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Implementation of a Protocol Nurse in the Emergency Department

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A Dissertation Submitted to the Graduate School at the University of Missouri- St.  
Louis in partial fulfillment of the requirements for the degree  
Doctor of Nursing Practice with an emphasis in Adult Gerontology Nurse Practitioner

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### Abstract

**Problem:** Increased wait times and extended length of stay (LOS) of patients in the Emergency Department (ED) are contributing to overcrowding, burdening EDs worldwide. A nurse can initiate patient care using protocol order sets while a patient is in the waiting room; however, triage nurses are often too busy to complete these orders. Scheduling a nurse to complete these protocol order sets could reduce ED overcrowding and patient LOS.

**Method:** A convenience sample was used to retrospectively chart review and collect data utilizing an excel spreadsheet with patients 40 years of age and older with a chief complaint of chest pain that arrived in the ED over 60 days. The Iowa Model of Evidence-Based Practice was applied to guide this quality improvement project.

**Results:** Results indicated that 62.22% of protocol order sets were completed when a protocol nurse was present. When there was no protocol nurse, 8.75% of patients had protocol order sets completed. The average LOS of patients with protocol order sets completed in triage was 517.98 minutes, while the average LOS of patients without protocol order sets completed in triage was 558.11 minutes. An independent samples *t*-test was performed, resulting in a *p* value of 0.275. Although there was a reduction in the LOS, the results were deemed not to be statistically significant.

**Implications for Practice:** Implementing a protocol nurse could result in more patients receiving protocol order sets and reducing the patient's LOS. Further data is needed to discover the relationship between LOS and protocol order sets.

### **Implementation of a Protocol Nurse in the Emergency Department**

Emergency Departments (Eds) across the United States are overcrowded due to long wait times and extended LOS. To combat this, many Eds have developed protocol order sets. Protocol order sets are a set of orders based on a patient's chief complaint, designed, and approved by physicians to be carried out by a nurse without any additional provider approval (American College of Emergency Physicians [ACEP], 2021). These order sets contain orders such as blood work, x-rays, electrocardiograms (ECGs), and administering certain medications. Utilizing protocol order sets in the ED waiting room could reduce long wait times and prolonged LOS for patients in the ED.

The ACEP endorses the use of protocols in the ED to initiate patient evaluation and subsequent care before the patient can be seen by a provider (ACEP, 2021). However, using protocol order sets on patients in the ED waiting room is not required or even common practice for many hospitals. Many hospitals do not consistently use protocol orders and only resort to using them when the ED is already experiencing overcrowding and lengthy wait times. This practice makes it difficult to determine the impact that protocol order sets have on wait times and overall patient LOS (Hwang et al., 2016). A dedicated protocol nurse in the ED could increase the utilization of protocol orders.

One of the most common chief complaints of patients in the ED is chest pain. Chest pain is a major acute coronary syndrome (ACS) symptom. ACS is a term that describes any condition related to sudden reduced blood flow to the heart, such as unstable angina or heart attack. Patients who present to the ED complaining of chest pain and symptoms related to ACS yearly are approximately 5% to 10% and contribute to

25% of all admissions to the hospital (Than et al., 2014). A missed diagnosis of ACS can lead to death or other adverse outcomes; therefore, all patients with ACS symptoms such as chest pain need a thorough assessment and diagnosis upon arrival to the ED.

This evidence based pilot quality improvement (QI) project aims to increase completed protocol order sets by implementing a protocol nurse in the ED. The primary outcome was to have protocol order sets completed in the ED waiting room by 50% or greater on patients 40 years of age and older with a chief complaint of chest pain when there is a protocol nurse versus days when there is not a protocol nurse. The secondary outcome was to have a 30-minute or greater decrease in the LOS for patients 40 years of age and older with a chief complaint of chest pain protocolled in the ED.

The question of the study is in ED patients aged 40 years and older with a chief complaint of chest pain: What is the number of patients with protocol orders completed and the LOS when a protocol nurse is present compared to the absence of a protocol nurse over two months?

### **Literature Review**

A comprehensive search of current literature was conducted using ED wait times and utilization of nurse-initiated protocols in triage. The Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and Medline (EBSCO) databases were investigated for data. Key search terms "Emergency Department" AND "protocol" AND "chest pain" were used as well as "Emergency Department" AND "overcrowding" AND "wait times" which yielded a total of 1640 results across all databases. Refined search settings included peer-reviewed journals, research articles, and randomized controlled trials (RCT), written in English from 2015 to the present, resulting in 389 articles. Studies

before 2015 were excluded, except for one influential reference. Inclusion criteria consisted of patients with a chief complaint of chest pain 40 years of age and older and ED protocol order sets. Exclusion criteria were patients without a chief complaint of chest pain and patients under 40 years of age. Articles were assessed, and deduplication was performed manually by visual inspection, resulting in 88 full-text articles. Then abstracts of articles were reviewed for the correct population and setting of healthcare delivery, resulting in 29 articles for further review. Upon reviewing the articles for suitability, 14 articles were selected to be included in the final literature review.

Research has shown that EDs worldwide are overcrowded (Hwang et al., 2016; Lindner & Woitok, 2019; McKenna et al., 2019; Morley et al., 2018). This overcrowded and overburdened ED system leads to a decline in emergency care quality and safety, resulting in delays in patient care (Hwang et al., 2016; McKenna et al., 2019).

Overcrowding is a term used when the function of the ED is compromised due to a high volume of patients waiting to be seen by a provider for consultation, diagnostics, treatment, transfer, or discharge (Lindner & Woitok, 2019). Considered an impending crisis within the healthcare system, overcrowding in the ED presents a significant patient safety issue, with some states referring to it as not only a national crisis but as a worldwide public health problem. (Lindner & Woitok, 2019; Morley et al., 2018). With these concerns for patient safety and public health overall, there is an increased expectation for EDs to provide timely care to patients (Shen & Lee, 2020). However, due to limited physical and staffing capacities in most EDs, as the ED experiences high volumes of patients, wait times to see a provider increase significantly (Jarvis, 2016; Lindner & Woitok, 2019; McKenna et al., 2019; Yarmohammadian et al., 2016). To

address this overcrowding crisis, many EDs have initiated the use of protocol order sets to shorten long wait times (Douma et al., 2016; Hwang et al., 2016).

As aforementioned, the protocol order sets are implemented by a nurse to initiate patient care before a provider can see a patient in the ED, which ultimately can reduce a patient's LOS. When patients first arrive in the ED, they are seen by a triage nurse. Triage is the process of categorizing patients based on the severity of their injuries and the order in which they are seen, with an optimal arrival to triage time occurring within 10-15 minutes (Yancey & O'Rourke, 2021). Nurses in triage should be able to assess the ED waiting room for critically ill patients that need to be seen first and prioritize available treatment rooms (Yancey & O'Rourke, 2021). Unfortunately, due to overcrowding, patients may be in the waiting room for many hours without being seen by a provider. By implementing a dedicated protocol nurse in the ED waiting room, protocol order sets can be used promptly post-triage to initiate care while the patient is waiting to be seen by a provider.

Protocol order sets are developed collaboratively in each hospital by physician and nursing leadership, hospital departments such as pharmacy, laboratory, risk management, hospital administrators, and more (ACEP, 2021). Utilizing protocol order sets in the waiting room can dramatically decrease the LOS of patients in the ED (Douma et al., 2016; Hwang et al., Jarvis, 2016). The article by Jarvis (2016) discussed using a triage nurse to complete investigations such as blood work and imaging has been associated with earlier diagnoses, shorter wait times, and faster patient throughput in the ED. A study by Douma et al. (2016) showed a 16% reduction in the LOS for four different chief complaint protocol order sets regardless of the protocol order set used. The

major potential advantage of utilizing protocol order sets is decreasing the LOS of the patient in the ED and increasing patient throughput because completed diagnostics would be available during the initial provider assessment, allowing for faster decision-making regarding the patient's disposition. Hwang et al. (2016) further demonstrated of patients presenting with chest pain who had a nurse use a protocol order set, 63% had lab results when first seen by a provider, and a disposition time reduction of 26 minutes. This same study showed a reduction in mean ED LOS from 282 minutes for patients that did not have a protocol set ordered while in the waiting room to 230 minutes for patients that did receive at least some orders from a protocol order set (Hwang et al., 2016).

Over 8 million people in the United States annually visit the ED with a chief complaint of chest pain (Baugh et al., 2016). Chest pain protocol order sets can be used for patients with chest pain, chest pressure, or symptoms often associated with a possible ACS such as shortness of breath, arm pain, shoulder pain, tingling or numbness, fainting or near fainting, or palpitations, at the discretion of the nurse (Hwang et al., 2016). An example of a chest pain protocol order set includes blood work, electrocardiogram (ECG), chest x-ray, and 324mg aspirin orally (Hwang et al., 2016). Protocol order sets for chest pain typically include an ECG to be collected and interpreted within 10 minutes of arrival to the ED to screen for an acute heart attack or damage to the heart. A patient workup for chest pain varies from patient to patient but generally requires considerable time, although less than 25% of patients with a chief complaint of chest pain are diagnosed with ACS (Than et al., 2014). The high number of patients assessed for ACS in the ED and the prolonged observation time contributes to ED overcrowding. This can increase hospital costs and can also lead to adverse patient outcomes if patients are

unable to get medical attention promptly (Than et al., 2014). Ineffective evaluation and management of chest pain caused by ACS in the ED has resulted in unnecessary hospitalizations, treatment delays, and a reduction in optimal healthcare outcomes (Bunch et al., 2016).

A patient who arrives at the ED with a chief complaint of chest pain will most likely receive an ECG and lab work such as serial cardiac biomarkers. The cardiac biomarkers and ECG are time-sensitive tests necessary to rule out a diagnosis of ACS for patients with chest pain. Patients who present to the ED with chest pain and concern for ACS receive a cardiac workup that often includes serial blood troponin testing over at least 6 to 12 hours of symptom onset (Crilly et al., 2020). The faster these tests are initiated and obtained; the faster the patient's disposition can be identified. With the current hospital overcrowding, it is imperative to utilize protocol order sets. Utilizing protocol order sets for patients with chest pain while the patient is still in the ED waiting room may profoundly decrease a patient's LOS and improve ED overcrowding (Douma et al., 2016; Hwang et al., Jarvis, 2016). One study showed that with the use of chest pain nursing protocol order sets, the average time for a laboratory-reported troponin level decreased from 114 minutes for those without a protocol order set to 35 minutes for patients who received a protocol order set (Douma et al., 2016). With data showing the positive effects of utilizing protocol orders for patients in the ED, further analysis is needed to show the benefits of having a protocol nurse in triage to carry out these order sets to ensure every patient is protocolled.

The Iowa Model of Evidence-Based Practice (IMEBP) was used to guide this QI project (Melnyk, 2017). The IMEBP model is used when a clinical problem of

importance to the organization is triggered and a change in practice is desired (Melnyk, 2017). Following the practice change, a continuous evaluation is used to determine if any further changes are needed (Melnyk, 2017). Using the IMEBP as a guide, a team was formed consisting of the ED nurse managers, assisted nurse managers, and staff nurses. This project was deemed a priority for the organization and the literature provided sufficient evidence to move forward with the process. The literature was assembled, reviewed, critiqued, and synthesized for use. There was sufficient research to continue with this pilot project and the results have been disseminated to the stakeholders to determine if this pilot for change should be implemented in practice.

## **Methods**

### **Design**

This evidence-based pilot QI project utilized a retrospective chart review to determine the effectiveness of a protocol nurse in the ED. Data collected over a 60-day trial period included the total number of patients that arrived to the ED with a chief complaint of chest pain 40 years of age and older who were protocolled in the ED when a protocol nurse was present, when a protocol nurse was not present, and the LOS of all of these patients.

### **Setting**

The project took place at a large Midwest metropolitan hospital ED. This 70-bed ED is a level one trauma center, comprehensive stroke center, and leading heart attack care site. The attached hospital has 1,400 beds and is a nonprofit teaching hospital that is the largest in the state and consistently ranks among the top hospitals in the United States. Patients walk into the ED or arrive via ambulance and are either sent directly to a patient

room or wait in the waiting room until a room is available. Patients that come in through the waiting room are greeted by a triage nurse, who enters the patient in the computer, identifies the patient chief complaint, gets a brief but descriptive history of the presenting problem, and goes through specific patient triage questions. If multiple patients are waiting for a room, patients are sorted based on acuity and wait time to determine which patient will go to a room first. Patients may be in the waiting room for several hours until a room is available, and they are seen by a provider. While patients are in the waiting room and have not been evaluated by a provider, nurses can practice within their scope and utilize protocol order sets to give certain medications, obtain bloodwork, x-rays, ECGs, and more as outlined in the predetermined protocol order sets. These protocol order sets were developed by a multidisciplinary group of ED physicians, nurses, nurse managers, and pharmacists. Unfortunately, these protocol order sets are not used consistently. Triage nurses often do not have the time to implement protocol order sets.

Due to a lack of a protocol nurse and consistent use of the protocol order sets, patients at the study hospital experience increased ED wait times and LOS. Data collected using Electronic Health Record (EHR) generated reports that are always available for management review showed that the average LOS in the ED for all patients over four months prior to study implementation was 318.25 minutes (Figure 1). The average LOS for patients with chest pain from this ED over those four months was 365.25 minutes (Figure 1). Having a dedicated protocol nurse helps promote consistency in the use of protocol order sets which can help reduce patient wait times and LOS to reduce the burden of ED overcrowding.

**Sample**

A convenience sample of 170 adult patients 40 years of age and older with a chief complaint of chest pain that arrived through the ED from February 2022 to April 2022. Inclusion criteria consisted of patients 40 years of age and older with a chief complaint of chest pain. Exclusion criteria consisted of patients under 40 years of age or patients over 40 years of age without chest pain. According to a statistician sample size calculation, a sample size of at least 60 patients in each group is necessary for adequate study power and results.

**Procedure**

This procedure was developed after several meetings with the stakeholders and the literature review revealed there was sufficient evidence to pilot the effectiveness of a protocol nurse in the ED. A retrospective chart review measured the impact of a protocol nurse in the ED waiting room to initiate care for patients with chest pain. Based on staffing, a protocol nurse was assigned in the ED during peak hours from February 2022 to April 2022. The goal was to staff a protocol nurse at least 50% of the days. However, this goal was impacted by severe high or low census and/or staffing shortages. When a protocol nurse was staffed, the responsibility was to implement protocol order sets on all patients 40 years of age and older with a chief complaint of chest pain. The chest pain protocol order set consists of blood work, ECG, and a chest x-ray.

Data was collected weekly using EHR-generated reports and excel spreadsheets to measure the number of patients with chest pain 40 years of age and older protocolled in the ED and if a protocol nurse was working at that time. The EHR can display all patients that arrive in the ED with a chief complaint of chest pain who are 40 years of age and

older. Of those patients, the LOS and if a protocol order set was used was identified in a refined search. Of patients that had a protocol order set, the primary investigator went through the charts to see if the protocol order set was completed while the patient was in the waiting room or if the patient had moved to an ED room by looking at the ED narrator time log in the patient chart. In addition, the primary investigator looked through the patient charts of those that had a completed protocol order set placed and completed to see which nurse completed the protocol order set and if they had been assigned as a protocol nurse or a triage nurse using the daily shift planner. The protocol nurse role can be fulfilled by any ED nurse and does not require additional training or education, as all ED nurses have education regarding the proper use of protocol order sets. All patient information was protected by using a secure computer system and destroying patient information once de-identified patient data was entered.

### **Data Collection/ Analysis**

Deidentified patient data was collected via a retrospective chart review. Data was stored in a secure database that only members of the project team had access to. The EHR of the participating ED was utilized to run reports of patients that meet criteria to sample. All patients 40 years of age and older that arrived in the ED with a chief complaint of chest pain were recorded. The data was then divided into two groups: patients 40 years of age and older with chest pain that had a protocol order set completed in triage, and patients 40 years of age and older with chest pain who did not have a protocol order set completed in triage. Patient data was excluded for patients who left against medical advice, before being seen by a provider, and patients that went directly to the cardiac catheterization lab. The patients with a protocol order set used while in triage were

categorized by whether a protocol nurse or triage nurse completed the orders.

Additionally, the LOS of all patients 40 years of age and older with a chief complaint of chest pain were recorded. Daily shift planners were recorded to identify if a protocol nurse was working, the name of the protocol nurse, and at what times during the day the nurse was working.

An independent samples *t*-test was used to compare the means of two independent groups to determine whether there is statistical evidence that the associated populations are significantly different. These results provided the stakeholders with the evidence to help their decision regarding the implementation of a protocol nurse in the ED.

### **Approval Processes**

Formal, written approval was sought and obtained from the Barnes-Jewish Hospital ED management team and the Department of Research. The project protocol was evaluated and determined not to be human subjects research by the University of Missouri -St. Louis Institutional Review Board.

### **Results**

There were 554 eligible patients aged 40-93 who arrived in the ED with a chief complaint of chest pain that were evaluated by a provider and either discharged or admitted to the hospital from February to April 2022. However, since a protocol nurse was only scheduled for 14 days for 12 hour shifts through this pilot project, a subsample of 14 days when a protocol nurse was not present was taken using the same 12 hours on similar census days was taken to best equate the days a protocol nurse was present to make a statistically appropriate comparative. Of the 28-day sample, 170 patients were included in this study.

### **Data Analysis**

Of the  $N=170$  (100%) patients included in the study, 52.9% ( $n=90$ ) patients were seen when a protocol nurse was present, and 47.1% ( $n=80$ ) were seen when a protocol nurse was not present (Figure 2). Out of  $N=170$ , there were 37% ( $n=63$ ) patients with a protocol order set completed while in triage (Figure 3). Out of  $N=63$  (100%), 89% ( $n=56$ ) were completed by a protocol nurse, and 11% ( $n=7$ ) were completed by a triage nurse (Figure 3). When a protocol nurse was present  $N=90$  (100%), 62.22% ( $n=56$ ) of patients 40 years of age and older with a chief complaint of chest pain received a protocol order set (Figure 2). On days when a protocol nurse was absent, 8.75% ( $n=7$ ) of patients 40 years of age and older with a chief complaint of chest pain received a protocol order set (Figure 2). The average LOS of patients that had a protocol order set completed while in triage was 517.98 minutes and the average LOS of patients that were not protocolled while in triage was 558.11 minutes, for a difference of 40.13 minutes (Figure 4). An independent samples  $t$ -test found a  $p$  value of 0.275. This value determines that there is no statistical significance between if a patient was protocolled in triage or not and the patient's LOS.

### **Discussion**

Having a protocol nurse in the ED increased the amount of protocol order sets completed on patients 40 years of age and older with a chief complaint of chest pain and had an average of a 40.13-minute decrease in a patient's LOS. However, the results were determined not to be statistically significant using an independent samples  $t$ -test compared to when a protocol nurse was not present in the ED, but was found to be of clinical significance due to the decrease in LOS.

The primary outcome of this study, which hypothesized a 50% or greater increase in the number of protocol order sets completed in the ED on patients 40 years of age and older with a chief complaint of chest pain when a protocol nurse was present versus days when a protocol nurse was not present, was met. When a protocol nurse was present, 62.22% of patients received a protocol order set (Figure 2). When a protocol nurse was not present, 8.75% of patients received a protocol order set (Figure 2). This shows an increase of 53.47% in patients with protocol order sets when a protocol nurse was present.

The secondary outcome of this study, which hypothesized a 30-minute or greater decrease in the LOS for patients 40 years of age and older with a chief complaint of chest pain that are protocolled in the ED, was met. Patients that received a protocol order set had an average LOS of 517.98 minutes, while those not protocolled had an average LOS of 558.11 minutes, for a decrease of 40.13 minutes in patients that received a protocol order set and those that did not (Figure 4). An independent samples *t*-test was performed and calculated a *p* value of 0.275, which shows that although there was a 30-minute decrease in a patient's LOS these results were deemed not to be statistically significant. Additionally, those that were protocolled and discharged from the ED had an average LOS of 412.88 minutes, while those who were not protocolled and discharged had an average LOS of 471.51 minutes, for a difference of 58.63 minutes (Figure 4). The difference in LOS for those that were protocolled and discharged and those that were not protocolled and discharged was calculated using an independent samples *t*-test that resulted in a *p* value of 0.173. Although there was no statistical significance for this result, there was a clinical significance in the finding.

This study showed when a protocol nurse is present, more patients received protocol order sets. This study also showed a decrease in the LOS greater than 30 minutes for patients that received a protocol order set compared to patients that did not. However, an independent samples *t*-test did not yield statistically significant results to support the reduction in a patient's LOS when protocolled. The data was further separated into patients seen in the ED and discharged, to avoid patients who waited excessively for an inpatient bed, called 'boarding', which happens frequently in the ED. Data showed that patients with a completed protocol order set that were discharged had an average LOS that was 58.63 minutes less than those that did not receive a protocol order set and were discharged.

As the data showed a decreased LOS of patients when a protocol order set was completed but not a statistically significant result, some potential explanations include patient census, staffing shortages, and lack of consistent protocol nurses. Throughout the 28-day data collection, the ED census was variable, with a remarkably low number of patients some days and an extremely high numbers of patients other days. During this time, there was extreme staffing shortages that required nurses to be pulled from areas in the ED that did not require as many nurses. This affected how often a protocol nurse was able to be staffed and unfortunately, a protocol nurse was only staffed 14 days out of the 60-day data collection, which resulted in a 28-day sample size. Additionally, a protocol nurse was staffed mostly during high census times when patients were not moving through the department quickly. This means that a protocol nurse would start protocoling patients when the waiting room already was full and had patients that had been waiting several hours before being protocolled. This makes it more likely that the patients that

were protocolled were already going to have a longer LOS, so it is difficult to determine if having a protocol nurse decreased this or not.

The results of the evidence-based pilot QI project have been shared with the stakeholders at the organization. The stakeholders have met and continues to review ED processes as it relates to staffing and implementing a designated protocol nurse role for each shift.

Recommendations for further study would be to implement a designated protocol nurse role in the ED and schedule this nurse for 12-hour shifts during peak census hours, such as noon to midnight, which was a limitation revealed in the study. To avoid lengthy LOS affected by patients waiting for admission or delays in discharging patients, it is recommended to track 'time to disposition' instead of LOS, which shows when the provider determined if a patient was going to be admitted or discharged, instead of the actual time the patient spent in the department due to uncontrollable delays. Every three months data should be evaluated and assessed for trends, patient satisfaction, and peak census times when a protocol nurse should be present.

### **Conclusion**

The implementation of a protocol nurse in the ED accomplished both the primary outcome of increasing the number of protocol order sets completed when there was a protocol nurse and the secondary outcome of decreasing the LOS of patients with a completed protocol order set. Having a protocol nurse resulted in the increased use of protocol orders, more patients with completed protocol orders, and decreased patient LOS, which allowed for faster patient throughput, faster provider decision making, and ultimately a decrease in ED overcrowding. Although further study is needed to quantify a

statistically significant result, the data collected showed clinical significance when a protocol nurse is present in the ED.

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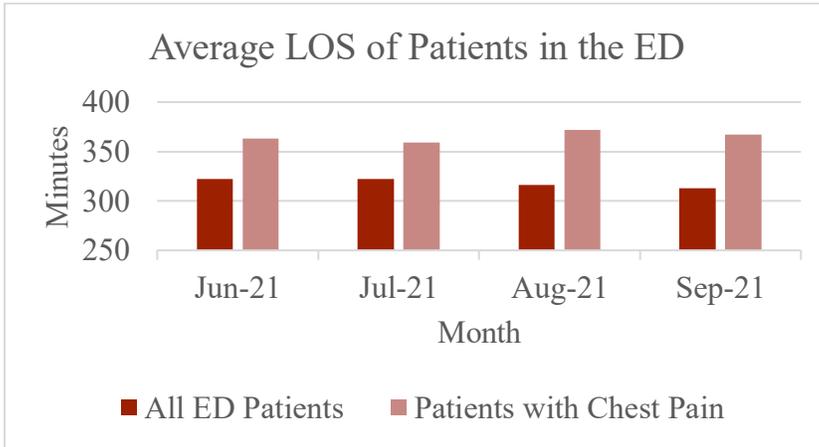
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Appendix

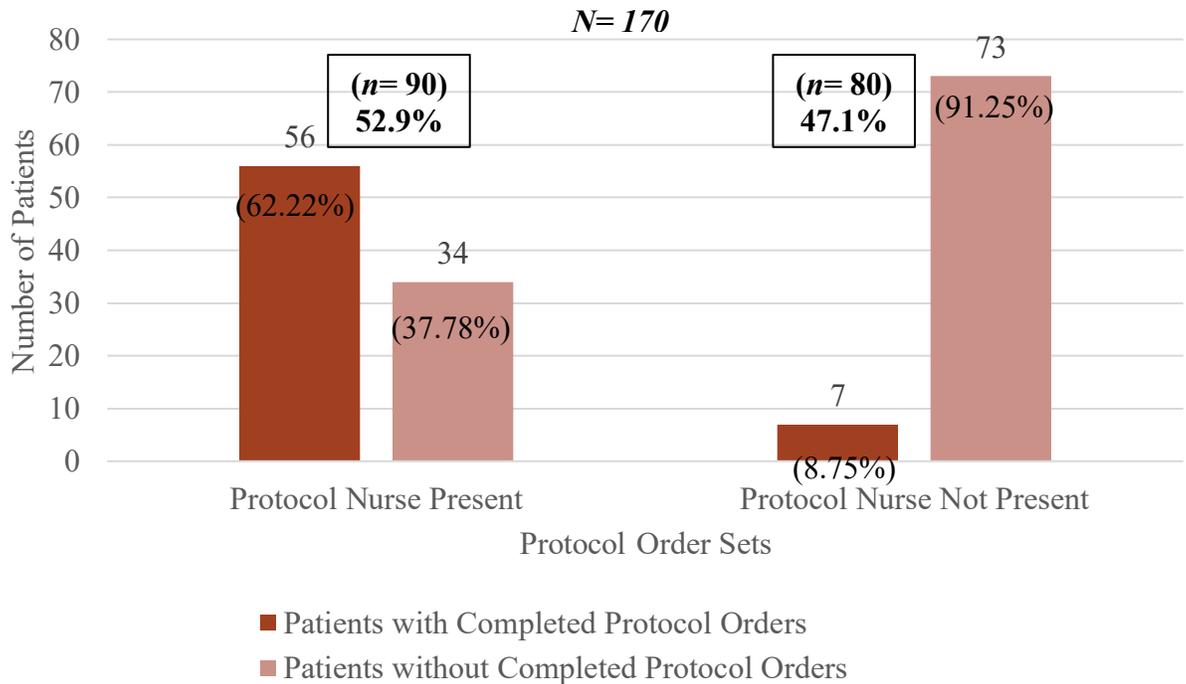
**Figure 1**

*Average LOS of Patients in the ED*



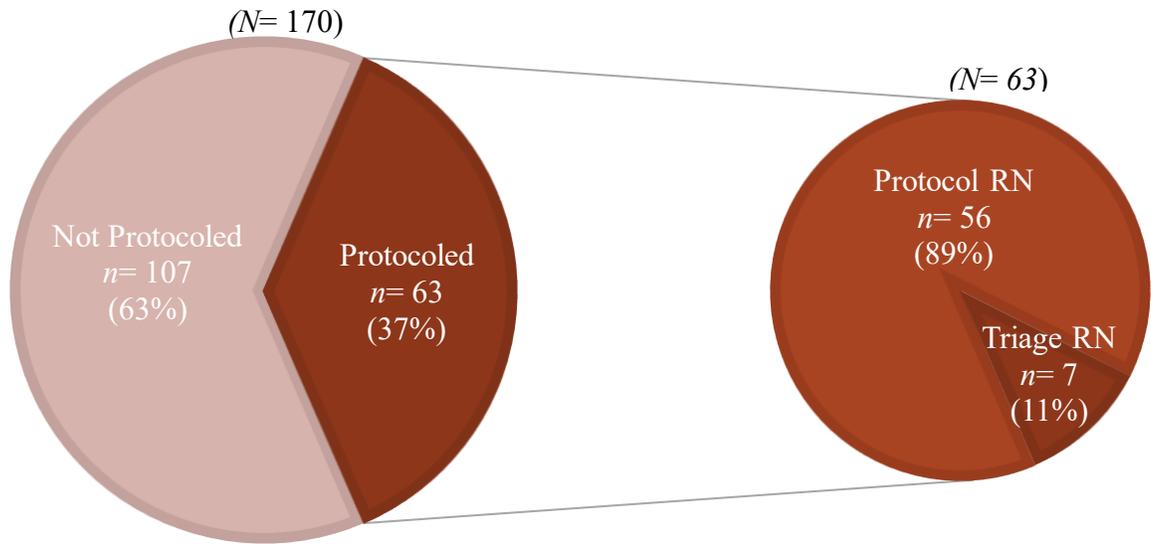
**Figure 2**

*Protocol Order Sets Completed with Protocol RN*



**Figure 3**

*Patients Protocoled in Triage*



**Figure 4**

*Average LOS of Patients*

