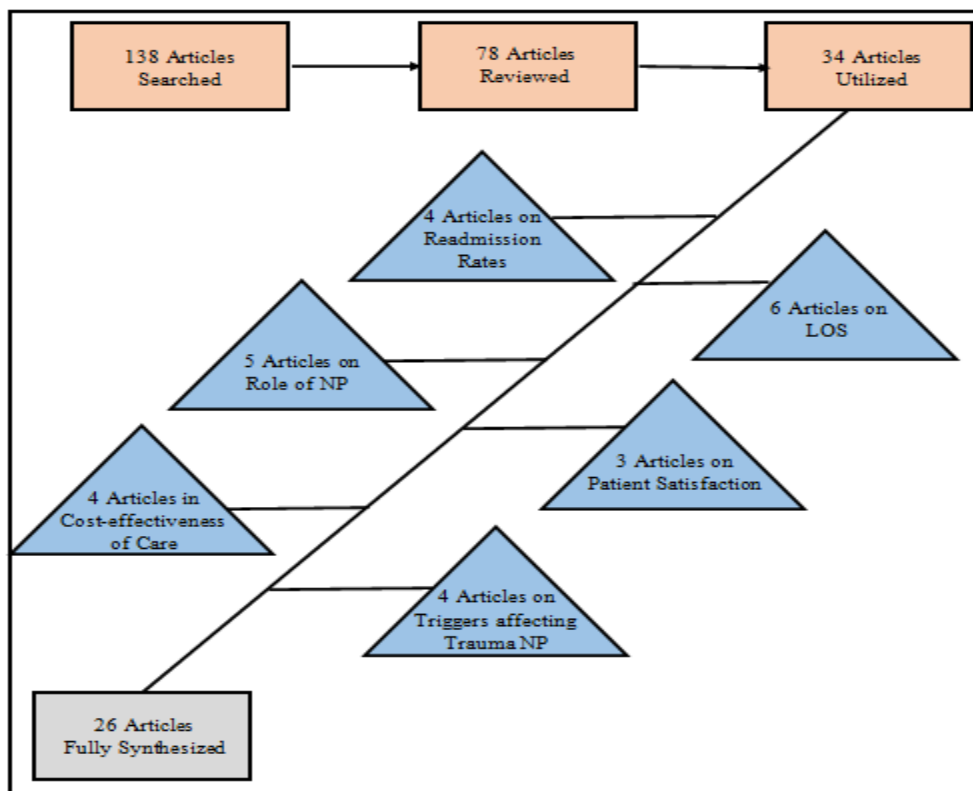
Similar to the purpose of this evidence-based project, the PICO question is, “Does the addition of trauma NPs working at night impact healthcare utilization and satisfaction of those trauma patients cared for on the TMSU, as evidenced by a decrease in LOS, a decrease in readmissions that are less than 30-days after discharge, and an increase in patient satisfaction scores for questions seven, eight, and nine of the HCAHPS satisfaction survey?” Those three questions are important, as they specifically address provider interactions with patients. Question seven asks if providers treat patients with courtesy and respect, question eight asks if providers listen carefully to patients, and question nine asks if providers explain information in an understanding way.

### **Review of Literature**

The project leader conducted a methodical literature search using several different searchable databases, including; Pub-Med, CINAHL, Cochrane Library, Google Scholar, and MEDLINE. The key words searched were; “roles of NP in trauma,” “roles of NP in acute care,” “how roles of NP effect patient outcomes,” “trauma patient length of stay,” “trauma patient satisfaction,” “staff satisfaction,” “trauma patient readmission rates,” “use of nurse practitioners,” “trauma nurse practitioners,” “patient outcomes affected by trauma nurse



practitioners,” and “cost-effectiveness of using trauma nurse practitioners.” The date ranges searched were from January 01, 2005 to September 01, 2017. This search yielded 138 articles, of which 78 articles seemed relevant to this project, and were reviewed. Out of those 78 articles, 34 were selected for their relevance to this project and were synthesized in greater detail. The review of literature has uncovered several main themes, including the role of the NP, how NPs in trauma contribute to patient satisfaction, inpatient LOS, 30-day readmission rates, cost-effectiveness of care provided, and the use of NPs not directly related to trauma.



**Figure 1.1** A diagram look at the Literature Review for this study

Out of the 34 relevant journal articles found, 26 were directly related to use of NPs in trauma and have been added to the summary and synthesis table. For those 26 journal articles, Melnyk’s level of evidence pyramid was consulted to better understand the evidence presented in each journal article. Based on the evidence pyramid, there was one level-one evidence article,

one level-two evidence article, 10 level-three evidence articles, one level-four evidence article, five level-five evidence articles, and eight level-six evidence articles. Also, out of the 26 articles synthesized, one article was not in the date range initially searched. However, this article is a 1990 classic study by Spisso et al regarding NPs in trauma, which adds to the quality of the project and was included in the summary and synthesis table.

### **Role of the NP**

For this project, it is extremely important to understand the role of the NP and how it is unique from other professional medical providers. Literature was reviewed specific to this topic, and findings show several traits that are unique to the role of the NP, and how it brings quality and value to inpatient services such as trauma (McManaway & Drewes, 2010; Lome, Stalnaker, Carlson, Kline, & Sise, 2010; Sangster-Gormley et al., 2013). Furthermore, Sise et al (2011) states, “alteration of provider roles and processes of care has the potential to maintain quality and reduce the cost of care” (p. 560). Literature shows that the utilization of NPs on the trauma service is a proven way to alleviate gaps in trauma physician coverage (Chakravarthy, 2008; Collins et al., 2014; Mower-Wade & Pirrung, 2010). Mower-Wade et al (2010) states, “when a trauma Advanced Practice Nurse (APN) works on the evening shift, the on-call trauma practitioner is able to focus on the new trauma admissions, while the evening APN responds to the patient floor needs” (p. 69). Literature points out that NPs practice from a holistic, patient centered perspective, which has been proven to positively affect patient outcomes (Sangster-Gormley et al., 2013). This is backed by Lome et al (2010), who states, “the NP’s holistic approach... has had a substantial impact on patient outcomes” (p. 80). Care led by NPs provide more value to patients, as NPs have a nursing foundation that focuses on holistic care, and health promotion (Sangster-Gormley et al., 2013). NPs provide safe and cost-effective care that is

comparable to the care provided by physicians (Sangster-Gormley et al., 2013). Literature points out that NPs place emphasis on communication, attention to detail, and flexibility with their practice, all contributing to increased patient outcomes (Lome et al., 2010). Lastly, it is discussed in the literature that the holistic care that NPs provide is comprehensive, cost-effective, and provides a high level of value to inpatient teams (McManaway & Drewes, 2010).

### **Patient Satisfaction**

Literature shows that patients tend to be more satisfied and trust the care provided by NPs (Sangster-Gormley et al., 2013). A study done in 2010 found that the use of NPs in trauma increases patient satisfaction scores (Mower-Wade & Pirrung, 2010). One study found that the use of NPs on the trauma service increased patient satisfaction (Collins et al., 2014). Similar findings were evidenced in another study in 2010, which demonstrated that the use of NPs in trauma increased patient satisfaction scores (Mower-Wade & Pirrung, 2010). Evidence has shown that proper utilization of trauma NPs will positively impact patient care (Lome et al., 2010). This role provides continuity of care, attention to detail, flexibility, and collaboration, which has shown to improve outcomes for trauma patients in areas such as patient satisfaction, LOS, readmission rates, and cost of care provided (Lome et al., 2010). Lastly, a 2007 study showed that satisfaction scores received from patients cared for by Advanced Practice Providers (NPs and Physician Assistants (PAs)) were strongly positive, as they felt that they were provided high-quality, compassionate, and timely care (Nyberg, Waswick, Wynn, & Keuter, 2007).

### **Length of Stay**

LOS is an important quality indicator for those who are associated with caring for patients in the hospital setting, as increased LOS translates to increased costs. Literature shows that when NPs have been utilized in trauma to compliment the physician's workload, successful

outcomes and decreased LOS have resulted (Chakravarthy, 2008). Furthermore, when NPs have been utilized on the trauma service, overall patient LOS has been decreased (Gillard et al., 2011; Mower-Wade & Pirrung, 2010; Jarrett & Emmett, 2009; Haan et al., 2007; Spisso et al., 1990). This is backed by a 1990 classic study by Spisso et al, who found that the use of trauma NPs can have a profound positive effect on patient outcomes (Spisso, O'Callaghan, McKennan, & Holcroft, 1990). A 2011 study found this to be true, as the use of NPs and PAs resulted in a reduction in the LOS of patients without increased complications (Gillard et al., 2011).

### **Readmission Rates**

Another quality indicator for hospitals nationwide are readmission rates. Copertino et al (2015) states, “unplanned readmissions to hospitals within 30-days of discharge ...are very costly, accounting for approximately \$17.4 billion of the \$104 billion Medicare hospitalization payments in 2004” (p. 268). Although not statistically significant, one study found that the utilization of NPs on the trauma service contributed to readmission rates being 3.6% lower than the previous two years without NPs (Woodfall et al., 2017). Lome et al (2010) states, “early data shows a decrease in ICU and overall LOS, decrease in complications, and decrease in readmissions” (p. 81).

### **Cost of Care Provided**

Cost of providing care is critical to all healthcare organizations and must be considered when any workflow process is revised. Like any entity, utilizing NPs to care for trauma patients must be cost-effective. It was discussed previously that the holistic nature of the NP role lends itself to patient care that is cost-effective (McManaway & Drewes, 2010). This is backed by Jarrett and Emmett (2009) who states, “NPs provide cost-effective, yet comprehensive medical care complemented by a holistic nursing approach” (p. 68). A 2015 study examined the LOS of

1464 trauma patients (674 patients in the pre-intervention population and 790 in the post-intervention population) whose LOS centered around NPs being added onto the trauma service (Hiza, Gottschalk, Umpierrez, Bush, & Reisman, 2015). Results, although not statistically significant, showed a decrease of 0.89 days in the LOS of those patients included in the post-intervention population (population cared for by trauma NPs) (Hiza et al., 2015). This resulted in an approximate savings of \$1,406,200 to the organization over the one-year intervention period (Hiza et al., 2015). Another study found that the use of NPs on the trauma service resulted in a cost savings of \$9,111.50 per trauma patient (Collins et al., 2014). This was backed by several other studies that found significant cost savings when NPs are utilized on the trauma service (Gottschalk, Umpierrez, Bush, & Reisman, 2015; Sise et al., 2011; Christmas et al., 2005).

### **Conceptual Framework**

The project leader used the Iowa model of Evidence-Based Practice (EBP) as the framework for this scholarly project. Based on this model, initial organizational triggers must be identified to ensure that there is a need to develop the project (White & Spruce, 2015). The project leader identified several triggers detailed above and felt there was a strong need to develop a project that examines the use NPs on the trauma service during the night shift, and how the role can affect health care utilization and patient satisfaction of those trauma patients who are receiving care on the TMSU.

Following the Iowa model, after organizational triggers had been identified, the algorithm guides the project leader to acquire an in-depth understanding of the identified triggers and decide if those triggers are an organizational priority. If the answer is that the identified triggers are seen as a priority, it must then be decided if the organization can accommodate such change (White & Spruce, 2015). The project leader discovered that the organization does find the

identified triggers a priority; as LOS, readmissions within 30-days of discharge, and patient satisfaction scores are meticulously examined by organizational stakeholders. It was also determined that the organization had the necessary resources to accommodate this type of project.

The Iowa Model guides the project leader to form a team, assemble relevant research, and critique and synthesize research that is to be used as evidence in practice (White & Spruce, 2015). The team for this project consisted of a voluntary advisory group who provided insight, unique perspectives and points of view, administrative and physician streamlining, and project advocacy. Next, the algorithmic properties of the Iowa model prompted the project leader to decide whether there was sufficient research on this topic (White & Spruce, 2015). Based on the literature reviewed, it was determined that sufficient evidence existed to be able to develop this project. Please see the summary and synthesis table in Appendix E.

To follow the next step of the model, it asks for a pilot study. However, a pilot study did not seem feasible or warranted for this project. Therefore, the project leader began the project at this point. This project took place over 120-days, which includes 60-days prior to the start of the NP on the night shift of the trauma service and 60-days after the NP had begun. This project will require a retrospective examination of medical records and HCAHPS satisfaction scores 60-days prior to the intervention commencing and then again 60-days after the intervention had started. This way, the project leader will be able to compare data collected for the two populations. The initial results of this project seem similar to the findings discussed in the literature. Based on these findings, the project leader and trauma director/trauma manager have begun the early stages of developing and implementing workflows and evidence-based guidelines into practice.

Once the project concluded and the evaluation process had begun, the project leader meticulously reviewed the minimal workflow protocols available and found that no new modifications were needed at this time. However, if changes were required, the project leader would have followed the feedback loop built into the model, and instituted changes to existing workflow practices. Lastly, the project leader has explored the need to disseminate findings to both internal and external stakeholders.

### **Theoretical Framework**

For this project's theoretical model, the project leader has chosen to utilize Lewin's Theory of Planned Change (LTPC). This theory provided a foundational framework to ensure that success is achieved during the change, as old workflows and processes get replaced with new ones. There are three phases to LTPC model; the unfreezing phase, the moving phase, and the refreezing phase (Vines et al., 2014).

Starting with the unfreezing phase, the purpose of this phase is to confront and challenge the existing attitudes of the stakeholders and staff regarding the addition of the trauma NPs on the night shift (Vines et al., 2014). In this phase, barriers to implementation were highlighted and openly dealt with, and education was provided on the new workflows that incorporate the night shift NPs.

The next phase of LTPC model is the moving or changing phase, which is characterized by focusing on achieving staff acceptance (Vines et al., 2014). The goal of this entire phase is to mitigate opposing forces of the project, so they do not impede the momentum of the project's positive driving forces (Wojceichowski, Pearsall, Murphy, & French, 2016). This was accomplished by engaging staff in the decision-making process, and coaching was performed with front-line staff on the benefits of using trauma NPs during the night.

The last phase of LTPC model is the refreezing phase. This is where new workflows that incorporate NPs on the night shift of the trauma service become engrained into the culture of the organization, and is accepted as best practice (Wojceichowski et al., 2016). During this phase, the goal for the project leader was to ensure that the use of trauma NPs on the night shift was a vital need for the organization, and is a required workflow for improvements in LOS, 30-day readmissions, patient satisfaction, and cost-effectiveness to take place. This occurred rather smoothly, as front-line staff (RNs and Physicians) have been supportive of the service that NPs have provided and have understood the important role of the NPs, which was spread to organizational stakeholders. However, quantitative data is needed for refreezing to be fully engrained throughout the organization.

### **Nursing Theory**

The project leader chose, “A theory of goal attainment” by Imogene King as the nursing framework for his project. King (1999) states, “this model, when used by nurses in any environment where nursing is practiced leads to goal attainment” (p. 293). King’s theory discusses that goal attainment represents patient outcomes, as a measure of quality of care provided (King, 1999). With the assistance of King’s nursing model, De Leon-Demare et al (2015) states, “nursing is defined as a process of human interactions whereby the nurse and patient each perceive the other, set-goals, and agree on a means to achieve goals” (p. 632). This concept seems to be the foundation for increasing healthcare utilization, as the role of the NP in this project is interacting with trauma patients to provide care, understand their needs, and set goals that are mutually agreed upon. This establishes a reciprocal relationship between the NP and the patient, leading to what King describes as transactions (King, 1999). De Leon-Demare (2015) states, “transactions are defined as purposeful interactions where human beings



communicate with their environment to achieve goals that are valued” (p. 632). Using King’s model for this project, it is imperative that for improvement of patient outcomes to occur, the NP must ensure that every interaction with trauma patients leads to the establishment of transactions. King (1999) states, “when transactions are made, tension or stress is reduced in a situation, which can lead to growth and development” (p. 294). This may contribute to desired improvement of outcomes in LOS, readmission rates, and patient satisfaction. De Leon-Demare et al (2015) states, “there should be a positive correlation relationship between the presence of transactions and patients’ perspectives of trust and satisfaction as outcomes of the NP-patient relationship” (p. 632).

### **Methods**

The review of literature undertaken by the project leader has shown that NPs on the trauma service can result in increased patient outcomes, increased patient satisfaction, and has been shown to be cost-effective. In addition, the use of NPs in trauma is supported by literature as a successful option to eliminate gaps in trauma provider coverage. However, to examine whether NPs can be successful at this facility, an evidence-based, quasi-experimental, pre-and post-intervention project was developed that examines the impact night shift NPs can have on healthcare utilization and satisfaction of trauma patients. Initially, one NP was added to the night shift of the trauma service to work three, 12-hour shifts per week. However, positive reports regarding the use of the night shift NP has prompted organizational and trauma service stakeholders to add two other NPs three-weeks later to work at night. This allows for seven-days per week NP coverage on the night shift, where they provide direct care to those trauma patients on the TMSU, offer direct support to the nursing staff on the unit, and remain in close collaboration with the trauma surgeon on duty.

This project was conducted at a level II trauma center located in California. In addition, this medical facility has the distinction of being the only trauma center in the county and is one of only eight trauma centers in the region. On average, the trauma service sees approximately 150 to 160 acutely injured trauma patients in the Emergency Room (ER) that come directly from the field each month, and another 20 to 25 via transfer from other ERs within the region. Of these 170 to 185 patients that present to this ER in need of acute trauma care, a total of 67% of them are admitted to the inpatient trauma service. Furthermore, of those admitted, 38% are sent to the TMSU. This is significant, as the TMSU is the specific unit where this project took place. The daily rate for beds on the TMSU is \$8,432.00, which only includes the bed and the nursing care, and is in exclusion of extra supplies, physician services, and bedside procedures. At this level II trauma center, the project leader worked closely with several organizational stakeholders, including the trauma program director/manager to get this project completed in a timely manner.

This was an evidence-based project that uses a quasi-experimental design to retrospectively examine and compare two populations of trauma patients. Those patients that were cared for on TMSU prior to NPs working at night on the trauma service will be referred to as the pre-intervention population, and those that were cared for on the TMSU after NPs started on the night shift of the trauma service will be referred to as the post-intervention population. In 1990, Spisso et al successfully used a similar design to show that NPs could be utilized successfully to provide effective care to a population of trauma patients (Spisso, O'Callaghan, McKennan, & Holcroft, 1990).

For this project, trauma patients are defined as those patients who have sustained injury as the result of a traumatic mechanism. There was no specific sampling or recruiting process of patients that took place, as all patients were included if they met the specific inclusion and

exclusion criteria. For trauma patients to be included in the pre-intervention population, they must have sustained an acute injury due to a traumatic mechanism, have been admitted by the trauma service, and their LOS on the TMSU must have taken place between the dates of July 21, 2017 and September 20, 2017. Similarly, for those patients included in the post-intervention population, they must have sustained an acute injury due to a traumatic mechanism, have been admitted by the trauma service, and their LOS on the TMSU must have occurred between the dates of September 21, 2017 and November 21, 2017. These dates will be markers for both the 60-days prior to the implementation of a night shift NP on the TMSU, and 60-days after the implementation of the night shift NP. In addition, all patients included in this project, regardless of assigned population, were at least 18 years of age, not pregnant, not actively under police custody, and were alive at the time of discharge from the TMSU.

To retrospectively compare the two populations, this project incorporated data-mining of medical records and HCAHPS satisfaction survey scores 60-days prior to adding the NP on the night shift of the trauma service, then again 60-days after the NPs were added. Data collection began once approval was granted from Liberty University Institutional Review Board (IRB) and the IRB from the organization where the study took place.

Through data-mining of medical records in the Electronic Medical Record (EMR), both demographic data and specific metric data was collected for the pre and post-intervention populations. The specific demographic data collected from the EMR included the age of each patient, their Injury Severity Score (ISS), and their discharge disposition. ISS is a universal score that assesses trauma severity, and correlates with mortality, morbidity, and length of stay in the trauma patient population (Greenspan, McLellan, & Greig, 1985). Furthermore, an ISS that is

greater than 15 is defined as a major trauma with multiple organ systems traumatically injured (Greenspan et al., 1985).

The metric data collected from the EMR was specific to patient LOS, readmissions that occur within 30-days of discharge, and LOS after readmission. Lastly, data-mining of patient satisfaction surveys was done by accessing the Press-Ganey (PG) website, as the HCAHPS surveys for this hospital are administered and managed through PG. For each population, 18 trauma patients completed their HCAHPS satisfaction survey and returned it. This allowed the project leader to examine a total of 36 completed surveys, with specific attention paid to patient answers for questions seven, eight, and nine of their survey. After all retrospective data was collected it was then populated into a data collection tool, where descriptive and inferential statistical calculations were performed for each population by using both Microsoft Excel 2016 and the Statistical Package for the Social Sciences (SPSS) programs version 23.

			Pre-Intervention		from dates: 07/21/2017-09/21/2017		coding: never=1, sometimes=2, usually=3, always=4	coding: never=1, sometimes=2, usually=3, always=4	coding: never=1, sometimes=2, usually=3, always=4	coding: home=1, rehab=2, snf=3, other=4	Intervention Start date: 9/21/2017			Post-Intervention		from dates: 09/21/2017-11/21/2017		coding: never=1, sometimes=2, usually=3, always=4	coding: never=1, sometimes=2, usually=3, always=4	coding: never=1, sometimes=2, usually=3, always=4	coding: home=1, rehab=2, snf=3, other=4	
Patient (assigned trauma #)	Age (in years)	ISS	Length of stay days w/outliers 2.2	Length of stay days w/outliers 1.5	Readmissions within 30-days	LOS (days) after readmission	Score on Question #7 of Press-Ganey Patient Satisfaction Survey	Score on Question #8 of Press-Ganey Patient Satisfaction Survey	Score on Question #9 of Press-Ganey Patient Satisfaction Survey	Disposition (Home/Rehab/SNF/Other)	Patient (assigned trauma #)	Age (in years)	ISS	Length of stay days w/outliers 2.2	Length of stay days w/outliers 1.5	Readmissions within 30-days	LOS (days) after readmission	Score on Question #7 of Press-Ganey Patient Satisfaction Survey	Score on Question #8 of Press-Ganey Patient Satisfaction Survey	Score on Question #9 of Press-Ganey Patient Satisfaction Survey	Disposition (Home/Rehab/SNF/Other)	

Figure 2.1 Data collection tool used for to collect all retrospective data for this study

### Results

To ensure that both the pre and post-intervention populations were similar, the demographic variables of patient age, ISS, and discharge disposition for each population were compared against each other. The pre-intervention mean for the demographic variables are as follows. The mean age for patients in this population was 47.94 years old (mean = 47.94, SD = 19.58). The mean ISS for patients in the pre-intervention population was 10.39 (mean = 10.39, SD = 6.34). The mean discharge disposition for patients in this population was 1.88 (mean =

1.88, SD = 1.24). The mean for the demographic variable of patient age in the post-intervention population was 46.24 years old (mean = 46.24, SD = 19.85). The mean ISS for patients in the post-intervention population was 10.68 (mean = 10.68, SD = 8.00). The mean discharge disposition for patients in the post-intervention population was 1.68 (mean = 1.68, SD = 1.16). Based on these results, the means of the demographic variables for each of the two populations (pre and post-intervention) were found to be similar.

Demographic Variables	Group	N	Mean	Std. Deviation	Std. Error of mean
age	control	138	47.94	19.58	1.67
	intervention	165	46.24	19.85	1.55
Injury Severity Score (ISS)	control	138	10.39	6.34	0.54
	intervention	163	10.68	8.00	0.63
Discharge Disposition	control	138	1.88	1.24	0.11
	intervention	165	1.68	1.16	0.09

**Table 1.1** Mean comparisons between the pre-intervention and intervention population for the demographic variables of Age, ISS, and Discharge Disposition

The pre and post-intervention population means for the dependent variable of LOS was calculated to examine if the use of NPs working on the night shift of the trauma service improved LOS in those trauma patients that were cared for on the TMSU. Results of the mean LOS for the pre-intervention population was 5.99 days (mean = 5.99, SD = 4.49) compared to 6.36 days (mean = 6.36, SD = 6.02) for the post-intervention population. During calculations of the mean LOS, it was noted that both the pre and post-intervention populations had higher than expected kurtosis and skewness scores. This signaled the project leader that there was a high degree of probability that the two populations contained outliers within their respective datasets.

Dependent Variables	Group	N	Mean	Kurtosis	skewness
LOS	control	138	5.99	3.30	1.86
	intervention	165	6.36	16.03	3.35
	Overall	303	6.19	14.68	3.07
LOS w/ Outliers Removed	control	130	5.15	0.93	1.30
	intervention	154	5.10	1.05	1.23
	Overall	284	5.12	0.96	1.25

**Table 1.2** Mean, Kurtosis and skewness results for the dependent variable LOS and LOS with outliers removed.

To account for outliers in each dataset for the variable LOS, the Outlier Labeling Rule (OLR) accompanied by the multiplier value of 2.2 was utilized. The journal article by Hoaglin & Iglewicz (1987) supports that when using the OLR, the multiplier value of 2.2 should be used, as it is superior to the value of 1.5 in ensuring that the appropriate outliers are removed from skewed datasets (Hoaglin & Iglewicz, 1987). Calculations took place by following the four-step OLR.

	Rules	pre-intervention Calculations	post-intervention calculations
step 1	Find the 1st (Q1) and 3rd (Q3) quartiles for each population	1st quartile for pre-intervention population = 3, 3rd quartile for pre-intervention population = 7	1st quartile for post-intervention population = 3, 3rd quartile for pre-intervention population = 7
step 2	Find the InterQuartile Range (IQR) (Q3-Q1) for each population	Pre-intervention population (7-3=4)	Post-intervention population (7-3=4)
step 3	Multiple the IQR for each population by the outlier value of 2.2	Pre-intervention population (4 x 2.2 = 8.8)	Post-intervention population (4 x 2.2 = 8.8)
step 4	Calculate the upper and lower outlier limits for each population by subtracting Q1 from the (IQR x 2.2), then adding Q3 to the (IQR x 2.2)	Lower limit and upper limit for pre-intervention population (3 - 8.8 = -5.8), (7 + 8.8 = 15.8)	Lower limit and upper limit for post-intervention population (3 - 8.8 = -5.8), (7 + 8.8 = 15.8)

**Table 2.1** The outlier labeling rule using 2.2 as the outlier value. Steps to calculate the outliers in the two populations.

The product for outliers was 15.8, which meant that any LOS 16-days or greater in both the pre and post-intervention populations were removed from their respective datasets and excluded from further calculations. A total of 19 outliers were removed; eight from the pre-intervention population and 11 from the post-intervention population. Out of these 19 patients recognized as outliers, 15 of them had a disposition delay due to social or placement issues and only four were delayed for medical reasons, with three of those being directly related to the traumatic injury suffered. Table 3.1a and 3.1b provides the reasons for the delays in disposition, which led those patients to be recognized as an outlier.

ISS	LOS in days	reason for discharge delay
21	20	No suitable living arrangements identified, no ability to pay for medications to treat chronic diseases, placement issues with Skilled Nursing Facility (SNF), as not accepting due to chronic illness needs
12	18	Placement issue, waiting for Acute Rehab Unit (ARU) to accept patient's insurance
10	17	Placement issue as no SNF would accept patient insurance, poor home living arrangements, waiting for insurance authorization for Durable Medical Equipment (DME) and discharge medications
19	19	Patient required Long Term Acute Care (LTAC) placement, which took some time for placement
17	24	Patient waiting SNF to accept insurance
13	21	Waiting for insurance authorization to pay for required outpatient long term antibiotics, which patient had no ability to pay out of pocket
12	19	Waiting for ARU to accept patient insurance
26	18	waiting for ARU to accept patient insurance

**Table 3.1a** Pre-intervention population list of those trauma patients that had prolonged LOS, causing them to be considered as an outlier for the variable LOS.

ISS	LOS in days	reason for discharge delay
18	25	No suitable living arrangements identified, patient refused shelter
29	18	Had medical needs that required prolonged hospitalization
29	21	Waiting for ARU to accept patient's insurance
22	16	Waiting for SNF placement
59	48	Waited several weeks for ARU or LTAC to approve patient's insurance
10	17	Due to mental/behavioral issues took extended time for SNF to accept
22	31	Had medical needs related to the trauma sustained that required prolonged hospitalization
25	25	Waiting for LTAC to approve patient's insurance
22	27	Waiting for SNF placement, has chronic health issues that prevented the patient from discharging home
10	19	Had medical treatments related to the trauma sustained that required prolonged hospitalization, as patient unable to return as outpatient
5	17	Had medical treatments related to the trauma sustained that required prolonged hospitalization, as patient unable to return as outpatient

**Table 3.1b** Post-intervention population list of those trauma patients that had prolonged LOS, causing them to be considered as an outlier for the variable LOS.

With outliers removed from the LOS datasets, the pre-intervention mean for LOS was 5.15 days (mean = 5.15, SD = 3.02), compared to a mean of 5.10 days (mean = 5.10, SD = 3.03) for the post-intervention population. The mean scores to the HCAHPS survey questions seven, eight, and nine for the pre-intervention population was 3.22 for each question (mean for question seven = 3.22, SD = 1.11, mean for question eight = 3.22, SD = 1.06, and mean for question nine = 3.22, SD = 0.94), out of 4.00 being the highest possible score. These scores correlated to an



overall ranking in the 1<sup>st</sup> percentile when benchmarked against 267 other Magnet® hospitals.

The mean scores for the same three questions within the post-intervention population were; 3.83, 3.94, and 3.72 (question 7 mean = 3.83, SD = 0.38, question 8 mean = 3.94, SD = 0.24, question 9 mean = 3.72, SD = 0.46) respectively out of 4.00. These scores correlated to an overall ranking in the 65<sup>th</sup> percentile when benchmarked against the same 267 Magnet® hospitals.

Dependent Variables	Group	N	Mean	Std. Deviation	Std. Error of mean
LOS	control	138	5.99	4.49	0.38
	intervention	165	6.36	6.02	0.47
LOS Outliers removed	control	130	5.15	3.02	0.26
	intervention	154	5.10	3.03	0.24
Survey Question #7	control	18	3.22	1.11	0.26
	intervention	18	3.83	0.38	0.09
Survey Question #8	control	18	3.22	1.06	0.25
	intervention	18	3.94	0.24	0.06
Survey Question #9	control	18	3.22	0.94	0.22
	intervention	18	3.72	0.46	0.11

**Table 4.1** Mean and standard deviations for the dependent variables; LOS, LOS with outliers removed, and PG patient satisfaction survey questions 7, 8, and 9

The LOS and LOS with outliers removed did not show statistical significance when using the independent samples t-test. For the variable LOS;  $t(301) = -0.61, p = 0.54$ . For the variable LOS with outliers removed;  $t(282) = 0.14, p = 0.89$ . The HCAHPS satisfaction survey questions seven and eight showed statistical significance when using the independent t-test. For the variable question seven;  $t(34) = -2.20, p = 0.04$ . For the variable question eight;  $t(34) = -2.82, p = 0.01$ . Results show that HCAHPS survey question nine narrowly missed statistical significance;  $t(34) = -2.02, p = 0.054$ .

		Levene's Test for Equality of Variances		T-test for Equality of Means				
				95% confidence interval of the difference				
		F	Significance	t	df	sig (2-tailed)	lower	upper
LOS	equal variances assumed	1.42	0.235	-0.61	301	0.54	-1.60	0.84
	equal variances not assumed			-0.63	297.3	0.53	-1.57	0.81
LOS Outliers removed	equal variances assumed	0.05	0.82	0.14	282	0.89	-0.66	0.76
	equal variances not assumed			0.14	274.39	0.89	-0.66	0.76
Survey Question #7	equal variances assumed	23.26	0.00	-2.20	34	0.04	-1.18	-0.05
	equal variances not assumed			-2.20	20.97	0.04	-1.19	-0.03
Survey Question #8	equal variances assumed	27.50	0.00	-2.82	34	0.01	-1.24	-0.20
	equal variances not assumed			-2.82	18.68	0.01	-1.26	-0.19
Survey Question #9	equal variances assumed	8.79	0.01	-2.02	34	0.051	-1.00	0.002
	equal variances not assumed			-2.02	24.69	0.054	-1.01	0.01

**Table 4.2** Independent samples t-test run for the LOS, LOS with outliers removed, and patient satisfaction survey questions 7, 8, 9

To perform a comparison of readmissions that are less than 30-days after discharge for the pre and post-intervention populations, the sum for readmissions and LOS after readmission were calculated for both populations. There were two readmissions that occurred less than 30-days after discharge in the pre-intervention population, which equaled a total of five LOS days after readmission. For the post-intervention population, there were no readmissions that were within 30-days of discharge.

	readmissions less than 30 days after discharge	LOS (days) after readmission
Pre-intervention Population	2	5
Post-Intervention Population	0	0

**Table 4.3** Number of readmissions less than 30-days after discharge and LOS after readmission for each population.

### Discussion/Analysis

Although LOS and LOS with outliers removed did not achieve statistical significance, it does provide overall significance for the organization where this project took place. A decrease of 0.05 LOS days with the addition of NPs on the night shift of the trauma service correlates to a

cost saving of approximately \$421.60 per patient over the 2-month intervention period. To understand the full monetary impact of a decrease in LOS, the formula highlighted in the article by Hiza et al was utilized (Hiza et al., 2015). Based on that specific formula (decrease in LOS \* bed rate \* number of patients in the post-intervention population), the cost-savings for the organization was \$69,564.00 over the 2-month intervention period. Furthermore, since there were no readmissions in the post-intervention population, the five LOS days that occurred after readmission in the pre-intervention population equates to an approximate cost savings of \$42,160.00. These monetary figures are based on the daily TMSU bed charge of \$8,432.00. Therefore, the combined cost savings after the initiation of NPs on the night shift of the trauma service was approximately \$111,724.00 over the 2-month intervention period. In addition, since improved HCAHPS satisfaction scores offer organizational reimbursement and benchmarking benefits, there is also a potential cost savings in this area as well.

Based on the data collected and the statistical calculations performed on the pre and post-intervention populations, it is evident that the addition of NPs on the trauma service at night does improve healthcare utilization and patient satisfaction in those trauma patients that were cared for on the TMSU. Furthermore, the cost savings of \$111,724.00 was only during the two-month intervention period. Meaning, there is a potential cost-savings of \$670,344.00 for the organization when the combined cost savings is projected over one years' time. Lastly, it must be noted that this project took place during the time when the role of night shift NP on the trauma service was first initiated and still being defined. Therefore, it is possible that if this same project was conducted at a later date after the role of the night shift NP had been well established, results could be different. Based on current calculations, the hypothesis is that results would show

improvement from the current figures. Possibly translating into even greater cost savings and higher patient satisfaction survey results.

	average cost per day for bed on TMSU	mean LOS	readmissions less than 30 days after discharge	LOS (days) after readmission	total combined savings
Pre-intervention Population	\$8,432.00	5.15 days	2	5	X
Post-Intervention Population	\$8,432.00	5.10 days	0	0	X
Pre intervention population compared to post-intervention population	X	decrease of 0.05 days	decrease of 2 30-day readmissions	decrease of 5 LOS days after readmission	X
Cost-savings	\$8,432.00	\$421.60 per patient	X	\$42,160.00	X
Combined cost-savings during 2-month intervention period	\$8,432.00	\$69,564.00	X	\$42,160.00	\$111,724.00
Potential combined cost-savings over 1-year period	\$8,432.00	\$417,384.00	X	\$252,960.00	\$670,344.00

**Table 4.4** Cost savings based on a post-intervention decrease in LOS, and LOS after readmission, as well as predicted cost savings over 1-year period

### Conclusions

The findings of this project show that the addition of the NPs working on the night shift of the trauma service does positively impact the healthcare utilization and satisfaction of those trauma patients cared for on the TMSU. This is evidenced by a decrease in LOS (when outliers are removed), a decrease in the number of readmissions that occur less than 30-days from discharge, a decrease in LOS after readmission has taken place, an increase in HCAHPS patient satisfaction scores for those questions that are specific to medical providers, and an overall cost savings to the organization in the amount of \$111,724.00 over the two-month intervention period.

This project has unintentionally highlighted a significant problem in healthcare. Those patients that no longer require acute care hospitalization, but are not able to adequately care for themselves, and lack available services and resources to receive necessary assistance. Causing them to be housed in the acute care hospital for several days after they have been medically cleared. This increases both the LOS and overall costs to the organization, which results in an overall decrease in healthcare utilization.

Lastly, it is the hope of the project leader that the positive results that have been achieved from this project will translate into greater organizational trust and backing for NPs in the role of trauma, as well as other inpatient and outpatient services. In addition, this project will contribute to an increase in the body of evidence that is in favor of using NPs to fill gaps in provider coverage at other hospitals and regions throughout the country. Lastly, the results of this project show that NPs provide high-quality, evidence-based care that effectively translates into improved healthcare utilization, an increase in patient satisfaction, and a decrease in overall costs for the organization.

### **Limitations**

Although this current project reports positive outcomes, this project is not without limitations. The retrospective design of this project makes the validity of it solely dependent on the accuracy of the medical records and patient satisfaction scores that have been collected. This makes it imperative that the medical records and satisfaction surveys gathered are accurate and complete. In addition, this project was performed at a single facility, and results gained may not be transferrable to other institutions. Furthermore, based on the demographic variables utilized, the pre and post-intervention populations were found to be similar. However, other demographic variables that were not considered could make the two populations no longer homogenous. Since

this project provides a snapshot of two-months prior to using a NP on the night shift of the trauma service and two months after, it is plausible that another snapshot in time could produce different results. Lastly, during the initial phases of this project, there was only one NP hired by the trauma service to work at night (others started in October 2017). During that time, which was approximately three-weeks after the start of this project, there was only three-days per week night shift NP coverage on the TMSU. Therefore, it is possible during that time there were patients on the TMSU that did not receive care managed by the night shift NP.

### **Feasibility Analysis**

The main feasibility factors that were considered for this project are financial, political, and organizational factors. Before the inception of this project, there were multiple financial issues that needed to be considered. An important question to answer early in the planning phase was, “does the facility have the necessary monetary resources to fund this project?” It seems this trauma center understands that change in healthcare is inevitable, has embraced the project, and has authorized any necessary funds that would be required to complete this project. This medical organization seems to genuinely want to examine other ways to be cost-effective in its delivery of healthcare and actively embraces projects that have similar goals of improved healthcare utilization. In the end, this project did not require any extra time, money, or resources to complete it.

Although this organization has committed to understanding the value in providing cost-effective care and improving healthcare utilization, it is possible that organizational stakeholders are yet to see the full value that NPs bring to an organization. Therefore, the political factors that surround this project are mostly due to acceptance of the NP role. Initially, the project leader was concerned that these political issues may delay starting this project on time. However, senior

leadership within the organization and trauma services were supportive of this project, and the goals and objectives that the project leader sought to accomplish. Therefore, this project was conducted rather smoothly, without major opposing arguments. Now that this project has been completed, the project leader is hopeful that the findings will alleviate apprehension from organizational administration about the use of NPs and will become a driving influence in minimizing opposing political forces.

There will always be those that oppose increasing the roles of NPs within the organization. However, the culture of the organization is strong, and favors change if those changes remain aligned with the organization's mission statement, which is to improve healing through providing quality and compassionate care. The results of this project show that NPs provide quality and compassionate care, which makes the project leader optimistic that opposing forces within this organization will be overcome.

### **Evaluation**

Prior to starting this project, the project leader defined success through achieving positive improvements in healthcare utilization and patient satisfaction within the organization. Based on results, it appears that this project accomplished that success. Even though this can be deemed a successful project, improvements and changes will need to take place once this project is repeated. One change would be to have a specific intervention that is performed with each patient in the post-intervention group instead of having the night shift NP be the intervention. This intervention is too broad, as it is difficult to appreciate the specific care practices that improve outcomes the most. Next, having a better understanding of workflows and processes may have produced even better results. Since this project started the first day the project leader started his position as the night shift trauma NP, familiarity with workflows and processes were

not possible prior to starting this project. In fact, since this was a new position within the organization, there were no protocols and workflows established at that point. Lastly, to gain even greater organizational support for NPs being used to fill gaps in provider coverage, staff satisfaction should have been one of the measured outcomes. During this project, staff satisfaction has grown immensely from where it was prior to having NPs on the night shift of the trauma service. However, this study did not capture such data, and without data to support these claims, there is no ability to substantiate or disseminate these findings to organizational stakeholders, who have the power to make further changes in the delivery of healthcare throughout the organization.

### **Dissemination Plan**

Now that this scholarly project has been completed, more focus must be placed on the dissemination process, and conveying the findings to the right people through the right avenues. The main target audience to disseminate the findings of this project remain those internal and external stakeholders at the level II trauma center where the project was conducted. In addition, the project leader is seeking to disseminate findings to professional healthcare organizations, such as; the American Association of Nurse Practitioners (AANP), the American Nurses Association (ANA), and various other trauma nursing organizations, as this will further the spread of results.

The project leader is wanting to disseminate findings within the organization via a PowerPoint presentation, as this will adequately spread results and create a heightened support for the use of NPs within the organization. Furthermore, to disseminate results to external stakeholders, the project leader is looking to publish the findings of this project in a peer-reviewed journal. Lastly, the project leader is looking to disseminate findings at a professional



conference via a well-designed poster or podium presentation, as this will offer great spread of information to those that are not affiliated with the organization.

### **Significance**

This scholarly project was a success for the organization, and for the NP profession. Meaning, the organization benefits by having a project that provides quantitative data about the ability of NPs to fill gaps in provider coverage when adding physicians are not a practical solution. In addition, the organization benefits by seeing firsthand that NPs can improve healthcare utilization and satisfaction in those patients that have been admitted to the hospital. For the NP profession, the successful results of this project should provide greater organizational trust and backing for the NP role in trauma. In addition, successful outcomes achieved will increase the body of evidence that is in favor of using NPs to fill gaps in provider coverage. Third, this project will contribute to the number of high quality projects that show favorable results for using NPs, which will ultimately benefit the NP profession through increased awareness of their excellent ability in providing high quality, evidence-based, cost-effective care. Lastly, the role of the Doctor of Nursing Practice (DNP) is important to this project, as it highlights many attributes of the doctorally prepared Advanced Practice Registered Nurses (APRN) and the education that is required to receive a DNP degree.

The American Association of Colleges of Nursing (AACN) essentials of doctoral education for APRNs are highlighted throughout this scholarly project. To explain in further detail, Essential I scientific underpinnings for practice is highlighted within this project through the NP's work on the trauma service of providing care to those trauma patients on the TMSU. Essential II organizational and systems leadership for quality improvement and systems thinking is highlighted throughout the project, as it has a quality improvement foundation to provide

interventions that increase patient outcomes and decrease costs within a specific healthcare system, as evidenced by this project showing improved healthcare utilization and patient satisfaction. Essential III clinical scholarship and analytical methods for evidence-based practice is exemplified throughout this project, as organizational triggers have propelled the project leader to use the Iowa model as the guiding framework of this project from inception to completion. Essential IV information systems/technology and patient care technology for the improvement and transformation of healthcare is evident by the collection of patient data from the EMR, PG website, and the organization's trauma registry, as precise data collection was key to being able to produce sound conclusions. Essential V healthcare policy for advocacy in healthcare is apparent from an organizational perspective, as one goal for this project was to increase acceptance throughout the organization as to the role of the NP. Essential VI interprofessional collaboration for improving patient and population outcomes is important to the project's success, as the collaborative role of the NP (between NP and MD) assisted in making the achieved results possible. Essential VII clinical prevention and population health for improving the nation's health is seen throughout the project, as evidenced by a decrease in readmissions less than 30-days from discharge, and a decrease in LOS after readmission had occurred. Essential VIII advanced nursing practice describes the role and function of the NP, which the project leader is proud of and will continue his quest to show that NPs have an important role in filling gaps in provider coverage.

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Appendix A



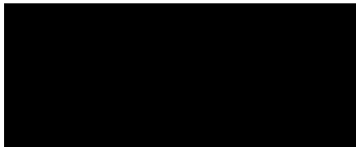
August 1, 2017

To whom it may concern,

As a representative of Trauma Services at [REDACTED] California, I, [REDACTED] MS, RN, Trauma Program Manager, grant Jason Pilkerton, DNP student at Liberty University, permission to perform an evidence-based project at [REDACTED] Trauma Medical-Surgical Unit.

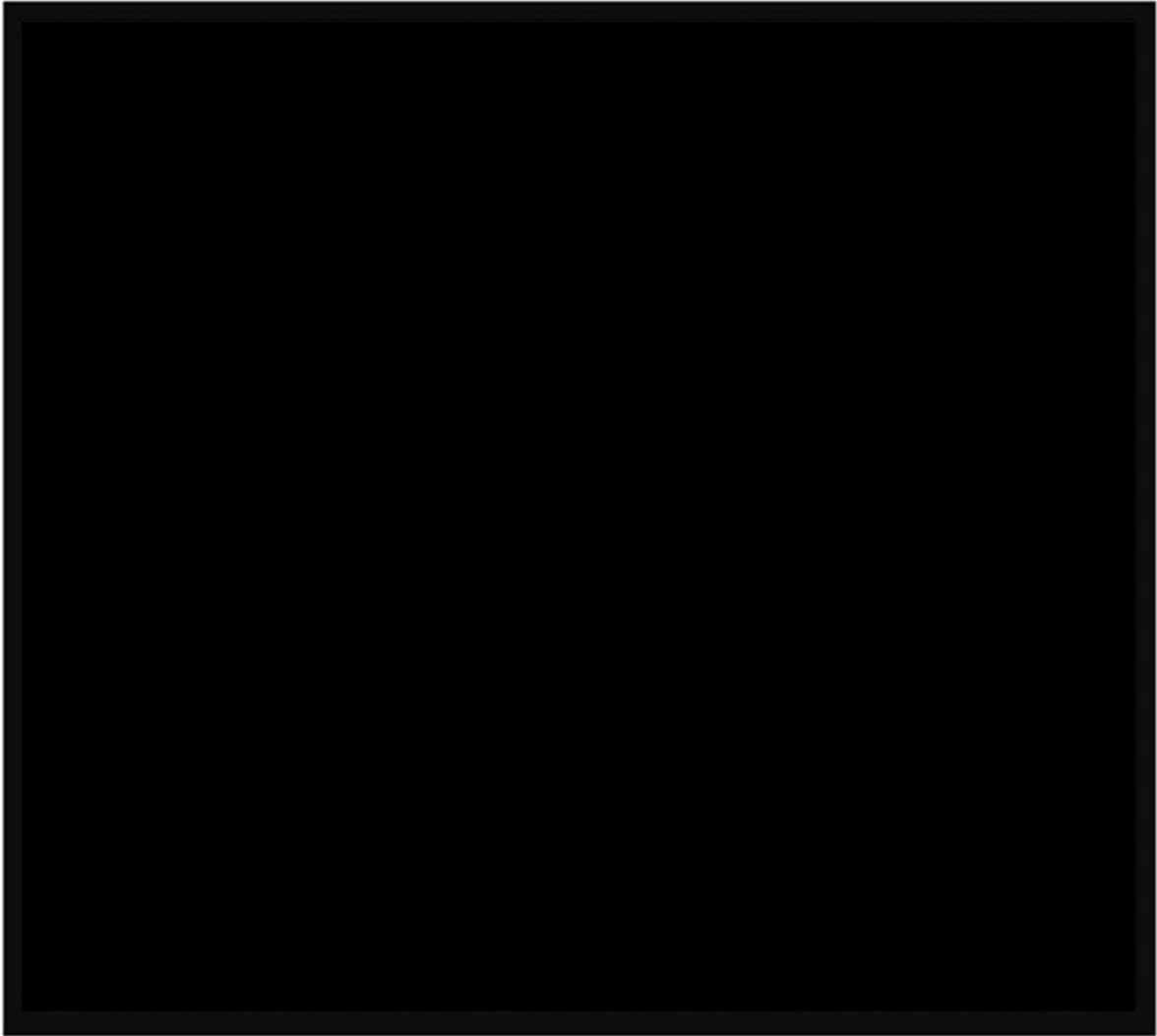
Please feel free to contact me if you need any additional information.

Sincerely,





Trauma Program Manager

Appendix B



Appendix C



Completion Date 29-May-2017  
Expiration Date 28-May-2020  
Record ID 19439191

This is to certify that:

**jason pilkerton**

Has completed the following CITI Program course:

**Human subject - Basic** (Curriculum Group)  
**Nursing** (Course Learner Group)  
**1 - Basic Course** (Stage)

Under requirements set by:

**Liberty University**

**CITI**

Verify at [www.citiprogram.org/verify/?we2b52775-4331-41f0-ac9a-08a85759fd02-19439191](http://www.citiprogram.org/verify/?we2b52775-4331-41f0-ac9a-08a85759fd02-19439191)

## Appendix D



[REDACTED] - University of Iowa Hospitals and Clinics &lt;noreply@qualtrics-survey.com&gt;

Pilkerton, Jason

Mon 10:27 AM

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Appendix E

Summary and Synthesis Table for Quantitative Research

Citation	Subjects	Design Methods	Outcomes	Relevance	Melnyk Level of Evidence
Jarrett, L. A., & Emmett, M. (2009, April-June). Utilizing trauma nurse practitioners to decrease length of stay. <i>Journal of Trauma Nursing</i> , 16(2), 68-72.	All hospitalized trauma pts from 1999 to 2006 at CAMC hospital	Quasi-Experimental design	LOS decreased significantly in all 4 injury severity score groups	LOS less than the National Trauma Databank. NP is driving force to move trauma patient through the trauma continuum.	Level 3 evidence
Morris, D. S., Reilly, P., Rohrbach, J., Telford, G., Kim, P., & Sims, C. A. (2012). The influence of unit-based nurse practitioners on hospital outcomes and readmission rates for patients with trauma. <i>Journal of Trauma and Acute Care Surgery</i> , 73(2), 474-478.	Database query for trauma patients between 01/01/2007 and 8/31/2010 that were either cared for by unit-based NPs, or residents. This totaled 3,859 trauma pts	Retrospective Case Controlled Design	Decreased LOS NP led trauma pts than resident led trauma pts	Over 1 year, this would be 1300 trauma patient days saved with NP over resident led trauma pts. Confirmed by other studies	Level 5 evidence
Noffsinger, D. L. (2014, November-December). Acute care nurse practitioners in trauma care: Results of a role survey and implications for the future of health care delivery. <i>Journal of Trauma Nursing</i> , 21(6), 266-271.	ACNPs involved in care of trauma pts	35-question demographic survey. Limited quantitative study, Mostly Descriptive design	Most ACNP who responded work at level 1 adult and level 1 pediatric trauma facility	Majority are female, average age is 42 years old, most have less than 3 years' trauma experience, however > than 10-year RN experience	Level 6 evidence
Hana, J. M., Dutton, R. P., Willis, M., Leone, S., Kramer, M. E., & Scalea, T. M. (2007). Discharge rounds in the 80-hour workweek: Importance of the trauma nurse practitioner. <i>The Journal of Trauma</i> , 63(2), 339-343.	All trauma pts admitted between 1999 and 2005 at shock trauma center	Quasi-Experimental Design	Decreased length of stay while using Trauma NP in discharge rounds. Less pts staying greater than 24 hrs.	Improved quality markers	Level 3 evidence
Christmas, A. B., Reynolds, J., Hodges, S., Franklin, G. A., Miller, F. B., Richardson, J. D., & Rodriguez, J. L. (2005). Physician extenders impact trauma systems. <i>The Journal of Trauma</i> , 58(5), 917-920.	Pts admitted to the trauma service during 2001-2003	Quasi Experimental Design	Decreased hospital length of stay 13% with trauma np and 33% decrease ICU length of stay.	Lower mortality rate of 5% in 2003 with the use of trauma NP and 9% in 2001 and 02 without NP	level 3 evidence
Sise, C. B., Sise, M. J., Kelley, D. M., Walker, S. B., Calvo, R. Y., Shackford, S. R., ... Osler, T. M. (2011). Resource commitment to improve outcomes and increase value at a level I trauma center. <i>The Journal of Trauma</i> , 70(3), 560-568.	Total of 9172 trauma pts that were admitted over a 4 (1-year spans) at Scripps Mercy	Retrospective Case Controlled Design	Saved housestaff 352 minutes/day, improved	Quality of care improved (decrease mortality/morbidity); cost of care decreased with use	Level 4 evidence

	hospital. All had to be 15 years or older		documentation, decreased hospital LOS, by an average of 1.05 days	of NP. Resulting in significant value to the hospital system.	
Matsushima, K., Inaba, K., Skiada, D., Esparza, M., Cho, J., Lee, T., ... Demetriades, D. (2016). A high-volume trauma intensive care unit can be successfully staffed by advanced practitioners at night. <i>Journal of Critical Care</i> , 33, 4-7.	162 pts admitted to trauma service at night (19-03) at busy trauma unit in LAC	Retrospective Case Controlled Design	Found that trauma NP pts outcome no different than resident pts outcomes	In hospital mortality rate 6.2% for residents and 12.6 for trauma np. However, when adjusted for clinically significant variables no significant difference	Level 5 evidence
Gillard, J. N., Szoke, A., Hoff, W. S., Wainwright, G. A., Stehly, C. D., & Toedter, L. J. (2011, July). Utilization of PAs and NPs at a level I trauma center: Effects on outcomes. <i>Journal of American Academy of Physician Assistants</i> , 24(7), 34-43.	2801 trauma pts included during a 26-month study period	Quasi Experimental Design	Post trauma mid-level ER throughput time down (136 min to 83 min. Los reduced 5.09 days to 4.84 days	DVT, major arrhythmia, UTI, hospital mortality of trauma pts decreased from pre-trauma midlevel	Level 3 evidence
Resler, J., Hackworth, J., Mayo, E., & Rouse, T. M. (2014). Detection of missed injuries in a pediatric trauma center with the addition of acute care pediatric nurse practitioners. <i>Journal of Trauma Nursing</i> , 21(6), 272-275.	Pediatric trauma patients from 2010 to 2013 with a documented missed injury	Quasi Experimental Design	Post using trauma np from 6/12 to 12/13 3.01% missed injury, compared to 0.39% before NP	The national missed injury rate is 4-5% in adult population. Most missed injury did not increase mortality or LOS	Level 3 evidence
Hiza, E. A., Gottschalk, M. B., Umpierrez, E., Bush, P., & Reisman, W. M. (2015, July). Effect of a dedicated orthopaedic advanced practice provider in a level I trauma center: Analysis of length of stay and cost. <i>Journal of Orthopedic Trauma</i> , 29(7), e225-e230.	All pts discharged from ortho trauma service 1 year prior to trauma NP and 1-year post trauma NP	Quasi Experimental Design	Adding trauma np to service decreased the LOS from 5.58 days to 4.69 days	The LOS decrease can be calculated to 0.89 x \$2000 /day cost x 122 pts = approx. \$217000 in cost savings	Level 3 evidence
Woodfall, M. C., Browder, T. D., Alfaro, J. M., Claudius, M. A., Chan, G. K., Robinson, D. G., & Spain, D. A. (2017). Trauma advanced practice provider programmed development in an academic setting to optimize care coordination. <i>Trauma Surgery and Acute Care Open</i> , 2, 1-4.	All trauma pts in the ICU from 2012-2014. as the NP program would be started to have NP do majority of care	Quasi-Experimental Design	Decrease in the ICU readmission rate (5.7 % in 2012 to 2.1 in 2014)	The overall readmission rate for the hospital was lower in 2014 compared to 2012 1.38% to 2.0% in 2012	Level 3 evidence
Spisso, J., O'Callaghan, C., McKennan, M., & Holcroft, J. (1990). Improved quality of care and reduction of housestaff workload using trauma nurse practitioners. <i>Journal of Trauma</i> , 30(6), 660-665. Retrieved from <a href="http://journals.lww.com/jtrauma/toc/1990/06000">http://journals.lww.com/jtrauma/toc/1990/06000</a>	1528 patients who met criteria in 1985-1986 and 1087 patients who met criteria in 1986-1987	Quasi-Experimental Design	Reduction in patient LOS by 1.05 days after NPs added to the trauma service	NPs saved housestaff 352 minutes per day when on duty, staff satisfied with the NP role	Level 3 evidence

<p>Nyberg, S. M., Waswick, W., Wynn, T., &amp; Keuter, K. (2007, July). Midlevel providers in a level I trauma service: Experience at Wesely Medical Center. <i>Journal of Trauma</i>, 63(1), 128-134.  <a href="http://dx.doi.org/10.1097/01.ta.0000221765.90190.73">http://dx.doi.org/10.1097/01.ta.0000221765.90190.73</a></p>	<p>All trauma patients admitted to WMC during period of April to June 2004 were included</p>	<p>Quasi-Experimental Design</p>	<p>Overall, strong positive responses when asked about care received by MLP</p>	<p>This is a survey on patient satisfaction. However, PA and NP fit (MLP)</p>	<p>Level 3 evidence</p>
<p>Fanta, K., Cook, B., Falcone Jr., R. A., Rickets, C., Schweder, L., Brown, R. L., &amp; Garcia, V. F. (2006). Pediatric trauma nurse practitioner provides excellent care with superior patient satisfaction for injured children. <i>Journal of Pediatric Surgery</i>, 41(1), 277-281.  <a href="http://dx.doi.org/10.1016/j.jpedsurg.2005.10.049">http://dx.doi.org/10.1016/j.jpedsurg.2005.10.049</a></p>	<p>In 2001-2002, all children 2 months to 17 years old admitted to the trauma service were considered and randomized to PNP group or RES group</p>	<p>Randomized experimental Design with pre-and post-intervention comparison</p>	<p>Overall, the PNP group showed LOS drop from 4.57 days to 2.65 days. LOS decrease translated to \$1,900,000 saved yearly</p>	<p>Higher patient satisfaction over the RES group. Trauma NPs add value to care when RESs have reduced work hours</p>	<p>Level 2 evidence</p>
<p>Olufajo, O. A., Cooper, Z., Yorkgitis, B. K., Najjar, P. A., Metcalfe, D., Havens, J. M., ... Salim, A. (2016). The truth about trauma readmissions. <i>The American Journal of Surgery</i>, 211(4), 649-655.  <a href="http://dx.doi.org/10.1016/j.amjsurg.2015.09.018">http://dx.doi.org/10.1016/j.amjsurg.2015.09.018</a></p>	<p>Trauma patients between 2007 and 2011 from California state inpatient database (252, 752 total trauma discharges in that period)</p>	<p>Retrospective Case-Controlled Design</p>	<p>The overall 30-day readmission rate was 7.56%. majority of patients had hospital LOS &lt; 4 days at (86.1%), complications seen in 14.47% of cases</p>	<p>No intervention design although NP and PA were used, this study does not separate</p>	<p>Level 5 evidence</p>
<p>Copertino, L. M., Rutigliano, D. N., Shapiro, M. J., &amp; Jawa, R. S. (2015). Early unplanned hospital readmissions after acute traumatic injury: The experience at a state-designated level I trauma center. <i>The American Journal of Surgery</i>, 209(2), 268-273.  <a href="http://dx.doi.org/10.1016/j.amjsurg.2014.06.026">http://dx.doi.org/10.1016/j.amjsurg.2014.06.026</a></p>	<p>Trauma patients age &gt;= 18-year-old discharged alive between July 2009 to June 2012 (total patients was 3,622)</p>	<p>Retrospective Case-Controlled Design</p>	<p>6.57% readmitted at mean of 9 days, mortality rate at readmission was 4.6%</p>	<p>This study shows that trauma patients are infrequently readmitted</p>	<p>Level 5 evidence</p>
<p>Collins, N., Miller, R., Kapu, A., Martin, R., Morton, M., Forrester, M., ... Wilkinson, L. (2014). Outcomes of adding acute care nurse practitioners to a level I trauma service with the goal of decreased length of stay and improved physician and nursing satisfaction. <i>Journal of Trauma and Acute Care Surgery</i>, 76(2), 353-357.</p>	<p>Data collected on patient LOS who were admitted to trauma stepdown at Vanderbilt from 12/1/2011 to 12/1/2012</p>	<p>Quasi Experimental Design</p>	<p>With use of Trauma NP average LOS decreased from 2.6 days in 2010 to 2.2 days in 2012</p>	<p>The decreased LOS, resulting in per trauma case a reduction of \$9,111.50, or 27.8 million dollars total</p>	<p>Level 3 evidence</p>
<p>Morris, D. S., Reilly, P., Rohrbach, J., Telford, G., Kim, P., &amp; Sims, C. A. (2012). The influence of unit-based nurse practitioners on hospital outcomes and readmission rates for patients with trauma. <i>Journal of Trauma and Acute Care Surgery</i>, 73(2), 474-478.</p>	<p>Database query for trauma patients between 01/01/2007 and 8/31/2010 that were either cared for by unit-based NPs, or residents. This totaled 3,859 trauma pts</p>	<p>Retrospective Case Controlled Design</p>	<p>Decreased LOS NP led trauma pts than resident led trauma pts</p>	<p>Over 1 year, this would be 1300 trauma patient days saved with NP over resident led trauma pts. Confirmed by other studies</p>	<p>Level 5 evidence</p>
<p>Noffsinger, D. L. (2014, November-December). Acute care nurse practitioners in trauma care: Results of a role survey and implications for the</p>	<p>ACNPs involved in care of trauma pts</p>	<p>35-question demographic survey.</p>	<p>Most ACNP who responded</p>	<p>Majority are female, average age is 42 years old,</p>	<p>Level 6 evidence</p>

future of health care delivery. <i>Journal of Trauma Nursing</i> , 21(6), 266-271.		Limited quantitative study, Mostly Descriptive design	work at level 1 adult and level 1 pediatric trauma facility	most have less than 3 years trauma experience, however > than 10-year RN experience	
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Summary and Synthesis Table for Research

Citation	Critique: Type & level of Evidence	Scope	Relevant Findings
Chakravarthy, A. A. (2008, July-September). Core competencies for a trauma subspecialty nurse practitioner. <i>Journal of Trauma Nursing</i> , 15(3), 145-148.	Background information: Level 6 evidence	Core competencies and role of the trauma NP	Trauma NP utilized to alleviate work-load on other specialties
Society of Trauma Nurses. (2005). Position statement on the role of the nurse practitioner in trauma. <i>Journal of Trauma Nursing</i> , 12(3), 71-72.	Background information: level 6 evidence	Offers the scope of trauma NP according to TSTN. Gives certification types.	Trauma NP proven to decrease LOS, outpatient wait times, patient complaints, residency workload
McManaway, C., & Drewes, B. (2010). The role of the nurse practitioner in level II trauma at Nationwide Children’s Hospital. <i>Journal of Trauma Nursing</i> , 17(2), 82-84. Retrieved from <a href="http://journals.lww.com/journaloftraumanursing/pages/default.aspx">http://journals.lww.com/journaloftraumanursing/pages/default.aspx</a>	Expert testimony: level 6 evidence	Offers information on role of NP and how that contributes to positive outcomes	With the use of trauma NPs, the LOS in the ER from 3 h 21 min to 2 h 35 mins from 1 <sup>st</sup> to 4 <sup>th</sup> quarter
Lome, B., Stalnaker, A., Carlson, K., Kline, M., & Sise, M. (2010). Nurse practitioner-The core of our trauma service. <i>Journal of Trauma Nursing</i> , 17(2), 80-81. Retrieved from <a href="http://journals.lww.com/journaloftraumanursing/pages/default.aspx">http://journals.lww.com/journaloftraumanursing/pages/default.aspx</a>	Expert testimony: level 6 evidence	Offers specifics on role of the NP and how that contributes to positive outcomes	With use of trauma NP decrease LOS in ICU, decrease readmissions, decrease complications, and increase in patient, nursing, and physician satisfaction
Sangster-Gormley, E., Frisch, N., & Schreiber, R. (2013). Articulating new outcomes of nurse practitioner practice. <i>Journal of the American Association of Nurse Practitioners</i> , 25, 653-658. <a href="http://dx.doi.org/10.1002/2327-6924.12040">http://dx.doi.org/10.1002/2327-6924.12040</a>	Expert testimony: level 6 evidence	Offers evaluation of NP practice, outcomes, and the use of theory to guide practice	NPs provide safe holistic, cost - effective care that is comparable to physicians
Mower-Wade, D., & Pirrung, J. M. (2010, April-June). Advanced practice nurses making a difference: Implementation of a formal rounding process. <i>Journal of Trauma Nursing</i> , 17(2), 69--71.	Expert testimony: level 6 evidence	Offers that when NP are included in formal rounding process, patient outcomes improve	Decreased LOS by 1.2 days, and increased patient satisfaction scores
Medeiros, R. S., NeSmith, E. G., Heath, J. A., Hawkins, M. L., Hawkins, D., & Bias, R. (2011). Midlevel health providers impact on ICU length of stay, patient satisfaction, mortality, and resource utilization. <i>Journal of Trauma Nursing</i> , 18(3), 149-152. <a href="http://dx.doi.org/10.1097/JTN.0b013e31822b7faf">http://dx.doi.org/10.1097/JTN.0b013e31822b7faf</a>	Systematic Review: Level 1 evidence	Purpose is to evaluate the impact of MLP on ICU outcomes	Showed reduction in overall LOS resulting in decreased costs



## Appendix F

**LIBERTY UNIVERSITY.**  
INSTITUTIONAL REVIEW BOARD

September 20, 2017

Jason Pilkerton

IRB Exemption 2987.092017: Impact of Utilizing the Nurse Practitioner Role in Trauma, and the Effects it has on Healthcare Utilization & Patient Satisfaction

Dear Jason Pilkerton,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(4), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at [irb@liberty.edu](mailto:irb@liberty.edu).

Sincerely,



*Administrative Chair of Institutional Research*  
The Graduate School

**LIBERTY**  
UNIVERSITY.

Appendix G



November 15, 2017

Jason Pilkerton, MSN  
Principal Investigator

**Re:** INITIAL STUDY APPROVAL                      **NEXT REVIEW:** November 2018  
**Study Title:** Impact of Utilizing the Nurse Practitioner Role in Trauma, and the Effects it has on Healthcare Utilization and Patient Satisfaction  
**Items Reviewed:** Research Application, Protocol, Waiver Request Form, Data Collection Tool, Department Approvals, Investigator CV, Human Subjects Training and Statement of Assurances  
**FWA# 00003748**

Dear Investigator:

The [REDACTED] Health Institutional Review Committee (IRC) would like to thank you for submitting the documents noted above for the above-captioned research. On behalf the IRC I have reviewed and noted the following:

Per the materials submitted, the purpose of this study is to determine if the addition of a Nurse Practitioner working on the night shift in the trauma unit will correlate with improved patient satisfaction and healthcare utilization metrics.

This retrospective data collection study will involve data collected for approximately 200 subjects at the [REDACTED] Campus in the TMSU. The PI will access subject records in Epic and extract the data elements listed on the data collection tool. The only identifiable health information collected will be dates of service. The Trauma Unit Manager will provide data from the Press-Ganey patient satisfaction surveys. Data will be collected 60-days prior to adding the NP to the night shift and then 60-days post intervention. Identifiers are necessary to locate and compare the pre-and post-intervention data for each subject. It is not practicable to ask subjects for their permission because they are already discharged from the hospital. Only the PI will have access to the password-protected and encrypted research data, which will be destroyed at the completion of the study.

Based on review of the materials as outlined above, on behalf of the IRC, I have determined that this research meets the criteria to qualify for waiver of patient authorization and consent. This research does qualify for expedited review per the Expedited Review Guidelines of the [REDACTED] IRC, therefore approval is granted. You can now feel free to proceed with your research study, subject to review in one (1) year. Also, please be advised of the following stipulations of continuing approval:

- Review/Continuation of Study forms need to be timely submitted to the IRC three (3) weeks prior to the review date noted above and you will receive a reminder notice in advance of the deadline for submission.
- Any changes in this study must be promptly submitted to the IRC and approved by the IRC prior to their implementation.
- Any unanticipated risks or new information that may impact on the risk/benefit ratio to subjects or others must be reported to the IRC within ten (10) working days and approved by the IRC. This may require re-consenting of patients.
- Any death or other serious adverse reaction must be reported to the IRC within twenty four (24) hours. Less serious adverse reactions must be reported to the IRC within five (5) working days. Minor reactions must be reported to the IRC at time of study review. These Adverse Reactions must be reported, whether or not they are the result of the drug or test article.

The IRC maintains the authority to terminate or suspend approval of research that is not being conducted in accordance with stated IRC requirements or that has been associated with unexpected serious harm to subjects. The IRC operates in compliance with 21Code of Federal Regulations ("CFR") Part 56 and 45 CFR Part 46. Should you have any questions, please feel free to contact me directly or contact the IRC Administrator as follows:



Sincerely,



Administrator - Institutional Review Committee