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Impact of Emergency Department Patient Flow Model and Triage Level on Patient Wait Times

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This is to certify that the doctoral study by

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Abstract

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MBA, Columbia University, 2012

BSN, Syracuse University, 1996

Doctoral Study Submitted in Fulfillment

of the Requirements for the Degree of

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Abstract

Some hospital emergency departments (EDs) are negatively affected by extended patient wait times, resulting in reduced hospital profitability. Therefore, it is critical hospital leaders understand factors impacting ED average patient wait times. Grounded in the business process improvement theoretical framework, the purpose of this causal comparative study was to examine the impact of an ED rapid evaluation unit (REU) patient flow model and emergency severity index (ESI) on average weekly patient wait times. Data collection comprised a census of 26 archival data records pre and postimplementation of an ED REU patient flow model from a hospital ED in Upstate New York from April 18-October 18, 2015, and October 19, 2015- April 19, 2016. The results of the mixed-method ANOVA indicated there was a significant time (pre and postimplementation) and emergency severity index interaction effect: Wilks lambda = .55, $F(2, 24) = 9.86$, $p = .001$, partial eta squared = .45. There was also a main effect for time: Wilks lambda = .72, $F(1, 25) = 9.74$, $p = .005$, partial eta squared = .28. In addition, there was significant main effect for ESI: Wilks lambda = .084, $F(2, 24) = 130.28$, $p < .001$, partial eta squared = .92. At ESI triage level 2, there was less difference in the door to provider time than there was for ESI triage level 4. The implications for social change include the potential to reduce patient wait times; improving on patient health outcomes and satisfaction.

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Dedication

I dedicate this dissertation to my husband, Darren, for his love, support, and understanding; and my children Erin, Madison, Danielle (Bedford), and Logan (Bedford); my parents Donald and Jacqueline Barnes without whose love, support and encouragement I could not have completed this journey.

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Section 1: Foundation of the Study

Strategic planning can help organizations remain viable. Organizational leaders in the healthcare field need to improve efficiencies without jeopardizing safety or quality. Healthcare has become a business, and strategies are necessary to deliver exceptional care promptly (Eagle, 2015).

Background of the Problem

Hospital administrators have little information available on process improvements to enhance emergency department (ED) patient flow (Woitas, Potthoff, Nelson, & Matticks, 2014). Efficient patient flow directly relates to quality, safety, financial reimbursement, and patient satisfaction (Kane et al., 2015). As of the fourth quarter of 2015, the Centers for Medicare & Medicaid Services linked reimbursement directly to flow metrics and outcomes (Baker, Shupe, & Smith, 2013). In response to the increasing volumes of patient utilization of EDs, as well as increased pressure for reimbursement from insurers, hospital ED directors need to develop process improvements to enhance the metrics (MacKenzie et al., 2014). The organizational leader needs to utilize staff most efficiently (Quinn et al., 2014).

Applied business research on enhanced ED patient flow has supported the need for ongoing study of process improvements strategies (Woitas et al., 2014). Previous studies conducted by Mumma, McCue, Li and Holmes (2014) included the analysis of the physical layout and implementation of fast track flow models. The applications for bedside registration, providers in triage, and direct bedding concepts have proven to be successful patient flow improvements (Soremekun, et al., 2014).

A quantitative study would generate information to help hospital administration explain the role healthcare providers play in patient throughput in EDs. Data on the impact of rapid evaluation concepts and the use of triage levels would bring value to ED directors. The analysis of metrics to include door to provider, door to admit time, and door to discharge would bring value to strategic planning. The focus will now shift to the problem statement for the study.

Problem Statement

Two percent of ED patients leave before being seen (LWOBS) due to long wait times (Marino, May, & Thompson, 2015). In 2012, the Center for Medicare & Medicaid Services called attention to improved ED wait times for patients by issuing hospital reimbursement incentive payments of more than 964 million dollars (Hwang, Lipman, & Kane, 2015). The general business problem is some ED hospital directors are negatively affected by extended patient wait times, resulting in reduced hospital profitability. The specific business problem is that some ED hospital directors in Central New York do not know the impact of an ED REU (Rapid Evaluation Unit) patient flow model and ESI (Emergency Severity Index) patient triage level on patient wait time.

Purpose Statement

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. The population was composed of data records from April 18-October 18, 2015, and October 19, 2015- April 19, 2016, of patients who presented at a hospital ED in New York. The first independent variable (within-factor) was time, with

two levels, time 1 prior to ED REU implementation (April 18- October 18, 2015) and time 2, post ED REU implementation (October 19, 2015- April 19, 2016). The second independent variable (within-factor) was patient triage, with five levels (L1, L2, L3, L4, and L5). The dependent variable was patient ED wait times, measured in minutes, after implementation of an ED REU patient flow model. The implication for social change includes the potential for hospital leaders to decrease the time it takes for a medical provider to see an ED patient, which may result in less ED overcrowding and increased efficacy of treatment.

Nature of the Study

A researcher utilizing a quantitative study methodology tests the objective theories through an examination of relationships or differences among variables. The researcher utilizes a quantitative methodology to test a hypothesis and infer results to a larger population (Orcher, 2014). I chose the quantitative method as a way to understand the impact that processing patients with an REU and processing patients via an ESI patient triage level has on the dependent variable, patient wait time. Because the purpose of a qualitative or a mixed method study is to explore *how* and *why* rather than explain outcomes or methodology, a qualitative or mixed methods study does not fit the purpose of this study (Yin, 2014). A mixed method study was not appropriate because it contains a qualitative component, and exploring *what* or *how* is not the objective of this investigation. I sought to understand the independent variable' influence on process efficiencies rather than understand the experiences of the participants in this ED activity.

Therefore, a quantitative methodology was the most appropriate form for the research study.

A mixed-method ANOVA study measures observations over time or under different conditions (Green & Salkind, 2014). A mixed-method ANOVA approach was appropriate for this study as it uses the same subjects, or level, over time, taking more than one measurement. Mixed-method ANOVA measurements are collected in a longitudinal study in which change over time is assessed (Griensven, Moore, & Hall, 2014). The ESI level as it related to wait time is the same variable measured. The patients who sought care during this study period all experienced an ESI evaluation and an ED REU patient flow process. Researchers conducting correlation design studies examine the relationship between and among two or more variables and do not seek to understand the cause and effect (Pallant, 2013); therefore, correlation design would not be appropriate. Experimental researchers examine cause and effect relationships (Yin, 2014). Researchers utilize quasi-experimental studies when nonrandomly selected individuals are included in a study (Fassinger & Morrows, 2013). In the study, utilization of data from a time period pre and postimplementation of the REU from patients who presented to the ED for treatment occurred. I examined the research data to understand the impact the independent variables had on the dependent variable. Therefore, utilization of a mixed-method ANOVA addressed the specific business problem and research question.

Research Question and Hypotheses

RQ: What is the impact of an ED REU patient flow model and ESI patient triage level on patient wait times?

H_0: ED REU patient flow model and ESI patient triage level do not impact patient wait time.

H_1: ED REU patient flow model and ESI patient triage level do impact patient wait time.

Theoretical Framework

Harrington (1991) proposed the business process improvement (BPI) framework. BPI is a systematic approach business leaders use to gain efficiencies through measuring, controlling, and improving processes. Monitoring and managing processes help organizations determine the success of an operational change (Qatawneh, & Khan, 2015). Business process reengineering and process redesigns are foundations of BPI. As it applies to this study, the ED REU model was the business process improvement initiative implemented by the hospital.

An organization's process owner identifies, analyzes, and improves existing processes to meet new objectives and goals. Goals may be improved performance, increased profits, reducing costs, increased effectiveness, or efficiency. The uses of BPI strategies are to focus on reducing waste and variation in processes and enhance the use of resources. Defining the organization's strategic goals and purpose, determining the organization's stakeholders and customers, and identifying key business processes for achieving the goals are the initial principal of BPI (Moghdeb, Indulska, & Green, 2007).

The ED directors are responsible for effectively leading and managing changes to maintain profitability within the department. Directors could gain efficiency from the implementation of BPI strategies resulting in a favorable impact on patient wait time

metrics related to the implementation of an REU patient flow model, or related to an ESI patient triage level. I evaluated the impact of the independent variables on emergency department patients' wait times to be seen by a provider.

Operational Definitions

Operational definitions provided are for technical terms, jargon, or special words used. Definitions in this section add clarity to the meaning of terms used in this study. For this study, ED directors are defined as nurse and physician leaders accountable for the daily operations of the ED. The following terms were used.

Care in progress: Care in progress is a stage during the progression of an ED patient where care has started but the patient is in a waiting room setting receiving treatment rather than in an actual emergency treatment room (Arya et al., 2013).

Clinical decision unit: Clinical decision unit is a unit where patients stay while the provider is awaiting results or a response to treatment to determine the disposition of the patient, discharged or admitted. Most patients have a length of stay between 8-12 hours (Lui, Hamedani, Brown, Apslin, & Camargo Jr., 2013).

Door to provider: Door to provider is the time it takes from when a patient enters the emergency room until the first provider sees the patient (Scrofine & Fitzsimons, 2014).

Emergency Severity Index (ESI) triage level: The ESI is a five-level tool used in emergency department triage. Patient acuity is rated from level 1, most urgent, to level 5, least resource intensive. ESI is unique as a triage tool because it includes both acuity and resource needs (Scrofine, & Fitzsimons, 2014).

First provider to admit decision: First provider to admit decision is the time it takes from when a patient first sees a provider until the decision to admit the patient to the hospital (Baker et al., 2013).

First provider to discharge decision: First provider to discharge decision is the time it takes from when a patient first sees a provider until the decision to discharge the patient from the ED (Baker et al., 2013).

Left without being seen: Left without being seen is defined as the patients who register to be seen as ED patients but leave before being seen by a provider (Scrofine & Fitzsimons, 2014).

Length of stay for admitted patients: Length of stay for admitted patients is the total time it takes from when a patient enters the ED until admission to the hospital (Arya et al., 2013).

Length of stay for discharged patients: Length of stay for discharged patients is the total time it takes from when a patient enters the ED until discharge (MacKenzie et al., 2013).

Rapid evaluation unit: Rapid evaluation unit is a unit where patients go when they initially arrive at the emergency room (MacKenzie et al., 2013).

Assumptions, Limitations, and Delimitations

The study contains assumptions, limitations, and delimitations. Efforts made to manage these situations included removal of patient identifiable factors and the utilization of a census population.

Assumptions

Assumptions are facts considered true but not actually verified. Assumptions support a clear, logical rationale for a study (Marshall & Rossman, 2014). As the data was secondary data, an assumption was the data was valid and reliable. Another assumption was that the healthcare workers accurately documented medical information in the patient records.

Limitations

Limitations refer to potential weaknesses or shortcoming that could disrupt the trustworthiness of the study (Marshall & Rossman, 2014). Limitations associated with the study included the population of the study was from one ED and not a broader population. Another limitation of this study was the use of archival data. A limitation of using archival data is the data needs to be in a form that the researcher can analyze (Lutze, Ross, Chu, Green, & Dinh, 2014). The form of the data may not fit the purpose of the study (Fassinger & Morrow, 2013). The patients that present to an ED vary; therefore, the patients presenting pre and postimplementation were not identical, and the comparison was not of an identical population.

Delimitations

Delimitations refer to the boundaries or scope of the study (Yin, 2014). The boundary of the study was a population of patients presenting to a rural Upstate Central New York hospital between April 18, 2015, and April 19, 2016. All records of patients who presented to the ED, excluding LWOBS, were included in the study. The population and time data elements utilized were from one hospital located in Central New York.

Significance of the Study

There is the potential for leaders to improve patient flow by utilizing the process improvement strategies identified in this study. From 1995 through 2005, the number of EDs in the United States has decreased by 10% while the number of emergency visits has increased by 20% (Wiler, Bolandifar, Griffey, Poirier, & Olsen, 2013). Hospital ED directors have a responsibility of minimizing the time it takes for a provider to see an ED patient to enhance patient safety and care (Scrofine, & Fitzsimons, 2014).

Contribution to Business Practice

ED directors play a critical role in the design and operations of EDs (Stitchler, 2015). However, ED directors have little information available on process improvement changes and utilization of resources to reduce ED wait times (Woitas et al., 2014). Leaders who implement and use ED resources can add business value by decreasing wait times and efficiently treating and discharging healthier patients. A contribution of this study was identifying if an ED REU model positively impacted ED patient wait times.

The business value of improved business practice aligns with an ED director's ability to implement process improvement strategies to gain efficiencies to remain profitable. ED directors could use the findings from this study to implement effective business practices and reduce the delays in ED care and treatment that can lower hospital profitability. The American Hospital Association (2007) noted that over the last 23 years there has been a steady increase in emergency patient volumes while the number of EDs decreased The element of a thriving healthcare organization requires its leaders to adjust, accommodate, and transform practices to meet the demand. Since the ED REU model

was found to positively impact ED patient wait times with certain ESI level patients, modifications to processes and procedures could be implemented to enhance patient flow in EDs.

Implications for Social Change

Implications for positive social change include the potential for improvements in efficiency and utilization of ED resources. Those changes could contribute to a positive social change by refining the efficacy of patient treatments and patient satisfaction. Improved patient treatment and patient satisfaction would improve patient lives and lead to better community relations.

A Review of the Professional and Academic Literature

Included in this section is a detailed review of the literature relevant to this doctoral study. A comprehensive review of literature involves identifying, synthesizing, and summarizing a large body of information related to the topic of study and provides an interpretation of the existing research (Buttitta, Iliescu, Rousseau, & Guerrien, 2014). The literature review contains several components. The literature reviewed included the theoretical framework used, literature on rival theoretical frameworks, and the BPI theory in relation to patient flow model, triage level, patient wait time, and measurement of variables. Key concepts reviewed for the chosen framework included process improvement, systematic approach, and efficiency measurements.

A review of the literature for this current research study included a range of professional journals, books, poster presentations, and research studies on the issues EDs are facing related to patient throughput, triage models, and ED wait times. The scope of

research expanded to include the review of information related to increasing ED volumes, the impact of overcrowding on ED wait times, the use of triage models and tools, previous studies of process improvement strategies, governmental information and regulation reviews, as well as patient satisfaction factors.

Academic libraries I used to search the databases utilized for this literature search included scholarly, peer-reviewed journals such as *Academic Emergency Medicine, Journal for Healthcare Quality, Nursing Management, Business Journals,* and *Journal of Emergency Medicine.* Keywords used for the literature review included *emergency department patient flow, emergency department overcrowding, emergency department boarding of patients, emergency department throughput, emergency department wait times, the emergency department increased volumes, hospital capacity, emergency department triage level, patient flow models, business process improvement, lean six sigma, theoretical frameworks* and *study designs*. Journals frequently referred to include *Emergency Medicine Journal, Academic Emergency Medicine, Journal of Healthcare Quality, Nursing Management,* and *Journal of Emergency Medicine*.

Information databases used to conduct in-depth literature searches were the available databases through Crouse Hospital's library, Walden University online library, and other web related resources. The primary source of literature for the current study was from peer-reviewed articles. Referenced and cited are textbooks and journal articles pertinent to the study. Resources utilized to support the theoretical framework were mainly from peer-related journals. The review of literature contained a review of ED design, patient throughput studies, and healthcare provider models. The literature review

included case studies, qualitative, quantitative, and mixed method studies, as well as theoretical framework reviews. The literature reviewed consisted of peer-reviewed professional articles. The literature reviewed remained both scholarly and timely. The literature review consisted of 91 sources. Greater than 95% of references were from peer reviewed resources and 87% were within 5 years of the anticipated completion of the current study.

Application to the Business Problem

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on the dependent variable ED patient wait time. The null hypothesis for this study was ED REU patient flow model and ESI patient triage level does not impact wait time. The alternative hypothesis for this study was ED REU patient flow model and ESI patient triage level do impact wait time.

Theoretical Framework: Business Process Improvement

BPI is a theoretical framework proposed by Harrington (1991). BPI is a systematic approach that helps organizations gain efficiencies through measuring, controlling, and improving processes. Monitoring and managing processes help organizations determine the success of an operational change (Qatawneh & Khan, 2015). Business process reengineering and process redesigns are foundations of BPI.

Business process management involves defining and documenting processes, accessing to determine the value added, and implementing the process improvement strategy. BPI is a systematic approach to process improvement. Lean six sigma

approaches and concepts utilized for process improvement initiatives decrease waste (Wiler et al., 2013). Organizations utilize lean six sigma strategies to improve efficiency by eliminating waste. A systematic approach is necessary to overcome the obstacles EDs face with patient flow strategies. Factors influencing patient flow expand beyond the ED. Influences affecting throughput can be inpatient bed capacity, prolonged length of stay related to certain patient groups, and lack of support from other areas within the hospital (Brouns, Stassen, Lambooij, Vanderfeesten, & Haak, 2015). The culture of an organization's acceptance of throughput obstacles can affect its performance.

Researchers (Karadag, 2015; Marta-Dominguez, Galán-Gonzáles, & Barroso, 2015) studied the lack of financial management knowledge and strategies. In combination with an uncertain business environment, this lack of knowledge can cause leaders to face serious financial crises that threaten the survival of the organization (Karadag, 2015). Karadag (2015) surmised that 86% of business failures were due to economic reasons caused mainly by disruptive technologies, lack of training, inadequate managerial skill, and other bureaucratic problems. Marta-Dominguez et al. (2015) posited leading strategic change necessitates the involvement of an organization's board of directors and management. Marta-Domingez et al. found that leaders who understand the process of change create a competitive advantage for the organizations. In an economic environment, leaders who adapt create a source of competitive advantage (Marta-Dominguez et al., 2015). Change is the only valid constant (Marta-Dominguez et al., 2015).

An organization’s process owner identifies, analyzes, and improves existing processes to meet new objectives and goals. Goals may be improved performance, increased profits, reducing costs, increased effectiveness, or efficiency. BPI focuses on reducing waste and variations in processes and enhances the use of resources (Buavaraporn & Tannock, 2015). BPI strategies improve outcomes by decreasing waste and variations that negatively affect an organization's financial stability. Defining the organization’s strategic goals and purpose, determining the organization’s stakeholders and customers, and identifying key business processes for achieving the goals are the initial principles of BPI (Moghdeb et al., 2007).

Leading change requires knowing when and to what extent to be assertive (O’Kane & Cunningham, 2014). Strategic change initiation involves leaders in organizations noticing, interpreting, and selecting the right option, whereas implementation involves mobilizing resources and overcoming challenges to achieve strategic change goals (Wales, Parida, & Patel, 2013). Although a formal strategic planning process positively relates to an organization's performance, evidence suggested that the success of strategic planning declines as environmental uncertainty increases (Dibrell, Craig, & Neubaum, 2014).

Parry, Carson-Stevens, Luff, McPherson, and Goldmann (2013) described the approach taken to evaluate health care improvements and initiatives to an audience of healthcare organization leaders across the world. Review of theories evaluation started with the program theory and the components of the theory. Parry et al. (2013) surmised an understanding of evaluation methods needed to include why some strategies succeed

while others fail. Perry (2013) reviewed multiple theoretical approaches and considered the phases of model testing. Perry's (2013) findings supported an evaluation of health care to start with guiding questions, followed by understanding what phase the improvement is at, innovation, testing or scale-up, and spread. The researcher must also understand the theory program, framework, and nature of improvement.

The ED directors are responsible for effectively leading and managing changes to maintain profitability in the department. BPI strategies could help ED directors gain efficiency resulting in a favorable impact on patient wait time metrics related to the implementation of an REU or related to utilization of an ESI patient triage level. I evaluated the impact of the independent variables.

Rival Theories/Opponents of the Theoretical Framework

There was a consideration of other theories and principles for this study. Principles considered for this study were team leadership theory, adaptive leadership, change management, queuing theory principles, and lean six sigma principles. I concluded BPI was most relevant for the purpose of the study.

In 2007, S. E. Kogler Hill developed team leadership theory. Team leadership theory is the process of the leader deciding if the group needs active leadership. Then the leader must determine if the group needs task or relationship leadership (Morley, 2014). The leader in team leadership theory continually evaluates what phase the team is functioning in. Team leadership theory addresses the need for leadership to flex the amount of oversight and direction provided to the team based on the current need and demands (Tsai, 2011). Team leadership theory was not appropriate for this study as

continual oversight by leadership is required. The implementation and support of a patient flow model and the use of an ESI triage model requires leader support but not continual oversight to ensure the success. This research study was focused on process and the influence of the independent variables on the dependent variable.

As the environment changes, leaders and the organization must assess the environment and be aware of changes that might influence the actions, behaviors, plans, strategies, and investments (Akhtar, Kei, Khan, & Rao-Nicholson, 2016). Adaptive leadership is a tool-kit resource for leaders with essential tools to guide key decision-making and formal chains of authority that contribute to an organization's growth and sustainability (Akhtar et al., 2016). Leaders' ingrained awareness and understanding of the organization's complex adaptive system provides them the ability to effectively react and stay ahead of environmental changes (Akhtar et al., 2016). Therefore, leaders and the organization must remain flexible, agile, and adaptive concerning strategies in a changing environment (Akhtar et al., 2016).

Lewin's theory developed in 1947, the change management model, consists of a three-stage process. Lewin's model of change shows the process as it happens in human beings. It is a three-stage model known as the unfreezing, moving, and refreezing, which involves prior learning rejection and replacement (Lewin, 2011). Unfreezing refers to the preparatory phase that involves recognizing the need for a change and creating the motivation for the change to occur. Moving refers to the second phase, which is the change. The transition from current to future state and the most difficult stage of the change is the second phase, moving. Refreezing occurs in the future state. Stabilization

and sustaining the change that has occurred is the last and final stage referred to as refreezing. The staff release previously learned behavior, understand the expectation of them, and continue with that new learned behavior when managing patient throughput. An essential part of a change process over time is the need for consistent reinforcement, communication, and education (Cairns, Dudjak, Hoffmann, & Lorenz, 2013). Lewin's approach has been viewed as mechanistic and overly simplistic. However, alignment exists with Lewin's theory and the perspective of complexity theory. Over the last 20 years, the focus has moved to transformational leadership, bringing into question the relevancy of Lewin's theory to modern organizations. However, there are many similarities with Lewin's theory and those of complexity theorists (Burnes, 2004).

ED leaders are responsible for effectively leading and managing changes in the department. Effective management and fiscal awareness helps maintain sustainability in an organization. Due to the continued need for leadership's interventions, the best option is not to change management theory. The focus of the study was to understand the impact the process change had on the independent and dependent variables.

Other theories and concepts considered included queuing theory principles, lean six sigma principles, transformational leadership, and servant leadership theories. Components of the mentioned theories were appropriate, but I determined that BPI theory was relevant for the focus of my research study. I was interested in understanding the impact the independent variables, ED REU patient flow model and ESI patient triage level, had on the dependent variable, ED wait time.

Theory (BPI) Patient Flow Model

Phrases used in literature reviews to refer to a patient flow model with a dedicated rapid intake and evaluation process area are rapid evaluation unit, a super track area, split care model, or other terms. The patient flow model is a model where upon arrival to the ED the patient has a mini-registration completed to include the gathering of information to correctly identify the person and secure the reason why the person is seeking care (Eagle, 2015). After registration, the patient is taken to a rapid evaluation room. In the room, with the nurse and provider present, the patient has a provider led triage conducted. Treatment and testing is begun if determined necessary. The patient remains in this room for a maximum of 45 minutes. The patient transitions to one of four areas; (a) discharge, (b) be moved to a main ED room, (c) be moved to the care in progress area, or (d) move to the clinical decision unit (MacKenzie et al., 2013).

The patient flow model has been examined in previous research and found to improve ED overcrowding (Marino, Mays, & Thompson, 2015). Pines and Bernstein (2015) indicated overcrowding in EDs could result in poor quality outcomes. Pines and Bernstein (2015) have studied supply and demand, lean principles, and alternative patient flow models to deal with the issue of ED overcrowding. The work of Pines and Bernstein (2015) could help other organizations understand and address opportunities within the EDs and the value of improved patient flow models. White's et al. (2014) validated these findings in relation to the issue of overcrowded EDs. The finding from White's et al. (2014) research supported the implementation of a fast track patient flow model within an ED as the findings showed a reduction in LOS. Implementation of a patient flow model

in an ED has shown to decrease patient wait times. Researchers (Kamal et al. 2014; Khanna, Boyle, and Zeitz, 2014) surmised ED overcrowding is a whole hospital issue and the best solution found was involving the whole organization to address the barriers to ED patient flow. ED overcrowding can negatively affect hospital organizations patient flow and patient outcomes. Kamal et al. (2014) studied the adverse effects overcrowding of EDs is causing while looking at an ED as part of the overall health and social system. Addressing ED patient flow requires an organization-wide support. Hospital leaders need to understand the research to apply it to their organization. Multiple studies related to patient flow models help to increase the amount of data and findings to help leaders.

Researchers (Carter, Pouch, & Larson, 2014; Cha, Song, Cho, Singer, & Shin, 2015; Kane et al. 2015; Sayah, Rogers, Devarajan, Kingsley-Rocker, & Lobon, 2014) reviewed the concern of patient safety related to ED overcrowding. A relationship identified was between patient outcomes and ED crowding. The findings of Carter's et al. (2014) study found an increased mortality rate and higher rates of patients leaving without being seen by a provider. Increased demand and improving an ED patient's experience was the focus of a multidisciplinary team lead by providers and nursing leadership (Kane et al., 2015). The goal was to use lean principles and tools to look for opportunities and ways to have an improvement without increasing resources needed. Lean management principles provided results supporting faster services, increased capacity, improved patient satisfaction all while decreasing resources (Cha et al., 2015). Lean principles and efficiency gains are the basis for improving patient flow models. Sayah et al. (2014) conducted an analysis pre and post-implementation of a process

change. Metrics measured and the comparison of pre to post showed an improvement in ED patient length of stay and ambulance diversion. The process changes implemented allowed for increased patient volume while delivering higher patient satisfaction. These studies focused on the concern of ED crowding and possible solutions.

MacKenzie et al. (2013) studied the impact and stress overcrowding created in an ED, and a new process implemented within an ED to improve patient flow. The hypotheses of the study were the improved process would decrease the length of stay, and improve other metrics for enhanced patient care. The new process proposed implemented an intake team approach with bringing the provider and treatment to the patient faster. The premise of this approach was a rapid evaluation of less acute patients with utilizing a triage model to determine patient acuity. MacKenzie et al. (2013) provided an analysis of the findings and data to support the results of the hypothesis. The results supported a positive impact of implementing the changes to the process flow. The authors considered various data elements to create validity in the findings. There needs to be a consideration for the potential negative impact on the main ED when the less acute patients are no longer in the mix of this population. The removal of less acute patients in the main ED leaves the main ED potentially needing a lower patient to health caregiver ratio due to acuity. The movement of more acute patients to a select smaller staff could negatively affect time outcomes.

Researchers (Jurish, Palka, Wolf, & Kremar, 2014; Qatawneh and Khan 2015; Ryan et al. 2013) studied ways to ensure a change is effective and controls needed to ensure the hospital organizations sustain change. Qatawneh and Khan (2015) surmised

applying value add perspective, process management, environmental analysis and performance measures helps organizations achieve success in quality supply chain integration. Business process changes (BPC) are complex and require many capabilities from organizations. Identify capabilities relevant to BPC resulting in a positive impact are IT, change management and project management (Jurish, Palka, Wolf, & Kremar, 2014). Leaders are required to implement and manage process changes. Ryan et al. (2013) focused on identifying what bottlenecks EDs and patient flow. Ryan et al. (2013) reviewed findings from two groups and the constraints EDs faced in the UK and how the application of lean principles could improve the outcomes. Ryan et al. (2013) used process maps and the use of SPSS, statistical software packages, for data analysis. Measurement of the process improvement strategy was by software applications.

Quantitative change leads to prominent qualitative change due to greater amplitude in larger firms (Fink, Frank, Gundolf, & Kailer, 2014). However, unlike large firms, smaller organizations lack the capacity to reflect on the change experienced, limiting the learning potential from change experienced (Fink et al., 2014). The first step for change management of any organization, according to Predişcan and Roiban (2014), is to know what drives change, and the steps needed to implement and sustain change.

Researchers (Buavaraporn & Thannock, 2015; Farley, et al., 2014; Grele, 2015; Harrington, Voehl, & Wiggin, 2012) studied quality measures related to ED flow and management of resources. Farley et al. (2014) studied the requirements for reporting quality metrics and the impact the Centers for Medicare & Medicaid Services have placed on hospitals related to the implementations of electronics medical records directly

linked to reimbursement. Emergency department information systems (EDIS) are important components of most hospital electronic medical records (EMR). Farley's et al. (2014) study focused on determining if a particular choose in EMR could influence safety and quality. Farley et al. (2014) recommended that emergency physicians are involved in the selection of the EMR. Recommended was further study to determine the influence an EMR could have on time and quality metrics. Harrington, Voehl, and Wiggin (2012) surmised that improved quality is a way to eliminate waste. The use of quality frameworks can help avoid misunderstandings and waste (Grela, 2015). Grela (2015) reviewed quality measurements of both analytical and synthetic level. Quality measurements utilized at the synthetic level include metrics in m-dimensional space and selected aggregate functions. Buavaraporn and Thannock (2015) explored how financial institutions adopted business process improvements. Processes reviewed were service quality and customer satisfaction. The approach taken was a case study reviewing a three phase's data collection to include expert interviews. Buavaraporn and Thannock (2015) concluded that incorporating BPI theory into existing quality models could yield better outcomes.

ED patient flow and improvement were the aim of the study conducted by researchers (DeFlitch, Geeting, & Paz 2015; Eagle, 2015; Pines, 2015; Sun et al. 2013). Pines (2015) had identified factors that related to program success. One of the greatest challenges facing U.S. hospitals is delivery of timely emergency care. Organizations need to consider the proper alignment of patient flow and reimbursement. DeFlitch et al. (2015) surmised a quality and access problem for the organization is crowding of EDs.

Crowded EDs affect patient flow, increasing patient wait times. DeFlitch et al. (2015) had reviewed increased patient volumes and limited space resulting in overcrowding. Paz (2015) reviewed staffing and patient flows, care delivery models, and the application of engineering principles. Physician-directed queuing was a new flow model developed after the review of data. ED efficiency was improved by accurately assess and directing patients who required fewer resources to another area in the ED. This freed up resources for those who required greater resources. Metrics utilized to measure efficiency included LWOBS, wait times, and the total length of stay. The results of the study proved greater efficiency with the use of applying engineering principles. Sun et al. (2013) surmised there is an increased rate of inpatient mortality and a modest increase in the length of stay for patients admitted during times of ED crowding. Eagle (2015) suggested ED designs did not include the idea of creating efficiency. Patients seek quick treatment. Reimbursement is now linked to patient satisfaction is a greater concern. One of the greatest challenges facing U.S. hospital is emergency care delivery. Organizations need to consider the proper alignment of patient flow and reimbursement to maintain financial stability (Pines, 2015).

Researchers (Abo-Hamad & Arisha, 2012; Harris & Wood, 2012; Pines & AlGhamdi, 2014) studied improved patient flow by addressing process efficiency. Leadership must continually review a process to ensure the practice of the most efficient processes while maintaining safety and quality of patient care. ED metrics monitored and managed by leadership ensure the patient flow model utilized is producing effective outcomes (Harris, & Wood, 2012). Literature reviews conducted by Abo-Hamad and

Arisha (2012) included the use of simulation frameworks related to patient flow to improve ED patient's experience.

Researchers (Qatawneh & Khan, 2015; Quinn, et al. 2014) conducted qualitative inquiries and identified positive business outcomes associated with patient flow models. Qatawhen and Khan (2015) proposed a qualitative approach to achieving quality supply chain success. Supply chain success is linked to improved workflow process, decreasing waste, and inefficient process. Qatawneh and Khan (2015) surmised applying value add perspective, process management, environmental analysis, and performance measures help organizations achieve success in quality supply chain integration. Quinn et al. (2014) reviewed the need for improvements in door-to-floor times for patients moving from an ED to an inpatient unit. Improved workflow, culture change and an understanding of incentives were found to be important sources of resistance and opportunities. To effect change, they posit all three domains need addressed simultaneously. The proposed recommendations include the elimination of redundancy and frustrating processes, encouraging multidisciplinary collaboration, provider buy-in and getting staff supporting the goal. Quinn's et al. (2014) study conclusions were that hospitals are complex adaptive systems that require, multiple interrelated groups to work together to accomplish this goal. Qatawneh and Khan (2015) and Quinn et al. (2014) studied ways to gain efficiencies through process improvement.

ED patient flow has attracted government involvement. Delays in patient treatment and care have raised the awareness of the issue of ED overcrowding. Impact large volumes of data can make is more than smaller data research. Sharing of data can

affect policies and political decisions. Large data sets can use integration and correlation of variables, while small data sets cannot (Pitts, Pines, Handrigan, & Kellermann, 2012). Multiple studies related to patient flow models help to increase the amount of data and findings to help leaders. By further exploring the use of large data sets, healthcare policy-makers can examine the information and its impact to facilitate evidence-based healthcare changes.

The Centers for Medicare & Medicaid Services (CMS) manage hundreds of dollars of funding based on mandated patient survey results. Hwang, Lipman, and Kane (2015) studied the recently mandated ED patient satisfaction survey. Many of the metrics CMS collect show to be positively influenced by the implementation of ED fast track patient flow models that improve patient throughput. Hwang et al. (2015) analyzed survey results pre and post implementation of a fast track ED process in an academic emergency department with 52,000 annual visits. The researchers' results showed significant improvements in the areas of wait times, doctor courtesy, nurse courtesy, pain control, likelihood to recommend, staff caring, and staying informed about delays. Baker et al. (2013) examined three patient emergency flow models. Baker et al. (2013) looked at the impact on patient flow has on front-end, middle, and back-end emergency department processes. Baker et al. (2013) found a need to address the necessary tools to include communication, data analysis, and predictive patterns. Baker et al. (2013) also completed a case study review of comparative models and utilized a phenomenology approach. Hwang et al. (2015) concluded the implementation of an ED fast track area showed significant improvements in the Press-Ganey satisfaction metrics and played a

role in improving CMS benchmarks for EDs. The implementation of a patient flow model influenced variables beyond time metrics.

The American College of Emergency Physicians (ACEP) describes high-impact initiatives to decrease crowding. EDs have implemented vertical patient flow, a novel initiative. Lui et al. (2013) studied the concept of vertical flow, which allows for the evaluation and management of patients without occupying a traditional ED bed. The concept is patients with a lower acuity remain vertical and are evaluated and treated without the need of a traditional bed. The concept of not utilizing a traditional ED bed for lower acuity patients allows the traditional bed to remain available for the higher acuity patient. Lui et al. (2013) conducted a study consisting of the survey over a period of March through May of 2010. The survey involved physician leaders completing a 2-minute online questionnaire. The response rate was 73 % (106/145) with a completion rate of 71% (103/145). The most prevalent initiative was ED fast track while the least was a physician in triage, 79% versus 12%. Lui et al. (2013) surmised a high variability of implementation of ACEP established initiatives to manage the overcrowding. Recommendations include further studies to examine barriers to implementing initiatives to deal with overcrowding and the impact of initiatives on patient safety, patient satisfaction, and ED throughput.

Triage Level

ED leaders utilize triage processes and triage levels in different ways (Lui et al., 2013; MacKenzie et al., 2013). Researchers (Jeanmonod, DelCollo, Jeanmonod, Dombchewsky, & Reiter 2013; Mazzocato et al., 2014; Naik et al., 2011) reviewed

research and findings on studies related to triage levels. An understanding of how triage level effects ED patient wait times could benefit a leader's ability to manage patient flow. An independent variable for this current study was the use of an ESI triage level with ED patients. Jeanmonod et al. (2013) conducted a review of the literature including the evaluation of peer articles and findings related to the triage models and ESI levels. Comparison data reviewed related to patient satisfaction and efficiencies of models that utilized triage models. In cases where the complexity increased, the ED would have greater difficulty in hardwiring the desired process (Mazzocato et al., 2014). The literature review included the review of methodology and lean principles. Review of articles included articles from Naik et al. (2011) and the studies related organizational approaches to transforming EDs by implementing lean principle methodologies.

Laker, Froehle, Lindsell, and Ward (2014) studied how EDs regardless of demand that have high and low-acuity treatment areas often with dedicated resources. Laker et al. (2014) conducted a simulation study utilizing a 10-bed fast track area and swinging five beds to either high- or low-acuity patients depending on demand. The results of the study showed the lowest wait times when utilizing three beds as swing beds instead of treating all beds as traditional ED beds. Allowing for some flexibility in bed dedication reduced patient wait times and increased efficiency.

Researchers (Arya et al., 2013; Rogg, White, Biddinger, Chang, & Brown, 2013) studied the effects patient acuity have on EDs. Arya et al. (2013) studied increased emergency visits, increased the length of stay for ED patients, and the need to manage the cost of care. Arya et al. (2013) research study conducted a retrospective chart review.

There was a comparison of two periods consisting of adult patients discharged from an urban ED. The data collected showed favorable results, with a decrease in length of stay by utilizing a split emergency severity patient flow model. The results found by their study support favorable results for split patient flow ED models for middle to low acuity patients according to the patient's triage level. Rogg, et al. (2013) studied the well-recognized issue of ED overcrowding. There is little data available regarding potential solutions, screening tools or studies related to the physician in triage. Rogg et al. (2013) hypothesized that the implementation of the provider in triage would improve ED metrics. The study conducted was a retrospective before and after observational comparison of metrics. Rogg's et al. (2013) findings supported the hypothesis that the implementation of a provider in triage does improve ED metrics.

Scrofine and Fitzsimons (2014) studied the stress on EDs due to overcrowding, extended wait times, boarding of admitted patients, as well as the negative impact this has on patient satisfaction and outcomes. Ocean Care Center's (OCC) needed to change the process and understand the impact the need to change the process had on the culture of the organization. OCC utilized Kotter's 8-step model as the framework to implement the change required. Scrofine and Fitzsimons (2014) outlined the solutions used to improve the process: immediate bedding, initiation of fast-track care, nontraditional beds, decreasing turnaround time for laboratory testing and using midlevel providers. Pre and post-implementation change metrics were outlined. Staff and patient satisfaction factored into the outcomes. Captured in previous studies are the influences of ED patient triage levels on other variables. The purpose of this study was to understand the influence an

ESI patient triage level had on ED wait time. The review of literature supports the need for further study.

Patient Wait Time

The dependent variable for the study was patient ED wait time. The dependent variable was the measurement of time influenced by the implementation of independent variables. For this study, first independent variable (within-factor) was time with two levels, time 1 prior to ED REU implementation (April 18- October 18, 2015) and time 2 post ED REU implementation (October 19, 2015- April 19, 2016), second independent variable (within factor) was patient triage with five levels (L1, L2, L3, L4, and L5).

Researchers (Marino, Mays, & Thompson 2015; MacKenzie et al., 2013; Pines & AlGhamdi, 2014; Silvester, Harriman, Walley, & Burley, 2014) conducted studies related to ED wait times. Silvester, Harriman, Walley, and Burley (2014) found best practices for improving the time for a patient to been seen in the ED, however, they neglected the issue of boarding patients in the ED due to capacity issues in the hospital. MacKenzie et al. (2013) conducted at study focusing on ED length of stay by implementing a rapid assessment unit. MacKenzie et al. (2013) noted employee satisfaction and quality metrics improved when ED length of stay decreased. Pines and AlGhamdi (2014) researched the impact overcrowding of EDs have on quality. The researchers looked at medium acuity patients and the impact a dedicated fast track has on the length of stay and left without being seen, patients. Pines and AlGhamdi (2014) showed the implementation of a fast track within an ED has a positive effect on decreasing length of stay and LWOBS. Marino, Mays, and Thompson (2015) studied the delays in timely treatment and access to

care in emergency departments where the non-clinical staff greets patients. Emergency department's waiting rooms have high liability and risk associated with wait times. Marino, Mays, and Thompson (2015) conducted a literature review and convened a team to implement an immediate bedding process. The process change implemented was placing a nurse greeter in the waiting room. A primary role of the nurse greeter was to assess patient acuity by conducting a quick assessment, place the patient in a bed appropriate to the acuity level. The process change resulted in the door-to-triage time, door-to-bed time, and door-to-physician time and patient satisfaction all improving.

Researchers (Jains et al., 2014; Mumma et al., 2014; Stitchler, 2015) studied the impact one variable had on another such as length of stay in EDs. Jains et al. (2014) surmised the effects extended length of stays can have on emergency patient's outcomes. Jains et al. (2014) took a deep look at ED length of stays (ED LOS) in stroke patients. A retrospective review conducted between July 2009 and February 2010. The findings analyzed the relationship between ED LOS and outcomes for patients who had a diagnosis of acute ischemic stroke/transient ischemic attack. The findings from the study found no association of ED LOS and poor outcomes. Jains et al. (2014) concluded that ED LOS alone is not an indicator of stroke care in EDs. Overcrowding EDs is associated with adverse outcomes. ED expansion has not reduced overcrowding. Mumma et al. (2014) conducted a retrospective study utilizing data from two 11-month periods pre and post expansion of an ED. The expansion took the ED from a 33-bed to a 53-bed unit. The daily census went from 128 to 145-post expansion. The percentage of patient who left before triage was unchanged. Total ED boarding increased from 160 to 180 hours per

day. Mumma et al. (2014) concluded that ED expansion alone was not a solution for ED crowding. The influence of one variable on another requires measurement to understand its influence and determine if it achieved the desired outcome (Stitchler, 2015).

The ability to predict and adapt helps ensure sustainability for healthcare organizations (Porter-O'Grady, 2015). The value for this study aligns with an ED's ability to generate the greatest revenue and help organizations remain sustainable. If the study produced expected outcomes, it would support in EDs the implementation of rapid evaluation units and ensure the utilization of triage levels influence ED wait times. Efficient patient flow models enhance the ability of patients in the community to receive care. A key element of a thriving healthcare organization is the ability for its leaders to adjust, accommodate, and transform practices. Care provided promptly produces higher quality outcomes. EDs are the front door for hospitals; therefore, many times are part of the strategic plan. An organization's sustainability directly relates to the ability to build a well-functioning ED. Efficiencies in an ED throughput model help the organization capture and maintain market share. Patient and community providers desire quality emergency care promptly. Prolonged ED length of stay can adversely affect critical patient's outcomes (Jones et al., 2015). In an ED, there are many contributing factors to patient outcomes (Jain, et al., 2014). One contributing factor is ED wait time.

Researchers (Singer et al. 2011; Sun et al. 2013) studied mortality related to ED wait times. Singer, Thode, Viccellio, and Pines (2011) concluded there was an increase in mortality from 2.5 to 4.5% comparing patients boarding less than 2 hours to patients boarding greater than 12 hours and found there is a relationship between hospital LOS

and mortality as related to the length of stay of ED patients. Sun et al., (2013) conducted a retrospective cohort analysis of mortality, the length of stay and cost of patients admitted in 2007 via EDs in California hospitals. The conclusion of the findings from a study conducted by Sun et al. (2013) showed an increased rate of inpatient mortality and a modest increase in the length of stay for admitted patients during periods of ED crowding. The impact increase of the length of stay was noted on the outcomes for ED patients in the Sun et al. (2013) study. Decreasing length of stay for ED patients can decrease overcrowding thereby positively influencing the negative effects overcrowding has on ED patients outcomes.

The length of stay is the measure of time for the duration of a patients visit (Arya et al., 2013). Lui, Hamedani, Brown, Asplin, and Camargo (2013) described the concept of vertical flow and reviewed initiatives to help decrease ED overcrowding. Vertical flow is safely assessing, treating and discharging or admitting patients without placing them in a traditional ED room. Lui et al. (2013) conducted the study by surveying providers in an academic residency program with a 2-minute survey occurred in 2010. Methods evaluated were inpatient discharge coordination, interventions with surgical scheduling, a fast track area in an ED, and the concept of the provider in triage. The findings of the study had a varying response. Most areas had implemented some portion of the initiative. This study evaluated the influence the implementation of a rapid evaluation unit and an ESI patient triage level had on time metrics for ED wait times.

Researchers (Cooke, 2013; Kane, et al., 2015) studied ways to decrease ED patient wait times. Cooke (2013) studied targets introduced to improve emergency care

and flow. One of the targets included not having emergency visits exceed 4 hours in length. Having set time targets had improved the emergency length of stay. Without targets, the length of stay did not decrease. Cooke (2013) recommended time targets and quality measures. Cooke (2013) describes ED success as an ED that has set targets and quality measures. Increased demand and improving an ED patient's experience was the focus of a multidisciplinary team lead by providers and nursing leadership. The goal was to use lean tools to look for opportunities and ways to have an improvement without increasing resources. Kane et al. (2015) applied lean management principles to support faster services, increased capacity, improved patient satisfaction all while decreasing resources. Sustained improvement required daily management. The implementation of applying lean principles resulted in decreased wait times for patients, decreased the length of stay, improved patient satisfaction, and improved patient throughput.

Researchers (Brouns, et al., 2015; Traub et al., 2015) studied influences into the time patients spent in EDs. Brouns et al. (2015) researched the factors that contribute to ED patient's length of stay. A retrospective review conducted on a randomized sample of internal medicine patients who visited an ED captured the length of stay was a time data elements. Brouns et al. (2015) found the contributing factors to increased length of stay were a large number of tests ordered and a low experience level of physicians. Over-ordering of testing and novice physicians can negatively influence society by increasing costs and incompetent physicians. Traub et al. (2015) studied the effects rapid medical assessment teams have on the length of stay and left without being seen metrics. Although shown the use of teams helps with the metrics, the actual understanding of the

mechanics is unknown. Traub et al. (2015) compared objectives to include the impact on length of stay of patients seen in a rapid medical assessment approach compared to those who did not have this approach to the care. The conclusion was a decrease in length of stay for a patient seen and discharged, but an increase for those seen and admitted. An impacting mechanism found to be on overall rapid disposition, not a change in placing orders in the trial. It was not understood why there was an increase in length of stay for patients admitted.

Measurement of Variables

Measuring is a way to determine the effect of a process change. The measurement of ED wait time determines if there is a reduction in wait times for ED patients. The study analyzed the impact of an ED REU (Rapid Evaluation Unit) patient flow model and ESI (Emergency Severity Index) patient triage level on the dependent variable patient wait times measured as a daily mean, calculated as a weekly average for each of the 26 weeks pre and post implementation. ED patient wait time was measured in minutes. ESI triage was measured in levels. There are five ESI levels (L1, L2, L3, L4 and L5). ESI triage levels are a basis of how many resources a patient needs for their care based on their issue (Scrofine, & Fitzsimons, 2014).

There is a growing need for standardized ED metrics. There are more mandates from payers, the public, hospitals, and Centers for Medicare & Medicaid Services (CMS) to improve ED performance and measure outcomes. The demand for more data is driving the need to standardize measurements of ED operational performance (Hwang, Lipman, & Kane, 2015). ED metrics to include door-to-provider, the length of stay, and left

without being seen (LWOBS) are ED metrics that CMS has endorsed. Core standard timestamps for EDs identified are: arrival time, EMS offload time, treatment space-time, provider contact time, data ready time, disposition decision time, admit decision time, departure time, arrival to provider time, ED length of stay, arrival to treatment space-time, treatment space to provider time, provider to data-ready time, data-ready to decision time, decision to departure time, and admit decision to departure time (Sorup, Jacobsen, & Forberg, 2013). The need for data elements from EMRs has evolved emergency information systems (Farley et al., 2014). This study utilized the timestamps arrival time, disposition decision time, arrival to provider time, and ED length of stay.

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on patient wait times. ED leaders lack an understanding of process improvement strategies they can implement to enhance patient throughput in EDs resulting in a decreased ED wait times. The independent variables were the implementation of an ED REU patient flow model and ESI patient triage level (Scrofine, & Fitzsimons, 2014). The dependent variable was ED wait time. Leadership-based programs can have an effect on emergency patient wait times (Patel, Combs, & Vinson, 2014). It was hypothesized there is an influence on the time it takes for a patient entering an ED to see a provider and the ED leader's process improvement strategy. I have included in this section a comprehensive review of previous studies related to ED efficiency studies.

Transition

Two percent of Emergency Department (ED) patients leave before being seen (LWOBS) due to long wait times (Marino, May, & Thompson, 2015). The specific business problem was that some ED hospital directors in Central New York do not know the impact of an ED REU (Rapid Evaluation Unit) patient flow model and ESI (Emergency Severity Index) patient triage level on patient wait time. Grounded in business process improvement theoretical framework, the purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU (Rapid Evaluation Unit) patient flow model and Emergency Severity Index (ESI) patient triage level on average weekly patient wait times. The population was comprised of data records from April 18-October 18, 2015, and October 19, 2015- April 19, 2016, of patients presenting at a hospital ED in Central New York. The researcher question was "What is the impact of an ED REU patient flow model and ESI patient triage level on patient wait times"? The null hypothesis was that ED REU patient flow model and ESI patient triage level do not impact patient wait time. The alternative hypothesis was that ED REU patient flow model and ESI patient triage level do impact patient wait time.

ED leaders have the opportunity to implement strategies to impact efficiencies and outcomes. Patient flow models and utilization of ESI patient triage levels can affect the time it takes for providers to see patients in EDs, therefore ED wait times. Utilizing BPI helps in understanding the influence of the independent variables on the dependent variable. Delays in treatment for patients can negatively affect the outcome and satisfaction. The research problem, research question, and the theoretical framework

contribute to the understanding of strategies ED leaders may utilize. The literature review provided information related to the business problem, theoretical framework, rival theories, theory (BPI) patient flow model, triage level, patient wait time, and measurement of variables.

In Section 2, I provide my role as the researcher, details of the participants, ethical considerations, expansion of the study's research method and design and data analysis, and reliability and validity. In Section 3 of the study, I provide my presentations of the findings with a description of the finding's application to professional practice and implications for social change.

Section 2: The Project

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. A quantitative mixed-method ANOVA approach enabled me to address the research question and better understand the influence the independent variables had on the dependent variable. For this study, private, protected health information or patient specific data was not utilized. Therefore, there was no consent or ethical integrity concerns raised. (See Appendix A for proof of completion of Collaborative Institutional Training Initiative.) In this chapter, I address the role of the researcher, participants, research method and design, population, ethical aspects, data collection instrument, data collection technique, data analysis, and study validity.

Purpose Statement

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. The population was composed of data records from April 18- October 18, 2015, and October 19, 2015- April 19, 2016, of patients who presented at a hospital ED in New York. The first independent variable (within-factor) was time, with two levels, time 1 prior to ED REU implementation (April 18- October 18, 2015) and time 2 post-ED REU implementation (October 19, 2015- April 19, 2016). The second independent variable (within-factor) was patient triage with five levels (L1, L2, L3, L4, and L5). The dependent variable was patient ED wait times, measured in minutes, after implementation of an ED REU patient flow model. The implication for social change

included the potential for hospital leaders to decrease the time it takes for a medical provider to see an ED patient, which may result in less ED overcrowding and increasing the efficacy of treatment.

Role of the Researcher

My role as the researcher in the data collection for this study was to collaborate with the quality analyst and information technology contact at the organization where the study took place, a Central New York hospital ED. I worked with the emergency services leadership team (ESLT) to ensure the ESLT understood the role in implementing the proposed study and ensured the ESLT stressed importance of accurate documentation to the ED team members. Physicians and emergency service leaders have a role in change in EDs (Pritchard, 2012). By collaborating with the emergency services leadership team, the education of the ED team was accomplished, ensuring data was reliable for the study (Piggott, Weldon, Strome, & Chochinov, 2011).

My role as a researcher was to comply with the Belmont Report protocol. The Belmont Report discusses ethical practices in research (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978). Three guiding principles in the Belmont Report include respect for persons, beneficence, and justice. Respect for persons means protecting their autonomy and treating them with respect and courtesy by allowing them to be fully informed prior to consent. Beneficence is the philosophy of maximizing the benefit of the research project, minimizing risk, and doing no harm to the research subjects. Justice means ensuring benefits of potential research aligns the costs and administration of the study (National Commission for the

Protection of Human Subjects of Biomedical and Behavioral Research, 1978). I have reviewed the ethical considerations identified in the Belmont Report and as this study used secondary data, there was minimal risk to study subjects.

The data collection for this study did not include any patient identifiable information. To avoid the risk of ethical issues, patient identifiable information was not included in the collection of data (Wretborn, Khoshnood, Wielock, & Ekelund, 2015). Neither individuals nor personal healthcare information was included in any reporting for this study. In speaking with the Institutional Review Board (IRB) coordinator where the study took place, the study was deemed exempt. The hospital's IRB coordinator concluded this study was exempt from IRB and submitted a letter of exemption (Appendix B).

Participants

The sample for this study was composed of data records from April 18-October 18, 2015, and October 19, 2015-April 19, 2016, of patients who presented at a hospital ED in New York. The data derived was from patients who presented as walk-in emergency patients, as well as patients brought to the ED via ambulance. The sample data reflected data elements from patients who presented with any chief complaints of illness, injury, disease, or any reason for seeking emergency care during a 26 week, period preimplementation and a 26 week period postimplementation of an ED REU patient flow model.

Strategies I used to gain access to the archival data for this study included complying with the organizations IRB process and enlisting the support of the IRB

hospital coordinator and the quality analytics person at the hospital where this study occurred. I have professional relationships with my IRB coordinator and the quality analytics contact. I previously worked at the hospital utilized for this study and have existing relationships.

Research Method and Design

A researcher's experience, expertise, and interests influence the approach to a study (Cooke, 2013). I utilized a quantitative mixed-method ANOVA study approach. My experience as a health care leader influenced the research topic, method, and employed design.

Research Method

A researcher utilizing a quantitative study methodology tests objective theories through an examination of relationships or differences among variables (Fassinger & Morrow, 2013). The researcher utilizes a quantitative methodology to test a hypothesis and infer results to a larger population (Orcher, 2014). I choose to use the quantitative method because I sought to understand the impact that processing patients with an REU and processing patients via an ESI patient triage level had on the dependent variable of patient wait time.

Quantitative, qualitative, and mixed method approaches to research offer different strengths (Fassinger & Morrow, 2013). In determining, the methodology to use for research, consideration is given to the role and competence of the researcher, the focus of the study, the researcher's relationship to the participants, and the researcher's ability and

experience with gathering, analyzing, and reporting data. The research design serves as a logical plan in the determination of data collected and the analysis of the data.

Quantitative methodology tests a hypothesis and infers results to a larger population (Orcher, 2014). Qualitative researchers test theories by measuring and analyzing the relationship between variables. Henriques (2014) surmised that research required recognizing bias and subjectivity to avoid ignoring preconceived notions or perceptions of the problem. The risk of bias and subjectivity is a weakness of qualitative studies. Perry (2013) stressed achieving a cognitive, self-reflective understanding of each participant's experiences that allows for a transcendental approach deters individual preconceptions from influencing the results. Mixed methods combine qualitative and quantitative approaches. The focus of this study, however, was to test a hypothesis with the potential the results of the study inferred to a larger population.

Researchers have found the use of mixed methods is beneficial in complex studies (Griensven et al., 2014). A single methodology approach does not capture a comprehensive understanding of complex studies. Combining the strengths of both quantitative and qualitative methods produces a comprehensive insight. Fetters, Curry, and Creswell (2013) surmised mixed methods approach provides powerful tools for studies within the healthcare environment. Mixed methods methodology offers tools to evaluate complex systems and processes.

The purpose of a qualitative or a mixed method study is to explore *how* and *why* rather than explain outcomes (Yin, 2014). Therefore, qualitative or mixed methods methodologies did not fit the purpose of this study. Integrating qualitative and

quantitative methods in mixed methods research could maximize the strengths and minimized the weaknesses of each method (Fetters et al., 2013). However, the additional cost and complexity did not support using mixed methods in this study. In addition, a mixed method study was not appropriate for this research effort because a mixed methods approach contains the qualitative component of exploring *what* or *how*, which was not the objective of this investigation.

I sought to understand the independent variables' influence on the dependent variable. The first independent variable (within-factor) was time, with two levels, time 1 prior to ED REU implementation (April 18- October 18, 2015) and time 2 post-ED REU implementation (October 19, 2015- April 19, 2016). The second independent variable (within-factor) was patient triage with five levels (L1, L2, L3, L4, and L5). The dependent variable was patient ED wait times, measured in minutes, after implementation of an ED REU patient flow model. The analysis in this study determined the impact of the independent variables on the dependent variable, time. Therefore, a quantitative methodology was the most appropriate form for this research study.

Research Design

A mixed-method ANOVA study measures observations over time or under different conditions (Green & Salkind, 2014). A mixed-method ANOVA was appropriate for this study, as it uses the same subjects, or level, over time, taking more than one measurement. Mixed-method ANOVA is collected in a longitudinal study in which change over time is assessed (Griensven et al., 2014). The ESI level as it related to wait time was the same variable measured. The purpose of this quantitative mixed-method

ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on patient wait times. In this study, the groups of patients who presented to the ED during the study periods were whoever sought care during that time. The patients who sought care during this study period all experienced an ESI evaluation within an ED REU patient flow process. Researchers conducting correlation design studies examine the relationship between and among two or more variables and do not seek to understand the cause and effect (Pallant, 2013); therefore, correlation design was not be appropriate. Experimental researchers examine cause and effect relationships (Yin, 2014). When non-randomly selected individuals are included in a study researchers are utilizing quasi-experimental studies (Fassinger & Morrows, 2013). In this study, I used a mixed-method ANOVA approach. Utilization of a mixed-method ANOVA method addressed the specific business problem and research question.

Population and Sampling

The population for this research study included archival data records of individuals who sought emergency medical care at a hospital ED in Upstate New York from April 18- October 18, 2015, and October 19, 2015- April 19, 2016. Any individual who presented for care during the time pre and postimplementation of the REU had the data elements from the ED visit included in the study. Therefore, the population aligns with the research question.

I chose a census method for this study. With a census population, there is not a selection of a sample as the entire data set is utilized (Babbie, 2015). A benefit of utilizing a census is the entire population is included in the study (Marshall, & Rossman,

2014). Using the entire population (a) eliminates sampling error, (b) yields benchmark data that may be obtained for future studies, and (c) provides detailed information about small subgroups within the population (Yin, 2014). However, disadvantages of a census are (a) time consuming due to volume, (b) expensive, and (c) not convenient for the researcher (Perry, 2013).

Ethical Research

As the researcher for this study, I reviewed the Walden IRB Ethics Self-check application for IRB approval. The Walden IRB approval number is: (06-09-17-0425503). Given that the nature of the study was to use archival data, no consent process was needed, nor was a procedure for participant withdrawal or incentives for participating. The Walden IRB committee instructed me to submit the hospital IRB form for review to the IRB coordinator at the hospital. Walden's research ethics support specialist advised it is common for sites to require the organizations own review forms. The form was completed, and all required information submitted for review. The hospital IRB coordinator concurred this study was exempt; all Walden IRB required documents were submitted. The hospital's IRB coordinator provided a letter stating no IRB approval was required for the study as there was no identifiable patient information in the data submitted. No personal private health information was included as part of the study metrics either. The information provided by the hospital IRB coordinator, including the exclusion letter, was provided to Walden's IRB committee. A completed Form B along with copies of the letter from the hospital were requested and sent for review (Appendix C). Walden's IRB committee specialist requested I complete Form A: Ethics Pre-

application to help the IRB committee determine what materials were required for Walden IRB review (Appendix D). IRB approval through Walden University was obtained.

Data Collection Instruments

The metrics measured in this study came from the electronic medical record (EMR) utilized at the hospital's ED. Within the EMR, there are time-stamped actions constituting the data collected. Data was imported to Statistical Analysis System (SAS) version 9.4. I used SAS 9.4 and SPSS to calculate the results from the data elements captured from the EMR. The data collected was an average weekly time from when a patient presents to the ED until they first see a provider, no individual patient times or individual patient data elements are included in the study negating the need for IRB approval.

The first independent variable was time, with two levels, before and after REU implementation. The second independent variable was ED ESI level, five levels with level 1 (most urgent) through 5, (least ED resources needed to manage the patient). The dependent variable was the measurement of time from when a patient first enters an ED until they are seen by a provider.

The data markers captured are the time the patient registers in the ED, the time when a provider first sees the patient, and the time when the provider decides to discharge the patient. The EMR can capture these data points as these time elements require an action. The data captured reflects ED wait time. The EMR has metrics for the necessary variables for the study as well as census data. The hospital where an REU was

implemented had provided permission to use their data, exemption letter (See Appendix B). Understanding the impact of the complexity of a patient allows for efficient patient flow (Grouse, Bishop, Gerlach, deVillecourt, & Mallows, 2014). Analyzing the differences in wait times related to a patient ESI level can improve efficiency. The use of the hospitals EMR and the data it contains was appropriate for this study. The ability of the EMR to capture these elements removed the need for the researcher to observe these actions and record the time.

Utilizing the calculation abilities within SPSS removed the need for manual calculations decreasing the concern of human error. To ensure accuracy and validity, review of the calculations to ensure the same results occurred when recalculated occurred. The hospital IRB coordinator and quality analyst approved utilizing the time data elements from the EMR for the study. Researchers have surmised the most recommended performance measures were ED time intervals (Sorup et al., 2013). Time intervals to include the length of stay, time from when a patient first arrives until they see a provider were among the most frequent measurements. ED time metric elements are a way of measuring efficiency. This study measured time metrics obtained from the EMR utilized by the hospital.

Data Collection Instruments

Used for the study were data elements from the EMR where the study occurred. The data elements were timestamp points within the EMR that populate as a patient progresses through treatment in the emergency department. The timestamp elements populate because of the caregivers completing and documenting in the EMR the patients

care. Reports are available within the EMR that generate time elements. The quality analyst pulled data for set periods. The data elements pulled for preimplementation of the rapid evaluation unit and post-implementation, as well as ED wait times in relation to ESI patient triage levels area, were analyzed for the study. For this study, I compared the average weekly time pre and post implementation of the rapid evaluation unit and the average time for an ED patient to see a provider based on an ESI patient triage level. The sample size was not be the number of patients seen during this time but rather the 26 data elements pre and 26 data points post implementation of an ED REU representing a weekly average mean time.

The data pulled included the timestamps for all patients, excluding LWOBS, for the set periods. Other methods of data collection such as convenience sampling where consent is necessary can result in lower response rates (Dinh, Enright, Walker, Parameswaran, & Chu, 2013). The design of this study negated the need for consent influencing the number of available data elements. The selected method of data collection for this study produced a robust amount of data.

Advantages of this data collection technique were no additional resources were necessary. Risk-adjusted monitoring is becoming increasingly popular with healthcare related data (Woodall, & Montgomery, 2014). The data required for this study were data elements currently utilized and measured at the hospital where the study occurred. This model affords a large sample size unlike a convenience sample or observational study that may limit the eligibility of patients (Lutze et al., 2014). A large sample size for the study allows for the feasibility of findings would be similar to another organization. No

risk-adjustments are necessary for this study. The timestamps are components of the medical records. These components populate as a necessary step in the documentation of the delivery of care. Removed with this method is the possibility of human error from observations or bias.

Data Analysis

RQ: What is the impact of an ED REU patient flow model and ESI patient triage level on patient wait times?

Answering this research question requires testing the following hypothesis:

H_0: ED REU patient flow model and ESI patient triage level do not impact patient wait time.

H_1: ED REU patient flow model and ESI patient triage level do impact patient wait time.

Study data was analyzed using a mixed-method analysis of variance (ANOVA). Mixed-methods ANOVA are also referred to as a between-within-subject ANOVA (Green & Salkind, 2016). A mixed between-within subject ANOVA is used when the researcher wants to investigate the impact, main effect, of two independent variables, on an intervention (between subjects) while at the same time examining another independent variable, group (within subject) difference over time (Pallant, 2013). Change over time is assessed in a longitudinal study using a mixed-method ANOVA analysis (Griensven et al., 2014). A mixed method between-within subject ANOVA was an acceptable technique to examine the impact of the ED REU patient flow model (the study between subjects) and patient triage level (the study within subjects) on the dependent variable

patient wait times. A mixed between-within subject ANOVA was an appropriate statistical technique to investigate the research question.

A mixed-methods ANOVA compares two groups with one within-subjects independent variable (IV) and the other IV as between-subjects. A mixed-methods ANOVA was used to study a dependent variable over two or more time points or conditions and assigned to two separate groups (Woodall, & Montgomery, 2014). The purpose of a mixed-method ANOVA evaluates the impact two independent variables have on a dependent variable. If significance is found, comparison of the original and adjusted means can provide information about the role of the two independent variables (Fetters et al., 2013).

A separate ANOVA is not appropriate as the study contained two factors each with multiple levels. The first factor is REU and the second is ESI with time as the dependent variable. In my study design, REU has two levels and ESI five. In all, there are 5 x 2 groups or cells. A mixed-method ANOVA was an appropriate analysis tool in this study design because I not only wanted to evaluate the impact of the REU intervention but also desired to know whether that impact was different between a second independent factor, ESI level. An advantage of using mixed-method ANOVA design is that ANOVA findings allow the researcher to explore the interaction of each independent variable (Pallant, 2013). A univariate within and between ANOVA would not reveal the interaction effects (Pallant, 2013). A second advantage of mixed-method ANOVA is a more conservative *F* statistic is produced, therefore, results in less Type 1 errors. Each time a statistical analysis is run; there is risk for Type 1 errors. Running two separate

analyses on a data set increases risk of Type 1 error rates. Another statistical technique in the *F*-test family, regression, was not appropriate for my study design, as the purpose of this investigation was to compare not to predict variables (Green & Salkind, 2016).

I screened and cleansed the data once it was analyzed to ensure the census was large enough. Consideration was given to review of all triage levels. The ED where the study occurred is not a trauma facility, therefore, patients presenting with an ESI level one was minimal. The volume of the patients presenting with an ESI level five low acuity patients and as the purpose of EDs was to treat serious cases, they too were minimal. Given the low number of data elements for level one and level five, these ESI levels are not included in the results.

Listwise and pairwise are data cleansing technics used to address missing data in studies (Dong & Peng, 2013). Listwise involves removing the entire record from the analysis when a single data element is missing while pairwise removes only the missing value (Ender, 2013). Listwise is the data deletion technique I utilized for this study. The entire records for ESI level one and ESI level five patients were removed from the final study results.

To use ANOVA three assumptions about the data need to be met normality, independence, and homogeneity of variances. Normality is the state of being typical, or expected (Barratt, Ferris, & Lenton, 2015). Normality in this study was be assessed using graphical descriptive statistical techniques like histograms. Histograms and boxplots provide basic, first brush, tests of assumptions are also useful to identify outliers. Normal probability plots were also verify whether study data fits the normal distribution

assumption. I utilized the Pearson chi-square test statistic to verify that the two sets of data are independent. Homogeneity of variances means that the variance within each of the groups should be the same. Homogeneity is a state or quality of being all the same or kind (Barratt, Ferris, & Lenton, 2015). Levene's test of homogeneity of group variances, which tests whether the average size of the residual is the same across all groups, was used to verify homogeneity. As the study used a mixed-method ANOVA, a further assumption of homogeneity of inter-correlations must be met. Box's *M* statistic was used to determine homogeneity of inter-correlations. I reported Wilks' Lambda statistics to ensure mixed methods can be used and reported Pillai's Trace if the study assumptions were violated (Pallant, 2013).

For data analysis, I used Statistical Analysis System (SAS) version 9.4 and Excel 2010. SAS software provides usable data for statistical analysis (Delwiche & Slaughter, 2012). SAS mixed-method ANOVA output includes *F* statistic, p value, *df*1, *df*2, degrees of freedom, Mauchly's W, Chi-Squared, and ε epslon (Delwiche & Slaughter, 2012). The *F* statistic is a measurement of predictability (Green & Salkind, 2016). The F-test of significance was used to assess the effects ED REU patient flow model (between-subjects) and patient triage level (within-subjects) on patient wait time. The *p* value is the significance probability (Green & Salkind, 2016). The *df*1 is the degrees of freedom within subjects. The *df*2 is the degrees of freedom between subjects. Mauchly's W evaluates for data sphericity (Delwiche & Slaughter, 2012). Chi-square, X^2, is a statistic that indicates whether there is or is not a significant association between two variables (Green & Salkind, 2016). Epslon represents the error in the analysis.

Study Validity

Validity is the assurance the approach taken by the researcher is accurate and measures what the study has determined measured. The concepts of validity and reliability started in the natural sciences and then appeared in quantitative research in social sciences (Yazan, 2015). Research validity and reliability are common concepts in quantitative research but also applicable in qualitative research since both researchers must establish creditability using either method (Olsen, McAllister, Grinnell, Walters, & Appunn, 2016). Internal, external, statistical, and construct validity threats need be eliminated or minimized to draw conclusions (Babbie, 2015). The study does not involve experimental procedures. Therefore, internal and external validity need not be addressed (Barratt, Ferris, & Lenton, 2015).

Threats to statistical conclusion validity are the reliability of the instruments, data assumptions and sample sizes. Threats to sample size are addressed by a G Power analysis. Threats to data assumptions in a mixed-method ANOVA study were addressed by Wilks' Lambda and or Pillai's Trace tests. Threats due to the reliability of the instrument do not apply as this study uses archival data.

A small sample size is a threat to a study's validity (Boyd et al., 2014). GPower is a statistical tool utilized to calculate statistical power analysis for different tests including the t-test, *F*-test, as well as other statistical tests (Barratt, Ferris, & Lenton, 2015). I completed power size calculation for a two factor balanced ANOVA using SAS Version 9.4 (Delwiche & Slaughter, 2012). Estimates were used for the means, for each combination of triage level and time, and a standard deviation. With an estimate of

census data error variance, the power exceeds 99% for both triage level and time period. The power for the test of the interaction is 87%. All calculations use alpha = 0.05 (or a 95% confidence level). Any patient who presented to the hospital ED during the study period had time data elements included in the weekly average mean time. For this study, the census period contained 26 data elements for each pre and post period and as more data improves confidence, a census size of 26 data elements pre and post was sufficient to ensure study validity.

Transition and Summary

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU (Rapid Evaluation Unit) patient flow model and Emergency Severity Index (ESI) patient triage level on average weekly patient wait times. My role as the researcher was to collaborate with the quality analysis and the information technology contact at the organization where the study took place to obtain the necessary data. The population and sample for this study comprised of archival data records of individuals who sought emergency medical care during the times from April 18-October 18, 2015, and October 19, 2015-April 19, 2016, at a hospital ED in New York. The sample size was not be the number of patients seen during this time but rather the 26 data elements pre and 26 data points post implementation of an ED REU representing a weekly average mean time. A census data technique where all records during the time of the study and not a sample was used.

Adherence to IRB review and recommendations was followed. The metrics measured in this study came from the electronic medical record (EMR) utilized at the

hospital's ED. Within the EMR, there are time-stamped actions constituting the data collected. Data was imported to SAS and SPSS. I used SAS and SPSS to calculate the results from the data elements captured from the EMR. The first independent variable was time, with two levels, before and after REU implementation. The second independent variable was ED ESI level, five levels with level 1 (most urgent) through 5, (least ED resources needed to manage the patient). The dependent variable was the measurement of time from when a patient first enters an ED until they are seen by a provider. A mixed between-within subject analysis of variance (ANOVA) was the appropriate statistical analysis for the research question. For this study, SAS was the computer solver application utilized for this test. The sample size for this study was large enough to represent validity.

The objective of Section 2 of this quantitative mixed-method ANOVA study proposal was to provide an overview of the plan and an understanding of the scope of the study. Section 2, discusses the role of the researcher, details on the participants, ethical considerations, expansion of the study's research method, design and data analysis, and study reliability and validity. Section 3 contains presentation of the findings with a description of how study findings apply to improved business practice and social change.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this quantitative mixed-method ANOVA study was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. There was a significant time (pre and postimplementation) and ESI interaction. There was a substantial main effect for time, and there was significant main effect for ESI.

Presentation of the Findings

Test Assumptions

I assessed the assumptions of equality of variance and homogeneity of intercorrelations assessed by running Levene's test of equality of variances and Box's *M* test, respectively. The assumption of equality of variances was not met as $p = .261$. The Box *M* test results were significant ($p < .001$). Therefore, Wilks' Lambda trace statistics were reported.

Descriptive Statistics

A total of 26 data records pre and postimplementation of an ED REU were examined in this analysis. There were two ESI triage level 1 observations and three ESI triage level 5 observations. Therefore, ESI triage level one and five were excluded from the analysis. Table 1 depicts time overall pre and postdescriptive statistics. Figure 1 depicts pre and postimplmentation door to triage time in minutes by triage level.

Table 1

Pre and Postimplementation Time in Minutes by Triage

Variable	Mean	SD
ESI 2- Pre REU	15.68	3.63
ESI 2- Post REU	14.90	3.44
ESI 3- Pre REU	24.41	5.67
ESI 3- Post REU	20.69	4.02
ESI 4- Pre REU	29.18	7.12
ESI 4- Post REU	21.68	5.01

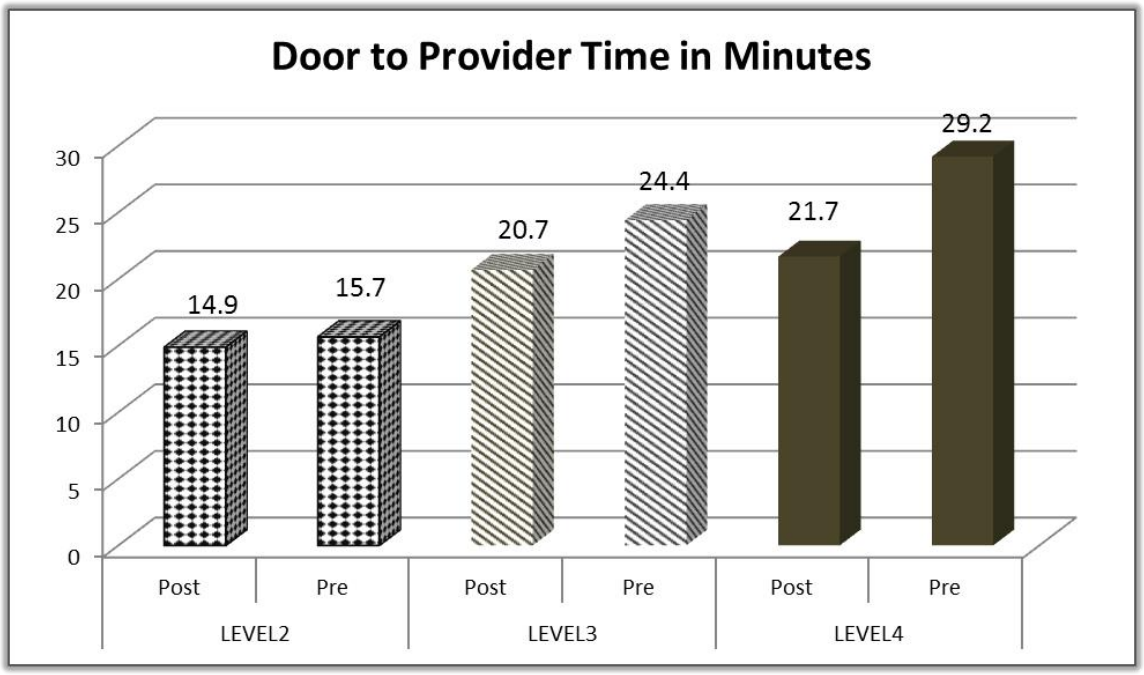

Figure 1. Door to provider time in minutes. At ESI triage level 2, there was less difference in the door to provider time than there was for ESI triage level 4. This may be expected given the severity of illness of an ESI triage level 2 patients under either process would warrant the provider to see then quickly. The greatest improvement in pre versus post was found for ESI triage level 4.

Inferential Results

A mixed-method ANOVA was conducted to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. There was a significant time (pre and postimplementation) and with ESI interaction: Wilks lambda = .55, $F(2, 24) = 9.86$, $p = .001$, partial eta squared = .45. There was a substantial main effect for time: Wilks lambda = .72, $F(1, 25) = 9.74$, $p = .005$, partial eta squared = .28. There was significant main effect for ESI: Wilks lambda = .084, $F(2, 24) = 130.28$, $p < .001$, partial eta squared = .92.

BPI was the theoretical framework selected for this study. BPI helps organizations gain efficiencies through measuring, controlling, and improving processes. Monitoring and measuring the effects of processes help organizations gauge success (Qatawneh, & Khan, 2015). Qatawneh's and Khan's (2015) findings supported the value of measuring a process improvement strategy to gauge success. Marta-Dominguez et al. (2015) findings emphasized that process improvement provides organizations with a critical competitive edge. Marta-Dominguez et al.'s results supported hospital management's adoption of an ED REU patient flow model as it improved ED patient flow and decreased patient wait times, providing the ED operation a significant competitive edge. Not only are improved processes attractive to patients, potentially increasing market share, but Centers for Medicare & Medicaid Services linked reimbursement directly to flow metrics and outcomes (Baker et al., 2013). There is a growing need for ED metrics related to mandates from payers for reimbursement (Baker et al., 2013). Researchers (Jeanmonod et al. 2013; Mazzocato et al., 2014; Naik et al., 2011) reviewed findings on studies related

to triage levels and found triage level can affect patient wait times. As I found, there is a relationship between ESI triage level and ED wait times. Pines and Bernstein (2015) studied overcrowding in EDs and found that overcrowding could result in poor quality outcomes. Supply and demand, lean principles, and alternative patient flow models were among solutions suggested by Pines and Bernstein. My research findings support Pines and Bernstein's work in recommending alternative patient flow models to lessen ED overcrowding. I found that an ED REU model impacted ED wait times for patients with ESI triage levels of 2, 3, and 4. One of the greatest challenges facing U.S. hospitals is the delivery of timely emergency care. Proper alignment of patient flow and reimbursement needs to be considered by hospital organizations. DeFlitch et al. (2015) surmised a quality and access problem for the organization was crowding of EDs. The work of DeFlitch et al. supported crowded EDs affect patient flow, increasing patient wait times.

There is a growing need for ED leaders to understand what impact they can make through process improvement strategies to decrease ED overcrowding and decrease patient wait time. Implementation of patient flow models can help alleviate the stress overcrowding places on ED patients related to wait time. ED leaders utilize triage processes and triage levels in different ways (Lui et al., 2013; MacKenzie et al., 2013). ED leaders who understand how triage level effects ED patient wait times could benefit from the findings of this study. My research study findings support the impact an ED REU patient flow model and ESI triage level have on wait time. My analysis of the data associated with this study supported the findings that an ED REU patient flow model and ESI patient triage level do impact patient wait times.

Applications to Professional Practice

The purpose of the research study was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. I found that both ED REU patient flow model and ESI patient triage level impact patient wait time. The implementation of an ED REU patient flow model did impact ED patient wait times at varying degrees depending on the patient ESI triage level. The results of the study conducted offer application to practice for ED leaders and hospital administrators. Adoption of an ED REU patient flow model may optimize an ED and could assist with alleviating overcrowding. Hospital administrators can use the study results to improve their knowledge about managing patient flow and handling hospital reimbursement and gaining market share, which affect the hospital sustainability. Hospital leaders implementing an ED REU patient flow model in conjunction with an ESI triage model can help decrease patient wait times. The practice of measuring processes helps leaders understand the impact of the change.

ED directors play a critical role in the operations of EDs (Stitchler, 2015). The use of ED REU patient flow models and ESI patient triage levels in relation to patient wait times provides a model for hospital administrators to utilize to manage efficiently. Implementation and use of ED resources and improved processes can add business value through a more efficient patient treatment and an improved patient health upon discharge. A practical implication is ED leaders can implement a way to measure patient flow processes to gain a better understanding of ways to improve patient wait time. A business practice value is a reduction in delays in ED care and treatment, which could increase

profitability (Woitas et al., 2014). The applicability of the findings with respect to the professional practice of business is ED REU patient flow models and ESI patient triage levels do impact patient wait times.

Implications for Social Change

Implications for positive social change include the potential for improvements in efficiency and utilization of ED resources. Improved ED patient flow could contribute to a positive social change by refining efficiency of patient treatments and patient satisfaction. Improved patient treatment and patient satisfaction would improve patient lives and lead to better community relations due to potentially healthier community members.

Recommendations for Action

Hospital administrators and ED leaders should develop strategies related to patient flow models and utilize a triage tool to reduce patient wait times. ED leaders and hospital administrators are negatively affected by extended patient wait times, resulting in reduced hospital profitability. The use of time measurements should be implemented to gauge the impact a patient flow model has on ED wait times. Hospital administrators and ED leaderships should benchmark and monitor their current patient flow models using wait times as a critical measure. Once selected, a patient flow model should be implemented. Further study on ED wait times should be conducted postimplementation and compared to the previous benchmarks. Hospital administrators and ED leaders can use the findings to reinforce the positive impact of decreased ED wait times and look for further opportunity to refine patient flow. Based on the research findings of the study, I

determined a patient flow model had the greatest impact on patients with an ESI triage level of 2 through 4, with the greatest impact noted on level 4 patients. I will share my study findings with hospital leaders through scholarly journals and nursing newsletter publications. My focus will be on assisting ED leaders with reducing patient wait times.

Recommendations for Further Research

I recommend the following for further research. First, since the study included only one Central New York ED, I would recommend conducting the study in another geographic location to see if the results are replicated. A second recommendation would be to conduct a causal comparative study comparing a split flow patient model and ESI patient triage level on patient wait times. A comparison study could provide ED leaders with further knowledge of which flow model would yield the greatest impact on patient wait time.

Reflections

The DBA doctoral study journey has been a challenging and humbling experience. Challenges along my journey included balancing school, career, and family. Along the journey, I faced a career change and family struggles due to health and loss. Through this time, I stayed focused on my school. A goal of mine was to complete my doctorate. I believe every challenge and every obstacle molds us into who we are. As I reflect on my doctorate journey, I am pleased to have had the experience as it helped me grow and value my strengths and fortify my weaknesses.

A challenge of this program was dealing with the learning environment, having this program primarily online other than the residencies, and dealing with the varying

personalities of my peers and my committee members. I have built relationships with some of my peers that will continue beyond this program. I have grown because of this journey, and I am thankful for the opportunity.

Due to my work experience, I had expected the results to show ED REU patient flow model and ESI patient triage level do impact patient wait times. The findings from the analysis confirmed the hospital administrator's concern with the need to improve ED patient wait time. My research found not all ESI triage levels saw the same reduction in wait time.

Conclusion

I found from this research study a decrease in the door to provider time between the post- and preperiods; however, the magnitude of this change differed by ESI triage level. At ESI triage level 2, there was less difference in the door to provider time than there was for ESI triage level 4. Hospital administers have little information available on process improvements to enhance emergency department patient flow (Woitas et al., 2014). The purpose of this quantitative mixed-method ANOVA study grounded in BPI theory was to examine the impact of an ED REU patient flow model and ESI patient triage level on average weekly patient wait times. Data was collected from an ED in Central New York over a period pre and postimplementation of the ED REU model from April 18- October 18, 2015, and October 19, 2015- April 19, 2016, respectively. Hospital ED leaders can apply the results of this study to decrease patient wait time. Individuals benefit from timely ED care and treatment, allowing them to return to their prehospital status sooner. Society may benefit as hospital administrators develop strategies to

improve ED patient flow and understand the impact of ESI triage levels to impact patient wait time. I recommend that further researchers gather data from hospitals in other geographic areas and examine the data to replicate this study finding. When I started this journey, I had thought every ESI triage level would be affected by the implementation of an ED REU patient flow model.

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Appendix A: Proof of CITI Training Completion

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2

COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.

See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** joann featherstone (ID: 4069500)
- **Email:** joannfeatherstone@crouse.org
- **Institution Affiliation:** Crouse Health Hospital (ID: 2042)
- **Institution Unit:** emergency services
- **Phone:** 315-470-8024
- **Curriculum Group:** CITI Good Clinical Practice
- **Course Learner Group:** CITI Good Clinical Practice Course
- **Stage:** Stage 1 - GCP
- **Description:** This course is for investigators and staff who conduct FDA regulated research or international research with investigational drugs and devices according to ICH Guidelines.
- **Report ID:** 12579420
- **Completion Date:** 25-Jul-2014
- **Expiration Date:** N/A
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY DATE COMPLETED SCORE

Crouse Health Hospital Courses (ID: 14369) 21-Apr-2014 No Quiz

The CITI Good Clinical Practice Course for Clinical Trials Involving Drugs and Devices (ID: 1350) 21-Apr-2014 3/3 (100%)

Overview of New Drug Development (ID: 1351) 21-Apr-2014 5/5 (100%)

Overview of ICH GCP (ID: 1352) 18-Jul-2014 4/4 (100%)

ICH - Comparison Between ICH GCP E6 and U.S. FDA Regulations (ID: 1354) 18-Jul-2014 4/4 (100%)

Conducting Investigator-Initiated Studies According to FDA Regulations and GCP (ID: 1355) 18-Jul-2014 3/3 (100%)

Investigator Obligations in FDA-Regulated Research (ID: 1356) 18-Jul-2014 5/5 (100%)

Managing Investigational Agents According to GCP Requirements (ID: 1357) 18-Jul-2014 5/5 (100%)

Overview of U.S. FDA Regulations for Medical Devices (ID: 1358) 18-Jul-2014 3/3 (100%)

Informed Consent in Clinical Trials of Drugs, Biologics, and Devices (ID: 1359) 18-Jul-2014 4/4 (100%)

Detecting and Evaluating Adverse Events (ID: 1360) 22-Jul-2014 4/4 (100%)

Reporting Serious Adverse Events (ID: 1361) 22-Jul-2014 4/4 (100%)

Audits and Inspections of Clinical Trials (ID: 1363) 22-Jul-2014 5/5 (100%)

Monitoring of Clinical Trials by Industry Sponsors (ID: 1362) 25-Jul-2014 8/8 (100%)

Completing the CITI GCP Course (ID: 1364) 25-Jul-2014 No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institutionidentified above or have been a paid Independent Learner.

Verify at: https://www.citiprogram.org/verify/?bd79b8f9-f148-4d85-a8b3-b918e56101ba

CITI Program

Email: support@citiprogram.org

Phone: 888-529-5929

Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 2 OF 2

COURSEWORK TRANSCRIPT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the

course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** joann featherstone (ID: 4069500)
- **Email:** joannfeatherstone@crouse.org
- **Institution Affiliation:** Crouse Health Hospital (ID: 2042)
- **Institution Unit:** emergency services
- **Phone:** 315-470-8024
- **Curriculum Group:** CITI Good Clinical Practice
- **Course Learner Group:** CITI Good Clinical Practice Course
- **Stage:** Stage 1 - GCP
- **Description: This ICH E6 GCP Investigator Site Training meets the Minimum Criteria for ICH GCP Investigator Site**

Personnel Training identified by TransCelerate BioPharma as necessary to enable mutual recognition of GCP training among trial sponsors.

• **Report ID:** 12579420

• **Report Date:** 25-Oct-2016

• **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES MOST RECENT SCORE

The CITI Good Clinical Practice Course for Clinical Trials Involving Drugs and Devices (ID: 1350) 21-Apr-2014 3/3 (100%)

Crouse Health Hospital Courses (ID: 14369) 21-Apr-2014 No Quiz

Overview of New Drug Development (ID: 1351) 21-Apr-2014 5/5 (100%)

Overview of ICH GCP (ID: 1352) 18-Jul-2014 4/4 (100%)

ICH - Comparison Between ICH GCP E6 and U.S. FDA Regulations (ID: 1354) 18-Jul-2014 4/4 (100%)

Conducting Investigator-Initiated Studies According to FDA Regulations and GCP (ID: 1355) 18-Jul-2014 3/3 (100%)

Investigator Obligations in FDA-Regulated Research (ID: 1356) 18-Jul-2014 5/5 (100%)

Managing Investigational Agents According to GCP Requirements (ID: 1357) 18-Jul-2014 5/5 (100%)

Overview of U.S. FDA Regulations for Medical Devices (ID: 1358) 18-Jul-2014 3/3 (100%)

Informed Consent in Clinical Trials of Drugs, Biologics, and Devices (ID: 1359) 18-Jul-2014 4/4 (100%)

Detecting and Evaluating Adverse Events (ID: 1360) 22-Jul-2014 4/4 (100%)

Reporting Serious Adverse Events (ID: 1361) 22-Jul-2014 4/4 (100%)

Audits and Inspections of Clinical Trials (ID: 1363) 22-Jul-2014 5/5 (100%)

Monitoring of Clinical Trials by Industry Sponsors (ID: 1362) 25-Jul-2014 8/8 (100%)

Completing the CITI GCP Course (ID: 1364) 25-Jul-2014 No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution

identified above or have been a paid Independent Learner.

Verify at: https://www.citiprogram.org/verify/?bd79b8f9-f148-4d85-a8b3-b918e56101ba

Collaborative Institutional Training Initiative (CITI Program)

Email: support@citiprogram.org

Phone: 888-529-5929

Web: https://www.citiprogram.org

Appendix B: Exemption Letter

October 21, 2016

[redacted]

Subject: **EXEMPT Status**
RE: **IRB Study# 2016.1028**
Protocol Title: **Emergency Department Patient Flow Strategy for Improving Efficiency: Quantitative Casual-Comparative Study**

Dear JoAnn:

Thank you for recent study submission for the above referenced study, which included the following document(s):

- [redacted] ***IRB Initial Application***
- ***Prospectus***

The document(s) have been reviewed and it has been determined that this study is **EXEMPT** from IRB review according to federal regulations.

You are required to notify the Board if/when:

1. The scope of your study changes significantly
2. Any serious adverse events occur

If you have any questions regarding this approval, please feel free to contact me. Thank you.

Sincerely,

[redacted]

PLEASE REFERENCE IRB STUDY# 2016.1028 ON ALL CORRESPONDENCE FOR THIS STUDY

Appendix C: Form B: Signature Page and Documentation of Data Release

Form B is required, with Form A, for the IRB approval of secondary analyses. Secondary analysis = Analysis of a dataset that is not primarily generated for the present study. Secondary analyses include: systematic review of existing literature, analysis of public data, chart reviews, analysis of de-identified student records, analysis of an organization's operational records, analysis of data generated (or to be generated) under the auspices of another organization, content analysis of documents/artifacts, etc. After completing Form A, the researcher should submit Form B to IRB@waldenu.edu to request IRB approval of a secondary analysis. Form B provides documentation of the researcher's commitment to the university's ethical standards in the conduct of this study, as well as (when applicable) the agreements from the supervising faculty member and the data provider.

Section 1: RESEARCHER ELECTRONIC SIGNATURE

By placing an X next to each of these boxes and providing my email address below as an authentication, I am providing an electronic signature certifying that each of the statements below is true.	
X	I agree to conduct this and all future IRB correspondence via email.
X	I will respond to all IRB inquiries within 2 weeks.
X	I understand that failure to respond to an IRB inquiry within 2 weeks will automatically result in my IRB approval being suspended.
X	I will request IRB approval before making any modification to the research procedures or forms, using the Request for Change in Procedures Form found at the Walden IRB Web site.
X	I will report any unexpected or otherwise significant adverse events and general problems within one week using the Adverse Event Reporting Form found at the Walden IRB Web site.
X	I understand that this research, once approved, is subject to continuing review and approval by the Committee Chair and the IRB.
X	I will maintain complete and accurate records of all research activities for at least 5 years* and be prepared to submit them upon request to the IRB. (*Exception: When a Data Use Agreement specifies a data retention period less than 5 years, the terms of the Data Use Agreement override the 5 year default.)
X	I understand that the IRB approval for this study is suspended if, for any reason, I cease to be enrolled in a course with this faculty member (or a replacement faculty member teaching the same course).
X	I understand that I must maintain complete confidentiality of names and any other identifiers that might be included in my research data and I will consult the IRB office via IRB@waldenu.edu before sharing names or identifiers with anyone.
X	I understand that noncompliance with IRB instructions and policies can result in consequences including but not limited to invalidation of data, revocation of IRB approval, and dismissal from Walden University.
Enter researcher email address below:	

(This email address provides authentication for electronic signature and thus must match email address on file with Walden University.)
Joann.featherstone@waldenu.edu

Section 2: SUPERVISING FACULTY MEMBER ELECTRONIC SIGNATURE

As the faculty member supervising this research, I assume responsibility for ensuring that the student complies with University and federal regulations regarding the use of human participants in research. By placing an X in each of these boxes and providing my email address below as an authentication, I am providing an electronic signature certifying that each of the statements below is true.	
	I will ensure that the researcher properly requests any protocol changes using the Request for Change in Procedures Form found at the Walden IRB Web site.
	I will ensure that the student promptly reports any unexpected or otherwise significant adverse events and general problems within 1 week using the Adverse Event Reporting Form found at the Walden IRB Web site.
	I will report any possible noncompliance on the part of the researcher by emailing notification to IRB@waldenu.edu.
	I understand that my supervision role continues as long as the student remains enrolled in the present course with me.
Faculty member should enter his/her email address (provides authentication for electronic signature and thus must match email address on file with Walden University):	

Section 3: Documentation of Data Release

You will need to attach one of the following forms of documentation of the partner site's agreement to provide data for the study. Please place an X next to the description that best fits your study.	
	My dataset does not require a data release agreement because the dataset is already available to the public via _____ *(in the blank, enter the website or process by which one can access the dataset)*
	A Data Use Agreement *(appropriate when the researcher had nothing to do with the site's original creation of the data)*

	An <u>Operational Oversight and Data Use Agreement when Doctoral Student has Dual Roles.</u> *(appropriate when the researcher is involved in the original creation of the data as part of some other role at the site)* *DNP students analyzing QI data should use <u>this version</u>.*
	A custom Data Use Agreement created or required by the site (must outline the site's confidentiality terms of sharing the data particularly removal of identifiers) *(appropriate when the site requires a particular agreement of their own to be used)*
X	**A copy of the <u>site's approved IRB application</u> (including the consent form(s) and recruitment materials) and the <u>site's IRB approval* letter</u>** *(appropriate when the site's IRB ("IRB of Record") has already reviewed the data collection protocol and the applicant is one of the investigators listed on the site's IRB application)*
	A <u>draft of the site's IRB application</u> (including the consent form(s) and recruitment materials) *(appropriate when the site's IRB ("IRB of Record") has not yet approved* the data collection protocol and the site's IRB wishes for Walden to conduct a substantive review of the data collection procedures first)*

Definition = An IRB approval letter clearly states approval of data collection activities. Some sites' IRB exemption letters simply state that the site IRB's oversight is not needed, while remaining vague about whether the activities are approved by the site. If a site IRB's letter of exemption does not clearly approve the research activities, then the researcher will need some <u>other type</u> of documentation that the site is overseeing data collection activities and wishes to release the data to the researcher.

Section 4: Dissemination of research results

Please indicate your specific plan for disseminating your results in an appropriate format with stakeholders.
I will share the results of my study with the quality department contact at Crouse Hospital. The contact at Crouse Hospital will determine the best way to share the data with the stakeholders at Crouse. I will provide a copy of my complete study to Crouse Hospital's contact if requested.

Section 5: Completion of ethics training certificate

Every researcher must submit a copy of a Human Research Protections training completion certificate with the ethics approval request. Walden accepts Human Research Protections training certificates from NIH, NCI, and CITI (as well as other agencies, upon request).	
Enter an X in the appropriate blue box below to indicate which training module was completed:	
	National Institutes of Health (NIH): http://phrp.nihtraining.com
X	**Collaborative Institutional Training Initiative (CITI): http://www.citiprogram.org**
	National Cancer Institute (NCI)
	Other research ethics training:

IRB Policy on Electronic Signatures: Electronic signatures are only appropriate when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. University staff will verify any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

Appendix D: Form A: Ethics Pre-application

Form A: Ethics Pre-application

Purpose: To determine which IRB forms and documentation (if any) a study needs

This form is the first step of the required ethics approval process for doctoral capstones and all other student/staff research projects that would be linked to Walden University in any way (i.e., published with a Walden affiliation, funded by Walden). This form allows the Office of Research Ethics and Compliance to determine which ethics form(s), partner approvals, and review steps a study would require to be in compliance with university policies and federal regulations.

Doctoral students may submit any time after the chair has approved the research design in the first chapter of the proposal.

Before completing the standard IRB application, applicants should send this form to IRB@waldenu.edu. Students must CC their supervising faculty member.

After reviewing the applicant's responses within this form, the Office of Research Ethics and Compliance will send the applicant one of the following:

(a) confirmation that the university is able to provide ethics approval based on information provided in this form alone; or

(b) a list of the documents and approvals that will be required for ethics approval of the proposed study; or

(c) a request for more information in order to determine which forms and documentation are needed for ethics approval of the study.

1. Enter the applicant's official Walden email address in the green space below:
Joann.featherstone@waldenu.edu
2. Applicant's program affiliation at Walden (for doctoral students, enter the name of the degree being sought):
DBA- Doctorate of Business Administration
3. If applicant is a student, provide student ID number and expected date of oral defense:
A0042553 Expected oral defense 12/2016
4. If applicant is a student, provide the Walden email address of the supervising faculty member:
John.hannon@waldenu.edu
5. Provide the title of the study:
Emergency Department Patient Flow Strategy for Improving Efficiency: A Causal-Comparative Study
6. Using the table below, provide a comprehensive list of all of the data that will be analyzed in the study. The study may not include analyses of any data that are not listed in this form. If an applicant wishes to add more data components to the study later, the applicant must send an updated version of this form to the IRB for prior approval.

a. In this column, list <u>each component of data that will be used in this study's analysis</u> in a separate row. Add more rows as needed. Sample data components: • publications/public records • an organization's records • surveys administered by site • surveys administered by student • interviews	**b. For each data component referenced in the previous column, describe <u>how you will collect or access the data.</u>** Samples: • employees will be invited via email to complete anonymous surveys online • de-identified patient records will be released as a dataset • an organization will release de-identified data from a survey it conducted	**c. Briefly describe the <u>analysis</u> that will be applied to this particular data component.** Samples: • thematic coding will be applied • ANOVA will identify whether means are different for the 3 groups • regression will be used to examine the degree to which the variables __ and __ predict __ • t-test will be used to compare the mean __ for __ and __	**d. If any of the following categories apply to that particular data component, please state so in this column:** i. already accessible to the public ii. generated as part of an organization's operations, such as quality improvement (specify whether in past or future) iii. generated as part of a study conducted under the auspices of an organization other than Walden University (specify whether in past or future) **Leave this column blank only if you are creating that particular datapoint specifically for the purpose of this capstone/study only.**

Data type 1: The metrics measured in this study will come from the electronic medical record (EMR) utilized at the ED where the study occurs.	Within the EMR, there are time-stamped actions constituting where the data points are collected. Data will be imported to SPSS. The data collected is "average daily time", no individual patient times or individual patient data elements are collected for this study. The quality analyst can pull data for set periods. The data elements pulled for preimplementation of the rapid evaluation unit and post-implementation, as well as ED wait times in relation to ESI patient triage levels area analyzed for this study. For this current study, I will compare the 'average daily time" pre and post implementation of the rapid evaluation unit and the average time for an ED patient to see a provider based on an ESI patient triage level.	I will use a *t*-test utilizing two means and a p-value to evaluate the findings. SPSS will be the computer program utilized for this test. The sample size for this study will be large enough to represent validity	The data elements are timestamp points within the EMR that populate as a patient progresses through their treatment in the emergency department. The timestamp elements populate because of the caregivers completing and documenting in the EMR the patients care. Reports are available within the EMR that generate time elements. The leadership at Crouse utilizes these data components for their quality and process review.
If applicable, Data type 2:			
If applicable, Data type 3:			

7. If any organizations will be partnering in the study in any of the following capacities, we need the organization's name and contact information. Please enter the organization name and a contact number/email address for all partners that would be serving your study in any of the following capacities. If you haven't yet identified these partners, please enter "to be identified" as a placeholder. Enter "NA" for the support roles that are not applicable for your study.		
Organization name	**Org contact number or email address**	**Role of the organization**
Crouse Hospital	johnbergeman@crouse.org	Name any organization(s) that will be providing access to its records or data for your study.
N/A		Name any organization(s) that will be distributing or displaying a study invitation/flyer on your behalf.
N/A		Name any organization(s) that will be letting you recruit participants onsite.
N/A		Name any organization(s) that will be providing space for the data collection.
N/A		Other partner roles (describe):_____ (examples: providing contact info for potential participants, permitting you to use employees' paid time for data collection)

8. Please describe the researcher's relationship to any of the organization(s) identified in section 7 (e.g., employee, volunteer, member, intern, etc.) as well as the nature of the researcher's relationship to potential participants (i.e., co-worker, supervisor, teacher, care provider, etc.).

9. Does the partner organization have its own IRB?	
	No. (Proceed to section 10.)
	Yes my partner site has an IRB but that IRB has indicated that the Walden IRB should serve as the "IRB of Record" for my project. (Proceed to section 10 and **submit documentation that the site IRB agrees for the Walden IRB to serve as the "IRB of Record"** such as an email or letter from the site IRB deferring to the Walden IRB.) Note that students may not make this determination themselves—only the site IRB can make this determination.
x- they completed the review and deemed the study exempt	Yes my partner site has an IRB but my data collection procedures are exempt from my site's IRB review. (Proceed to section 10 **and submit a copy of the institution's IRB policy or a documentation from the site IRB stating that the proposed data collection procedures don't require the site IRB's review**.)

x- they completed the review and deemed the study exempt	Yes my partner site has an IRB and that IRB has indicated <u>that it wishes to serve as the "IRB of Record"</u> for my project. (STOP HERE and complete Form B.)

10. <u>Validation/Piloting</u>: If you plan to do any type of piloting or instrument validation, answer the next 5 questions by entering an X for "yes" or "no" <u>in each row.</u>
If you will not be doing any validation or piloting, then enter an X here [x] and skip down to 11.

Yes	No	
		a. Will the study involve asking a panel of stakeholders (or experts) to give <u>feedback</u> on materials developed by the applicant, as an intermediate stage in development of materials, <u>without</u> any reporting of feedback data analysis in the final study? This doesn't require prior IRB approval or a formal consent process.
		b. Will the study involve a <u>trial run of survey or interview questions</u> with <u>acquaintances</u> to give the applicant practice or logistical insights (with pilot data <u>discarded</u>)? This doesn't require prior IRB approval or a formal consent process.
		c. Will the study involve a <u>trial run of survey or interview questions</u> with <u>non-vulnerable strangers who meet particular inclusion criteria</u> to give the applicant practice or logistical insights (with pilot data <u>discarded</u>)? This doesn't require prior IRB approval or a formal consent process, as long as pilot participants are non-vulnerable adults.
		d. Will the study involve a <u>trial run of survey or interview questions</u> with <u>vulnerable strangers who meet particular inclusion criteria</u> to give the applicant practice or logistical insights (with pilot data <u>discarded</u>)? This will require prior IRB approval and a formal consent process.
		e. Will the study involve collecting data to establish reliability/validity/usability (with pilot data analysis to be <u>reported in the study</u>)? This <u>will</u> require prior IRB approval and a formal consent process.

11. Would any of the following <u>vulnerable groups of individuals</u> be particularly sought out to provide data? If so, then highlight which groups.

	x	minors (age 17 and under)	individuals in crisis (i.e., natural disaster victims)	individuals aged 65+
		your own patients/subordinates/students	facility residents	economically disadvantaged individuals
		individuals with a mental or emotional disability	people who are less than fluent in English	military personnel

12. If you will be collecting data from participants for research purposes only, please enter X's to indicate which recruitment procedure(s) will be used (mark all that apply). If your dataset was or will be collected under the auspices of another organization, then enter an X here [ ] and skip down to 13.

Yes	No	
	x	Flyers: specify how/where flyers would be distributed:_____
	x	Social media

	x	Mailed/emailed invitation: describe how contact info would be obtained: _____
	x	Invitation/ad placed in an organization's publication/website: specify where: _____
	x	Direct calling: describe how contact info would be obtained: _____
	x	In-person: specify where: _____
	x	Group presentation: specify where:_____
	x	Other (specify):_____
13. If the study is tied to any type of <u>professional practice</u> that is overseen by a licensing board (i.e., public education, psychotherapy, nursing etc.), answer the next 2 questions. **If not, then enter an X here [x] and skip down to 14.**		
a. Walden studies may not include programs, site initiatives, interventions, or licensed professional practice of any type unless the researcher has explicit documentation that the program/intervention/practice is overseen by the site as part of its operations. **Name the organization that is responsible for the program/intervention/practice.**		
b. Please explain whether the researcher has any type of role in developing, implementing, or delivering the program.		
14. All applicants must answer the next 2 questions.		
Yes	**No**	
	<u>x</u>	a. Are any of the above procedures being done as part of applicant's job? (please specify which procedures fall under job duties) _____
	<u>x</u>	b. Are any of the above procedures being done as part of the applicant's internship/practicum/volunteer position? (please specify which procedures are primarily done in direct service to the site (with this study just being the secondary purpose)) _____

15. If your dataset serves research purposes only, then enter an X here [x] and disregard the questions below.
However, if your research dataset also supports the partner organization's operations, then your study might be enhanced and streamlined by having the organization collect the data and then asking the organization to release the dataset to you for secondary analysis. The benefits of this approach typically include the following:
-broader timeframe for data collection since a researcher can analyze data from past as well as the future
-broader range of perspectives included
-rationale for data collection is usually clearer to the people involved
-site will own the dataset and can replicate the study itself in the future to support its operations
-the researcher's permission procedures are typically streamlined (i.e., via a single official's release of the de-identified dataset rather than obtaining consent from each individual in the manner used when data serves research purposes only)

Please complete the following section if this study will involve analysis of data that was (or will be) collected under the auspices of another organization for that site's own use (as the data's primary purpose) while the study is a secondary purpose.
A secondary data analysis of the partner site's dataset might be appropriate if all of the following questions can be answered with a "yes."

Yes	No	
		a. **Aside from your study, would the data be directly used by the organization in some way that will directly benefit the organization?** (for example: supporting the organization's continuous improvement, staff development, needs assessment, or other operations?)
		b. **Is the organization comfortable overseeing this type of data collection solely under its own policies and procedures?**
		c. **Is it possible for you to conduct your study without recording any names or other identifiers of individuals in your research records?**
		d. **Is the organization's research gatekeeper (i.e., C.E.O. or designee) comfortable signing a** data use agreement **releasing the de-identified dataset to you for research purposes?**
		e. (if applicable) This question only applies to those studies in which the researcher proposes to adjust some aspect of the organization's standard data collection practices in order to make the data more amenable to research (for example: atypical timing of data collection, use of alternative or additional data collection tools, adding a reflective component, etc.): **Has the organization's research gatekeeper explicitly approved any adjustments you propose to data collection that would depart from regular practices?** Note that this explicit approval must be indicated in the organization's letter of cooperation (and the IRB will advise on which template is most appropriate).
		f. (if applicable) This final question only applies to those studies examining outcomes of some sort of implemented program, intervention, professional service, or other systematic practice implemented to produce desired outcomes): **Is the organization agreeing to fully deliver and supervise the implementation within the scope of its standard operations?** Note that this explicit approval must be indicated in the organization's letter of cooperation (and the IRB will advise on which template is most appropriate).