1-1-2012

The Effect of Obtaining Chest Pain Center Accreditation on the Compliance with Current Practice Standards

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THE EFFECT OF OBTAINING CHEST PAIN CENTER ACCREDITATION ON THE COMPLIANCE WITH CURRENT PRACTICE STANDARDS

by

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EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

DOCTOR OF NURSING PRACTICE

2012

Student	Date	Advisor	Date

DEDICATION

I would like to dedicate this project report to my loving husband and my family for all of their support throughout this process. Most of all I would like to dedicate my work to my Mom, Diana Lee, who taught me to work hard for what I want.

ACKNOWLEDGMENTS

I would first like to acknowledge my academic advisor Dr. Julie Brandy, for without her guidance I do not know how I would have made it through this project. I would also like to acknowledge the emergency department staff I worked during this project, namely Terry Wuletich and Kari Evans. They have been very supportive in my work for this project and always willing to help make the process improvements needed to succeed in the accreditation process.

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ABSTRACT

The Society of Chest Pain Centers (SCPC) has created a holistic model focused on providing best care to acute coronary syndrome (ACS) patients. The SCPC uses the American College of Cardiology/ American Heart Association (ACC/AHA) guidelines to define best practice for treating ACS patients. The objective of this evidence-based practice project was to obtain SCPC accreditation at a rural hospital in Northwest Indiana and improve adherence with the ACC/AHA standards of care. In the literature, eighteen articles were reviewed and found to be level II or higher using Polit & Beck's hierarchy of evidence. The literature review revealed that hospitals demonstrated higher rates of compliance with the ACC/AHA guidelines after becoming an accredited Chest Pain Center. Implementation of this EBP project included emergency department staff education on the SCPC accreditation process, and reinforcement of the importance of obtaining the patient's ECG in less than ten minutes from his/her time of arrival in the emergency department. This hospital currently tracks ECG times and door to balloon times through a quality improvement process for all patients taken to the catheterization lab for ST-segment elevation myocardial infarctions (STEMI). For those patients presenting to the hospital with non- STEMI, ACS, or chest pain in general, a review of almost 6,000 charts was completed to analyze the ECG times for both admitted and discharged patients. The evaluation of this project was completed through comparing baseline door to ECG times and door to balloon times from the third quarter, to those of the fourth quarter of 2011. The recommendations following the implementation of this project would be that the hospital will maintain certification to improve patient outcomes and the health of the community.

CHAPTER 1

INTRODUCTION

Approximately six million people are seen in the emergency department (ED) annually with undifferentiated chest pain (Cure Research, 2011). The American College of Cardiology/American Heart Association (ACC/AHA) have published evidence-based guidelines for the management of cardiac issues such as ST-segment elevation myocardial infarctions (STEMIs) and Non-ST segment elevation myocardial infarctions (NSTEMIs) (Chandra et al., 2009). Adherence with these standards does not remain consistent in all hospital systems. In an effort to solve the problem of non-adherence to the ACC/AHA standards, the Society of Chest Pain Centers created an accreditation process that was framed around the evidence-based standards.

The concept of the Chest Pain Center (CPC) has been evolving since the 1990's (Taverna, 2007). The CPC model was created to incorporate both clinical and operational considerations into the management of acute coronary syndrome (ACS) in today's hospital systems (Taverna, 2007). The CPC uses eight key elements to evaluate the triage and diagnostic processes of the care of ACS (Chandra et al., 2009). These eight key elements include: integration with the emergency medical system (EMS); emergency assessment of patients with ACS symptoms; patients with low risk of ACS and no assignable cause for their symptoms; functional facility design; personnel, competencies, and training; organizational structure and commitment; process improvement orientation; and community outreach (Taverna, 2007). This is a holistic model focused on providing best care practice to ACS patients, from the prevention of symptoms to the treatment of an ACS event.

The Centers for Medicare and Medicaid Services (CMS) has established a set of core measures for acute myocardial infarctions (AMI) for all hospitals that bill for the care

of Medicare patients (Ross, et al, 2008). The core measures include: administration of aspirin and beta blocker on arrival; percutaneous intervention greater than 120 minutes; fibrolytics less than thirty minutes after arrival; aspirin at discharge; beta blocker at discharge; angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker at discharge; and smoking cessation counseling (Ross et al., 2008). These measures represent best practices for the care of AMI patients (Ross et al., 2008). The creation of the CPC and achieving the accreditation from the CPC has been found to lead to higher adherence with these core measures (Ross et al, 2008).

Statement of the Problem

Signs and symptoms of myocardial infarction are frequently ignored or attributed to other diseases by both patients and healthcare providers. This can lead to premature morbidity and mortality (Taverna, 2007). The Society of Chest Pain Centers (SCPC) found that through the use of rapid risk stratification, there was a higher adherence rate to the ACC/AHA evidence-based guidelines. More than six million patients present to the emergency department (ED) annually with undifferentiated chest pain (Chandra et al., 2009). Chest pain is the second most common ED presenting complaint, and one third of the ED patients with seen with chest pain will have the diagnosis of ACS (Storrow & Gibler, 2000). Currently, in the treatment of ACS “time is muscle” and the push is for rapid assessment and treatment. The current recommendations include a patient receiving an ECG in less than 10 minutes after arrival to the ED, and the door to percutaneous intervention (PCI) to be less than 90 minutes (AHA, 2011).

A hospital in Northwest Indiana compiled a record of times in 2010 for ED patients that were taken to the cardiac catheterization lab and PCI performed. This sample size consisted of 80 patients. The average door to ECG time in 2010 was 18.8 minutes and the average door to PCI was 99.7 minutes (Porter Hospital, 2010). This means that it was taking the ED staff average of 18.8 minutes to obtain an EKG on

patients with ACS symptoms from the time they walk in the door. It was taking an average of 99.7 minutes for the balloon to be inflated in the patient's artery that will help restore circulation to that portion of the heart. These average times include two outliers when activation of the cardiac catheterization lab team occurred at six hours and five hours after arrival to the emergency department. The outliers were included to illustrate the need to prevent such outliers through the use of rapid risk stratification. Outliers may be caused due to abnormal symptoms such as nausea, arm pain, or jaw pain. It is more difficult to identify these patients as being at risk for ACS due to these symptoms not being clearly cardiac related. Another reason outliers occur is high volume in the emergency department. When a major influx of patients occurs all at one time it is difficult to address every patient within ten minutes. A new measure that this hospital is tracking with patients in 2011 is door to doctor time, measuring the first point that the patients with chest pain are examined by the emergency practitioners. This was measured on sixteen of the PCI patients in 2010 and the average was 42 minutes to see a practitioner (Physician or Mid-Level) (Porter Hospital, 2010). At a time of 42 minutes to see a practitioner, half of the PCI time has been taken in emergency room delays. These delays can cost the patient cardiac muscle since there is a lack of blood flow to the affected portion of the heart. The practice of improving current protocols and hospital practices through the guidance of the SCPC will lead to more effectively diagnosing ischemic symptoms therefore increasing survival and decreasing morbidity and mortality (Taverna, 2007).

Purpose of the Evidence-Based Project

In 2010, a hospital in Northwest Indiana began a promotional drive promising to make "Your Life. Better". With this initiative came the drive to become an accredited stroke, heart failure, and chest pain treatment center. This project manager has initiated the process of achieving chest pain center accreditation at this hospital. The SCPC is a

non-profit organization that is dedicated to removing cardiovascular disease as the number one cause of death (SCPC, 2011). The purpose of becoming a CPC accredited hospital is to provide evidence-based care to ACS patients and maintain the highest standards of care possible (SCPC, 2011).

At this Northwest Indiana hospital, does the implementation of becoming an accredited chest pain center versus the non-accredited practice currently in place improve the adherence to ACS practice standards of the ACC/AHA over the fourth quarter of 2011? This question will be answered through the approval of accreditation and by maintaining the process improvement actions implemented during the accreditation process. This Hospital has maintained a high level of cardiac services for many years. Core measures, such as ECG times, door to doctor times, and door to PCI times can be used to evaluate the effectiveness of ACS care is a hospital (Chandra, et al., 2009). It was the goal that becoming CPC accredited would improve ACS treatment and with it, patient outcomes would improve.

This was accomplished through a variety of practices. First, this project manager completed a thorough review of the current policies and practices for the care of ACS patients. Next, these practices were compared with the most current recommendations for ACS care and with the guidelines listed in the eight key elements that have been created by the SCPC. Additionally, process improvement measures were implemented to improve educational practices, protocols, and policies to adhere with the most current practices. Lastly, these process improvement measures were measured by comparing the quality improvement measures of ECG times and door to percutaneous intervention (PCI) times from third quarter 2011 to the quarter of implementation (fourth quarter 2011). The goal of this project was through the accreditation process; this hospital in Northwest Indiana would continue to provide high quality cardiac care and would advance to meet the quality measures that the SCPC endorses. This improvement was

accomplished by changes current practice that reduced treatment delays, education to identify less obvious cardiac symptoms, and encouragement to use the risk stratification tool to more efficiently identify ACS patients.

CHAPTER 2

THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

Theoretical Framework

The theoretical framework for this project was Betty Neuman's Systems Model (NSM). The NSM focuses on the response of the client system to actual or potential environmental stressors. It also focuses on the use of primary, secondary, and tertiary nursing prevention for retention, attainment, and maintenance of optimal client system wellness (Neuman & Fawcett, 2011). NSM focuses on three levels of prevention for the client system. Primary prevention is applied during client assessment and intervention to focus on the reduction of possible or actual risk factors (Neuman & Fawcett, 2011). Secondary prevention relates to symptomatology following a reaction to a stressor, appropriate ranking of intervention priorities, and treatment to reduce their noxious effects (Neuman & Fawcett, 2011). Tertiary prevention relates to adjusting processes taking place as reconstruction begins and maintenance factors move back in a circular manner toward primary prevention (Neuman & Fawcett, 2011). This project focused primarily on the use of secondary prevention as the efficiency of door to ECG and door to balloon times is decreased, the hope is that the noxious effects of ACS can be minimized.

One of the strengths of this model is the focus on prevention. The ACC/AHA guidelines recommend that primary care physicians screen for ACS risk factors and consider the patient's ten-year risk. This would be considered primary prevention (Anderson et al, 2012). Secondary prevention is encouraged with the recommendation that ECG's be conducted within ten minutes of the patient's arrival to the ED, that ASA be administered promptly, and the door to balloon time be under ninety minutes (Anderson et al, 2007). Tertiary prevention is addressed by a recommendation of the

patient to be discharged with the instructions to take aspirin and beta-blockers on a daily basis (Anderson et al, 2012). The main weakness of this model for this DNP project is that the focus of data collection will only concern the use of secondary prevention. However, by using this model it leaves the project open to the potential for future evaluation of primary and tertiary prevention methods for treating ACS.

This project focused on Neuman's 2011 revision of the original nursing theory. The 2011 revision concentrated its focus on the inclusion of evidence-based nursing practice. An example of this shift in focus is the Research Approach in Nursing (RAIN) project. The RAIN program was developed to promote nursing-theory guided evidence-based practice and nurse driven research (Breckenridge, 2002). The NSM has been the guide for twelve of the 45 evidence-based projects in the RAIN program (Breckenridge, 2002). Much like this project, the RAIN projects that used NSM focused on perceptions, stressors, and prevention interventions. In a project by Breckenridge, the risks and benefits of peritoneal dialysis and hemodialysis were reviewed using NSM and the three levels of prevention (2002). Each level of prevention was aimed at a central core of stability that focused on the optimal level of wellness. This project will use this evaluation as a guide. The goal for this projects optimal wellness is to have EKG times less than ten minutes and door to balloon times less than 90 minutes for all patients presenting to the ED with ACS symptoms.

Evidence-Based Practice Model of Implementation

The PARIHS framework is the model used for this EBP project. The PARIHS framework is based on three elements: evidence; context; and facilitation (Roycroft-Malone, 2004). The evidence in this model is described as including, not only research, but instead the combining different sources of knowledge. "The PARIHS framework identifies these as research, clinical experience, and local data/information," (Rocroft-Malone, 2004, p.298). This project facilitated a high level of evidence through a

comprehensive literature review, clinical knowledge of ED nursing and chest pain management, and by providing data from a Northwest Indiana hospital regarding the practice standards for the treatment of chest pain patients.

Context in the PARIHS framework refers to the environment in which people will receive healthcare services, or the context of getting research evidence into practice (Roycroft-Malone, 2004). There are three themes that are addressed in the context of the EBP project; culture, leadership, and evaluation (Roycroft-Malone, 2004). Culture is described in this context as individual, group processes, and organizational systems (Roycroft-Malone, 2004). Leadership has a key role in transforming culture and making the decision as to whether the organization is ready for change (Roycroft-Malone, 2004). Evaluation also plays a role in deciding on the organization's readiness to change. The evaluation will focus on deciding if the changes as appropriate, effective, and efficient (Roycroft-Malone, 2004). Culture is a key element to address when change is occurring in an organization. This project manager had to evaluate the most effective means of education and the organization's readiness for change when implementing this project. "Leaders have a key role to play in transforming cultures and are therefore influential in shaping a context that is ready for change" (Roycroft-Malone, 2004, p. 299). Constant communication with the leaders at this Hospital has become a highly important part of planning the implementation of this project. Evaluation of this project took place through the comparison of 2011's ECG times and door to balloon times. It was the goal of this project manager that the measures show a decrease in times with the education and implementation of the best practice standards recommended by the SCPC.

"Facilitation is a technique by which one person makes things easier for others" (Roycroft-Malone, 2004, p.300). The three key themes of facilitation are broad and include purpose, roles, and skills and attributes. The purpose of the project is reinforced through research findings that lower ECG times and lower door to balloon times improve

the patient outcomes and spare cardiac muscle and therefore decreasing mortality risks. The facilitator role in this project focused on staff education. This education included the best practice guidelines and the re-enforcement on the importance of decreasing EKG times and door to balloon times. Strong skills and attributes are found in the facilitator. This facilitator maintains eight years of practice in emergency medicine, as well as education as an advanced practice nurse focused on implementation of evidence-based practice.

The PARIHS framework lent itself well as a guide for this project. One weakness of using the PARIHS framework was the difficulty in differentiating roles since the project manager took on many of the roles such as project manager, educator, and staff nurse. While the project manager was able to lead the ED in changes, the leadership role was difficult to assume during the accreditation process due to the magnitude of this request. The project manager was able to serve as a committee member and not a leader of the committee. Strengths of using the PARIHS framework were the inclusion of research, clinical experience, and local data. All three factors played a strong role in the development of this project and local data is what was used to measure the outcomes of the project. This project has highly benefited from the use of the PARIHS framework as a guide.

Literature Search

For the literature search the search engines of CINAHL, MEDLINE, Joann Briggs Institute (JBI), and Cochran library were used. An initial search in CINAHL using the key term chest pain produced 3946 hits. Limiting that same search to research published between 2001-2011, excluding child or children, and adding accreditation as a search term produced twelve results. Using the same search criteria in the JBI search, one research summary was found that was relevant to this EBP project. The Cochrane library produced no results. MEDLINE produced sixteen results with the same search

criteria, much of which was overlapping with CINAHL. After reviewing the evidence, three articles were discovered from the MEDLINE search that were applicable to this project. Additional searches involved such key words as ECG times or EKG times (twenty results), percutaneous coronary intervention (821 results), and CRUSADE (196 results). Accreditation was added to these searches and this yielded no results. Science direct was also used in this complete search, however, no original research was found on this search engine.

After seeking guidance from the Valparaiso University Librarian a new set of search criteria was created. This included using “acute coronary syndrome or myocardial infarction”, “accreditation”, and “guideline adherence or practice guidelines” as both minor and major headings. This search yielded one result in MEDLINE, two results in CINAHL, and no results in JBI or Cochrane. The relevant articles found through the CINAHL and MEDLINE searches were then hand searched from their reference lists. This search was completed to provide additional sources that were useful to this project. Saturation was met and there were a total of thirty-two articles included. Two were deemed Level I (systematic reviews of randomized control trials), ten were deemed level II (single randomized control trials), twelve were level IV (single correlation/observational studies), one was level V (descriptive studies), and seven were level seven (opinions of authorities) (Table 2) (Polit & Beck, 2008).

Table 2.1

Levels of Evidence

Level of Evidence on Polit & Beck's Hierarchy of Evidence	Number of Articles
Level I (Systematic Review of Randomized Control Trials)	2
Level II (Single Randomized Control Trial)	10
Level III (Systematic Review of Correlational/Observational Studies)	0
Level IV (Single Correlational/ Observational Study)	10
Level V (Systematic Review of Descriptive/ Qualitative/ Physiologic Studies)	1
Level IV (Single Descriptive/Qualitative/Physiologic Study)	0
Level VII (Opinions of Authorities, Expert Committees)	7

Review of Literature

Each year healthcare providers in the United States will see over six million patients in the ED who present with complaints of chest discomfort or other symptoms that are consistent with potential coronary artery disease (Blomkalms & Gibler, 2004). It is not uncommon for at least half of these patients to be admitted for further work up, although only 20% will actually be diagnosed with CAD (Blomkalms & Gibler, 2004). Care for these individuals requires a concept of rapid diagnosis and treatment along with the evaluation of risk stratification. “Emergency physicians are responsible for rapidly identifying and initiating evidenced-based treatment in patients with acute coronary syndromes,” (Chandra, et al., 2009). The mortality from heart disease has been found to be greater by itself than that of the totals of the next seven leading causes of death (Diercks et al, 2010). Risk stratification is a form of medical decision making where activities such as labs, history, and clinical testing are used to determine a patient’s risk of suffering from a certain condition (Diercks et al, 2010). Risk stratification of patients with ACS has been emphasized so that patients at the highest risk are identified for guideline directed pharmacological therapy and early invasive therapy for revascularization (Gibler, et al, 2005).

In 2002 the ACC/AHA developed guidelines for the evaluation of CAD patients, namely those with unstable angina (UA) and NSTEMI patients (Gibler et al, 2005). These guidelines include risk stratification, a timely 12-lead ECG, and measurement of cardiac biomarkers for the evaluation of chest discomfort and other associated complaints such as weakness, shortness of breath, dizziness, syncope, arm/jaw pain, and other nonspecific complaints (Gibler et al, 2005). The purpose of risk stratification is to quickly evaluate a person’s risk early in the treatment to provide the proper guideline directed care (Gibler et al, 2005). There are many tools that have developed for rapid risk stratification. This risk score is calculated and used to determine a plan of care for

patients, determining if immediate reperfusion is needed or more modest cardiac testing should be carried out. There are two risk stratification tools that were commonly cited in the literature, GRACE and TIMI.

The GRACE risk score was developed from a multinational, observational study of patients that were hospitalized with suspected ACS (GRACE investigators, 2006). The aim of this study was to improve in-hospital and long-term outcomes for ACS patients (GRACE Investigators, 2006). Through the GRACE study, an in-hospital, six months death/MI prediction model was created called the GRACE risk score (Yan, et al., 2005). This risk score was comprised of age, heart rate, systolic blood pressure, Killip class, cardiac arrest, ST-segment deviation, serum creatinine level, and cardiac biomarker status (Yan et al., 2005). Bradshaw et al. included 103 hospitals in Canada in their study. This study was conducted to determine the validity of the GRACE prediction model for death six months after discharge in all forms of ACS diagnoses (Bradshaw et al, 2006). Good discriminatory capacity for predicting six-month mortality in ACS patients was found a C statistic, or ability to distinguish high risk subjects, of 0.81 and 95% confidence interval (CI) (Bradshaw, et al., 2006).

The cohort study conducted by Yan et al. (2005) was carried out in fifty-one hospitals across Canada. Yan et al. (2005) studied the relationship between in-hospital revascularization and one-year outcomes among NSTEMI patients as stratified by the GRACE risk score. The GRACE score demonstrated very good discrimination for death in-hospital and one-year. There was a c-statistic of 0.82 for in-hospital death and 0.79 for one-year death in this study population (Yan et al., 2005). Overall, the GRACE risk score was validated as a predictor of adverse outcomes for ACS patients (Yan et al., 2005).

TIMI is a long-standing study conducted by the Academic Research Organization that was founded in 1984 and has conducted numerous practice-changing clinical trials in patients with cardiovascular disease or risk factors for cardiovascular disease (TIMI

study group, 2010). The establishment of a clinical risk score derived from baseline clinical information that served as a powerful predictor of clinical outcomes in patients with UA, NSTEMI, and STEMI (TIMI study group, 2010). The TIMI risk score is comprised of seven points: age; prior coronary artery stenosis; three or more conventional cardiac risk factors (hypertension, diabetes, cholesterol elevation, family history of ACS, and/or history of tobacco use); use of aspirin in the seven preceding days; two or more angina events in twenty-four hours; ST-segment elevation or depression greater than 1mm; and elevated cardiac biomarkers (Pollack et al., 2006).

Three articles specific to the TIMI risk tool were found through a comprehensive literature review, two cohort studies and one meta-analysis. The first study was conducted at The University of Pennsylvania and involved over 1400 patients (Chase et al., 2006). The objective of this study was to validate the use of the TIMI risk score in the ED on a broad population of chest pain patients (Chase et al., 2006). The incidence of 30-day death, AMI, and revascularization were measure for TIMI scores of zero through seven. The scores appeared to correlate with the outcomes as predicted by the IMI risk score and the percentage of 30-day death, AMI, or revascularization increased as the TIMI score increased (Chase et al., 2006). In a similar study, Pollack, et al. (2006) examined the validity of the TIMI risk on all patients that presented to an urban ED with the complaint of chest pain. The results were much like those of Chase, et al; as the TIMI risk score increased so does the percentage of 30-day death, MI, or revascularization (Pollack et al., 2006).

The meta-analysis performed by Hess, et al. (2010) found that there was a strong linear relationship between the TIMI risk score and the CI of cardiac events. The meta-analysis included ten prospective cohort studies that validated the TIMI risk score in ED patients (Hess et al., 2010). One limitation of this meta-analysis was the lack of randomized control studies. This was due to the fact that the TIMI risk score needed to

be complete on “real life” patients and not in a controlled setting (Hess et al., 2010). The results of the Meta-analysis found there to be a 1.8% miss rate for those patients who scored a zero on the TIMI risk score (Hess et al., 2010). The authors make the point that the TIMI risk score maintains a CI of 95% and a sensitivity of 97.2% making it a good diagnostic tool, but it should not be the only criteria used to determine the patients’ course of treatment (Hess et al., 2010).

Twelve-lead ECG and cardiac biomarkers are the most common diagnostic tools used for the evaluation of an ACS patient and important parts of both GRACE and TIMI. The ECG can show st-segment of t-wave changes which can be indicative of cardiac damage (Gibler et al, 2005). A high likelihood of CAD on an ECG will show new or presumably new transient ST segment deviation or T-wave inversion with symptoms. Cardiac biomarkers, including troponin and creatine phosphokinase MB isoenzyme (CK-MB), are the second method for identifying patients with ACS at risk for significant complications. Troponin is a protein that regulates calcium-dependent interactions between myosin and actin, facilitate cardiac contraction and relaxation (Chernecky & Berger, 2008). Slight elevations in troponin can indicate cardiac muscle damage. Studies have shown that any detectable elevation of troponin identifies a patient at high risk for ischemic complications (Gibler et al, 2005). The significance of the elevation of the troponin has been associated with the increased risk of death and increased complications (Gibler et al, 2005). CK-MB has been the predominant marker of myocardial necrosis (Gibler et al, 2005). CK-MB or creatinine kinase is an enzyme found in muscle and brain tissue and reflects tissue catabolism as a result of cell trauma (Chernecky & Berger, 2008). This test is performed to detect myocardial muscle damage resulting in increased tissue catabolism from the myocardial tissue (Chernecky & Berger, 2008).

Acute management of ACS is focused on performing early invasive therapy, in the case of this Northwest Indiana hospital, this is PCI. The current ACC/AHA guidelines suggest that the following treatment be administered early to high risk patients in the ED:

- Aspirin and/or clopidogrel
- Low molecular weight heparin or fondaparinux
- Tirofiban or eptifibatide
- Oxygen
- Nitroglycerine
- Morphine
- Arrangements for coronary angiography and revascularization unless contraindicated
- In the absence of heart failure, bradycardia or hypotension, immediate administration of intravenous and oral beta-blockers should be considered

(Ong, 2010)

Low risk patients with non-ST elevation should be further evaluated to rule out other diagnoses and determine the most appropriate treatment strategy, often including a pre-discharge stress test (Ong, 2010).

Throughout the literature search there have been multiple studies performed that defines ways to improve the identification of patients with symptoms of ACS. Tatum, et al. performed an observational study to strategize ways in which to improve the evaluation and triage of patients with chest pain (1997). The researchers observed 1,187 consecutive patients seen in the ED of an urban hospital. Within 60 minutes of arrival each patient was assigned a level: level 1, MI; level 2, MI/UA; level 3, probable UA; level 4, possible UA, and level 5, noncardiac chest pain (Tatum et al, 1997). These levels

were determined with an unspecified risk stratification tool. The findings demonstrated there was a high consistency of accuracy when using the tool: level 1 showed that 96% of those identified required revascularization, 13% of level 2 were an acute MI and 29% required revascularization, level 3 3% were an MI and 17% required revascularization, and level 4, 0.7% were an MI and 2.5% required revascularization (Tatum, 1997) One limitation to this practice is the possibility of overlooking a possible cardiac event by using the risk stratification tool and treating the patient according to their score.

Gibler et al had similar findings when implementing their Heart ER program (1995). Heart ER is a method for identifying low- to moderate-risk patients with possible ACS in the ED setting (Gibler, et al, 1995). Patients were monitored in the ED for 9 hours and received serial ECG and cardiac biomarkers at 3, 6, and 9 hours after onset of symptoms (Gibler et al, 1995). Of 1,010 patients, 82.1% were released to home and 15.1% were admitted, of those admitted 52 patients had cardiac causes for their symptoms (Gibler et al, 1995). The largest limitation of this study is the nine hour stay in the ED. This practice will cause backlogs for other patients needing to be evaluated. Overall, this project was found to be successful at identifying those patients with low- to moderate-risk.

There were two research articles that most closely applied to the evidence-based care that will be implemented in this project. Ross et al conducted a study looking at the association of having a chest pain center accreditation with having better adherence to the core measures for acute myocardial infarction outlined by Medicare and Medicaid services (2008). In this study the core measures of aspirin administration at arrival to the hospital and at discharge, Beta-blacker administration at arrival and at discharge, PCI intervention less than 120 minutes after arrival, fibrolytic therapy less than 30 minutes after arrival, angiotensin-converting enzyme inhibitor or angiotensin receptor blocker administration for left ventricular systolic dysfunction, and smoking cessation counseling

on discharge were compared with accredited and non-accredited hospitals (Ross et al, 2008). During this studies study period, “4,197 hospitals reported core measures for acute myocardial infarction (AMI), of which 178 were accredited” (Ross et al, 2008, p. 121). It was found that hospitals that were accredited by the SCPC have higher rates of compliance with the Joint Commission guidelines for treatment of patients with AMI (Ross et al, 2008).

The second study most closely related to this project is an analysis of the SCPC accreditation with the adherence of the ACC/AHA guidelines for the treatment of NSTEMI patients (Chandra et al, 2009). This study involved 33,238 patients from twenty one chest pain center accredited hospitals and 323 non-accredited hospitals (Chandra et al, 2009). This study focused on hospitals that implemented the CRUSADE initiative and the patients included must have a confirmed NSTEMI, presented to the hospital within 24 hours of ischemic symptoms and had symptoms lasting longer than ten minutes (Chandra et al, 2009). The researchers investigated similar outcomes as Ross, et al with the inclusion of an investigation on the time of arrival to the time of the initial ECG. It was found that at SCPC accredited hospitals patients were more likely to receive aspirin and beta-blockers within 24 hours (Chandra et al, 2009). No difference was found in the receiving of a timely ECG, administration of glycoprotein IIB/IIIa inhibitor, or administration of heparin (Chandra et al, 2009). There was also no significant difference in the mortality rates at the hospitals included in this study (Chandra et al, 2009). The researchers noted that further studies were needed to investigate the association between SCPC accreditation and improved care for patients with ACS (Chandra et al, 2009).This project aims to provide evidence that the SCPC accreditation process has improve the ACC/AHA standards of door to ECG times and door to balloon times.

The implementation of this project required education of the hospital staff including, physicians, nurses and ancillary staff. Leegaard, et al, identified seven forms

of educational formats: brief in-services, patient stories, hands-on learning, E-learning, lunch-and-learn, designated education days, and speaking with colleagues (2011). Brief in-services provide quick facts by experts in the field. Patient stories are opportunities for staff to hear their prospective and experiences on the issue at hand. Hands-on learning allows staff to follow patients through the treatment process and experience what they experience. E-learning are easy to use online educational sessions. Lunch-and-learn are short sessions where food is provided to allow staff members to be educated during their break time. Designated education days require that one day a month be designated to educational opportunities. Speaking with colleagues is the most readily available form of education where staff will learn from others experiences. Leegaard et al, did not find that a specific form of educational opportunity was more effective than another but rather that the request was that the educational opportunity was "quick". This study used the option of a lunch-and-learn to provide education on pain management (Leegaard et al, 2011). Leegaard et al, performed a focus group study of twenty-two participants (2011). The participants were asked about their perceptions of patients' educational needs for pain management and approaches to help nurses meet those needs. Participants identified their most helpful educational approaches being brief in-services, hands-on learning, lunch-and-learn sessions, and designated education days (Leegaard et al, 2011).

For the purpose of this project, this facilitator chose a brief in-service as the educational forum. The information given was reiterating knowledge the staff already possessed, but needed to be reinforced, so a brief in-service was found to be the most appropriate. The in-service was provided for all ED nurses, aids, paramedics, and unit secretaries. For the staff unable to attend the in-service, the information sent in an email, hand-outs were posted in the unit, and this process was supplemented with by speaking

with colleagues. Through the combination of methods each staff member had the ability to benefit from the educational opportunity.

Construct Evidence-Based Practice

Through the literature search it became evident that there were few studies performed to provide a link between improved adherence to the ACC/ AHA guidelines and the completion of the SCPC accreditation. This project will further investigate that link by providing education to staff on the most current evidence based guidelines for the treatment of ACS and re-education on the risk stratification tool established by a committee at Porter Hospital (Figure 1).

The current guidelines for ACS evaluations and treatment are as follows:

- Patients with symptoms that may represent ACS should have an evaluation by a physician including the recording of a 12-lead ECG with-in ten minutes of arrival and cardiac biomarkers.
- Health care providers should actively address the following issues regarding ACS with patients with or at risk for CHD and their families or other responsible caregivers:
    - The patient's heart attack risk
    - How to recognize symptoms of ACS
    - The advisability of calling 9-1-1 if symptoms are unimproved or worsening after 5 min, despite feelings of uncertainty about the symptoms and fear of potential embarrassment
    - A plan for appropriate recognition and response to a potential acute cardiac event, including the phone number to access EMS, generally 9-1-1

- Pre-hospital EMS providers should administer 162 to 325 mg of ASA (chewed) to chest pain patients suspected of having ACS unless contraindicated or already taken by the patient.
- Health care providers should instruct patients with suspected ACS for whom nitroglycerin [NTG] has been prescribed previously to take not more than 1 dose of NTG sublingually in response to chest discomfort/pain. If chest discomfort/pain is unimproved or is worsening 5 min after 1 NTG dose has been taken, it is recommended that the patient or family member/friend/caregiver call 9-1-1 immediately to access EMS before taking additional NTG. In patients with chronic stable angina, if symptoms are significantly improved by 1 dose of NTG, it is appropriate to instruct the patient or family member/friend/caregiver to repeat NTG every 5 min for a maximum of 3 doses and call 9-1-1 if symptoms have not resolved completely
- Patients with a suspected ACS with chest discomfort or other ischemic symptoms at rest for greater than 20 min, hemodynamic instability, or recent syncope or pre-syncope should be referred immediately to an ED. Other patients with suspected ACS who are experiencing less severe symptoms and who have none of the above high-risk features, including those who respond to an NTG dose, may be seen initially in an ED or an outpatient facility able to provide an acute evaluation.

(Anderson et al., 2007)

Additional guidelines for the treatment of patients presenting with ACS symptoms has been established in an Algorithm but the ACC/AHA (Figure 3). This algorithm outlines a course of treatment by patients based on their potential diagnosis and risk factors.

Through the implementation of the best practice standards outlined by both the ACC/AHA and the SCPC the aim is for improved adherence and as a result improved outcomes of ACS patients. Adhering to the guidelines will encourage this hospital's nurses, advanced practice nurses, and physicians to improve on door to ECG times. This will allow for early identification of AMI leading to improved door to balloon times. Therefore, decreasing assessment time initially will decrease the damage to the patient's heart muscle in the long run and decrease morbidity and mortality following ACS.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Sample and Setting

The sample for this project included all patients who presented to the ED in a Northwest Indiana hospital during the third and fourth quarter of 2011 with a diagnosis of chest pain, ACS, NSTEMI, unstable angina, myocardial ischemia, or STEMI. The door to ECG times were tracked on all admissions for chest pain, ACS, NSTEMI, and STEMI. However, door to balloon, or PCI, was only measured in the STEMI patients. The sample size for the third and fourth quarter of 2011 was 1,190 patients that either presented to the ED with a complaint of chest pain or other associated symptoms. These patients were tracked by their diagnosis when they were either admitted of discharged from the ED. Those diagnoses included non-specific chest pain, chest pain, unstable angina, ACS, myocardial ischemia, MI, NSTEMI, or STEMI.

The setting for the project is a hospital located in Northwest Indiana. This hospital is part of the corporation of Community hospitals and is the only hospital serving Porter County, Indiana. Porter County is located 40 miles southeast of Chicago with a major part of the county bordering Lake Michigan (Porter County, 2011). The 2010 population of Porter County was 164,343 which has seen a 12.2% increase over the last 10 years (US Census, 2010). In addition to serving Porter County, this hospital also serves Jasper, Lake, Starke, La Porte, and Newton counties. The population is estimated to be as many as 809,334 people in these counties (Porter Health, 2011). The hospital serves many middle class populations, but being the only hospital serving Porter County, the hospital is not limited to only serving middle class populations. This hospital has 301 beds and currently employs 1,938 employees (Porter Health, 2011). The hospital is accredited by the Joint Commission and 297 physicians at this hospital.

This Northwest Indiana hospital offers a continuum of specialized services such as: "emergency/trauma (including ALS ambulance services), cardiology, family medicine, surgery, obstetrics, pediatrics, neonatal intensive care, orthopedics, oncology, physical rehabilitation, a joint replacement center, advanced diagnostic imaging capabilities, the Center for Heart Rhythm Disorders and Wound Care & Hyperbaric Center," (Valpo Life, 2011).

This Hospital began in 1939 with the common goal to serve area families by providing quality care and health and wellness programs (Valpo Life, 2011). It has grown over the last 70 years into a network of seven different medical sites. In April of 2007, the former not-for-profit hospital was purchased by a corporate health system and became part of a for-profit hospital system. Once the hospital transitioned to a part of this health system the mission statement changed to, "We provide for the well-being of those who rely on us by embracing the highest levels of service, technology, and involvement," (Valpo Life, 2011). A vision statement for this hospital focuses on a goal to help people live longer, healthier lives (Valpo Life, 2011).

The administrators at this hospital have fully embraced their mission statement as they continue to expand. Updates have continually been implemented through computer charting and changing many other departments, such as the radiology department, on computerized systems. This Northwest Indiana hospital is constantly on the look-out for the next best practice. They have created the Center for Heart Rhythm Disorders, which leads the region in treating heart rhythm problems and a heart failure telemanagement (Valpo Life, 2011). With the close proximity to Chicago and the rapidly growing population it has become important for this moderately sized hospital to remain competitive by providing the most current practices in health care.

Outcomes

Two major outcomes were measured in this evidence-based practice (EBP) project, door to ECG times for chest pain, ACS, NSTEMI, and STEMI patients; and door to balloon times for patients diagnosed with a STEMI. The ECG is the simplest, most convenient, reliable, and cost-efficient method for routine evaluation and diagnosis when patients present with chest pain or other cardiac issues (Jesse & Kontos, 1997). It is estimated that 50%- 60% of acute myocardial infarctions (MI) were found on ECG readings (Jesse & Kontos, 1997). The current recommendation is to perform the ECG within 10-minutes of the patient's arrival to the ED (AHA, 2011). This hospital's door to ECG time, in 2010, averaged 18.8 minutes for the initial ECG time (Porter Hospital, 2010).

Door-to-balloon is a time measurement in emergency cardiac care, specifically in the treatment of STEMI patients. Angioplasty, or PCI, is the preferred emergency procedure for opening the arteries for some types of heart attacks. Angioplasty is a procedure to open narrowed or blocked blood vessels that supply blood to the heart (Doylestown Hospital, 2009). The time clock begins when the patient arrives in the ED. The time interval ends in the cardiac catheterization lab when an interventional cardiologist inserts a catheter, either through the femoral artery in the groin or through the radial artery in the wrist, to open the blocked coronary artery (Doylestown Hospital, 2009). The current recommendation is to accomplish this in less than 90-minutes (AHA, 2010). This hospital 2010 average is 99.7 minutes for door to balloon time (Porter Hospital, 2010).

Intervention & **Planning**

This EBP project included an extensive review of this hospital's current policies, protocols, and guidelines regarding treatment of ACS patients. When this review was completed, adaptation to current practices was initiated. This adaptation included adding

the current Chest Pain Center power point presentation to general hospital orientation, re-education on the Rule Out Myocardial Infarction Operation (ROMIO) protocol for the physicians and mid-levels, and re-education of the ED staff on the need for expedited door to ECG times.

ROMIO is a risk stratification protocol designed by a committee that included ED physicians, nurses, educators, and cardiologists at this hospital to use evidence-based guidelines to guide the treatment of ACS patients. This protocol was created in 2009 but to date has not been fully implemented. Throughout the accreditation process the benefit of using ROMIO has become much more prevalent because much of the ACC/AHA guidelines are included in the ROMIO tool. ROMIO can be used to meet a portion of every key element of the CPC accreditation. While working toward the goal accreditation the need for re-education of the staff on the use of ROMIO has become apparent. To assure this was being completed, re-education of the use of ROMIO was included. Re-education will reinforce the guidelines of the CPC and improve the identification of patients at risk of ACS.

Another, much needed part of this project was to re-educate the ED staff on the importance of completing an ECG in less than ten minutes of the patient's arrival. This was accomplished through education at staff meetings, emailing handouts to those unable to attend staff meetings, and posting remaindered in the unit on getting the ECG quickly. This education was not only available for the nursing staff, but also aides, paramedics, and registration staff. The staff was very receptive to many of the suggestions given to improve EKG times (Figure 3.1). Some suggestions included: having ED staff start the ECG prior to the ECG technicians arrival in the unit; doing the ECG prior to IV starts, a full history, or undressing; starting ECGs in the triage booth; and using the time on the paramedics ECG as the initial ECG time for patients brought

to the ER by ambulance. A handout with these suggestions was placed around the department to continually serve as a reminder.

Figure 3.1

EKG FIRST!

- Be Proactive!
  - Start the EKG prior to the EKG tech arriving in the department
  - EKG prior to charting
  - Stop less pertinent tasks when a new chest pain patient arrives in the department
  - Triage RN, Triage II RN, NA, and Medics should carry phones to be available for EKGs
- Document accurate EKG times
  - This includes documenting the EKG time of EMS transmitted EKGs as the initial EKG and the EKG on arrival as a follow-up EKG
- Encourage EKG first
  - When the EKG tech is at the bedside for the EKG please allow them to obtain the EKG prior to putting on our monitor and getting the patient's IV
- Acknowledge associated ACS symptoms (use your clinical judgment)
  - Shoulder/jaw pain
  - Syncope
  - Weakness
  - SOB
  - Nausea/vomiting

Recruiting sample

The sample for this project were patients who presented to the ED at a Northwest Indiana hospital with a complaint of chest pain or other associated symptoms such as shortness of breath, weakness, syncope, arm/shoulder pain, or jaw pain. When patients have these symptoms, ACS must be ruled out with the performance of an ECG in less than 10-minutes. The second measurement sample included patients that were found to have an acute STEMI or were in need of PCI. These patients created the sample of door to balloon time. The sample was a random sample since it was impossible to predict when these patients would present to the ED. The sample was limited to patients who presented with the before mentioned complaints during the third and fourth quarter of 2011 at a Northwest Indiana hospital.

Data

This project used the method of an independent t-test to evaluate the results of the EBP implementation. The independent t-test is used to measure the difference between two independent groups (Gravetter & Wallnau, 2009). “The independent t-test is used in situations in which there are two experimental conditions and different participants have been used in each condition” (Field, 2005, p. 296). For this project this facilitator measured the ECG times and door to balloon times for the third quarter of 2011 and compared them with the ECG times and door to balloon times from the fourth quarter of 2011. The fourth quarter measures followed the application of SCPC accreditation and a re-education of the ED staff on the importance of rapid evaluation of possible ACS patients. For this project the independent t-test was not used to compare pairs of scores but rather to compare the overall means of the two samples. In an independent t-test the researcher will usually have a prediction of an outcome. In the case of this EBP project the prediction is that the ECG times and door to balloon times

will be lower in the fourth quarter, thereby showing improvement in the organizations ACS practices.

Collection of the information was completed through this hospitals quality assurance (QA) data collection and through an extensive chart review completed by the project facilitator. QA is the systematic monitoring and evaluation of the various aspects of a project, service or facility to maximize the probability that minimum standards of quality are being attained by the production process (Porter Health, 2011). The QA data at this hospital had only been tracked for those patients who presented to the ED with a diagnosis of a STEMI and were taken to the cardiac catheterization lab. Data for all other diagnoses was completed through a chart review by the project facilitator. After achieving Institutional Review Board approval from both the hospital and the university, the chart review was started. This chart review was guided by a list of all ECGs performed in the ED in the third and fourth quarters in 2011, and included close to 6,000 charts. During the chart review times were tracked for all patients who were discharged with a diagnosis of non-specific chest pain or angina or patients who were admitted with a diagnosis of chest pain, unstable angina, MI, myocardial ischemia, or NSTEMI. It is the goal of this facilitator that a positive trend will be identified and ECG times and door to balloon times will be lowered.

Protection of human subjects

Protection of human subjects is of minimal concern with this EBP project since the current practice guidelines were not be disrupted. Specific cases were not identified in the results but rather the door to ECG and door to balloon times were averaged and presented in the findings of this EBP project. No demographic data was collected on the patients used in the sample. This was not collected because the practice of efficient ECG times and door to balloon times should not be affected by demographics. The EBP

project focused on the re-education of hospital staff and only affected patient care by encouraging more efficient treatment of ACS symptoms.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to answer the question: at this Northwest Indiana hospital, does the implementation of becoming an accredited chest pain center versus the non-accredited practice currently in place improve the adherence to ACS practice standards of the ACC/AHA over the fourth quarter of 2011? This was measures through improvement in ECG times and door to balloon times in the fourth quarter as compared with the third quarter times. Through the evaluation of these times it was the goal of this project facilitator that the hospital would support an improved adherence to the ACC/AHA standards for the care of patients with ACS.

Sample Characteristics

The findings for this project were based upon chart reviews for patients that presented to the ED with CP in the third and fourth quarters and from the QA data for STEMI patients at a hospital in Northwest Indiana. The goal was that through staff re-education the fourth quarter times would show an improvement, thus demonstrating that the education given in preparation for the chest pain center accreditation was effective. To achieve this data an extensive chart review took place as previously described.

For data collection to be completed guidelines had to be placed since the data was purely based on time and no demographic data was collected. The data collected was from all patients at the ED in the third and fourth quarter of 2011. The data was then collected based on the patient's diagnosis when he or she was either admitted or discharged with a diagnosis of STEMI, NSTEMI, angina, MI, myocardial ischemia, unstable angina, ACS, or atypical chest pain. The only piece of data collected on each of these patients was the door to ECG times. The door to balloon time was collected only on patients that were given the diagnosis of a STEMI and were taken to cardiac

catheterization lab for PCI. No demographic data was reported since the Chest Pain Center Accreditation is concerned with all patients presenting with ACS symptoms regardless of age, race, sex, or income.

The sample was divided into four groups: door to ECG for STEMI patients; door to balloon for STEMI patients; door to ECG for patients admitted for ACS or other similar diagnoses; and door to ECG for patients that were discharged with non-specific chest pain or angina. The mean times for each of the four groups were then compared between third and fourth quarter (Table 4.1). The cardiac catheterization lab at the hospital collects the QA data for all STEMI patients including both the door to ECG times and door to balloon times. This QA data was used for the measurements of door to ECG times for STEMI patients and door to balloon times for STEMI patients.

This hospital's door to ECG times were also tracked for patients that presented to the ED with the complaint of chest pain, shortness of breath, arm/shoulder pain, jaw pain, syncope, or weakness. These complaints were recorded on the patient's medical records at time of admission or discharge. Data on subjects with these complaints were then collected through a chart review of every ECG that was done in the ED. This included a review of nearly 6,000 charts. Through the chart review the data was then collected by tracking the ECG time for those patients that were admitted with the diagnosis of chest pain, ACS, NSTEMI, Atypical CP, and angina or discharged with the diagnosis of atypical chest pain.

Table 4.1

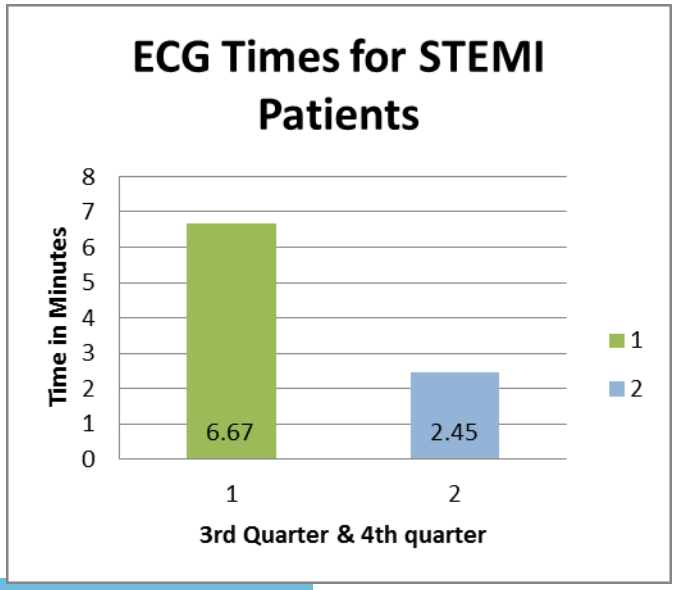
Data Collection Table

	Third Quarter *n*	Third Quarter Average Time (minutes)	Fourth Quarter *n*	Fourth Quarter Average Time (minutes)
Door to ECG for STEMI	15	6.6	20	2.45
Door to Balloon for STEMI	15	94.8	19	70.1
Door to ECG for Admitted CP	275	15.1	286	7.8
Door to ECG for Discharged CP	328	19.6	266	11.3

Sample size and Characteristics

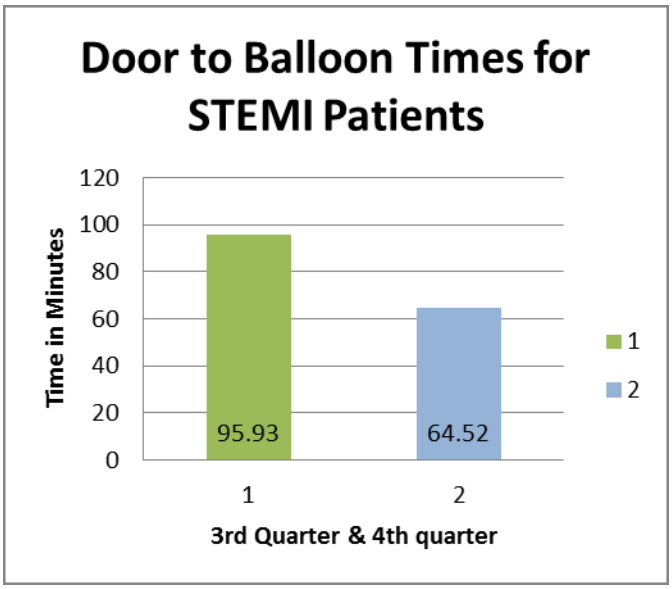
ECG times for STEMIs. The first group to discuss is the ECG times for all patients who presented to the ED and were diagnosed with a STEMI. This included fifteen patients (n=15) for the third quarter and twenty patients (n=20) for the fourth quarter. The mean ECG time for the third quarter STEMI patients was 6.67 minutes. The fourth quarter ECG times for STEMI patients decreased to 2.45 minutes. This data shows a mean improvement of 4.21 minutes. Levene's test was calculated to determine if the variances in the two groups were equal. Significance is shown with a result of Levene's test of $p \leq .05$ (Field, 2005). For this project, Levene's test for equality of variances had a significance of 0.001. This finding allows for the conclusion that the null hypothesis is incorrect and the variances are statistically significant (Field, 2005). An independent t-test comparing the means of the ECG times of STEMIs for third quarter and fourth quarter found a statistically significant difference between the means of the two groups ($t= 1.953$, $p < .05$). The mean of the fourth quarter was statistically significantly lower (m=2.45, sd= 2.43) than the mean of the third quarter (m=6.67, sd= 9.28) (Figure 4.1) (Appendix 1).

Figure 4.1



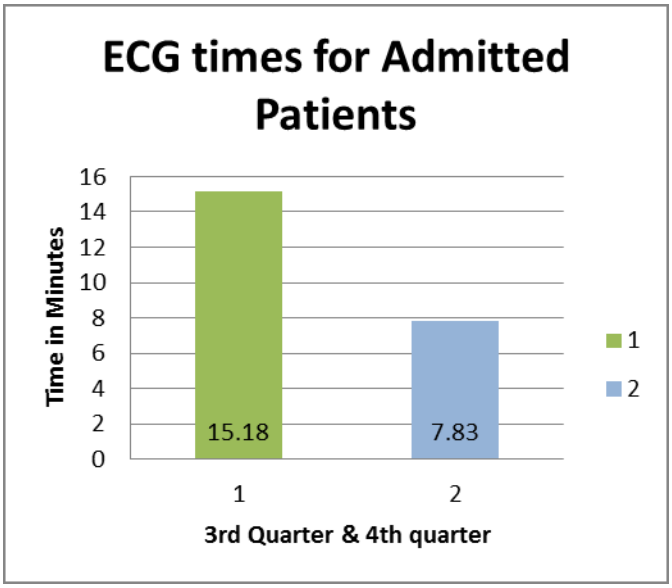
Door to balloon times for STEMIs. The next group that was measured was that of patients diagnosed with a STEMI. The time measured was from when the patient presented to the ED to the time the balloon was inflated for the PCI. The standard is that this time should be less than 90 minutes. There were a total of twenty-four patients in this sample; fifteen patients (n=15) were from the third quarter and nineteen patients (n=19) were from the fourth quarter. Levene's test found this analysis to not be statistically significant (Sig. =.069). The independent t test was calculated comparing the mean door to balloon times of the third and fourth quarter. No statistically significant difference was found (t= 1.24, p=>.05). The mean of the fourth quarter door to balloon times (m= 64.52, sd=20.93) was not statistically significantly different from the mean of the third quarter door to balloon times (m= 95.93, sd=96.28) (Figure 4.2) (Appendix 1).

Figure 4.2



ECG times for admitted patients. ECG times were then evaluated for patients that were admitted with the diagnosis of NSTEMI, angina, MI, myocardial ischemia, unstable angina, or ACS. The standard is that ECG times will be completed on all patients presenting with chest pain or other associated symptoms in less than ten minutes. An independent t test comparing the mean ECG times of third quarter and fourth quarter found a statistically significant difference between the means of the two groups (t=4.35, p=<.05). The mean of the fourth quarter ECG times was significantly lower (m=7.83, sd=12.87) than the mean of the ECG times in the third quarter (m=15.18, sd=25.28) (Figure 4.3) (Appendix 1).

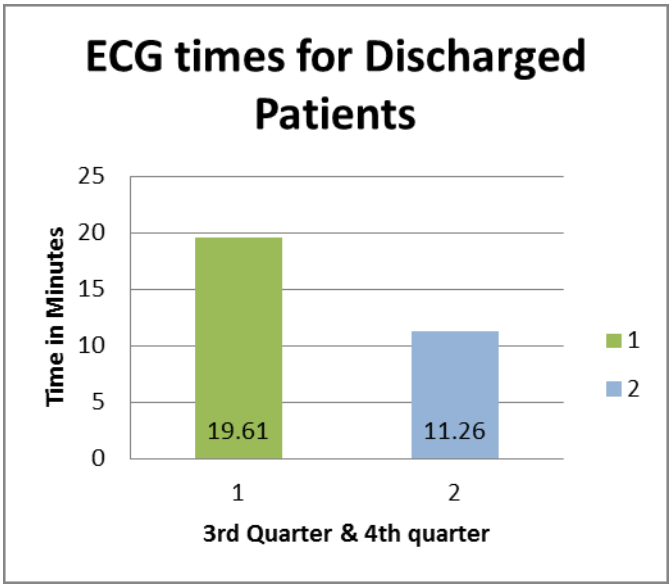
Figure 4.3



ECG times for discharged patients. The last group to be measured was that of patients that were discharged from the ED with diagnosis of atypical chest pain or angina. An independent t-test was completed to compare the means of ECG times in the third quarter to the ECG times of the ECG times of the fourth quarter. The difference of the means was found to be statistically significant (t=4.10, p=<.05). The mean of the

fourth quarter was significantly lower (m=11.26, sd 22.42) than the mean of the third quarter ECG times (m=19.61, sd=26.27) (Figure 4.4) (Appendix 1).

Figure 4.4



Outcomes

At this Northwest Indiana hospital, does the implementation of becoming an accredited chest pain center versus the non-accredited practice currently in place improve the adherence to ACS practice standards of the ACC/AHA over the fourth quarter of 2011? This is the PICOT question that has driven this project. The ACS practice standards that were measured were the ECG times and door to balloon times from the third and fourth quarter of 2011. The findings supported the fact that preparation for a chest pain center accreditation improved the practice of efficient ECG times and door to balloon times. There was a statistically significant improvement found with ECG times for STEMIs, admitted patients, and discharged patients. The mean improvement by twenty-two minutes in door to balloon times was not found to be statistically significant. The improvement in all groups supports the goal of increased adherence to the ACS practice standards of the ACC/AHA in the fourth quarter of 2011.

CHAPTER 5

DISCUSSION

The purpose of this EBP project was to improve a Northwest Indiana Hospitals adherence to ACS practice standards as set forth by the ACC/AHA as the hospital worked toward achieving Chest Pain Center Accreditation. The measures that were collected to support the findings of improvement of the ACS standards were: Door to ECG times for all patients that were admitted to the cardiac catheterization lab with a STEMI; patients admitted to the hospital with a diagnosis of NSTEMI, Angina, MI, myocardial ischemia, unstable angina, or ACS; patients discharged with a diagnosis of atypical chest pain; and door to balloon times for STEMI patients. Cannon et al found that even small improvements in time to achieving reperfusion make clinically significant improvements in morbidity and mortality (2000).

Explanation of Findings

Data for this project were collected through the use of the hospitals QA data and through an extensive chart review. The data was then analyzed using the PASW system; a computerized data analysis system. The data that were analyzed were ECG times for STEMI patients, patients that were admitted with a specific diagnosis (NSTEMI, ACS, MI, myocardial ischemia, chest pain, or angina), discharged patients diagnosed with non-specific chest pain, and the door to balloon times for STEMI patients. The data collected from the third quarter were then compared to the data findings from the fourth quarter to track whether the re-education process was successful in improving the adherence to the ACC/AHA standards for ACS. The standards recommend that ECGs should be completed in less than ten minutes for all patients presenting for chest pain or other atypical symptoms (weakness, arm pain, shoulder pain, lightheadedness, or

syncope) and door to balloon times should be less than ninety minutes for STEMI patients (AHA, 2011).

ECG times for STEMIs. An independent t-test of the ECG times for all patients who were diagnosed with a STEMI and taken to the cardiac catheterization lab was found to be statistically significant at 0.001. The mean time of these ECG times decreased remarkably from third quarter (m=6.67) to fourth quarter (m=2.45) supporting not only statistical significance but clinical significance as there was more than a four minute decrease in the door to ECG time. The 12-lead ECG in the ED is at the core of therapeutic decision making because of the strong evidence that supports ST-segment elevation identifies patients who benefit from reperfusion therapy (Antman et al, 2009). It is for this reason that the decreased time in door to ECG can be deemed clinically significant. The clinically significant improvement in the ECG times supports the statement that a re-education process on the implementation of ECG times improved adherence to the ACC/AHA standards.

Door to balloon times for STEMIs. Through the analysis of an independent t-test, door to balloon times from third to fourth quarter were not found to be statistically significant (Sig. = .069). The mean for fourth quarter door to balloon times (m=64.52) was remarkably lower than the third quarter data (m=95.93). With the mean time for the door to balloon decreasing by 30 minutes, this data can be found clinically significant. The ACC/AHA guidelines state that the time from symptom onset to balloon inflation is significantly correlated with one year mortality in patients undergoing primary PCI for STEMI (Antman et al, 2004). Therefore, even though the data were not statistically significant, the clinical significance of this data must not be overlooked due to the benefit it provides the patient outcomes. The standards for treating STEMI patients, as set forth by the ACC/AHA boast that “time is muscle” (Antman et al, 2004). It is for this reason that an improvement of 30 minutes must not be overlooked due to the fact that was not

found to be statistically significant. This margin of improvement will improve patient outcomes and decrease morbidity and mortality, therefore being deemed clinically significant.

ECG times for admitted patients. Through the process of a chart review the ECG times were collected for all patients that presented to the ED with ACS symptoms and were admitted with a diagnosis of NSTEMI, angina, MI, myocardial ischemia, unstable angina, or ACS. These data were found to be statistically significant ($p < 0.001$) through the independent t-test analysis. The fourth quarter ECG times (m=7.83) were decreased by half from the third quarter ECG times (m=15.18) showing clinical significance as well as statistical significance. This improvement was made through following the suggestions given during the re-education sessions: be pro-active (triage ECGs and not waiting for ECG technicians); documentation of accurate ECG times; obtaining the ECG prior to other treatments; and acknowledging atypical symptoms for ACS.

ECG times for discharged patient. The data for the ECG times of discharged patients were collected through a chart review of all patients who were discharged with the diagnosis of angina or atypical chest pain. Through the analysis of an independent t-test the findings were statistically significant ($p< 0.004$). The fourth quarter ECG times (m= 11.26) were much lower than the third quarter ECG times (m=19.61). While the decrease of over 8 minutes, from the third quarter to the fourth quarter, is clinically significant, there is still room for improvement in this group as the average is still not less than the ten minute standard outlined by the ACC/AHA. A factor to consider with the extended ECG time for this group is that the diagnosis of atypical chest pain was often given to patients who also had respiratory diagnoses. However, when a patient first presents to the ED it is not certain that a respiratory diagnosis will be given. Therefore these patients were still included in this data.

Evaluation of the Applicability of the Theoretical Framework

This EBP project used two frameworks to guide the development, implementation, and evaluation; Betty Neuman's Systems Model and the PARIHS framework. NSM was used to guide the theoretical aspects for this project. The PARIHS framework was used to guide the implementation and evaluations of this EBP project.

Betty Neuman's Systems Model. Neuman's Systems Model focuses on the three levels of prevention. The focus for the purpose of this project was that of secondary prevention. Secondary prevention relates to symptomatology following a stressor, appropriate ranking of intervention priorities, and treatment to reduce their noxious effects (Neuman & Fawcett, 2011). The ranking of intervention priorities was a key focus in the re-education of the staff. One of the main points of the re-education was the reassurance that other interventions could wait until after the ECG was attained since the ECG would, often times, be guarding the treatment plan. The use of secondary prevention as a guide was one of the strengths of using the NSM.

One of the weaknesses of using the NSM as a theoretical guide is that there was minimal focus on primary and tertiary prevention. Primary prevention is more often applied during client assessment in a primary care setting to focus on the reduction of possible or actual risk factors (Neuman & Fawcett, 2011). Tertiary prevention is focused on maintenance factors after a disease process has occurred (Neuman & Fawcett, 2011). These two levels of prevention were not addressed during this project, however, this project has laid the groundwork for future EBP projects to expand and potentially take into account the primary and tertiary levels of prevention for ACS.

The PARIHS Framework. The evidence-based practice model that was used to guide this EBP project was the PARIHS framework. There are three elements that the

PARIHS framework outlines as key to successful implementation: evidence, context, and facilitation (Roycroft-Malone, 2004). Each of these elements is broken into sub-elements. It is through the evaluation of these sub-elements that a judgment can be made as to whether implementation is likely to be successful. The sub-elements are placed on a continuum of low to high (Roycroft-Malone, 2004). Those found to be on the higher end of the spectrum indicate more likelihood of successful implementation.

The sub-elements for evidence include: research evidence, clinical experience, patient experience, and local data/information (Roycroft-Malone, 2004). Some factors that place research evidence on the high end of the spectrum are: well-conceived, designed, and executed research; judged as relevant; and lack of certainty acknowledged. This project had a well-defined search that was narrowed down to "ACC/AHA guidelines adherence in chest pain accreditation" early in the search. Many of the articles were judged as relevant, as twenty-three were analyzed to be level V or higher on Polit & Beck's hierarchy of evidence. It was found that only four of the articles reviewed were specific to ACC/AHA guideline adherence during the Chest Pain Center accreditation process, thus leaving much room for further research.

Clinical experience, as a sub-element of evidence, was something that was highly useful in the implementation of this project. To be evaluated on the high end of the sub-element continuum clinical experience must include: clinical experience and expertise that is reflected upon, valued as evidence, importance weighted, and conclusion drawn (Roycroft-Malone, 2004). This project facilitator used clinical experience from eight years of ED practice to evaluate the ECG process and devise process improvement strategies. The value and importance of the clinical experience is valued due to every ED having different concerns and a different patient flow. By being an active member of the ED staff, this project facilitator was able to blend the research

evidence with the current ED practices to devise the most effective process improvement methods.

The patient experience is considered on the high end of the continuum when: it is valued as evidence, there is a partnership with healthcare professionals; and the patient experience is seen as part of the decision to change (Roycroft-Malone, 2004). This sub-element is weakly represented in this project. The patient's outcomes were concerned but not much weight was placed on their experience during this process. The rapid evaluation of obtaining the ECG in less than ten minutes can be overwhelming for patients. It is a process that the ED must explain to the patients while attempting to accomplish an efficient ECG.

Local data/information is seen as being on the high end of the continuum when: the data is collected and analyzed systematically and rigorously; and it is evaluated and reflected upon (Roycroft-Malone, 2004). Local data is the crux of this project. It was through a systematic chart review that the data of ECG times were collected and analyzed. Through this evaluation improvements were seen in each category that was evaluated. Through this the conclusion can be made that the re-education process was successful.

Context is broken into three sub-elements: culture, leadership, and evaluation (Roycroft-Malone, 2004). Culture is evaluated on the continuum to be highly effective when: values of individual staff and clients are considered; a learning organization is promoted; there is consistency of the individual's role; and the initiative fits with the strategic goals (Roycroft-Malone, 2004). The member of the staff of the ED thrives on working at an increased paced and the staff was very receptive to the suggestions that were given on where improvements could be made in the ECG process. Learning and additional suggestions were encouraged at the re-education sessions as they were conducted at unit meeting and were very informal. This initiative fit the goal of improving

the adherence to ACC/AHA standards since the treatment for all ACS patients begins with the ECG. By improving the first step in the process further changes to enhance adherence will be welcomed by the staff.

To measure leadership on the high end of the continuum a few areas were evaluated: role clarity; effective teamwork; and enabling/empowering approach to teaching (Roycroft-Malone, 2004). Role clarity was one of the hardest parts of this project. Since the project facilitator serves as a staff RN in the ED it was confusing to staff members on what the project facilitator's role was in the improvement of ECG times and in the accreditation process. The hospital where this project took place did not have a complete understanding of the evidence-based practice process and a significant amount of education was needed throughout the project. After receiving the re-education on the ECG process, the staff members were receptive and teamwork was witnessed as they worked to improve ECG times. The assumption may be made that the improvement in teamwork is because the staff members were empowered during the education to make the change in ECG times.

Evaluation is evaluated on the high end of the continuum when there is feedback given by those involved and when multiple methods of evaluation are used (Roycroft-Malone, 2004). The evaluation of this project was fairly simple; to measure an improvement in ECG times and door to balloon times. This area could have been seen as more effective if the project facilitator would have surveyed the ED staff members at the end of the fourth quarter to evaluate how they felt the ECG process was going and where improvements could be made. A more complex method of evaluation and staff feedback would have enhanced the strength of the evaluation of this project.

Facilitation is the final element of the PARIHS framework with the sub-elements of purpose role, and skills and attributes (Roycroft-Malone, 2004). Ranking high on the continuum for these two sub-elements requires a holistic approach (Roycroft-Malone,

2004). The re-education of the ED staff was not limited to nursing staff. However, more education could be provided to ancillary staff such as the ECG technicians, EMS providers, and registration personnel. The ancillary staff did begin to follow the lead of the ED staff, but re-education may give them the confidence to be more proactive in addressing patients with ACS-like symptoms. Overall, the PARIHS framework served as an effective guide for this project. Through evaluation of the PARIHS framework's effectiveness it was easy to see what areas of implementation could be improved upon.

Strengths and Limitations of the EBP project

Strengths. There are many different areas of strength associated with this project. First, the data collected in this project supports the question of whether preparing for the Chest Pain Center accreditation improves adherence to the ACC/AHA standards. The second strength of this project is the simplicity of the re-education. By providing a simple handout throughout the department and reinforcing the handout in a monthly staff meeting it allowed the entire department a chance to partake in the educational session. Those who were unable to attend the staff meeting were able to review the handouts that were posted throughout the ED. Third, there is the close adherence to the NSM, specifically through the use of secondary prevention, as a guide for the implementation of the project. Lastly, this project could be easily replicated at other facilities that are working toward obtaining accreditation and could be translated to the collection of further ACC/AHA guideline adherence measures. The tracking of ECG times and door to balloon times is an area of quality measure that should be tracked at every facility that is striving for Chest Pain Center accreditation. The recommendations given in the re-education to improve these times is simple to replicate at any other facility (Figure 3.1). Further projects could be implemented that track additional ACS treatment guidelines such as aspirin on arrival or the initiation of beta-blockers and heparin. This

project can serve as a guide for the monitoring of this information by using a similar chart review process.

Limitations. After evaluation of this project there were a significant amount of limitations to this project. First, ancillary staff could have been given the re-education in addition to the ED staff. One specific section of ancillary staff that would have benefitted from re-education is that of the ECG technicians. The decision to not do a re-education of this group of staff members was made initially because this project facilitator did not want the ED staff to rely on their responsiveness since they perform the ECGs to the entire hospital and they are not staffed twenty-four hours a day. However, with a few of the ECG staff there was a positive reception to the changes that were being made and a curiosity for how effective the changes were in our times. It would have been more effective to include these staff members to foster that willingness to improve by all employees partaking in care of patients with ACS.

A second limitation was the lack of consideration for the patient's experience. The push for more efficient ECGs is in the patient's best interest. However, further research on their perception of this rapid treatment would be helpful in the evaluation of the care of the patient with ACS symptoms. In addition, feedback from the staff following the reporting of the data would have been a great way to decide on additional areas where process improvements could be made.

One of the biggest limitations of this project was the struggle to obtain IRB approval from the hospital IRB to complete the chart review process. The data that were collected through the chart review is data that should have been tracked through a QA process. This data collection stopped being collected at some unidentified point. This was brought to the attention of many of the management level staff and no changes were attempted to be made to rectify this issue. Therefore, IRB approval was required to be able to complete the data collection. The communication with the hospital IRB was

difficult and the chair did not return communication when it was inquired if the request could be considered exempt. Had there been more timely responses or additional support more quality measures could have been evaluated. Despite the limitations to this project, the data still supported a successful implementation.

Implications for the Future

Practice. There are two aspects to consider for future practice, continued tracking of ACC/AHA guidelines and maintaining and improving the current measures. For this project the ACC/AHA standards of ECG times and door to balloon times were chosen as a starting point for tracking the adherence to these standards. There are additional standards that could continue to be tracked: aspirin given on arrival; beta-blockers given with 24-hours; administration of heparin; or administration of glycoprotein IIB/IIIa (Chandra et al, 2009). Tracking additional standards will guide the hospital in continued process improvements that are required to attain and maintain Chest Pain Center Accreditation. Additionally, the door to ECG times for all patients that were not diagnosed with a STEMI was collected through a chart review because these data were not being tracked. It is the recommendation of this facilitator that this data be continually tracked to assure adherence to the current practice of efficient ECG times and door to balloon times.

It is also the recommendation of this project facilitator that this hospital continue to work toward improving ECG times for both admitted and discharged patients. A new goal of five minutes should be attainable. This improvement could be attained by refining the process of ECGs completed in triage, having an ED tech or paramedic in triage at all times would be one way to improve this process. An additional area of improvement would be to improve the process of ECG transmission by paramedics when the patient is arriving by ambulance. Currently, one EMS group is transmitting their ECGs and this process still has not been perfected. There is difficulty transmitting 100% of the time due

to either technical difficulties of not enough time when also caring for the patient. This process could be improved by reaching out to other ambulance services to find ways for them to be able to transmit to the ED and by continued education of the EMS on the importance to transmit ECGs to improve patient outcomes.

Theory. Using the NSM as the theory to guide this project allows for an extensive amount of future growth. This project focused on the level of secondary prevention, in that process improvements were made to improve interventions to more effectively treat ACS. Primary prevention could be addressed by the physicians and nurse practitioners who work in the family care setting. It could be implemented that patients be educated on the atypical signs of ACS such as: shortness of breath; arm or jaw pain; syncope; dizziness; or weakness. The patients would then also be educated on the urgency of the condition and therefore reach out for care sooner.

Tertiary prevention would be a simple transition from this project. A part of the core measures associated with ACC/AHA guidelines involve discharge planning for patients with ACS in an effort to decrease future risks. Some of these core measures include: Aspirin given on arrival and when discharged from the hospital; beta-blockers prescribed at discharge; angiotensin-converting enzyme inhibitor or angiotensin receptor blocker prescribed at discharge; and smoking cessation information given at discharge (Tatum et al, 1997). By incorporating these core measures in the evaluation of future projects the NSM could be used to its fullest extent and quality measures could be improved upon, decreasing the morbidity and mortality of the patients.

Research. Further research is needed on both the role the chest pain accreditation plays in improving adherence to the ACC/AHA guidelines and the role the APN can play in this process. It was supported by the data reported in this project that there was a correlation to preparing for the chest pain center accreditation and improved adherence to the ACC/AHA guidelines of ECG times and door to balloon times. Further

research could be used to support improved adherence to all ACC/AHA guidelines such as: whether aspirin or nitroglycerin was given on arrival, when heparin was initiated; or if beta-blockers were given on arrival.

The role of the APN in the chest pain center accreditation is not supported in the research. It is the hope of this project facilitator that this project will show the role the APN can play in the accreditation. This project facilitator lead the organization of the documentation needed to be submitted to the chest pain center. Through organizing that data, areas where improvements in the hospitals ACS treatment process was made and re-education was given to the ED. This re-education proved effective with the decrease of both ECG times and door to balloon times. The APN is a valuable resource that further research could be done to provide support for the APNs role in the accreditation process.

Education. The re-education given to the staff in preparation for the Chest Pain Center accreditation encouraged them to improve their ECG times. There is room for future growth by educating the staff on additional ACC/AHA standards such as: aspirin or nitroglycerin was given on arrival; when heparin was initiated; or if beta-blockers were given on arrival. There could be additional education on the role they play in the treatment of ACS and the need for them to be given in an efficient manner. As discussed previously this could then also lead to future research on how education on the ACC/AHA standards improves patient outcomes.

Conclusion

The evaluation of this project supports the statement that working toward attaining Chest Pain Center accreditation improves adherence to ACC/AHA guidelines for the treatment of ACS. The ECG times and door to balloon times improved in all groups from third quarter to fourth quarter supporting an improved process of obtaining ECGS at this hospital. This project opens doors to many future projects that continue to

measure the ECG times and door to balloon process as well as other ACC/AHA guidelines. This project supports that a simple re-education and the encouragement of ED staff can make a significant difference in patient care and improves patient outcomes.

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BIOGRAPHICAL MATERIAL

Lisa R. Stephenson

Lisa Stephenson graduated from Marian University with a bachelor's degree in the science of nursing in 2004. She has worked in the emergency department or intensive care unit during her eight years of nursing experience. Lisa is currently attending Valparaiso University to earn a DNP in May 2012. Lisa is a member of Sigma theta Tau and a member of AANP. She will be presenting a poster presentation on her DNP project, "The effect of Chest Pain Center Accreditation on compliance with ACC/AHA guidelines for the treatment of Acute Coronary Syndrome" at MNRS conference in April. She became interested in cardiac issues, mainly acute coronary syndrome through her years as an emergency nurse and hopes to continue working with this patient population after graduating from the DNP program.

Appendix 1

PASW Data Sheets

ECG Times for STEMI Patients

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ECG times for STEMI	Equal variances assumed	12.414	.001	1.953	33	.059	4.21667	2.15884	-.17553	8.60886
	Equal variances not assumed			1.716	15.457	.106	4.21667	2.45701	-1.00688	9.44021

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
ECG times for STEMI	3rd quarter STEMI ECGs	15	6.6667	9.27875	2.39576
	4th quarter STEMI ECGs	20	2.4500	2.43818	.54519

Door to Balloon Times for STEMI Patients

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Door to balloon times	Equal variances assumed	3.535	.069	1.386	32	.175	31.40702	22.65567	-14.74108	77.55511
	Equal variances not assumed			1.240	15.048	.234	31.40702	25.32046	-22.54740	85.36143

Group Statistics

	Group1	N	Mean	Std. Deviation	Std. Error Mean
Door to balloon times	3rd quarter STEMI ECGs	15	95.9333	96.28638	24.86104
	4th quarter STEMI ECGs	19	64.5263	20.92943	4.80154

ECG Times for Admitted Patients

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Admitted patient's ECG time	Equal variances assumed	20.676	.000	4.354	557	.000	7.34739	1.68746	4.03283	10.66196
	Equal variances not assumed			4.304	402.082	.000	7.34739	1.70714	3.99135	10.70343

Group Statistics

	group2	N	Mean	Std. Deviation	Std. Error Mean
Admitted patient's ECG time	3rd quarter ECG times	274	15.1825	25.28163	1.52732
	4th quarter ECG times	285	7.8351	12.87497	.76265

ECG Times for Discharged Patients

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Discharged patient's ECG times	Equal variances assumed	8.284	.004	4.100	590	.000	8.34441	2.03520	4.34728	12.34154
	Equal variances not assumed			4.168	588.410	.000	8.34441	2.00191	4.41266	12.27617

Group Statistics

	group3	N	Mean	Std. Deviation	Std. Error Mean
Discharged patient's ECG times	3rd quarter discharged ECG times	327	19.6086	26.27217	1.45285
	4th quarter discharged ECG times	265	11.2642	22.42019	1.37726

ACRONYM LIST

ACC/AHA: American College of Cardiology/ American Heart Association

ACS: Acute Coronary Syndrome

AMI: Acute Myocardial Infarction

CAD: Coronary Artery DIsease

CPC: Chest Pain Center

CRUSADE: Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes with Early Implementation of ACC/AHA Guidelines

EBP: Evidence-Based Practice

ECG: Electrocardiogram

ED: Emergency Department

EMS: Emergency Medical System

GRACE: Global Registry of Acute Coronary Events

MI/UA: Myocardial Infarction/ Unstable Angina

NSM: Neuman's Systems Model

NSTEMI: Non-ST segment elevation myocardial infarction

NTG: Nitroglycerin

PASW- Predictive Analytics Software

PCI- Percutaneous Coronary Intervention

QA- Quality assurance

ROMIO: Rule Out Myocardial Infarction Operation

SCPC: Society of Chest Pain Centers

STEMI- ST-segment elevation myocardial infarction

TIMI: Thrombolysis in Myocardial Infarctions