2012

Emergency Departments and STEMI Care, Are the Guidelines Being Followed?

Dawn W. Hendren
Gardner-Webb University

EMERGENCY DEPARTMENTS AND STEMI CARE, ARE THE GUIDELINES BEING FOLLOWED?

By

Author

Dawn W. Hendren, RN, BSN

A thesis submitted to the faculty of

Gardner-Webb University School of Nursing

in partial fulfillment of the requirements for the

Degree of Master of Science in Nursing

Boiling Springs

July 2012

Submitted by:	Approved by:
_____	_____
Dawn W. Hendren, BSN, RN	Janie M. Carlton, EdD, MN, BS, RN
_____	_____
Date	Date

Abstract

The purpose of this study examined if an Emergency Department (ED) in a small rural hospital in western North Carolina is compliant with the American College of Cardiology (ACC) and the American Heart Association (AHA) guidelines for obtaining Electrocardiogram's (ECG's), administering fibrinolytics, and performing Primary Percutaneous Coronary Intervention (PCI) on patients with chest pain diagnosed with ST-Elevation Myocardial Infarction (STEMI). The national standards for ECGs is less than 10 minutes from arrival to first medical contact (FMC) with triage nurse; for fibrinolytics, less than 30 minutes from arrival to FMC; and for FMC to PCI, less than 90 minutes. The national standard for ECG times is for all patients presenting to the ED with symptom of chest pain. The national standards for FMC to PCI and fibrinolytics are for STEMI patients only. Using a retrospective design, twenty-five patient records were examined from January 2010 to December 2011. The one-sample *t* test was used to compare the sample means for the ECG and FMC to PCI times to the national standards. The one sample t test revealed a significant difference in length of time between arrival to the ED and ECG between the sample and national standard. The length of time between arrival and ECG for the sample was significantly shorter that the national standard of 10 minutes or less. The length of time between FMC and PCI, although significantly different, was significantly longer than the national standard of 90 minutes. There was insufficient data to examine the length of time for the administration of fibrinolytics. Additional research is needed using a larger sample size as well as additional EDs that transfer patients for PCI.

Acknowledgements

The researcher would like to express her heartfelt gratitude and appreciation to those who gave the most, and for their effortless support, in order for her to continue her pursuit for higher education.

- Stephanie Starling, RN, MHA, BSN for all of her support, passion for cardiovascular nursing, and many words of encouragement in pursuit of my educational endeavors.
- Amy Craver, BSRS RT(R) (CT) (MR) Heart Center Outreach Coordinator for Wake Forest Baptist Health, for all of her help with data collection and encouragement.
- Cristie Burnette, RN, BSN, CEN Cardiac Emergencies Regional Manager for Forsyth Medical Center (Novant Health Systems) for her help with data collection.
- Dr. Janie Carlton, Gardner-Webb University Faculty, for all of her support, knowledge, and encouragement in helping her to complete her educational goals.
- My parents, Ken and Marlene, for their never-ending support in my endeavors.
- My in-laws, Clyde and Marlene, for their support in my pursuit of my educational endeavors.
- My husband, Brad, and my children, Darian and Grayson, for the many sacrifices they have made in my pursuit of my educational endeavors.

Table of Contents

List of Tables

Chapter 1
Introduction

Statement of the Problem

The heart, a powerful muscle that beats over 50,000 times in one day, is fed the blood and energy it needs through small tubes called coronary arteries. Coronary artery disease is the most common cause of death and disability in the United States and other industrialized countries, and it can be manifested if these arteries become narrowed by cholesterol to about half their normal diameter (National Institutes of Health 2010). Coronary artery disease (CAD) is the most common type of heart disease. Coronary heart disease (CHD) or coronary artery disease is a condition in which plaque builds up inside the coronary arteries. These arteries supply your heart muscle with oxygen-rich blood. When your coronary arteries are blocked or narrowed, oxygen-rich blood cannot reach the heart muscle. This can cause angina or a heart attack. Angina is chest pain or discomfort that occurs when not enough oxygen-rich blood is flowing to an area of your heart muscle. Angina may feel like pressure or squeezing in your chest. A heart attack occurs when blood flow to an area of your heart muscle is completely blocked. This prevents oxygen-rich blood from reaching that area of heart muscle and causes it to die (National Heart Lung and Blood Institute 2010). Lifestyle changes, medicines, and/or medical procedures can effectively prevent or treat CAD in most people. The estimated direct and indirect cost of cardiovascular disease for 2010 is $503.2 billion (Heart Disease and Stroke Statistics 2010).

Background and Need

In a STEMI (ST- elevation myocardial infarction), the coronary artery is completely blocked off by the blood clot, and as a result virtually all the heart muscle

being supplied by the affected artery starts to die. This more severe type of heart attack is usually recognized by characteristic changes it produces on the ECG (Electrocardiogram). One of those ECG changes is a characteristic elevation in what is called the "ST segment." This is where the name STEMI comes from. The elevated ST segment indicates that a relatively large amount of heart muscle damage is occurring (because the coronary artery is totally occluded), and is what gives this type of heart attack its name (Fogoros 2009).

The American College of Cardiology (ACC) and the American Heart Association (AHA) have established guidelines for the treatment of STEMI. "Our recommendations for the initial treatment of STEMI continue to reinforce the goal of restoring blood flow to the heart as quickly as possible," (p. 25) said Elliot Antman, MD, chair of the guideline-writing group. Antman is the director of the Coronary Care Unit at Brigham and Women's Hospital and a professor of medicine at Harvard Medical School, both in Boston. "ED nurses need to be very alert to the possibility that a patient with chest pain may be experiencing a STEMI," (p. 25) he says. "They should obtain a 12-lead ECG promptly in such patients, with a goal of doing so in less than 10 minutes from the presentation of the patient to the triage area." (p. 25). STEMI patients who present to the hospital without PCI capability may be candidates for transfer to another hospital, says Antman. "Expeditious transfer in such cases is key," (p. 44) he says. To cut delays, he recommends avoiding use of intravenous lines and infusion pumps that need to be switched over to different equipment systems.

Purpose of the Study

The purpose of this study was to examine if an Emergency Department (ED) in western North Carolina was in compliance to the American College of Cardiology (ACC) and the American Heart Association (AHA) guidelines for obtaining Electrocardiogram's (ECG's), administering fibrinolytics, and performing Primary Percutaneous Coronary Intervention (PCI) on patients with chest pain who present to the ED. The national standards are for ECGs to be obtained less than 10 minutes from arrival to first medical contact (FMC), for fibrinolytics to be administered less than 30 minutes from arrival to FMC, and for FMC to PCI to be less than 90 minutes.

Studies have shown that patients have improved outcomes when an ECG, fibrinolytics, or PCI follows ACC/AHA guidelines. Emergency nurses should ensure that all patients with possible ST-elevation myocardial infarction (STEMI) get ECG's within 10 minutes of their presentation to the triage area according to updated guidelines. To improve the care of STEMI patients, one needs to remember that diabetics and women frequently present with atypical symptoms, require that nurses obtain certification in Advanced Cardiac Life Support (ACLS), and to ask about other symptoms such as , shortness of breath and diaphoresis, and whether or not the pain increases with exertion (Antman, 2004). This study determined if the standards for treating the STEMI patients in the ED were being met according to the ACC/AHA guidelines. The data gathered from the study will be used to implement changes where indicated to ensure that patients who present with chest pain to the ED will obtain optimal care based on the standards of practice for care.

Significance

If the guidelines of the ACC/AHA are followed, then optimal care will be given to patients who present to ED's with chest pain and diagnosis of STEMI. The practice guidelines are intended to assist healthcare providers in clinical decision making that will be in the patients' best interest (Antman, 2004). One third of patients who experience STEMI will die within 24 hours onset of ischemia, and many of the survivors will suffer significant morbidity (ACC/AHA, 2004). All practitioners are accountable for educating patients on the risk factors for CHD and consequences of actions if patients ignore their advice.

Research Question

Is the Emergency Department in rural western North Carolina following the ACC/AHA guidelines for STEMI patients in regards to timely ECGs, administration of fibrinolytics, and performance of Primary Percutaneous Coronary Intervention?

Research Hypotheses

There is not a significant difference between the sample mean (ECG time) and the population mean (National standard ECG time). There is not a significant difference between the sample mean (FMC to PCI time) and the population mean (National standard FMC to PCI time).

Definition of Terms

STEMI is an acronym for ST elevation myocardial infarction; this is the more severe form of heart attack that can occur.

PCI is an acronym for percutaneous coronary intervention and it is a procedure used in the cardiac catheterization laboratory to open occluded coronary arteries by use of a thin

guide wire with balloon that is inflated and sometimes deployment of a stent into the artery.

FMC is an acronym for first medical contact.

FMC to PCI is an acronym for the first medical contact to percutaneous coronary intervention. Many patients need to be transferred from rural areas to a medical center that performs PCI.

ECG is an acronym for Electrocardiogram; this test is used in patients who present to the ED with chest pain to determine if they are experiencing a STEMI.

ECG Time is an acronym for the time of first medical contact to ECG. This time correlates to the time the patient is registered in the ED until the time that the ECG is performed.

ED is an acronym for Emergency Department.

EMS is an acronym for Emergency Medical Services.

RACE is an acronym for Reperfusion of Acute Myocardial Infarction in Carolina Emergency Departments.

CABG is an acronym for coronary artery bypass graft.

SRC is an acronym for STEMI receiving center.

Theoretical Framework

The theoretical framework used in this study was Ida Jean Orlando's Nursing Process Theory. Orlando describes her model as revolving around the following five major interrelated concepts: the function of professional nursing, the presenting behavior of the patient, the immediate or internal response of the nurse, the nursing

process discipline, and improvement. Orlando's nursing theory stresses the reciprocal relationship between the patient and the nurse (Tomey & Alligood, 2006).

Orlando states that it is the nurse's responsibility to see that "the patient's needs for help are met, either directly by her own activity or indirectly by calling in the help of others." (p. 36.) This is more fully amplified by Orlando's approach to the nursing process discipline, which she proposes is composed of the following basic elements: "(1) the behavior of the patient, (2) the reaction of the nurse, and (3) the nursing actions, which are designed for the patient's benefit. The interaction of these elements with each other is the nursing process" (Orlando, 1961, p. 36). Orlando's theory is applicable in the care of STEMI patients because the nurse is using the nursing process to care for the patient. The patient's have a need that is not being met; the nurse is calling in the help of others (based on the standards of practice) to meet the patients need.

Chapter 2

Review of the Literature

Introduction

A current review of the literature was obtained by conducting research using CINAHL, Medline, and Circulations from the American Heart Association. These literature bodies ensured that the researcher was able to encompass a broad breadth of information on the topic of STEMI Care, and if the current guidelines were followed correctly to ensure the best quality of care.

Literature Review

A retrospective correlational study was conducted by Vlahaki, et al (2008) to determine whether the target door to needle time (DTN) of 30 minutes or less for thrombolytics could be met in 2 rural Ontario Emergency Departments (ED). A convenience sample of 101 patients who received thrombolytics was used in the study. Research has suggested that a major contributing factor to improved DTN times is who decides to administer thrombolytics (Vlahaki, et al, 2008). Overcrowding has also been shown to contribute to delays on delivery of optimal ED cardiac care (Vlahaki, et al, 2008). The researchers have shown that the study demonstrates that the DTN time of 30 minutes or less is achievable in rural EDs.

A randomized control trial was conducted by Borzak and Cantor (2009) to determine what the effectiveness of early transfer for angiography is and PCI compared with transfer for rescue PCI or delayed angiography. A convenience sample of 1059 STEMI patients who presented within 12 hours were used in the study. The researchers found that in patients with STEMI, early transfer for angiography and PCI, reduced

ischemic events compared with selective emergency and delayed elective transfer (Borzak and Cantor, 2009). The researchers identified that early transfer had a lower ratio of the composite outcomes, recurrent ischemia, and new or worsening heart failure than did standard care but that it did not differ in reinfarction, death, cardiogenic shock, or in-hospital bleeding complications (Borzak and Cantor, 209). Researchers felt that the benefit was almost certainly the result of PCI because the medical care was similar in the referring and referral institutions.

A cross-sectional study was conducted by Schull, et al (2008) to determine the extent to which Emergency Medical Services (EMS) use prehospital strategies in Canada to reduce the time to reperfusion for STEMI patients. A convenience sample of 97 ambulance operators was surveyed, representing 15,681 paramedics serving 97% of the combined prehospital populations (Schull, et al 2008).

A contemporary analysis of quality improvement program was conducted by Ahman, Quarin, Ajari, Kennedy, and Grigg (2008). A total cohort of 107 was used in the study. These were divided into two groups A & B. The mean age was 60 years in both the study groups with a male predominance. Both groups had similar clinical characteristics, with cigarette smoking and hypertension (HTN) being the important cardiovascular risk factors (Ahman, et al 2008). The researchers study has shown that the initiation of a quality improvement program involving both the emergency and cardiology departments led to an improvement in the management of acute STEMI. This analysis of the management of STEMI with primary PCI emphasizes the critical importance of optimizing times. A coordinated approach with ongoing review through a

quality improvement program is essential in reducing these management times in patients with acute STEMI (Ahman, et al 2008).

A retrospective comparative design study was conducted by Caudle, Piggott, Dostaler, Graham, and Brison (2009) to assess the effectiveness of a protocol for rapid access to PCI in reducing door to balloon times in STEMI. A convenience sample of 97 patients were included who met criteria following chart review. The researchers found that their results show a statistically significant reduction in time to reperfusion via primary PCI after implementation of a rapid access protocol (Caudle, et al 2009). The researchers found that in their region, implementation of an EMS protocol for rapid access to PCI significantly reduced time to reperfusion for patients with STEMI (Caudle, et al 2009).

A systematic review of world literature and Meta analysis was conducted by Brooks, et al (2009) to determine whether direct transport of adult STEMI patients by EMS to primary PCI centers improved 30-day all-cause mortality when compared with a strategy of transportation to the closest hospital. Five studies, including 980 STEMI patients, met inclusion criteria and were included in the study. After comprehensive review, the researchers found that there was insufficient data derived from direct comparisons to support the effectiveness of direct transport of prehospital STEMI patients for primary PCI when compared with transportation to the closest hospital (Brooks, et al 2009). The researchers identified the need that further research is needed to determine optimal prehospital strategy for STEMI patients (Brooks, et al 2009).

A prospective multi-center registry study was conducted by Zhang, Hu, Sun, and Yang (2008) to determine time delays, management strategies and in-hospital outcomes

as well as the adherence to current guidelines in consecutive patients with STEMI in metropolitan Beijing, China. A convenience sample of 803 patients admitted to CCU at 19 hospitals in Beijing, China was used in the study. The researchers found that there was a higher rate of reperfusion therapy, good adherence to medical therapy and prolonged time delay to reperfusion in patients with STEMI in Beijing (Zhang, et al 2008). The researchers identified the high use of evidence-based drugs, such as aspirin, low molecular weight heparin (LMWH), clopidogrel, and statin, during hospital stay (Zhang, et al 2008). The researchers found that there remains important potential for improvement in the administration of reperfusion therapy (Zhang, et al 2008).

A Meta analysis was conducted by Lee, et al (2008) to implement a Clinical Practice Improvement Project (CPIP) to improve door to balloon time on primary percutaneous coronary intervention in Singapore by simple and inexpensive operational measures. A convenience sample of 285 non-transfer patients who underwent primary PCI was used in the study. The researchers found that the overall door to balloon time for the entire twelve-month period was 72 minutes (Lee, et al 2008). The researchers identified that by implementing this CPIP, improved health care delivery can be achieved by changing simple and inexpensive operational processes (Lee, et al 2008).

A retrospective cohort analysis of a population-based cohort of acute myocardial infarction patients admitted to 102 acute care hospitals in Ontario, Canada, from July 2000 to March 2001 was conducted by Atzema, et al (2009). The main outcome measures were the rate of low-acuity triage among acute MI (myocardial infarction) patients and its association with delays in time from arrival to ED to initial ECG and to administration of fibrinolysis. The results showed that low-acuity triage was

independently associated with a 4.4-minute delay in median door-to-ECG time and a 15.1-minute delay in median door-to-needle time. In summary, half of the patients were given a low-acuity triage score when presenting to the ED and this was associated with substantial delays in ECG acquisition and to reperfusion time (Atzema, et al, 2009).

A retrospective cohort of 14,821 patients with STEMI transferred to 298 STEMI receiving centers for PCI in the ACTION Get With the Guidelines between January 2007 and March 2010 was conducted by Wang, et al, 2011. The context of the study was patients with STEMI requiring inter-hospital transfer for PCI often have prolonged overall door-to-balloon (DTB) times from first hospital presentation to second hospital PCI. Door–in to Door-out (DIDO) time, defined as the duration of time from arrival to discharge at the first or STEMI referral hospital, is a new clinical performance measure, and a DIDO time of 30 minutes or less is recommended to expedite reperfusion care. The objective was to characterize time to reperfusion and patient outcomes associated with DIDO time of 30 minutes or less (Wang, 2011). In conclusion, the study showed that a DIDO time of 30 minutes or less was observed in only a small portion of patients transferred for primary PCI but was associated with shorter reperfusion delays and lower in-hospital mortality (Wang, et al, 2011).

A quality improvement study that examined the change in speed and rate of coronary reperfusion after system implementation in 5 regions in North Carolina involving 65 hospitals and associated emergency medical systems (10 PCI hospitals and 55 non-PCI hospitals). The objective was to establish a statewide system for reperfusion, as exists for trauma care to overcome systemic barriers (Jollis, et al, 2007). Interventions were early diagnosis and the most expedient coronary reperfusion method at each point

of care: emergency medical systems, emergency department, catheterization laboratory, and transfer. Within 5 regions, PCI hospitals agreed to provide single-call catheterization laboratory activation by emergency medical personnel, accept patients regardless of bed availability, and improve STEMI care for the entire region regardless of hospital affiliation. In summary, a statewide program focused on regional systems for reperfusion for STEMI can significantly improve quality of care. Further research is needed to ensure that programs result in improved application of reperfusion treatments will lead to reductions in mortality and morbidity from STEMI (Jollis, et al, 2007).

A prospective observational study enrolled all patients diagnosed with STEMI by paramedics in a mid-sized regional EMS system. The objective was to quantify the potential reduction in time to PCI by early hospital activation of the cardiac catheterization laboratory in STEMI (Lee, et al, 2010). The results of the study showed that important reductions in time to reperfusion seem possible by activation of the catheterization laboratory by EMS from the scene. This type of clinical research can inform multidisciplinary policies that bring about meaningful clinical practice changes (Lee, et al, 2010).

A prospective study that evaluated the first year implementation of a regional STEMI receiving center (SRC) network to determine the key intervals for patients identified with STEMI in the prehospital setting. The objective was to determine the performance of a regional system with prehospital 12-lead ECG identification of STEMI patients and direct paramedic transport to STEMI Receiving Center's (SRC) for provision of PCI (Eckstein, et al, 2009). In conclusion, the DTB times within the 90-minute benchmark were achieved for almost 90% of STEMI patients

transported by paramedics after implementing our regionalized SRC system (Eckstein, et al, 2009).

Summary

The review of the literature showed that there is a multitude of information relating to STEMI and PCI. The studies revealed that PCI could be obtainable for STEMI patients when they are taken directly to a PCI either center by EMS or transferred from a STEMI referral center. EMS systems can improve STEMI care by directly contacting the PCI center and taking the patient straight there. Quality improvement projects have helped to decrease Door to Needle (DTN) times and show that PCI is the best outcome for STEMI patients. The researched revealed that in some cases the national standards are being met but that there is definitely room for improvement for all areas.

Chapter 3

Methodology

Setting and Sample

The setting for the study was a rural Emergency Department in Western North Carolina. The sample included STEMI patients from the rural hospital (140 beds) that were transferred to two large regional teaching facilities approximately forty-five minutes away. One of the regional facilities operates 921 beds and the other operates 1004 beds. Each of the facilities operates a primary PCI lab and accepts STEMI patients regardless of bed status.

Study Type

A retrospective design was used. The researcher examined data that was collected and put into a database at the two large teaching facilities. The two large teaching facilities combined the data from the rural hospital into one data set. This data set was in the form of an Excel spreadsheet.

Ethical Considerations

Prior to conducting the study, the researcher obtained permission from the Internal Review Board (IRB) for Gardner-Webb University as well as from the two participating regional facilities receiving the STEMI patient from the rural facility. Consent was not necessary since no Personal Health Information was contained in the data that was entered into the data set. The initial convenience sample was to include data over a period of six months from the RACE coordinators at the two regional facilities. However, data made available to the researcher was over a two-year period from January 2010 to December 2011. Permission was granted to the researcher to

include the two years of data. No identifying information relating to demographics of the patient were obtained.

Data Collection and Sampling

A convenience sample of data for STEMI patients for two years was included in the sample size. Inclusion criteria were STEMI patients who received ECG's, fibrinolytics and PCI. Patients excluded from the study underwent Coronary Artery Bypass Graft (CABG) and received fibrinolytics with rescue PCI some time afterwards.

Data was gathered from an Excel spreadsheet that was provided to the researcher by the RACE coordinators from the two regional facilities. Data was uploaded into an Excel spreadsheet. The 0 value in the data for ECG times (see Appendix A) means that the ECG was obtained when the patient was registering in the ED and the time of the ECG was the same as the registration time; therefore, you had a time of 0 minutes. . Data was uploaded into SPSS using the ECG times and PCI times with the one sample t-test being utilized to compare the means.

Data Analysis Procedures

Statistical analysis utilized for the research was the one-sample *t* test. The one-sample *t* test was utilized to compare the means for ECG and FMC to PCI times to the national standards.

Chapter 4

Results

Demographic data was not made available to the researcher, as the data had been de-identified prior to it being made available to the researcher. Statistics using Excel was performed on the data gathered by the researcher. Data consisted of twenty-five patients who had STEMI's and were transferred for PCI to one of the two regional hospitals. Twenty- five ECG times were available for data abstraction and sixteen times were available for FMC to PCI. Patients were excluded who received Lytics with rescue PCI and CABG as this information was not available. Descriptive statistics revealed a mean for ECGs was 5.52 and the mean for FMC to PCI was 114.9. Table 1 shows the national standards for which the sample means were compared. There were 21 instances where ECG time is under time and 2 instances where PCI is under time.

Table 1. ***STEMI Data***

	EKG	FMC to PCI
National Standard	< 10 minutes	< 90 minutes
	EKG (n=25)	FMC to PCI (n=16)
Max	30	192
Min	0*	80
Mean	5.52	114.9
Number under required time	21	2
Percentage under/on Time	84	12
Percentage over Time	16	88

* The zero value in the data for ECG times means that the ECG was obtained when the patient was registering in the ED and the time of the ECG was the same as the registration time; therefore, a time of 0 minutes occurred.

The one-sample *t* test was used to compare the mean score of the sample to the national standard values for ECG times and FMC to PCI times.

Statistical Presentation

The one sample *t* test for hypothesis 1 revealed a significant difference in length of time between FMC and ECG between the sample and the national standard, $t(24) = -3.50$, $p=.002$. The length of time between arrival and ECG for the sample ($M= 5.52$, $SD =6.39$) was significantly shorter than the national standard of 10 minutes or less.

The one-sample *t* test for Hypothesis 2 did not support the difference in length of time between FMC and PCI, although significantly different, $t(15) = 3.98$, $p=.001$, the sample mean length of time ($M = 115.37$, $SD=25.468$) was significantly longer than the national standard (of 90 minutes or less).

Table 2 shows the results of the one-sample *t* test. These results show that the mean for the ECG times were significantly less than the national standard of less than 10 minutes and that the mean for the FMC to PCI were significantly longer than the national standard of less than 90 minutes.

Table 2. ***One-sample t test results***

	Sample	Sample	National Standard
	M	SD	M
FMC to ECG (n=25)	5.52	6.39	10
FMC to PCI (n=16)	115.37	25.468	90

Chapter 5

Discussion

Interpretation of the Findings

According to the original research question, the data revealed that some of the areas were being met while others could use improvement. ECG times are being met consistently with few times over the limit. ECG times are being met eighty-four percent of the time. FMC to PCI times are not being met. Consistently, the numbers revealed that times were greater than 90 minutes. Eight-eight percent of the time, FMC to PCI is over the recommended time frame. No information was available on Lytic administration, so that part of the research question was left unanswered. The Null hypotheses for both ECG times and FMC to PCI times revealed that there was a significant difference between the sample mean and the population mean. Hypothesis 1 revealed that the times were shorter for ECG times and Hypothesis 2 revealed that the FMC to PCI times were longer.

The conceptual framework for the study was that of Ida Jean Orlando's Nursing Process Theory. The researcher found that the study showed that the conceptual framework supported the theory. The nurses involved in the patient care in the Emergency Departments (ED) called in others to help the patients meet a need that they could not meet on their own.

Implications for Nursing Practice

The findings of the study showed that there are always areas for improvement. Triage and registration processes can be changed. Communication between the areas can be improved. Communication with Emergency Medical Systems (EMS) can be improved for better transport times. Unfortunately, what happened after the patient

transfer to another facility is out of the control of the ED. It is unknown what happened on the other end of the transfer, so some of the time delays may have occurred there.

Limitations of the Study

Limitations of the study included that there were no times available for Lytic administration so that part of the research question could not be addressed. A small sample size may have adversely affected the findings of the study.

Recommendations for future research

The researcher felt that the study could have been improved by including more than one ED and having the study include a larger time frame. In the future, recommendations would be made to have a larger sample size; to include more EDs that transfer patients for PCI, and to include Lytic times.

Importance of the findings for nursing

The findings are important for nursing in that it allows health care professionals to identify areas of improvement of care for the STEMI patient that includes nursing. The ultimate goal of nursing is to insure that patients have optimal care based on evidence of standards of care. The study also showed that nurses may use nursing theory (Orlando's theory) based care of patients as reflected in the work that nurses do every day, whether it is consciously thought about or not.

References

Ahmar, W., Quarin, T., Ajani, A., Kennedy, M. and Grigg, L. (2008). *Improvement in door-to-balloon times in management of acute ST-segment elevation myocardial infarction STEMI through the initiation of 'Code AMI'.* Internal Medicine Journal; *38*, 714-718.

Antman, EM, et al. ACC/AHA 2004 Guidelines for the management of patients with ST-elevation myocardial infarction: A report of the ACC/AHA Task Force on Practice Guidelines.

Atzema, C.L., Austin, P.C., Tu, J.V., and Schull, M. J. (2009). Emergency *Department Triage of Acute Myocardial Infarction Patients and the Effect on Outcomes.* Annals of Emergency Medicine; *53*(6), 736-745.

Borzak, S., and Cantor, WJ. (2009). *Early transfer for angiography after fibrinolysis reduced ischemic events in patients with STEMI.* ACP Journal Club, 10568751, Vol. 151, Issue 5

Brooks, S., Allan, K., Welsford, M., Verbeek, P., Arntz, H., and Morrison, L. (2009). *Prehospital triage and direct transport of patients with ST-elevation myocardial infarction to primary percutaneous coronary intervention centres: a systematic review and meta-analysis.* Canadian Journal of Emergency Medicine; *11*(5): 481-492.

Burns, N. and Groves, S. (2009) The Practice of Nursing Research Appraisal, Synthesis, and Generation of Evidence. (6th ed). St. Louis, Mo. Saunders Elsevier.

Caudle, J., Piggott, Z., Dostaler, S., Graham, K., and Brison, R. (2009). *Impact of a rapid access protocol on decreasing door-to-balloon time in acute ST elevation myocardial infarction.* Canadian Journal of Emergency Medicine; *11*(1): 29-35.

Coronary Heart Disease. National Institutes of Health. Retrieved February 20, 2010 from http//:www.nih.gov/medlineplus/ency/article/007115.html

Coronary Heart Disease. National Heart Lung and Blood Institute. Retrieved April 28, 2010 from http://www.nhlbi.nih.gov/health/dci/Diseases/Cad/CAD_WhatIs.html

Eckstein, M., Koenig, W., Kaji, A., and Tadeo, R. (2009). *Implementation of Specialty Centers for Patients with ST-Segment Elevation Myocardial Infarction: The Los Angeles STEMI Receiving Center Project.* Prehospital Emergency Care; *13*(2): 215-222.

Field, Andy. (2005) Discovering Statistics Using SPSS. (2nd ed). Thousand Oaks, CA. Sage Publications Inc.

Forgoros, Richard N., STEMI-ST Segment Elevation Myocardial Infarction. Retrieved April 28, 2010 from http://heartdisease.about.com/heartattacks/g/STEMI.html

Jollis, J. G., Roettig, M. L., Aluko, A. O., Anstrom, K, J., Applegate, R. J., Babb, J. D., Berger, P.B., Bohle, D.J., Fletcher, S. M., Garvey, J. L., Hathaway, W. R., Hoeskstra, J. W., Kelly, R. V., Maddox Jr., W. T., Shiber, J. R., Valeri, F. S., Watling, B. A., Wilson, B. H., and Granger, C. B. (2007). Implementation *of a Statewide System for Coronary Reperfusion for ST-Segment Elevation Myocardial Infarction.* JAMA; *298* (20): 2371-2380.

Lee, C., Ooi, S., Tay, E., Low, A., Teo, S., Lau, C., Tai, B., Lim, I., Lam, S., Lim, Ing-Ham, Chai, P., and Tan, H. (2008). *Shortening of Median Door-to-Balloon Time in Primary Percutaneous Coronary Intervention in Singapore by Simple and Inexpensive Operational Measures:* Clinical Practice Improvement Program. Journal of Interventional Cardiology; *21*(5):414-423.

Lee, C. H., Van Gelder, C.M, and Cone, D.C. (2010) Early *Cardiac Catheterization Laboratory Activation by Paramedics for Patients with ST-Segment Elevation Myocardial Infarction on Prehospital 12-Lead Electrocardiogram.* Prehospital Emergency Care; *14* (2): 153-158.

Orlando, I. J. (1961). *The dynamic nurse-patient relationship.* New York: G. P. Putnam's Sons.

Schull, M., Vaillancourt, S., Donovan, L., Boothroyd, L., Andrusiek, D., Trickett, J., Sookram, S., Travers, A., Vermeulen, M., and Tu, J. (2009). *Underuse of prehospital strategies to reduce time to reperfusion for ST-elevation myocardial infarction patients in 5 Canadian Provinces.* Canadian Journal of Emergency Medicine; *11*(5): 473-480.

Tomey, A. & Alligood, M. (2006). Kristen M. Swanson. Theory of Caring. *Nursing theorists and their work,* 762-773. St. Louis, MO: Mosby Elsevier.

Vlahaki, D., Fiaani, M., and Milne, W. (2008). *A door-to-needle time of 30 minutes or less for myocardial infarction thrombolysis is possible in rural emergency departments.* Canadian Journal of Emergency Medicine; *10*(5): 429-433.

Wang, T. Y., Nallamothu, B. K., Krumholz, H. M., Li, S., Roe, M. T., Jollis, J. G., Jacobs, A. K., Holmes, D. R., Peterson, E. D., and Ting, H. H. (2011).

Association *of Door-In to Door-Out Time with Reperfusion Delays and Outcomes Among Patients Transferred for Primary Percutaneous Coronary Intervention.* JAMA; *305* (24): 2540-2547.

Zhang, S., Hu, D., Sun, Y., and Yang, J. (2008). *Current management of patients with ST elevation myocardial infarction in Metropolitan Beijing, China.* Clinical Investigative Medicine; *31*(4): 189-197.

Appendix A: ED Data Sheet

ED Data			
ID	EKG Time	FMC to PCI	Remarks
1	0*	110	
2	9	129	
3	2	192	
4	13		CABG
5	11	118	
6	4	116	
7	5	112	
8	3		Lytics - 380
9	9		Lytics - 315
10	11		Exclude - 213
11	6	106	
12	6	119	
13	0	106	
14	3		Exclude - 157
15	0		CABG
16	6	83	
17	30		CABG
18	7		CABG
19	2	92	
20	0	122	
21	4	110	
22	0	113	
23	5	107	
24	2	138	
25	0	80	

Mean	5.52	114.88	Average
Max	30.00	192.00	Max number
Min	0.00	80.00	Min number
Number under req time	21	2	used.
Percentage on time	84	12	
Percentage over time	16	88	

* The zero value in the data for ECG times in Appendix A means that the ECG was obtained when the patient was registering in the ED and the time of the ECG was the same as the Registration time; therefore, a time of 0 minutes occurred.