Signs and Symptoms of Women with

Acute Coronary Syndrome

Bonni Cohen

Medical College of Ohio

2005
DEDICATION

This thesis is dedicated to my family who provided me with love, encouragement and support during this long process of pursuing my MSN.

To my husband, Joel, you are my best friend. I could not have done this without your love, support, and encouragement. Thank you for always being there for me. To my children, Aaron, Melissa and Madelyn, thank you for your patience and understanding during this process.
ACKNOWLEDGEMENT

I would like to acknowledge Jane Evans, Ph.D., R.N. for all her efforts as my committee chair. Her editorial skills, guidance and support brought this thesis to its completion. She always had an encouraging word, and believed that I could make this a reality.

I would like to extend my sincere appreciation to my other committee members, Sue Idzcak, Ph.D., R.N. and Debra Buchman Ph.D., R.N. Sue has been a guiding force in my pursuit of my MSN degree. When I became discouraged, she reminded me of my progress and goals. She has taught me more than she will ever know. I thank her for her words of wisdom, her infectious smile and reassuring hugs. To Deb, thank you for your statistical expertise and input into my thesis preparation. Your guidance is immeasurable.

I finally would like to thank my husband and family for allowing my dream to become a reality. This venture was a family enterprise and we survived another one. Joel, your love, support, encouragement and mentorship has been invaluable throughout our lives together, especially during the last 2 years.
Table of Contents

Dedication……………………………………………………………….………….ii
Acknowledgement………………………………………………………………….iii
Table of Contents…………………………………………………………………..iv
List of Tables…………………………………………………………………………vi
Chapter I  Introduction……………………………………………………………1
  Statement of the problem………………………………………………………1
  Theoretical framework…………………………………………………………3
  Statement of the purpose………………………………………………….……3
  Research Questions…………………………………………………………..4
  Definition of terms……………………………………………………………4
  Significance………………………………………………………………….6
  Assumptions………………………………………………………………….6
  Limitations………………………………………………………………….7
  Summary…………………………………………………………………….7
Chapter II Literature Review………………………………………………………...8
  Theoretical framework……………………………………………………….8
  Review of research…………………………………………………………..10
  Summary……………………………………………………………………14
LIST OF TABLES

TABLE 1-Frequency of Signs and Symptoms of Women..........................21
TABLE 2-Frequency of Risk Factors..................................................23
TABLE 3-Triage Time to First Diagnostic Test......................................24
TABLE 4-Pairwise Comparison of Time by Presenting Group....................26
TABLE 5-Triage Time to First Cardiac Medication.................................27
TABLE 6-Pairwise Comparison of Time to Cardiac medication...................28
TABLE 7-LOS for Women with ACS...................................................29
TABLE 8-Frequency of Admitting Diagnosis........................................30
CHAPTER I
Introduction

Coronary artery disease (CAD) is the most frequent cause of death among women in the United States (American Heart Association, 1998). It is well documented that women undergo intensive evaluation and treatment for cardiac disease less frequently than men who present with the known familiar global symptoms. This study examined what differences exist in presentation of females with Acute Coronary Syndrome (ACS). Acute coronary syndrome is an umbrella term that covers any group of clinical symptoms with myocardial ischemia, including unstable angina and ST-segment elevation or depression. This study investigated the frequency at which signs and symptoms of women with ACS are diagnosed and treated. Advanced Practice Nurses (APNs) are in a position to assess, diagnose and gain treatment for these women. Nurse practitioners play a vital role in assisting in health promotion and disease prevention for women with ACS. Ultimately, when women are knowledgeable about the signs and symptoms of acute coronary syndrome, more appropriate and aggressive treatment will lead to a better, more positive outcome than when women are not knowledgeable of the signs and symptoms of ACS.

Statement of the Problem

Acute coronary syndrome is a continuum of disease involving unstable and/or ruptured plaque that encompasses angina, non-ST segment elevation, and ST-segment elevation in myocardial infarction (MI) (Califf, 2003). It is important to realize that men
and women present with differing symptoms of ACS. Patients who present with clinical symptoms such as nausea, substernal chest pain with radiation to the jaw and neck, and diaphoresis are grouped into a category now known as ACS. Unfortunately, patients do not always present with these classic symptoms. Goldberg et al. (1998), notes that women present more frequently with non-chest pain symptoms, such as fatigue, dyspnea, jaw and neck pain.

The Advanced Practice Nurse has a more difficult decision choosing the appropriate diagnostic test for a woman due to the lack of concise diagnostic indicators. Deaton, Kunik, Hachamovitch, Redberg and Shaw (2001) showed early, rapid treatment of chest pain is equally effective in both men and women with a decrease in mortality. Therefore, early and prompt diagnosis is critical. Fuster (1999) demonstrated women have an overall lower incidence of coronary artery disease before menopause, but cardiovascular disease is still the leading cause of death for women. In 1995, 50,000 more women died of heart disease than men even though the treatment appears equally effective (Fuster, 1999). In the last couple of years, women with ischemic heart disease have received different treatment than men (Davis, Chaitman, Ryan, Bittnes & Kennedy, 1995). A number of researchers have implied that women are less likely to have appropriate diagnostic evaluation and referral for treatment (Davis, 1995). Therefore, there is a need for the timely recognition of signs and symptoms in women and for early intervention to diagnosis and treatment in ACS. Nurse Practitioners, other healthcare practitioners and the public need to be educated as to the sign and symptoms of ACS in women.
Statement of Purpose

The purpose of this study is to examine a set of diagnostic indicators which may help identify the signs and symptoms women experience with ACS. The outcome of this study may contribute to the creation of a higher index of suspicion among healthcare providers in the early diagnosing of ACS in women. Through education, these changes will ultimately lead to a change in the number of women dying from heart disease each year.

Conceptual Framework

Nursing agency is a conceptual element of Orem’s (1995) Self-Care Deficit Theory of Nursing. It expresses the broad purpose of nursing: to compensate for or overcome known or emerging health-derived or health-associated limitations of legitimate patients for self-care. Nursing systems attribute to nurses the power of nursing agency. Nursing agency produces action sequences toward accomplishment of nursing purposes that are contributory to the life, health and well being of the patient. Nursing agency is understood as a power developed by maturing or mature persons through specialized education, training and mastery of cognitive and practical operations of nursing practice, clinical experiences in nursing practice, and situations under the Nursing agency. Nursing agency is understood as a set of developed and developing capabilities that nurses exercise in provision of nursing to individuals or groups. Nursing agency is developed and exercised for the benefit of others. Nursing agency encompasses capabilities that are specific to the social and interpersonal, as well as the professional-technologic features of nursing practice situations.
Orem’s concept of nursing agency serves as a framework for understanding how the profession of nursing recognizes and manages the signs and symptoms of acute coronary syndrome.

Research Questions

The research questions for this study were created from the literature review and the researcher’s nursing practice. The questions are:

1. What are the signs and symptoms of women ultimately diagnosed with acute coronary syndrome?

2. Is there a difference in the time to initial cardiac diagnostic testing in women who present with chest pain symptoms or non-chest pain symptoms?

3. Is there a difference in the time to receiving the first cardiac medication in women who present with chest pain and those who present with non-chest pain symptoms?

Definition of Terms

Each variable is defined using a conceptual definition to describe the variable and an operational definition to explain how the variable will be observed and measured in this study. The definition of terms in this study include:

Signs and Symptoms

Conceptual definition: the initial stage of a disease, the interval between the earliest signs and the appearance of the disease (Taber’s, Medical Encyclopedia, 1995).
Operational definition: The subjective or objective signs and symptoms that the patient presented to the emergency department as documented in the medical record. These symptoms may include but are not limited to fatigue, dyspnea, neck or jaw pain, chest pain, arm pain or nausea.

**Acute Coronary Syndrome**

Conceptual definition: The disruption of a vulnerable or high risk plaque secondary to a series of ischemic events resulting in a reduction of flow through the effected coronary artery leading to ST elevation MI, non-ST elevation MI and angina.

Operational definition: The 12-lead Electrocardiogram (ECG) and cardiac biomarkers that are used to categorize patients into three broad cohorts: those presenting with ST-segment elevation or ST-segment depression greater than 1mm in two leads and/or elevation of Tropinin I (greater than 0.04) (ACC/AHA Practice Guidelines, 2004). Additionally, a confirmed diagnosis of ACS documented on their medical record by the International Classification of Diagnosis (ICD) codes (Appendix A).

**Diagnostic Tests**

Conceptual definition: “a method of examination to determine the presence or absence of a definite disease” (Stedman’s Medical Dictionary, 1982, p. 490). Serves as a screening mechanism for the healthcare professional and the patient.

Operational definition: For this study, a cardiac diagnostic test was defined as an electrocardiogram (ECG). An electrocardiogram is used to detect myocardial ischemia/infarction, arrhythmias, and chamber enlargement. The 12-lead ECG can support the overall clinical impression of underlying coronary artery disease.
Cardiac Medication

Conceptual Definition: Agents that increase contractility, enhance cardiac performance, and help with myocardial oxygen demand.

Operational Definition: For this study, cardiac medications included aspirin, beta-blockers, nitroglycerin IV/SL and heparin or Lovenox.

Significance

Coronary artery disease is the leading cause of death in women (Berra, 2000). Many women never address the signs and symptoms of heart disease, which may be atypical; therefore, they do not seek care and treatment within a timely manner. Women need the knowledge to become aware of the signs and symptoms of ACS so that they seek treatment. In addition, advanced practice nurses must be educated to the signs and symptoms particular to women with ACS. Through education of signs and symptoms of ACS, women will receive the diagnosis and treatment that they need and deserve. The scope of practice for APNs includes assessing, managing, or referring women at risk or who have developed symptoms of ACS. Having the knowledge to promptly diagnosis and ensure quick and thorough evaluation of ACS in women is important to provide optimal health.

Assessing women for symptoms of ACS would reduce the morbidity and mortality associated with delayed diagnosis. Women who present with non-classic/atypical symptoms have a worse prognosis compared with men who present with
typical symptoms (Goldberg et al. 1998). Practitioners who are aware of the signs and symptoms of ACS in women will provide a better prognosis.

Assumptions

The assumption of this study is that the group studied is representative of a larger population. It is also assumed that information gathered from the medical record review is accurate and complete and that patients conveyed accurately their signs and symptoms to their healthcare practitioners. It is also assumed that according to Orem’s SCD theory, APN’s are in a position to help clients during evaluation, admission and discharge from a healthcare facility. Nurses help facilitate appropriate services needed for patient care, thereby helping the patient increase their own ability to care for themselves.

Limitations

Within a retrospective chart review a number of limitations exist when examining the signs and symptoms, diagnostic tests and outcomes of the patients. These include the geographical area that the patient population discharged with a diagnosis of ACS is located. The study is limited to the women who were discharged within the months of September 2003 thru September 2004. Additionally, the study is limited by the consistency in assessment, intervention and documentation by the healthcare practitioners involved in the care of these women.

Summary

This study seeks to examine the signs and symptoms that identify women with acute coronary syndrome. Lack of gender specific research is a contributing factor to the high morbidity and mortality of women with ACS. The scope of the APN includes assessing, managing, referring and educating women who present with ACS. By
intervening earlier, healthcare professionals can promote a change in lifestyle and decrease the threat of death associated with ACS.
Chapter II

Literature

Introduction

The purpose of this study was to define the signs and symptoms of women who have developed ACS. The ability to determine the difference in the signs and symptoms of women who present with complaints of ACS will allow APNs to diagnosis, treat and modify outcomes. In this chapter, Orem’s self care theory was discussed in relation to women with or at-risk of developing ACS. In addition, the literature review focused on previous research studies relevant to this study and the results obtained from those studies.

Theoretical Framework

Orem’s Self Care Deficit Theory of Nursing (SCDTN) assumes that people maintain life, health, and well being through intentional learned self care actions (Orem, 1995). The main idea of the SCDTN is that people live day to day within a community where they perform actions to meet their known self-care requisites (Orem, 1995). These actions are designed to meet the individual’s needs, known as requisites. The requisites are the factors that promote or adversely affect the regulation of the individual’s functioning or development in relation to life, health and well-being.

There are three types of self-care requisites: Universal, Health deviation and Developmental. Universal requisites are common to all human beings during their lifetime. They are associated with maintenance and functioning of the human body.
Health deviations are associated with genetic and constitutional defects and human structural and functional deviations with their effects and the medical diagnosis and treatment measures. Meeting the health deviation requisite promotes control of pathology in its early stages and in the prevention of disability in later stages. Every adult should be aware of his or her personal universal requisites. As with the ACS patient, the individual must first have knowledge of the risk factors, then signs and symptoms to be effectively diagnosed and treated. It is the patient’s responsibility to meet these self-care requisites (Orem 1995). These can be met by awareness of the basic conditioning factors (BCF), such as patterns of living, health state of women, socio-cultural factors. Additionally, the universal self-care requirements (USCR), such as lifestyle, nutritional status and stress management must be addressed to reduce risk of ACS.

Women with, or at risk of developing ACS are in need of assistance from the nurse agent in order to meet SCDs. The nurse agent is the person who will assist the patient in learning how to reduce the risk factors and gain knowledge regarding the disease process. The nurse agent is the person who is educated and trained to assist the person to meet their self-care demands (Orem, 1995).

Nurses need reliable assessment tools and techniques to provide structure for data collection and to be able to make sound nursing diagnoses. Through Orem’s framework, specifically nursing agency, nurses are guided to assess, manage and treat patients. Nursing operation helps the nurse master reliable techniques and make sound judgments. Through increased awareness of the signs and symptoms of ACS, nurses can begin to manage and treat women and improve the health of the self-care agent.
In summary, Orem’s SCVTN provides a framework for nurses and other healthcare professionals to use and develop a strategy of health promotion and disease prevention for women who are at risk of ACS. Through nursing systems theory, specifically nursing agency, nurses can be guided to master reliable and valid techniques of nursing diagnosis and treatment, thereby reducing the morbidity and mortality associated with ACS.

**Literature Review**

Cardiovascular disease is the leading cause of death for American women as reported by the American Heart Association in 1998. Statistics show that 44% of women will die in the first year after an acute myocardial infarction (AHA, 1998). In a 1999 national survey, only 7% of women recognized heart disease as their greatest risk of death (Berra, 2000). This review of the literature will examine symptoms of woman in relation to ACS. Additionally, the review will investigate the differences in typical symptom presentation and atypical symptom presentation, diagnosis and treatment strategies of woman presenting with ACS and/or acute myocardial infarction (AMI).

Until recently, the differences that exist between men and women who present with symptoms of an AMI had not been explored. Men and woman both share risk factors, but women may develop their symptoms later than men, probably secondary to protection from estrogen (Goldberg et al., 1998). Since women do not regard heart disease as a primary threat, it is possible that women are not attuned to the signs and symptoms of an impending cardiac event. If women are experiencing warning symptoms that are unrecognized, they are at increased risk of suffering an unrecognized cardiac insult.
A number of differences in presentation of men and women with ACS have been investigated. Some of the differences researched have included age of onset, type of presentation, as well as racial and ethnic differences. Although studies have been completed examining the presenting symptoms of men and women, few studies have looked specifically at symptoms women develop when presenting with ACS (Jaarsma 2002; McSweeney, Cody & Crane 2001; Deaton, Kunik, Hachamovitch, Redberg & Shaw 2001; Berra 2000; Goldberg et al. 1998).

**Symptoms**

Early studies of anginal pain as a precursor symptom of AMI focused almost exclusively on the male population (Bergelson & Tommaso 1995). These early studies explored symptom manifestations. These symptoms included chest pain, jaw pain, numbness and tingling in the left arm and the classic Levine sign, clench fist to the chest (Wilson, 1991).

There is a growing realization of the need to collect data on symptoms of heart disease in women. With the realization that heart disease is the number one killer of women, newer studies have started to include larger numbers of women. This growing body of research shows evidence that woman experience a completely different set of symptoms than men with regard to ACS. Goldberg et al. (1998), in a community based study of 810 men and 550 women hospitalized with AMI, found woman were more likely to experience back pain, jaw pain, nausea, fatigue and shortness of breath. These researchers further demonstrated that women are more likely to experience either an anterior or non-ST elevation myocardial infarction (NSTEMI). Goldberg et al. (1998)
states that women with coronary disease were significantly older at the time of their AMI and more likely to have angina, diabetes and hypertension. These co-morbid diseases can alter the pain sensation making diagnosis more difficult. Additionally, women and their healthcare providers typically ignore the signs and symptoms because they are different then the classic symptoms men experience with an AMI. McSweeney et al. (2001) conducted qualitative interviews with woman who had experienced an AMI. The study focused on acute symptoms, but also noted the prodromal symptoms woman articulated prior to the acute episode. These prodromal symptoms included pain between shoulder blades or upper back discomfort, headaches and fatigue. Oka, Fortmann and Varady (1996) found even when women have these symptoms, they delay seeking treatment because the symptoms differ from the well-publicized symptoms experienced by males. When women seek treatment and describe their symptoms, they are often misdiagnosed and treated incorrectly from standardized AMI protocols (Kim, Schaaf, Maynard & Every 2001; Harrold, Estaban, et al. 2003; Natarajan, Liao, Guichan, Lipsitz & McGee 2003).

Recently, studies have been conducted looking at the prodromal symptoms of women who have been diagnosed with AMI. In a study of exploratory interviews with 76 women, McSweeney et al. (2001) found that woman did not recognize the importance of their symptoms. Frequent among these symptoms was tiredness and fatigue (59%) followed by shortness of breath (59%) and then pain/discomfort in the center high in the chest (45%). McSweeney’s research found that 43% of women who have ACS report that chest pain was not a presenting symptom. Goldberg et al. (1998) noted that gender bias is
still strong and that women are treated less promptly and aggressively than men. When women seek treatment it appears that the varied presentations can hamper the diagnosis of ACS, which can delay the use of diagnostic or interventional management (Deaton et al. 2001).

In contrast to the above studies Harrold, Estaban et al. (2003), looked at 2,461 women and 3,454 men hospitalized with AMI during a 12-year period between 1975-1997. The patients were divided into four different age specific groups and then studied (less than 55 years, 55-64 years, 65-74 years, 75 years of age or greater). A multivariate regression analysis indicated that women were significantly less likely to receive aspirin and angiotension converting enzyme inhibitors (ACEI) as compared to men, however, there was no significant gender difference in the use of other cardiac medications. This study further noted that advanced age of both sexes reduced the likelihood of cardiac therapies including aspirin, thrombolytics and lipid-lowering therapy. Vaccarino, Parsons, Every, Barron, and Krumholz (1999) found a discrepancy in cardiac medication usage upon presentation of men and women, especially younger women. Vaccarino et al. looked at medical management in the first 24 hours and found, thrombolytic therapy in males (22.5%), females (16.2%), reperfusion strategies, male (11.5%) female (7.4%), aspirin, male (78.6%), female (71.8%), oral beta blockers, male (35.8%), female (31.7%) and ACEI, male (16.9%), female (20.3%). Harrold, Lessard et al. (2003) concluded that any gender differences of treatment for AMI for the most part no longer exists. The goal of healthcare providers should be to identify women at highest risk of developing CAD and educate them to decrease risks of a cardiac event.
**Diagnosis and Treatment Modalities**

In 1995, approximately 50,000 more women than men died due to cardiovascular disease. (AHA 1998). Numerous authors suggest, that when appropriate treatment is obtained, women and men fair equally well and have a reduced risk of major cardiac events (McSweeney et al. 2003; Goldberg et al. 1998). Typical angina is defined as chest pain that occurs with exertion and is relieved with nitroglycerin. This pain is described as substernal chest pain, radiating down the left arm, lasting greater than 15 minutes (Deaton et al. 2001). Atypical pain chest pain may be anything from nausea, shortness of breath or fatigue. Even though these categories have been set up to categorize patients, clinicians should note that women present with nonconforming symptoms and may need further evaluation. Deaton et al. suggests studies are problematic that use noninvasive testing to diagnosis cardiovascular disease in women. Initially, study criteria included those patients who presented with typical anginal symptoms. As noted earlier women usually present with atypical symptoms. According to Deaton et al., women in particular are older at time of referral for exercise electrocardiography/stress-testing. Parameters set for the stress test have typically been unattainable for women. For example, women usually have been unable to sustain increased exercise tolerance and statistically last 2 minutes less on the treadmill then men (Harrold, Estaban et al. 2003). Present data suggest that clinicians typically refer women for pharmacological stress testing. A number of factors including menopause, hormone replacement therapy and the difference in the exercise ability of women could generate false positives for these tests (Deaton et al. 2001).
Further, it has been difficult to obtain enough women study participants to show a statistically significant gender difference for these studies, although increasing statistics of women participants are beginning to accumulate (Harrold, Estaban et al., 2003; Kim et al., 2001; & Goldberg et al., 1998). By applying this knowledge, clinicians will be better able to determine sensitivity and specificity of individual noninvasive testing and treatment for the management of women.

Summary

It remains of utmost importance to find the most effective way to recognize the signs and symptoms of women presenting with ACS. Multiple studies have been completed that examined differences in gender related to ACS, however, none have explored the signs and symptoms, time to diagnosis and treatment of women who present to the emergency department and are ultimately diagnosed with ACS. Improving the awareness of the signs and symptoms of ACS may lower the mortality and morbidity of women.

While there are not any conclusive gender specific symptoms, the public needs to be educated that different people present with different symptoms when having an ACS. Traditional chest pain may not be the presenting symptom, especially for women. Research must be done to determine what the presenting symptoms of ACS are in order to accomplish this goal. Women, need to be specifically educated that they are more likely to have jaw pain, nausea and shortness of breath when experiencing ACS.

The nurse needs to obtain a complete and thorough health history looking beyond the long-established signs and symptoms for a diagnosis of ACS in female patients. Until
a thorough assessment tool is formulated to identify women with ACS, diagnosis and treatment will continue to fall short in providing the best care for women.
CHAPTER III

Methodology

The purpose of this study was to determine the difference in the signs and symptoms of women who develop ACS. This chapter will provide a discussion of the target population; describe the research setting, data collection methods and the instruments used for data analysis.

Design

This study is a descriptive, nonexperimental design using retrospective data. To accomplish this study, data were gathered by using a retrospective database chart review for the period of time from September 2003 through September 2004. The descriptive design allowed for the variable findings to be interpreted and provided knowledge about the study population. The variables of interest included signs and symptoms of fatigue, diaphoresis, neck or jaw pain, nausea, shortness of breath (SOB) and changes in electrocardiogram. Additionally, diagnostic testing and/or interventions including cardiac enzymes, stress test and cardiac catheterization or percutaneous transluminal coronary angioplasty (PTCA) were included. The uses of IV heparin/Lovenox, nitroglycerin, aspirin, or other cardiac medications (Beta blockers, ACEI) were also included. Comorbid risk factors including, smoking, diet, diabetes, family history and hypertension were noted. Finally, the outcome of the hospitalization, the length of the stay and disposition at discharge, whether to home, nursing home, rehabilitation facility, home with family or relative or to an assisted living facility were obtained. Data on these
variables were gathered and statistical analyses were completed to determine the assessment and treatment of ACS.

**Subjects**

**Setting:**

This study was conducted at a large midwestern hospital, with a Level 1 emergency department and an open-heart program. Those patients who were seen in the emergency department and/or generated a diagnosis of ACS were included.

The target population included all women who meet the inclusion criteria and were over the age of 25 years. All subjects were seen at least once in the emergency department and/or admitted under (International Classification of Disease) ICD codes 410.0-410.9, 4.11 (Appendix A). Those patients admitted for surgery and who developed an AMI during surgery or in post-op recovery hospitalization were not included. Patients who were admitted and diagnosed with substance abuse were not included.

**Material**

The Medical Record Audit Tool for Gender Differences of CAD used in the Penque, et al. (1998) research was adapted and used with permission from the principal researcher. An expert panel of clinicians (experienced cardiac registered nurses and cardiologists) developed the tool in the Penque research. The Medical Record Audit Tool for Gender Differences of CAD has 81 questions, 6 different categories addressing demographics, presenting signs and symptoms, treatments and outcomes that were reported to the emergency room practitioner or nurse by the subjects. The revised
Medical Record Audit Tool for ACS also has a total of 81 questions with six categories. The tool was adapted to include only the answers from female subjects. The first category includes 10 fill-in-the-blank questions related to demographics. The second category includes 21 yes or no questions related to signs and symptoms of ACS. The third category has 16 questions related to risk factors of ACS. The fourth section asks a combination of fill in the blank and yes/no questions related to diagnostic tests. The fifth section asks nine yes/no and fill-in the blank questions regarding treatment, and the sixth section asks three questions regarding the outcomes of the diagnosis of ACS. The Medical Record Audit Tool for ACS can be found in Appendix B.

Data Collection

The study was presented to the appropriate Institutional Review Boards (IRB) for approval. The Medical Records Department retrieved the records using the inclusion criteria of 25 years or older, female, and a diagnosis of either AMI or ACS. The investigator examined the charts to obtain the necessary data from the medical records. To protect patient rights of privacy, the patient’s names were not recorded in the data collection process. To identify the records used, a code was assigned by the investigator.

Data Analysis

The data were analyzed using the SPSS computer program. The statistical analyses included a t-test and chi-square. The t-test was used to compare the differences in the continuous variables and their outcomes of ACS in the women. The chi-square examined whether the discrete variables; signs and symptoms, diagnostic testing, treatment and risk factors, were significantly different for the typical and atypical signs
and symptoms of women with ACS. Descriptive statistics were utilized to describe the demographic information of the subjects.

Summary

Once IRB approval was obtained, the data were gathered retrospectively from the medical records of those subjects that met the inclusion criteria for this study. The Medical Records Department gathered the records and the investigator excluded those that did not meet the criteria. All subject data remained confidential and only known by an assigned number per the investigator. Data analysis was conducted using a t-test and chi-square test in the SPSS computer program.
CHAPTER IV

Results

This chapter describes the sample and research results. While much has been written concerning gender differences of symptoms at presentation in the emergency department for patients with ACS, specific symptoms remain unknown. Many papers have shown differences in the typical presenting symptoms between men and women. The purpose of this research was to first determine what symptoms are present in female patients treated in an emergency department who subsequently left the hospital with a diagnosis of ACS. The second purpose was to determine whether there is a difference in the time to initial cardiac diagnostic test in women who present with typical (chest pain) and atypical symptoms (non-chest pain). The third purpose is to determine differences in the time to first cardiac medication between the chest pain group and the non-chest pain group. This data will help successfully diagnosis and manage the female patient with ACS.

Sample

The study cohort consisted of the charts of 136 females who presented consecutively at a large urban emergency department between the months of September 2003 to September 2004. All patients were discharged with a diagnosis of ACS. All subjects were female, 33-91 years of age with an average age of 70.01 (SD=15.21) years.
Findings

The signs and symptoms for patients discharged with a diagnosis of ACS are presented in Table 1.

Table 1

Frequency of Signs and Symptoms of Women Presenting with ACS

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Frequency (n)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain/discomfort</td>
<td>74</td>
<td>54.4</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>10</td>
<td>7.4</td>
</tr>
<tr>
<td>Nausea</td>
<td>9</td>
<td>6.6</td>
</tr>
<tr>
<td>Falls</td>
<td>8</td>
<td>5.9</td>
</tr>
<tr>
<td>Weakness</td>
<td>7</td>
<td>5.1</td>
</tr>
<tr>
<td>Unresponsiveness</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Syncope</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Dizziness</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Cough</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Diaphoresis</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Left arm pain</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Back pain</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Epigastric pain</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>1</td>
<td>0.7</td>
</tr>
</tbody>
</table>
Research Question One: What symptoms are present in female patients treated in an emergency department and who subsequently left the hospital with a diagnosis of ACS?

In this chart review of 136 women presenting consecutively at a major hospital and who were discharged with a diagnosis of ACS, 54.4% (n=74) presented with chest pain or chest discomfort. This proportion included patients who presented with chest pain alone as well as chest pain with other symptoms. Of the remaining patients, 45.6% (n=62) presented with a variety of symptoms, either as a single symptom or in combination, none of which included chest pain. Patients presenting without chest pain who were diagnosed with ACS at discharge, reported shortness of breath as the most frequent symptom (7.4%, n=10), followed by nausea (6.6%, n=9), falls (5.9%, n=8) and weakness (5.1%, n=8).

Chest pain was the most frequent symptom of women diagnosed at discharge with ACS. However, it is important to note that a significant number of patients, 45.6% presented with symptoms that did not include chest pain.

Patients discharged with a diagnosis of ACS also presented in the emergency department with a number of cardiovascular risk factors. The frequencies of risk factors for those women presenting with chest pain (typical) versus those without chest pain (atypical) are listed in Table 2.
### Table 2

**Frequency of Risk Factors Between Symptoms**

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Chest Pain Presentation</th>
<th>Non-Chest Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N)</td>
<td>(%)</td>
</tr>
<tr>
<td>No Risk Factors</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>One Risk Factor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Family history</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Smoking</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>Two Risk Factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTN/diabetes</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Smoking/fam. history</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Smoking/HTN</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>HTN/fam. history</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Smoking/diabetes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Three Risk Factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking/HTN/diabetes</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Smoking/HTN/fam. history</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Diabetes/HTN/fam. history</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Four Risk Factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking/HTN/diabetes/fam hx</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
A cardiovascular risk factor was defined as hypertension, diabetes mellitus, smoking or family history of coronary artery disease. Within the group of patients who presented with chest pain as their major complaint, 32% (n=24) had at least one cardiovascular risk factor. Within the group presenting without chest pain 33% (n=20) also had at least one risk factor. Hypertension was the most frequent risk factor in the one risk category for all women who presented with typical or atypical symptoms in ACS.

**Research Question Two:** Is there a difference in the time to initial cardiac diagnostic testing in women who present with typical or atypical symptoms?

The time to obtain an ECG after triage in the emergency department was used as a surrogate measure for diagnostic suspicion. The time to ECG data is presented in Table 3.

---

**Table 3**

**Triage Time to First Diagnostic Test**

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Chest Pain</th>
<th>Non Chest Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=74</td>
<td>N=62</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>15 minutes</td>
<td>33</td>
<td>38.3</td>
</tr>
<tr>
<td>16-30 minutes</td>
<td>36</td>
<td>41.8</td>
</tr>
<tr>
<td>31+ minutes</td>
<td>17</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Note: n=3 (2.2%) patients did not have ECG
It is important to determine whether differences in presenting symptoms have an impact on diagnosis and subsequent treatment of patients with ACS. A chi-square analysis was conducted to evaluate whether female patients presenting with chest pain upon arrival at the emergency department would receive an ECG in less time than those patients presenting with symptoms other than chest pain. Initially, times were broken down into four time periods: 0-15 minutes, 16-30 minutes, 31-60 minutes and greater than 60 minutes. These data then were collapsed into the first three time frames in view of the fact that the chest pain group (typical) all received an ECG within the first 60 minutes, which generated an empty cell in the table. Chest pain symptoms and time to ECG were found to be significantly related, \( \chi^2 (3, N=133)=9.26, p=.01 \), Cramer’s \( V=.26 \). Follow-up comparisons were conducted to evaluate the difference among these proportions using a Holm’s sequential Bonferroni Method. Table 4 shows the results of analyses.
Table 4

Pairwise Comparison of Time to Diagnostic Test by Presenting Symptom Group

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Pearson Chi-square</th>
<th>p value</th>
<th>Cramer’s V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15 minutes vs. 31-60 minutes</td>
<td>7.64</td>
<td>.01</td>
<td>.31</td>
</tr>
<tr>
<td>16-30 minutes vs. 31-60 minutes</td>
<td>7.31</td>
<td>.01</td>
<td>.29</td>
</tr>
<tr>
<td>less than 15 minutes vs. 16-30 minutes</td>
<td>.021</td>
<td>.88</td>
<td>.01</td>
</tr>
</tbody>
</table>

Significant differences between the chest pain and the non-chest pain groups were seen in both the less than 15-minute group compared with the 31-60 minute group and between the 16-30 minute and the 31-60 minute group receiving ECGs. The probability of a woman with non-chest pain symptoms receiving an ECG in less than 30 minutes was statistically less likely than the women in the chest pain group. Patients who presented with chest pain received an ECG significantly faster than those patients who presented with symptoms other than chest pain.

Research Question Three: Is there a difference in the time to first cardiac medication in women who present with typical and atypical symptoms?

The time to first cardiac medication was used as a surrogate measure of the time to diagnosis. Time to first administration of cardiac medication is presented in Table 5.
Table 5

Triage Time to First Cardiac Medication by Presenting Symptom Group

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Chest Pain</th>
<th>Non Chest Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 minutes</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>16-30 minutes</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>31-60 minutes</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>60+ minutes</td>
<td>22</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: N=20 (14.7%) patients did not receive medication during ED evaluation.

The data then were analyzed to determine if those patients presenting with chest pain were treated faster than those patients who presented with symptoms other than chest pain. Cardiac medications used as a surrogate marker included, aspirin, beta-blocker, IV nitro/SL nitro or IV heparin/Lovenox. Time to receive cardiac medication and the presence of chest pain were found to be significantly related, $[X^2 (3, N=116) = 8.77, p=.03, \text{Cramer’s } V=.28]$. Follow-up comparisons using the Holm’s sequential Bonferroni Method were conducted to evaluate the difference among these proportions. Table 6 shows the results of analyses.
Table 6

Pairwise Comparison of Time to Cardiac Medication by Presenting Symptom Group

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Pearson chi-square</th>
<th>p value</th>
<th>Cramer’s V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15 minutes vs. 16-30 minutes</td>
<td>.15</td>
<td>.22</td>
<td>.17</td>
</tr>
<tr>
<td>Less than 15 minutes vs. 31-60 minutes</td>
<td>.18</td>
<td>.67</td>
<td>.06</td>
</tr>
<tr>
<td>Less than 15 minutes vs. greater 15 minutes</td>
<td>2.22</td>
<td>.14</td>
<td>.19</td>
</tr>
<tr>
<td>16-30 minutes vs. 31-60 minutes</td>
<td>2.80</td>
<td>.09</td>
<td>.23</td>
</tr>
<tr>
<td>16-30 minutes vs. greater 60 minutes</td>
<td>8.41</td>
<td>.00</td>
<td>.34</td>
</tr>
<tr>
<td>31-60 vs. greater 60 minutes</td>
<td>1.03</td>
<td>.31</td>
<td>.13</td>
</tr>
</tbody>
</table>

The only pairwise difference that was significant was between the 16-30 minute and the greater than 60 minute time interval. These data suggest that the diagnosis of ACS was made quicker in the chest pain group as compared to the non-chest pain symptom group for all patients ultimately diagnosed with ACS.

Other Findings

The data regarding length of stay (LOS) comparing the chest pain and non-chest pain patients discharged with the diagnosis of ACS are presented in Table 7.
The difference in LOS was not found to be significant after independent t-tests were completed between the chest pain and the non-chest pain groups ($t(134)=-1.3$, $p=.20$).

The location after discharge was categorized into home, home with assistance, skilled nursing facility, extended care facility, expired, hospice, and discharged to another facility. Location was not significantly different between the chest pain and non-chest pain groups [$\chi^2(18,N=136)=16.0, p=.60$].

Women with signs and symptoms of ACS were admitted under differing diagnoses other than chest pain/rule out myocardial infarction even though all subjects were discharged with a diagnosis of ACS. Listed in Table 8 are the various admitting diagnoses.
Table 8

Frequency of Admitting Diagnosis for Women Ultimately Discharged with ACS

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule out MI</td>
<td>77</td>
<td>56.6</td>
</tr>
<tr>
<td>Angina/Chest pain</td>
<td>33</td>
<td>24.2</td>
</tr>
<tr>
<td>Shortness of Breath/Dyspnea</td>
<td>7</td>
<td>5.0</td>
</tr>
<tr>
<td>CHF</td>
<td>5</td>
<td>3.6</td>
</tr>
<tr>
<td>Syncope</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Dehydration</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>Falls</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Vertigo/Dizziness</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>1</td>
<td>0.7</td>
</tr>
</tbody>
</table>

The results showed 81% of the time women were admitted under a diagnosis of rule out MI or chest pain secondary to their presentation symptom of chest pain. The other 19% of the women were admitted under various other diagnoses including dyspnea, congestive heart failure (CHF), syncope, falls and altered mental status. After the initial emergency department visit and admission to the hospital the diagnosis was amended. This change occurred most often following either an elevation in the patient’s Tropinin level, stress test or evaluation by attending practitioner who suspected the patient needed a further cardiac work-up.

Summary

Findings were based on the retrospective review of women who presented to the emergency room and were ultimately discharged from the hospital with a diagnosis of ACS. This chapter described the comparison between variables of those women admitted
with symptoms of chest pain and those with other symptoms. The primary symptom reported was chest pain (54.4%). The remaining women, 45.6% presented with non-chest pain symptoms. Non-chest pain symptoms were broken down according to frequency of occurrence, with shortness of breath as the number one symptom followed by nausea, falls, weakness and dizziness.

Chest pain and time to ECG were found to be statically significant. Eighty percent of the women who presented with chest pain received an ECG within 30 minutes; however, only 55.2% of the non-chest pain group received an ECG in 30 minutes. The remaining 45% percent of the women received their ECG in greater than 30 minutes.

The time to first cardiac medication was significant in showing that 54% of the women with chest pain as a symptom received cardiac medication within the first 30 minutes. This compares to the non-chest pain group, where a majority of these women 51% received their medication after 60 minutes.

The data showed that most women discharged with a diagnosis of ACS did in fact present with chest pain. However, there were a large number of patients who presented with symptoms other than chest pain and who, as a result subsequently had a delay in their diagnosis and treatment.
Chapter V

Discussion

The purpose of this project is to identify signs and symptoms associated with ACS in women and to examine differences in time to diagnose and time to treat. The literature provided the most support for the proper identification of the signs and symptoms of ACS. Multiple studies have been completed that examined differences in gender related to ACS, however, none have specifically explored the signs and symptoms, time to diagnosis and treatment of women who present to the emergency department and were ultimately diagnosed with ACS. Improving the awareness of the signs and symptoms of ACS may lower the mortality and morbidity of these women.

This chapter includes a discussion of the findings from the research followed by conclusions based on the findings and Orem’s theoretical framework. Following these conclusions, limitations of the study are addressed and implications for further research in nursing practice and nursing education, with recommendations for future research are noted.

Findings

Through increased awareness of the signs and symptoms of ACS, advanced practice nurses can improve the health promotion of women with ACS.

Research Question One: What signs and symptoms do female patients present with who are treated in an emergency department and discharged with a diagnosis of
acute coronary syndrome? This study showed that chest pain is the primary symptom of women (54.4%) presenting to the emergency room. These findings are consistent with the findings of Goldberg et al. (1998), and Penque et al., (1998). Both studies found chest pain to be the major presenting symptom of women ultimately diagnosed with ACS. Goldberg et al. showed chest pain as the primary complaint followed by diaphoresis, SOB and nausea in decreasing order of frequency. The research by Penque et al. found chest pain the primary complaint, however, in contrast her study found fatigue to be the primary symptom of the non-chest pain group.

McSweeney et al. (2003) and Canto, Shlipak, and Roger’s (2000) research supports the findings of the current study. McSweeney found that 43% of women did not experience any type of chest discomfort with AMI. Canto, Shlipak, and Roger reported that 33% of women had no chest pain but were diagnosed with AMI. The current study found that 45.6% of women experienced symptoms other than chest pain. Canto et al. linked the lack of chest pain with the presence of diabetes; in the current study of the non-chest pain patients, 23% had diabetes.

All of the studies found chest pain to be the primary symptom, yet there were variations in the frequency of symptoms from the non-chest pain group. A trend was seen in the literature, which showed that the first six symptoms, shortness of breath, fatigue, nausea, weakness, diaphoresis and syncope were all present. This trend is worth pursuing in future research. In contrast to the previous mentioned studies, Milner et al. (2002) found that women were more likely to have complaints of back pain, not chest pain as the
presenting symptom of ACS. The variation may be attributed to the small number of participants in Milner’s study.

**Research Question Two**: Is there a difference in the time to initial cardiac diagnostic testing in women who present with typical symptoms of chest pain compared to those who present with non-chest pain or atypical symptoms?

In the current study 133 (98%) women with chest pain and non-chest pain received an ECG within the first 60 minutes after triage. Among women presenting with chest pain 24.8% (N=33) received an ECG in less than 15 minutes, an additional 27.1% (36) received an ECG within 30 minutes for a total of 51.9%. In comparison, women who did not present with chest pain 15.9% (N=12) received an ECG in the first 15 minutes and an additional 10.5% (N=14) by the end of 30 minutes for a total of 26%.

This is the first study to examine time to first diagnostic test using ECG as a surrogate marker. Other studies have used the ECG as a tool for diagnoses, but none have looked at the time differences in women presenting with chest pain or non-chest pain symptoms in ACS. The ECG provides support to clinical suspicion of ACS and provides critical information based on the symptoms. An ECG recording of an episode of ischemia can be particularly invaluable. Boden (2004) found that “the ECG upon hospital admission is one of the most useful and powerful predictors. ST deviation of as little as 0.05 mV is associated with an approximately two-fold higher risk of death” (p. 107).

Studies by Penque et al. (1998), Kim et al. (2001), and Gowda, Valek, and Hallas (1999) used the ECG as part of their inclusion criteria to explore coronary artery disease in women. Redberg and Shaw (2003) suggested that the ECG be a diagnostic tool
used in conjunction with assessment of symptoms in women with coronary artery disease.

Though all the women in this study had ECGs within the first 60 minutes of evaluation in the emergency department, it should be noted that within this emergency department, if a patient declares they have any form of chest pain, an initial ECG is performed. Those patients without complaints of chest pain may wait for up to 1 hour before an ECG is obtained. Within that time, many transient changes might be missed and the patient given an incorrect diagnosis.

**Research Question Three**: Is there a difference in the time to receiving the first cardiac medication between the typical and atypical symptoms groups?

The present study is the first to actually look at time to first cardiac medication, (aspirin, b-blockers, heparin or nitroglycerin), as a marker for time to diagnosis of ACS. The current study was significant in showing that 54% (N=44) of women with chest pain as a symptom received cardiac medication within the first 30 minutes. However, a majority of the non-chest pain group, 51% (N=18) received cardiac medication after 60 minutes. Further, 14.7% (N=20) of women did not receive any cardiac medication while in the emergency department.

A previous study by Vaccarino et al. (1999) of 155,565 women and 229,313 men found that medication administration the first 24 hours after presentation for women was less for thrombolytic usage and reperfusion strategy, but approximately the same for aspirin, beta blockers and angiotension converting-enzyme inhibitors. No study had
looked at time to receiving these medications, however, some have speculated that this could be a factor in morbidity or mortality.

Additional findings of the study showed that women who do not present with chest pain are incorrectly diagnosed. The current study found that 19.2% of women ultimately diagnosed with ACS were incorrectly diagnosed at admission. These findings support Vaccarino et al. (1999) who found that more women are presenting with atypical chest pain and are incorrectly diagnosed at presentation of symptoms.

Conclusion

Inability to recognize acute symptoms may be one explanation why women experience a larger degree of cardiac death and why coronary artery disease remains the number one cause of death in women throughout the United States. The present study concluded that there are differences in the signs and symptoms women present with who ultimately are diagnosed with ACS. The present study further concluded, that the time to identify and treat women is dependent on the accurate diagnosis of these typical and atypical symptoms. While more than half the women in the study presented with chest pain as their primary complaint, nearly 46% presented with other symptoms. The study found that symptoms of shortness of breathe, syncope, weakness and falls, where the primary non-chest pain symptoms either alone or in combination with other non-chest pain symptoms. The time to diagnosis and treatment could be the difference in preserving cardiac muscle and function.

Knowing women present with chest pain and non-chest pain symptoms is crucial to survival. The study suggested that women should seek care for their non-chest pain
symptoms even if those symptoms are determined to be non-cardiac in origin. Knowing the myriad of signs and symptoms of women with ACS assures the patient of receiving a quick and more thorough cardiac evaluation and treatment.

Limitations

There were several limitations within the present study. The first limitation is the study only captured patients through a retrospective chart review of emergency room records. This study does not allow the investigator to assume causation. The researcher cannot manipulate the independent variable because it has already occurred. The advantage to this design is that the relationships between the variables can be explored.

Another limitation is the potential distortion of the information gathered by the emergency department personnel. The investigator did not have any control in staffing, the manner in which the assessment was completed, the questions asked or written in the chart. Patients were asked to describe their signs and symptoms during a stressful event. The manner in which the assessment was completed and the information recorded may have varied according to the hospital staff.

Another limitation in the study was the inclusion data. Only patients who presented through the emergency room and were discharged with a diagnosis of ACS or AMI were included. From the literature review, one third of the patients who have an MI fail to seek medical attention. A large proportion of these patients are women who are having “silent” MIs without the classic symptoms for cardiac disease. Therefore, the results of this study may actually underestimate the true signs and symptoms women are experiencing. Considering the patient population studied, not all women who present
with diaphoresis, fatigue, weakness, or arm pain should be given the diagnosis of ACS. Practitioners must correlate the presenting signs and symptoms with family history, risk factors and diagnostic findings.

Final limitations to the study are the size of the sample and the limited time in which data were collected. The total sample size was 136 females. This study done with a larger sample size may demonstrate that more variables are near or at significance. A multi-institutional study or one that collects data over a longer period of time would provide a larger sample size.

Implications

Knowing that women present with atypical symptoms is crucial to diagnosis, and therefore, treatment. Women should seek care for their atypical/non-cardiac symptoms even if those symptoms are determined not to be cardiac in origin. Knowing the myriad of signs and symptoms of ACS at presentation will assure the patient of receiving a quick and more thorough cardiac evaluation and treatment.

Nursing Theory: The findings of the present study support Orem’s (1995) Self care deficit theory of nursing. Self care deficit is explored looking at knowledge and judgment of the self care agency. Women need to know what change in their USCR, those signs and symptoms, along with risk factors require seeking intervention. The decision to make good judgments about self-care depends on the awareness of internal or external conditions, which affect the health, and well-being of the SCA.

Orem’s nursing agency goal, of producing actions toward the accomplishment of nursing purpose to contribute to life, health and well-being guided this research and
provided structure for data collection. Nurses should have reliable techniques for nursing diagnosis to meet the health-deviation self-care requisites. Orem’s theory helped to isolate the deficit in the area of nursing operation, specifically professional-technologic. Through increased awareness of this deficit, and lack of knowledge, health professionals can begin to assess, manage and treat women who present with typical and atypical symptoms and improve a woman’s SCA. Through nursing agency, professionals can be guided to the mastery of reliable and valid techniques of nursing diagnosis and treatment.

Nursing Practice: The findings of the study have a clear significance for health care professionals and the advance practice nurse. The present study shows that women present to the emergency department personnel with atypical symptoms that are not diagnosed as ACS. The knowledge and skill of the advanced practice nurse in assessing these individuals can provide for a more definitive diagnosis. Having knowledge of the findings from the research would give nursing the knowledge to act pro-actively in reducing the morbidity or mortality of these individuals and contributing to the life, health and well being of the patient.

Nursing Education: Nurse practitioners and clinical nurse specialists need to be further educated that women and men do not manifest the same signs and symptoms for ACS. Knowing the signs and symptoms can assist the public, particularly women in seeking early treatment. Those patients with signs of ischemic change need to be rapidly treated. In those patients without ECG changes, considerable information can be gained from their risk factors, associated signs and symptoms, family or cardiac history. Additionally, cardiac markers and imaging can help augment the diagnosis. Although
these tools can help in clarifying the diagnosis, the process begins with the ED practitioner who suspects the unexpected cardiac event. Advanced practice nurses can promote the early recognition of ACS in women by updating assessment skills and improving interviewing techniques. The advanced practice nurse should educate the public to signs and symptoms of ACS to reduce morbidity and mortality.

Nursing Administration: Administrators of hospitals as well as administrators of nursing schools should insist on educating all health professionals to the typical and atypical presentation of ACS. Hospital personnel should review their assessment forms to adequately assess women who present with signs of ACS. Nurse educators should include information as to the gender differences in ACS and what atypical symptoms women might experience. Further, nurse managers need to educate or reeducate the nursing staff as to the signs and symptoms or presentation of women with ACS.

Recommendation for Future Nursing Research

There are several recommendations for future research. First, the study warrants using a larger sample size and multiple settings to validate the findings. A larger sample could be further broken down into age categories or race, looking at Asian, Caucasian, Hispanics, and African-American. Future nursing studies might look at ways to educate females as to the signs and symptoms of ACS so that delay time is decreased. Additionally, future studies need to explore outcomes of females who present with atypical symptoms of ACS.
Summary

The findings of the present study were discussed in relation to existing literature and the theoretical framework. Variables were identified that demonstrate that women predominately report chest pain as the number one symptom of ACS. Additionally, variables of significance other than chest pain were determined to be of importance in assessing women with ACS. The lack of identification and misdiagnosis of acute coronary syndrome represents the current need to educate health care professionals, patients and the public. Being aware of the signs and symptoms of ACS can assist healthcare providers in diagnosis and treatment. Several limitations in this study were discussed and related to future research. Finally, implications for nursing practice and future nursing research were discussed.

Early detection and evaluation is the key to survival of ACS. Patients, especially women, need to seek evaluation and not delay treatment when they suspect cardiac involvement. Emergency room personnel, from the triage nurse to the practitioner, need to be reminded that women with ACS have a myriad of presentations. Creating heightened suspicion allows a more rapid administration of life saving therapy can be begun. Evaluating women with cardiac ischemia is a difficult task; however, missed diagnosis of ACS can lead to poor outcomes.
### Appendix A

**ICD-9 Codes**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.0</td>
<td>Acute Myocardial Infarction, Anterolateral wall</td>
</tr>
<tr>
<td>410.1</td>
<td>Acute Myocardial Infarction, Anterior wall</td>
</tr>
<tr>
<td>410.2</td>
<td>Acute Myocardial Infarction, Inferolateral wall</td>
</tr>
<tr>
<td>410.3</td>
<td>Acute Myocardial Infarction, Inferoposterior wall</td>
</tr>
<tr>
<td>410.4</td>
<td>Acute Myocardial Infarction, Inferior wall</td>
</tr>
<tr>
<td>410.5</td>
<td>Acute Myocardial Infarction, other lateral wall</td>
</tr>
<tr>
<td>410.6</td>
<td>Acute Myocardial Infarction, true posterior wall</td>
</tr>
<tr>
<td>410.7</td>
<td>Acute Myocardial Infarction, Subendocardial wall</td>
</tr>
<tr>
<td>410.8</td>
<td>Acute Myocardial Infarction, other specified site</td>
</tr>
<tr>
<td>410.9</td>
<td>Acute Myocardial Infarction, unspecified site</td>
</tr>
<tr>
<td>411.1</td>
<td>Acute Coronary Syndrome, unspecified</td>
</tr>
</tbody>
</table>
Appendix B

Medical Record Audit Tool for Signs and Symptoms of women with ACS

Pt. No: ____________ - Age_____________ Date__________

Emergency Department Door Time________

Time seen by practitioner (Physician, NP or CNS)____________

Time to diagnosis, identified by first cardiac medication (ASA, Nitro, BB, Hep)____

Time to First Diagnostic test, identified as EKG____________

Admitting Diagnosis ____________Chief Complaint__________________

Marital status M: Ô W: Ô S: Ô

Insured: Y:O N: O

Associated symptoms:


Nausea Y:O N:O Headaches Y:O N:O


Headaches Y:O N:O Shoulder pain Y:O N:O

Other__________________________________________________________

Length of time of symptoms described above________________________

As described to:__________________________________________________

Risk Factors:

History of smoking N:O Y:O Pack years __________

Hypertension N:O Y:OMedication________________________________

Height__________Weight__________________________

Diet__________________________________________________________

Regular exercise(#times per week) 0 1 2 3 > 4
Diabetes N:0 Y:O Type I O Type II O Controlled by diet : O Medication: O
Surgical removal of ovaries N:O Y:O N/A: O
Estrogen replacement N:O Y:O N/A: O
Family history:(immediate family-mother and/or father, brother and/or sister under age 55 for males and 65 for females) N:O Y:O relation___________
Recent stress in life:________________________
Diagnostic Tests:
EKG N:O Y:O findings ________________________________
Cardiac Enzymes N:O Y:O Results __________________________
Chest x-ray N:O Y:O Results _____________________________
Echocardiogram N:O Y:O Results __________________________
Stress Test N:O Y:O Type of stress__________________
Results_________________________________________________________________
Cardiac catheterization N:O Y:O Results _______________________
Treatments:
IV Heparin/Lovenox: N:O Y:O IV Nitroglycerin N:O Y:O
Thrombolytics N:O Y:O
Other IV/PO cardiac medications N:O Y:O Medication____________________
PTCA N:O Y:O Date____________ Coronaries_____________________
Stent N:O Y:O Date____________ Coronaries_____________________
CABG N:O Y:O Date____________ Coronaries_____________________
Grafts:_________________________________________________________________
OUTCOMES:
Discharge Diagnosis________________________________________
LOS:_____________________days
Location at discharge:_________________________________________
Appendix C

Orem’s Schematic Framework

**BCF**
- Age, gender
- Health state
- Family
- Marital status
- Sociocultural

**USCR**
- Air, H20, Lifestyle, nutrition'
- Stress mgmt, Activity, rest solitude

**SCA**

**Deficit**

**Identification of S/S of ACS**
- Chest pain
- SOB
- Nausea
- Syncope
- Falls
- Hypo/hyperglycemia
- Weakness
- Fatigue

**Early Intervention**

**Health and Well-being & Life for the patient**

Nursing Agency
REFERENCES


ABSTRACT

Coronary artery disease is the most frequent cause of death among women in the United States. This may be due to differences in presentation of women with acute coronary syndrome. A convenience sample of 136 women who presented to an emergency department and were eventually diagnosed with ACS were reviewed for signs and symptoms at presentation, time to ECG and first cardiac medication. This study found that the majority of women (54.4%) presented with chest pain, however, a large number (45.6%) presented with other symptoms; sob, syncope weakness and falls. Presenting with non-chest pain symptoms was found to result in increased times to first diagnostic test and to first cardiac medication. The results are discussed in terms of Orem’s Self Care Deficit Theory of Nursing. Future studies should utilize larger sample sizes and multiple settings to validate findings and investigate outcomes in female patients who present with non-chest pain symptoms.