

SYMPTOMS IN ADULTS WITH ATRIAL FIBRILLATION SEEKING CARE IN  
EMERGENCY DEPARTMENT

by

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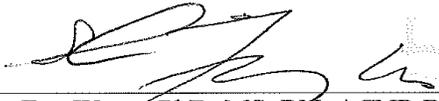
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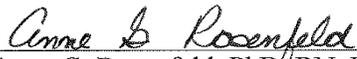
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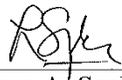
As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Regina G. Gonia entitled "Symptoms in Adults with Atrial Fibrillation that Seek Care in Emergency Department" and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

  
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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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#### STATEMENT BY AUTHOR

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## ABSTRACT

Atrial fibrillation is a common arrhythmia encountered in the emergency department. In the United States, newly diagnosed cases of atrial fibrillation is projected to be 2.6 million cases in 2030 and the annual prevalence of atrial fibrillation is expected to be 12.1 million in 2030 (Colilla et al., 2013). Patients may present to the emergency department for treatment of atrial fibrillation with a variety of symptoms and therefore makes diagnosing atrial fibrillation based on symptomatology challenging for the clinician. The primary goal of this Doctor of Nursing Practice (DNP) project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department.

**Methods:** This descriptive study contains secondary analysis of existing data derived from structured interviews that took place at two academic medical centers. This analysis included 74 patients that presented to the emergency department with symptoms suspected of acute coronary syndrome and were later diagnosed with atrial fibrillation. Descriptive statistics were used to synthesize data, while inferential statistics (bivariate tests) were used to compare symptoms between the age groups.

**Results:** The mean age of subjects was  $70 \pm 13$  years, ranging 31 to 92 years. The majority of subjects were men (75.7%) and whites (90.5%). The most common symptoms reported by study subjects included chest discomfort (n = 50; 67.6%), followed by generalized weakness (n = 39; 52.7%) and shortness of breath (n = 39; 52.7%), and palpitations/ funny beating of the heart (n = 36; 48.6%) and unusual fatigue/

tiredness (n = 36; 48.6%). Sweating was the only symptom that was statistically significant in the younger adult group than in the older adult age group.

Conclusion: The symptoms identified in this DNP project can be used to aid in identifying patients that present to the emergency with symptomatic atrial fibrillation. Further efforts for the assessment of atrial fibrillation should focus on the dissemination of common although nonspecific symptoms to facilitate the inclusion of atrial fibrillation as part of the differential diagnosis.

## INTRODUCTION

Many adults are affected with atrial fibrillation and the incident rate of newly diagnosed atrial fibrillation cases in the United States (U.S.) is projected to be 2.6 million cases in 2030, a 4.6% increase, from an estimated 1.2 million cases in 2010 (Colilla et al., 2013). The annual prevalence of atrial fibrillation is projected to increase by 4.3%, from an estimated 5.2 million in 2010 to a projected 12.1 million in 2030 (Colilla et al., 2013). Hospitalization for atrial fibrillation in the U.S. has increased from 312,926 (1,552 per one million) in 2000 to 409,854 (1,812 per one million) in 2010, which reflected a 14.4% increase (Patel et al., 2014). In 2007, there were 8,749 claims for newly diagnosed atrial fibrillation in the U. S., based on the insurance database review (Colilla et al., 2013). Atrial fibrillation as the primary discharge diagnosis, accounts for a total of 3,960,011 hospitalizations from 2000 to 2010 (Patel et al., 2014).

The global number of individuals with atrial fibrillation in 2010 was estimated at 33.5 million (12.6 million in women and 20.9 million in men), based the systematic review of 184 population-based publications from 1980 to 2010 (Chugh et al., 2014). In 1990, the global age-adjusted incidence rates of atrial fibrillation was estimated at 43.8 and 60.7 per 100,000 person-year in women and men and an estimated population prevalence of 359.9 and 569.5 per 100,000 in women and men, respectively (Chugh et al., 2014). Mortality rates associated with atrial fibrillation increased 1.9-fold in women and 2-fold in men globally from 1990 to 2010 (Chugh et al., 2014).

## **Background Knowledge**

Atrial fibrillation is frequently encountered condition in the emergency department. In a longitudinal study spanning over 12 years (1999 to 2011) involving 32,104 adults for initial diagnosis of atrial fibrillation or flutter in 63,398 emergency department encounters in five geographic zones in Alberta Canada, Rosychuk and colleagues (2017) reported an emergency department presentation rate of 2.9 to 3.4 per 1,000. A total of 20,396 patients (63.5%) presented to the emergency department once, while 2,361 patients (7.4%) presented two and three times and 5,699 patients (17.7%) had multiple visits (Rosychuk et al., 2017). However, symptom descriptors upon emergency department presentation were not evaluated in this study.

Patients with symptomatic atrial fibrillation can present to the emergency department with diverse symptoms that result in hospitalization (Streur, Ratcliffe, Shoemaker, & Riegel, 2016). Streur and colleagues (2016) used data obtained from the Vanderbilt Atrial Fibrillation Registry involving 1,501 hospitalized adults and those visited the emergency department with confirmed atrial fibrillation and completed the University of Toronto Atrial Fibrillation Severity Scale (AFSS). The AFSS is a patient self-report questionnaire incorporating seven common atrial fibrillation symptoms (fatigue at rest, shortness of breath at rest, chest pain, dizziness, shortness of breath with activity and exercise) measure on a five point Likert scale (Streur et al., 2016). The investigators identified two symptoms clusters: At Rest and With Activity. At Rest symptoms cluster included: chest pain, shortness of breath, dizziness, and fatigue at rest and this symptom cluster was significantly associated with emergency department visits

and hospitalizations related to atrial fibrillation (Streuer et al., 2016). With Activity symptoms cluster included: exercise intolerance and shortness of breath with activity (Streuer et al., 2016). The only symptom to not cluster with other symptoms was palpitations. It is important to note that the patient with atrial fibrillation may present to the emergency department with more than one symptom that may not be included as part of the seven common symptoms assessed in this study. To obtain a better understanding of all potential symptoms of atrial fibrillation, a more comprehensive and thorough evaluation of the symptom presentation descriptors are required at the time of emergency department presentation.

Clinically, symptom presentation and electrocardiogram are used to diagnose atrial fibrillation (Hardin & Steele, 2008). The ability to identify atrial fibrillation accurately in the patient with severe symptom presentation can add a new component to practitioners' understanding, because genuine episodes of atrial fibrillation may not correspond with symptoms suggestive of atrial fibrillation (Quirino et al., 2009). The patients' symptoms of atrial fibrillation can markedly differ, which can impact assessment reliability and the patient may report symptoms in absence of an arrhythmia (Quirino et al., 2009). It is common for the patient with symptomatic atrial fibrillation to present to the emergency department, thus creating an opportunity to focus efforts on identifying symptoms that correlate with atrial fibrillation (Angaran et al., 2015). The variability of symptom presentation increased the need to better understand these symptoms to increase practitioner awareness to properly treat the patient (Hardin & Steele, 2008; Nottingham, 2010). Substantial discrepancy in symptom presentation in

patients with atrial fibrillation was recognized as an important issue that remains unresolved (Charitakis et al., 2015).

### **Local Problem**

The climate of Southern Arizona draws older people from all walks of life to migrate to the area. Based on geographic distribution of hospitalization for atrial fibrillation in the United States between years 2000 and 2010 (Patel et al., 2014), the highest percentage of hospitalization for atrial fibrillation was in the South (38.5%), followed by Midwest (24.9%), Northeast (22.2%), and the West (14.4%). According to the Centers for Medicare and Medicaid Services (2008), among a total of 157,777 enrollees in the state of Arizona, atrial fibrillation was diagnosed in 8.4% and 0.4% of Medicare and Medicaid enrollees, respectively (U.S. Centers for Medicare & Medicaid Services, 2016). In 2014, there were 1,004,516 (17.2%) Pima County, Arizona residents who were 65 years of age or older (Coyle, Gail, & Tippens, 2015).

In clinical practice, atrial fibrillation is the most common arrhythmia encountered (Gupta & Roistacher, 2016; Prystowsky, Padanilam, & Waldo, 2011). Atrial fibrillation is characterized by disorganized atrial electrical activity (Gupta & Roistacher, 2016; Prystowsky, Padanilam, & Waldo, 2011) and classified into three categories: permanent, persistent, and paroxysmal (Prystowsky, Padanilam, & Waldo, 2011). The patient with atrial fibrillation may be asymptomatic; however, decreased exercise tolerance, shortness of breath, palpitations, and fatigue can be a contributing factor in health seeking (Della, 2007). The practitioner must perform a thorough history and physical examination to include evaluation of the presenting symptom descriptors to exclude any non-cardiac

causes, including sympathomimetic use, pulmonary embolism and/or pulmonary disorder, electrocution, hypokalemia, and hyperthyroidism (Bontempo & Goralnick, 2011).

### **Purpose**

It is unknown if older adult patients with atrial fibrillation, who seek medical attention in the emergency department, experienced symptoms other than – chest pain, dizziness, palpitations, fatigue, and shortness of breath. The purpose of this DNP project is to gain insight into the symptom descriptors in patients with atrial fibrillation that seek emergency treatment in an effort to improve patient outcomes and reduce adverse events. This descriptive study will involve analysis of secondary data in which 74 adult patients presented to the emergency department with symptomatic atrial fibrillation. Demographic information, patient characteristics, and symptom descriptors will be analyzed to gain an understanding of the symptoms that the patient experienced. The key stakeholders for this study are individuals diagnosed with atrial fibrillation, the researcher, and the cardiovascular healthcare professionals.

### **Problem Statement**

The clinical presentation of atrial fibrillation can be varied from asymptomatic to disabling symptomatic episodes. Patients with symptomatic atrial fibrillation may present with syncope, chest pain, palpitations, fatigue, anxiety, dizziness, and shortness of breath (Nottingham, 2010; Prystowsky, Padanilam, & Waldo, 2011). Atrial fibrillation is a serious condition that requires prompt practitioner diagnosis that left untreated, can become permanent thus limiting treatment options (Lee & Campbell-Cole, 2014). The

goal of this DNP project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department. Symptom descriptors can be used by emergency department providers to diagnose atrial fibrillation early to reduce adverse events and improve patient outcomes.

## **FRAMEWORK & SYNTHESIS OF EVIDENCE**

### **Theoretical Framework**

Patient with multiple symptoms can have a delay in provider assessment, diagnosis, and treatment, which can have a negative effect on the outcome of the patient (Lee, Vincent, & Finnegan, 2016). The patient that presents to the emergency department with atrial fibrillation can have diverse clinical symptom presentations. Incorporation of a middle-range nursing theory can aid in maintaining the narrow and concrete conceptual focus needed to guide the project (Lee, Vincent, & Finnegan, 2016). Middle-range theory is recognized to be less abstract than grand theory and more applicable to practice for explanation (Myers, 2009).

The theory of unpleasant symptoms is a middle-range theory presented in 1995 through the collaboration of three separate researchers working on the concepts of dyspnea and fatigue nearly simultaneously (Lenz, Suppe, Gift, Pugh, & Milligan, 1995). The theory was introduced as a work in progress to be utilized as “means for integrating existing information about a variety of symptoms” (Lenz, Pugh, Milligan, Gift, & Suppe, 1997). The first collaboration involved two researchers working at different stages on the concept of fatigue, who formed a partnership to merge ideas and to create a framework for the model with respect to fatigue during childbearing (Lenz et al., 1995). The

literature review in combination with the clinical experience of the researchers lead to the realization of the similarities in conceptualization and marked the catalyst to formulating the theoretical model (Lee, Vincent, & Finnegan, 2016). The second partnership united two researchers that recognized similar perceptions and commonalities on the concepts of fatigue and dyspnea that contribute to the ability to utilize the model on multiple concepts (Lenz et al., 1995). The final process in the development of the theory of unpleasant symptoms included the evaluation of like concepts for inclusion in an effort to maintain generalizability for application in clinical practice and across a variety of symptoms (Lenz et al., 1995). Symptoms play a key role in this theory of unpleasant symptoms. The theory of unpleasant symptoms can be further classified as either an explanatory or predictive theory that can be applied to nursing research and nursing practice (Lee, Vincent & Finnegan, 2016). The theory of unpleasant symptoms is a “parsimonious theory” that reflects the diversity of symptoms that interact and occur simultaneously (Brant, Beck, & Miaskowski, 2009).

The theory of unpleasant symptoms was revised and updated in 1997 to reflect “a more accurate representation of the complexity and interactive nature of the symptom experience” (Lenz et al., 1997). Symptoms are indicators of the health and functional status as perceived and experienced by the patient that can reveal a change from normal (Lenz et al., 1997). In the original theory of unpleasant symptoms model only one symptom was illustrated. However, in the updated version, it was emphasized that “symptoms can occur alone or in insolation from one another but that, more often, multiple symptoms are experienced simultaneously” and frequently lack synchrony (Lenz

et al., 1997). The three major concepts of the theory of unpleasant symptoms include influential factors (i.e., psychological, situational, and physiologic), symptom experience (i.e., duration, intensity, quality, and distress), and performance (i.e., cognitive, physical, and functional status) (Lee, Vincent, & Finnegan, 2016; Myers, 2009). The updated theory of unpleasant symptoms incorporates the multidimensional symptom experience in that, the patient may experience lone symptom or a combination of symptoms that differ in intensity (i.e., symptom strength and severity), timing, level of distress perceived (i.e., degree of discomfort), and quality (i.e., description of what the symptom feels like) (Lenz et al., 1997). Symptom quality, distress, duration, and intensity of symptoms can fluctuate between each person and his/her functional status, physical performance, and cognitive function thereby affecting symptom experience (Lenz et al., 1995; Myers, 2009). The character and class of symptoms can be conceptualized and measured to determine common symptoms across the clinical populations. It is important to recognize symptoms that relate to one another and symptoms that are expected to be separable (Lenz et al., 1997).

The description of the symptom experience is complicated by factors that contribute to ability of the patient to differentiate and label the symptom (Lenz et al., 1997). Three variable factors, physiologic, psychologic, and situational, contribute to the manifestation and/or have influence on a person with respect to unpleasant symptoms (Lenz et al., 1995). The updated theory of unpleasant symptoms recognizes that these three variable factors influence the symptom experience that act on the feedback loop to impact physical performance (Lenz et al., 1997). The ability to recognize sensations that

correlate with a specific symptom are enhanced in the patient with symptom experience over the long term which allows for increased discernibility and symptom characterization (Lenz et al., 1997). In the clinical setting, symptoms aid in formulating the diagnosis and contribute to the selection of appropriate screening and testing to determine the correct course of therapy based on the alteration from normal health.

The ability to employ the middle-range theory in the clinical setting is based on the utility of the theory to guide practice or to apply the theory (Lenz et al., 1997). The patient with a history of cardiovascular disease may report to the emergency department with the chief complaint of pain and symptom evaluation is important for the development of the differential diagnosis (Lenz et al., 1997). The primary goal of this DNP project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department.

The evaluation and analysis of the theory of unpleasant symptoms by Lee, Vincent, and Finnegan (2016) reviewed and summarized 31 articles, whose authors stated the utilization of the middle-range theory as the conceptual or theoretical guide for their studies between 2000 and March 2016. The theory of unpleasant symptoms was utilized by Jurgens et al. (2009) in a research study to identify number, type, and symptom clusters in patients with decompensated heart failure. Patients with heart failure, like patients with atrial fibrillation, can develop multiple symptoms and a change in symptoms can be an indicator of change in disease process. The focus of this DNP project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department.

### **Synthesis of Evidence**

To gain a better understanding of symptom prevalence and descriptors, literature searches were conducted using PubMed, Embase, Google Scholar, and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). The following key phrases were used: symptomatic atrial fibrillation, symptomatic atrial fibrillation AND emergency department, symptomatic atrial fibrillation AND emergency department AND treatment seeking, symptom experience atrial fibrillation, symptomatic atrial fibrillation symptom science, symptomatic atrial fibrillation symptom descriptors, and atrial fibrillation symptoms other than palpitations. Inclusion criteria for articles included: English language only, all adults (18 years of age and older), peer reviewed, clinical studies, with abstracts, humans, full text articles, and publication dates of 1995 to 2017.

Systematic reviews and meta-analysis articles that did not evaluate atrial fibrillation symptom descriptors were excluded. The search for articles utilizing the inclusion criteria and key phrase of symptomatic atrial fibrillation yielded 547 articles, which were later reduced down to 127 articles using key phrases listed above. After applying exclusion criteria, eligible articles were further reduced to 25. Fourteen articles that did not report symptom descriptors were further excluded. The following discussion will highlight the synthesis of evidence obtained from the literature review as it pertains to the DNP project (see Table 1 and Table 2) with respect to strengths and weaknesses as well as the identified gaps in knowledge.

### **Strengths and Weaknesses**

In both the in-patient and community settings the utilization of medical records review continues to be the primary method of data collection. All of the studies conducted in the out-patient setting utilized medical records review, while four of the seven in-patient studies utilized this data collection method (Buccelletti et al., 2013; Lok & Lau, 1995; Salam et al., 2014; Scheuermeyer et al., 2016). The researchers that used medical records review for data collection were not responsible for the original data collection. The data obtained from medical records review may be incomplete and not fully address the research question. In order to gain a better understanding of atrial fibrillation symptom descriptors, direct patient interview at the time of emergency department presentation may solicit more comprehensive and informative data.

Vermond et al. (2014) conducted the only randomized control study to determine the relationship between cardiovascular outcomes and severity of atrial fibrillation in patients in the emergency department. In this study, severity of atrial fibrillation was determined using the University of Toronto Atrial Fibrillation Severity Scores (AFSS) which comprised a seven item self-report questionnaire rated on a six point severity scale. AFSS scores were not attributed to a single symptom. Women had higher AFSS scores than men, indicating more severe symptoms in women. The AFSS scores completed by physicians were lower than patients' self-report, reflecting the importance of patient symptom assessment tool in the clinical setting (Vermond et al., 2014). Buccelletti et al. (2013) was the only study focusing on atrial fibrillation symptom presentation in the hospital/emergency department setting. Palpitations were found to be the most common

presenting symptom (73.5%), followed by dyspnea (18.8%), chest pain (16.5%) and signs of acute failure (dyspnea at rest, peripheral pitting edema, rales on admission, and signs of pulmonary edema on chest X-ray) (7.5%) (Buccelletti et al., 2013).

In the community setting, Freeman et al. (2015) and Golwala et al. (2016) utilized the Outcomes Registry for Better Informed Treatment in Atrial Fibrillation (ORBIT-AF) in two separate studies. Freeman et al. (2015) compared atrial fibrillation symptoms prevalence, patient outcomes and quality of life, while Golwala et al. (2016) compared ethnic and racial differences with respect to atrial fibrillation symptom presentation among blacks, Hispanics and whites. Both research groups incorporated the European Heart Rhythm Association Classification (EHRA) classification system (EHRA 1 – asymptomatic, EHRA 2 – mild symptoms, EHRA 3 – severe symptoms, and EHRA 4 – disabling symptoms (Freeman et al., 2015) completed by physicians to evaluate atrial fibrillation symptoms. The Atrial Fibrillation Effect on Quality of Life (AFEQT) questionnaire, a patient self-report questionnaire, was used to assess three domains of atrial fibrillation quality of life: activity, treatment concerns, and symptoms (Freeman et al., 2015). Freeman et al. (2015) found that younger and healthier patients had lower quality of life scores with higher symptom burden and physicians undervalued symptoms when symptoms were mild. Golwala et al. (2016) found that Hispanics and blacks to be younger and had higher traditional risk factors of atrial fibrillation than whites; however blacks were more symptomatic with worse quality of life when compared with whites or Hispanics.

Similarly, Lip et al. (2015) conducted medical records review to investigate sex differences in presentation, treatment and outcome in atrial fibrillation patients in Europe. Although EHRA scores were used to evaluate symptoms, these researchers did not provide information on patient self-reported atrial fibrillation symptom presentations or descriptors. Women were found to be older and more symptomatic with lower overall health scores, specifically in the physical and psychological domains when compared with men. Lip et al. (2015) found no gender differences with respect to chest pain, shortness of breath or dyspnea, fatigue, dizziness, or generalized non-wellbeing. Siontis et al. (2016) analyzed data from the Rochester Epidemiology Report (REP) records system to investigate the frequency, association, and prognostic impact of the different clinical presentation of new onset atrial fibrillation in the community setting. Siontis et al. (2016) found palpitations reported in 193 patients (40%), 122 patients (26%) reported non-palpitations symptoms, and 161 patients (34%) were symptomatic at time of diagnosis.

In the outpatient setting, EHRA was the most frequently used tool to evaluate symptoms in patients with atrial fibrillation and medical records review was most commonly used for data collection from different database sources. As mentioned earlier, EHRA classification system is a simple tool for physicians to evaluate severity of atrial fibrillation symptoms rather than to profile patient symptoms. Physicians tend to undervalue symptoms when symptoms are mild (Freeman et al., 2015). Similarly, AFSS scores completed by physicians were lower than patients' self-report scores, underscoring the importance of patient-centered symptom assessment.

In the hospital/emergency department setting, McCabe, Chamberlain, Rhudy, & DeVon (2016a) and McCabe, Rhudy, Chamberlain, & DeVon (2016b) developed their own data collection tool that was based on the Leventhal's Common Sense Model, Myocardial Infarction (MI) Syndrome, and Acute Coronary Syndrome (ACS) to evaluate atrial fibrillation symptoms descriptors via structured interview. These studies are similar to this DNP project due to the incorporation of the ACS symptoms into structured interview to evaluate symptom descriptors in patients with atrial fibrillation. The structured interviews by McCabe and colleagues were conducted after hospital admission or via telephone interview after discharge. In order to better understand atrial fibrillation symptom descriptors, it is important to interview the patient in the emergency department at the time symptoms are experienced in order to capture the most accurate data at that particular time. Interviewing the patient in the hospital room or at the time of discharge relies on patient recall of symptoms experienced at a different point in time. Data collected when atrial fibrillation symptoms are being experienced provide real time patient symptom description and improves accuracy of the data collected.

The primary goal of this DNP project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department. In reviewing symptoms reported in existing literature, there is a lack of comprehensiveness and consistency of symptom presentation. In the hospital setting, palpitations were reported in every study except the study by McCabe et al. (2016a) which rapid heartbeat and/or skipping beats instead of palpitations were reported. Although dyspnea and/or shortness of breath were reported in all studies reviewed, other symptoms were inconsistently

reported. For example, chest pain, chest discomfort, or chest tightness was not reported in the study by Siontis et al. (2016). Scheuermeyer et al. (2016) included weakness, acute neurologic symptoms and other symptoms, while Salam et al (2014) reported non-cardiac symptoms. Lok and Lau (1995) reported stroke, MI, and Chronic Obstructive Airway Disease (COAD) symptoms that were not reported in other studies. Buccelletti et al. (2013) and Lok and Lau (1995) were the only studies to report signs of heart failure, while Scheuermeyer et al. (2016) and Buccelletti et al. (2013) reported weakness as part of the symptoms evaluation. Lack of symptom evaluation and reporting consistency reflects the need to conduct research to evaluate comprehensive symptoms that the patient with atrial fibrillation may present to the emergency department.

The secondary goal of this DNP project is to compare symptoms related to atrial fibrillation between age groups, younger adults (< 65 years old) and older adults ( $\geq$  65 years or older). In reviewing the literature it is apparent that this is an area that requires further evaluation. Many existing studies were conducted to determine sex and racial or ethnic differences but not on age differences in symptom presentations between groups. Lok and Lau (1995) reported a sharp increase in atrial fibrillation after age 65 years; however, differences in symptoms presentations between age groups were not the goal of this study. Of the studies reviewed, none compared age differences with respect to atrial fibrillation symptoms. Clinically, it is important that the practitioner be able to identify age specific symptom presentation in order to formulate appropriate differential diagnosis, order diagnostic and/or screening tests, and develop treatment plans.

TABLE 1.

## Atrial Fibrillation Hospital/Emergency Department Setting

Author	Data collection Method	Symptoms Evaluated
Salam et al. (2014)	Physician Discharge Case Report	Palpitations, absence of palpitations, shortness of breath, chest pain, dizziness, non-cardiac symptoms, and asymptomatic
Scheuermeyer et al. (2016)	Records Review – Standardized Electronic Spreadsheet	Palpitations, chest pain, dyspnea, weakness, acute neurologic symptoms, and other symptoms.
Vermond et al. (2014)	Patient and Physician used – University of Toronto Atrial Fibrillation Severity Scores (AFSS)	Palpitations, chest pain, dyspnea, dizziness, fatigue, or no symptoms.
McCabe, Chamberlain, Rhudy, & DeVon (2016a) and McCabe, Rhudy, Chamberlain, & DeVon (2016b)	Leventhal’s Common Sense Model, Myocardial Infarction (MI), and Acute Coronary Syndrome (ACS) based – structured interview	Rapid heartbeat, skipping beats, fatigue, chest discomfort, dyspnea, and lightheaded.
Lok and Lau (1995)	Records Review	Palpitations, dyspnea, chest discomfort, dizziness, stroke, syncope, heart failure, MI, and Chronic Obstructive Airway Disease (COAD).
Buccelletti et al. (2013)	Records Review – Standardized Electronic Spreadsheet	Palpitations, dyspnea, chest pain, weakness, syncope, and signs of heart failure.

TABLE 2.

## Atrial Fibrillation Community Setting

Author	Data collection Method	Symptoms Evaluated
Freeman et al. (2015)	European Heart Rhythm Association Classification system (EHRA) AND the Atrial Fibrillation Effect on Quality of Life (AFEQT) questionnaire from registry database, Outcomes Registry for Better Informed Treatment of Atrial Fibrillation (ORBIT-AF).	Palpitations, dyspnea with exertion, fatigue, lightheadedness or dizziness, exercise intolerance, chest discomfort or tightness, and dyspnea at rest.
Golwala et al. (2016)	Medical Records (EHRA scores and AFEQT scores) and treating physician from registry database (ORBIT-AF).	Palpitations, syncope/fainting, dyspnea on exertion, exercise intolerance, lightheadedness, dyspnea at rest, fatigue, and chest tightness.
Siontis et al. (2016)	Medical Records Review from Rochester Epidemiology Report (REP) records system	Palpitations, Non-palpitations symptoms (fatigue, dyspnea, and lightheadedness).
Lip et al. (2015)	Medical Records Review, Physician EHRA scores In-Patient or Out-Patient	Palpitations, fear/anxiety, dyspnea/shortness of breath, chest pain, general non-wellbeing, dizziness, and fatigue.

## Knowledge Gaps

The review of medical records in the hospital setting continues to be the primary method to evaluate atrial fibrillation symptom presentation. Medical records review does not allow real-time data collection and does not afford the researcher the opportunity to obtain the detailed information directly from patients. It is important to obtain information directly from the patients at the time of symptoms presentation. Research studies on symptoms of atrial fibrillation were either in the hospital or in community. In the community setting, EHRA classification system was frequently used to assess self-report atrial fibrillation symptom descriptors (Freeman et al., 2015; Golwala et al., 2016; Lip et al., 2015). In the hospital setting, symptom descriptors have prognostic importance in patients with atrial fibrillation (Vermond et al., 2014). Although the seven item University of Toronto Atrial Fibrillation Severity Score (AFSS) questionnaire was used by patients and physicians to understand atrial fibrillation symptom descriptors (Vermond et al., 2014), a more comprehensive evaluation of the symptom description is still needed. The lack of a standardized data extraction tool to assess symptom descriptors prompted investigators to develop structured interviews (McCabe et al., 2016a). This DNP project will utilize data obtained from structured interviews conducted in the emergency department to assess presenting symptoms of atrial fibrillation, not just presence or absence of most common symptoms. This DNP project will aid in the understanding of the symptoms presentation in patients with atrial fibrillation that seek medical attention through the secondary analysis of existing data gathered in the emergency department and incorporates ACS symptoms into the structured interview.

Patients with symptoms related to atrial fibrillation may experience chest pain, palpitations, syncope, shortness of breath, and rapid heartbeat (Nottingham, 2010). Salam et al. (2014) further reported non-cardiac symptoms and Scheuermeyer et al. (2016) reported other symptoms of atrial fibrillation, however, it is unclear which symptoms were included in these subcategories. Clarification with respect to non-cardiac and other symptoms of atrial fibrillation is needed to gain a better understanding of atrial fibrillation symptom descriptors in patients that present to the emergency department. Upon reviewing the literature, it is apparent that there is a lack in comprehensiveness and consistency with respect to reporting symptom descriptors in patients with atrial fibrillation. It is important that providers have comprehensive understanding of possible symptoms not just most common symptoms of atrial fibrillation in patients who may present to the emergency department. This will aid in more readily identification of these patients, selection of appropriate diagnostic tools as well as formulation of appropriate patient centered treatment modalities to improve patient outcomes and reduce adverse events.

The emergency department environment provides an opportunity to thoroughly evaluate all atrial fibrillation symptom descriptors due to population differences and prognostic importance (Vermond et al., 2014). Similarly, there is a need to better understand if patients under the age of 65 tend to present with common symptoms of palpitations as older patients with dyspnea and fatigue (Salam et al., 2014). Interestingly, none of the studies compared symptoms between age groups to identify similarities and/or differences of atrial fibrillation symptoms.

## **METHODS**

### **Project Design**

This is a secondary analysis of data collected from the “New ECG Criteria for Posterior Myocardial Infarction” study which was funded by the National Institute of Health (R01 NR08092, Principal investigator, Shu-Fen Wung). These data were developed from structured interviews on presenting symptoms of patients suspected of acute coronary syndrome in emergency departments. Since patients with atrial fibrillation have symptoms resemble acute coronary syndrome to include chest pain, shortness of breath, and generalized weakness, thus were included in the original study.

### **Setting of the Original Study**

The original study was conducted in the emergency departments at the University of Arizona Medical Center and the Veterans Administration Medical Center in Tucson.

### **Sample of the Original Study**

The original sample size consisted of 1,083 patients presented to the emergency department with suspected myocardial infarction. Patients were not excluded based on ethnicity, gender, or age. Patients under the age of 18 years were excluded as well as patients with early repolarization, pericarditis, ventricular pacemaker, and bundle branch blocks (BBB) because abnormal ST segments on electrocardiogram (ECG) were unrelated to cardiac ischemia. Among 1,083 patients enrolled in the original study, 74 adult patients were diagnosed with atrial fibrillation, confirmed by ECG.

### **Data Collection of the Original Study**

Patients presented to the emergency departments at both the University of Arizona Medical Center and the Tucson Veterans Administration Medical Center with angina or angina equivalent symptoms (i.e. sweating, hypotension, dyspnea, nausea/vomiting) were approached and consented to the study. For those consented, continuous ECG monitoring and blood work for serum cardiac markers for diagnosis of acute myocardial infarction were obtained. All patients with suspected myocardial infarction enrolled in the original study were interviewed by a research nurse or research assistant in the emergency department using the Myocardial Infarction Symptom Profile (MISP) questionnaire developed by Dr. Julie Zerwic (see Appendix A) to gather data with respect to physical symptoms experienced prior and during their visit. Each section of the MISP questionnaire consists of a comprehensive list of symptoms to include descriptors considered typical, atypical, or not associated with acute coronary syndrome as well as symptoms used to rule-out a cardiac diagnosis. Responses were primarily yes or no, however under the category of location, subjects were asked to identify the specific area of discomfort. Patients with more than one episode of symptoms were asked about the location of discomfort with both recent and prior symptomatic episodes; however questions with respect to time of acute symptom onset were open-ended.

### **Data Relevant to this DNP Project**

This DNP project involved secondary data analysis on symptom descriptors (i.e. chest pain, palpitations, dizziness, fatigue, generalized weakness, shortness of breath, nausea, syncope, and/or other symptoms) in patients whose primary diagnosis for

emergency department visit was atrial fibrillation. A secondary goal of this project is to compare symptoms related to atrial fibrillation between age groups, younger adult (less than 65-year-old) and older adults (65-year-old or older). Demographic information (i.e. age, race, sex, depression, smoking status, and alcohol use) were also obtained from the existing database. Institutional Review Board (IRB) approval from the University of Arizona was obtained before the project commenced.

### **Plan for Data Analysis**

The International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) version 24 for Windows was used to analyze data for this DNP project. The primary goal of this project is to describe symptoms of atrial fibrillation in patients that seek medical treatment in the emergency department. Descriptive statistics were used to organize and synthesize the data. To gain a better understanding with respect to symptoms and symptom presentation, frequency, percentages, mean, and range of number of symptoms were calculated. The secondary goal was to compare symptom presentations between younger and older adults. Inferential statistics (bivariate tests) were used to compare symptom presentations between younger (< 65 years of age) and older adults ( $\geq$  65 years of age) group.

## RESULTS

### Demographic and Physiologic Characteristics

Demographic characteristics are reported in Table 3. Among the 74 subjects included, ages ranging from 31 to 92 years ( $M = 70.47$ ,  $SD = 13.43$ ) (Table 3). The sample consisted of 56 (75.7%) men and 17 (23.0%) women. Former smokers ( $n = 37$ ; 50%) are most common among the subjects, followed by non-smokers ( $n = 23$ ; 31.1%), current smokers ( $n = 12$ ; 16.2%) and smoking not reported ( $n = 2$ ; 2.7%). The majority of participants were white 67 (90.5%). Over half the subjects were retired ( $n = 49$ ; 66.2%). The majority of subjects were either obese with body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup> ( $n = 25$ ; 33.8%) or overweight BMI 25-29.9 kg/m<sup>2</sup> ( $n = 23$ ; 31.1%). Twenty-seven subjects (36.5%) reported difficulty sleeping.

Subjects' baseline physiologic characteristics are reported in Table 4.

Hypertension ( $n = 55$ ; 74.3%) is the most common comorbidity among study subjects, followed by hyperlipidemia ( $n = 35$ ; 47.3%), coronary artery disease ( $n = 32$ ; 43.2%) and myocardial infarction ( $n = 24$ ; 32.4%). Reported family histories include cerebrovascular disease ( $n = 44$ ; 59.5%), diabetes mellitus ( $n = 35$ ; 47.3%), hypertension ( $n = 31$ ; 41.9%), stroke ( $n = 10$ ; 13.5%) and hyperlipidemia ( $n = 9$ ; 12.2%).

### Symptom Descriptors

Of a total of 37 symptoms (see Table 5), 18 cardiac symptoms include chest discomfort, palpitations/funny heart beating of the heart, chest pressure, chest pain, and chest tightness rank among the top most frequent symptoms reported. Gastrointestinal symptoms identified include, belching, nausea, indigestion, and vomiting. Neurologic

symptoms include general weakness, numbness or tingling in the hands, numbness or tingling in the feet, fainting, lightheaded, headache, and hot sensation or flushed.

Respiratory symptoms include suffocating and shortness of breath.

To gain a better understanding of the symptoms presentation, the symptoms have been ranked from one to 26 (Table 5) to reflect the most frequent symptoms to the least frequent symptoms reported. Chest discomfort was the most common symptom reported by 50 (67.6%) subjects. Generalized weakness and shortness of breath are second commonly reported symptom (n = 39; 52.7%) followed by palpitations/funny beating of the heart and unusual fatigue/tiredness as third commonly reported symptom (n = 36; 48.6%).

### **Symptoms Experienced by Younger and Older Adults**

To address the secondary goal of this DNP project, Chi-square tests were performed to compare the symptoms presentations between younger (< 65 years of age, n=21) and older adults ( $\geq$  65 years of age, n=52) groups. There were no significant differences in symptoms experienced by age except the symptom of sweating. Of the 21 younger patients, 14 (n = 66.7%) experienced sweating while only 18 (40%) of the older patients experienced sweating ( $\chi^2 (df = 1) = 4.08, p = .043$ ).

Table 3

*Demographic Characteristics*


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Variables	N	%
<b>Biological Sex</b>		
Female	17	23.0%
Male	56	75.7%
<b>Marital Status</b>		
Single	10	13.5%
Married	36	48.6%
Divorced	6	8.1%
Widowed	21	28.4%
<b>Race</b>		
Black	2	2.7%
White	67	90.5%
Unknown	2	2.7%
Asian	1	1.4%
➤ 1 Race	1	1.4%
<b>Ethnicity</b>		
Non-Hispanic	71	95.9%
Hispanic	2	2.7%

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Table 3 (continued)

*Demographic Characteristics*


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Variables	N	%
Employment		
Employed	14	18.9%
Unemployed	5	6.8%
Retired	49	66.2%
Disabled	5	6.8%
BMI Category (kg/m <sup>2</sup> )		
Underweight ( $\leq 18.5$ )	2	2.7%
Normal (18.6-24.9)	20	27%
Overweight (25-29.9)	23	31.1%
Obese ( $\geq 30$ )	25	33.8%
Smokers		
Former	37	50.0%
Never	23	31.1%
Current	12	16.2%

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Table 3 (continued)

*Demographic Characteristics*

Variables	N	%		
Alcohol Use				
No	30	40.5%		
Yes	24	32.4%		
Former User	16	21.6%		
Former Abuse	1	1.4%		
Abuse/Alcoholic	1	1.4%		
Difficulty sleeping				
No	42	56.7%		
Yes	27	36.5%		
	N	M	SD	
Age (years)	73	70.47	13.43	
Weight (pounds)	72	192.86	50.68	
Height (inches)	70	68.70	3.63	
Years Smoked	47	26.98	17.52	

Table 4

*Subjects' Physiologic Characteristics*

Variables	N	%
<b>Past Medical History</b>		
Coronary Artery Disease	32	43.2%
Myocardial Infarction	24	32.4%
Diabetes Mellitus	18	24.3%
Hypertension	55	74.3%
Hyperlipidemia	35	47.3%
Coronary Artery Bypass Graft	16	21.6%
Percutaneous Coronary Interventions	18	24.3%
Congestive Heart Failure	20	27.0%
Transient Ischemic Attack	1	1.4%
Depression	18	24.3%
<b>Family History</b>		
Diabetes Mellitus	35	47.3%
Hypertension	31	41.9%
Hyperlipidemia	9	12.2%
Stroke	10	13.5%
Cerebrovascular Disease	44	59.5%

Table 5

*Ranked Symptom Descriptors*

Rank	Variables	Total Subjects	Symptom Present		Symptom Absent	
		N	N	%	N	%
#1	Discomfort (chest)	62	50	67.6%	12	16.2%
#2	General Weakness	64	39	52.7%	25	33.8%
	Shortness of Breath	64	39	52.7%	25	33.8%
#3	Palpitation/Funny Beating of the Heart	64	36	48.6%	28	37.8%
	Unusual Fatigue/Tiredness	65	36	48.6%	29	39.2%
#4	Pressure (chest)	62	34	45.9%	28	37.8%
	Pain (chest)	62	34	45.9%	28	37.8%
#5	Tightness (chest)	61	33	44.6%	28	37.8%
	Lightheaded	64	33	44.6%	31	41.9%
#6	Dizziness	64	32	43.2%	32	43.2%
	Sweating	66	32	43.2%	34	45.9%
#7	Dull ache	61	31	41.9%	30	40.5%
#8	Weight in the Center of the Chest	60	29	39.2%	31	41.9%
#9	Heaviness (chest)	60	28	37.8%	32	43.2%
#10	Suffocating	59	23	31.1%	36	48.6%
	Anxious/Nervous	41	23	31.1%	18	24.3%

Table 5 (continued)

*Ranked Symptom Descriptors*

Rank	Variables	Total Subjects	Symptom Present		Symptom Absent	
		N	N	%	N	%
#11	Band Across the Chest	61	22	29.7%	39	52.7%
#12	Fearful or Frightened	65	21	28.4%	44	59.5%
#13	Nausea	65	20	27.0%	45	60.8%
#14	Indigestion	65	19	25.7%	46	62.2%
	Headache	65	19	25.7%	46	62.2%
#15	Vice-like (chest)	61	18	24.3%	43	58.1%
	Sharp (chest)	61	18	24.3%	43	58.1%
#16	Numbness or Tingling in the Hands	65	16	21.6%	49	66.2%
#17	Squeezing (chest)	62	15	20.3%	47	63.5%
	Belching	65	15	20.3%	50	67.6%
#18	Hot Sensation or Flushed	41	14	18.9%	27	36.5%
#19	Numbness or Tingling in the Feet	65	13	17.6%	52	70.3%

Table 5 (continued)

*Ranked Symptom Descriptors*

Rank	Variables	Total Subjects	Symptom Present		Symptom Absent	
		N	N	%	N	%
#20	Leg Cramps	64	12	16.2%	52	70.3%
#21	Knife-like (chest)	62	11	14.9%	51	68.9%
	Numbness (chest)	61	11	14.9%	50	67.6%
#22	Burning (chest)	62	10	13.5%	52	70.3%
	Stabbing (chest)	62	10	13.5%	52	70.3%
#23	Vomiting	64	9	12.2%	55	74.3%
#24	Crushing (chest)	61	8	10.8%	53	71.6%
#25	Fainting	64	5	6.8%	59	79.7%
#26	Cutting (chest)	61	4	5.4%	57	77.0%

## DISCUSSION

The primary objective for this DNP project was to identify symptoms in patients with atrial fibrillation that presented to the emergency department for medical treatment. The patient that presents to the emergency department with symptomatic atrial fibrillation can present with a variety of symptoms. Chest discomfort is the most common symptom reported in study subjects. The secondary objective of the project was to compare symptoms of atrial fibrillation between the younger and older adults. Sweating is the single symptom experienced between the two age groups. Younger adults (66.7%) experienced significantly more sweating than older adults (40%).

Data from this DNP project showed that patients with atrial fibrillation seeking care in the Emergency Department may present with symptoms similar to acute coronary syndrome, suggesting that providers need to consider atrial fibrillation when formulating differential diagnoses after ruled out for ACS. Similar to existing literature, patients with atrial fibrillation generally experience symptoms of chest pain, dizziness, palpitations, and shortness of breath. In addition, findings from this study showed that symptoms of chest discomfort, generalized weakness, and unusual fatigue/tiredness are also frequently reported by almost half of the study subjects.

Prior studies have shown that chest pain was more commonly reported by over 10% of study subjects (Buccelletti et al., 2013; Lip et al., 2015; Salam et al., 2014; Vermond et al., 2014). We found that chest discomfort is the most common symptom and chest pain/pressure/tightness was also reported by almost half of study subjects. This finding contrasts the current American College of Cardiology (ACC)/American Heart

Association Task Force on Practice Guidelines (AHA)/Heart Rhythm Society (HRS) guidelines that report fatigue as the most common symptom of atrial fibrillation (January et al., 2014). This finding also contrasts with studies that found chest discomfort reported by less than 10% of subjects (Freeman et al., 2016; Lok & Lau, 1995; McCabe, Chamberlain, Rhudy, & DeVon, 2016a; McCabe, Rhudy, Chamberlain, & DeVon, 2016b). Such discrepancy may be due to methods utilized to collect data with respect to atrial fibrillation symptoms. For example, medical record review was used by Lok and Lau (1995), Salam et al. (2014), Scheuermeyer et al. (2016), Buccelletti et al. (2013), and Siontis et al. (2016). The issue with medical records review is that the information documented in the medical record is only as good as the information put into the chart. When the clinician does not document chest discomfort, such descriptor will not be reflected in the medical record; therefore not identified during medical record review. This does not imply that the clinician did not ask specifically about this symptom and/or that the patient did not acknowledge this symptom.

In the ORBIT-AF registry, Freeman et al. (2015) and Golwala et al. (2016) assessed symptoms of atrial fibrillation with respect to quality of life using AFEQT questionnaire completed by the patient and/or physician. Symptoms evaluated include palpitations, dyspnea with exertion, fatigue, lightheadedness/ dizziness, dyspnea at rest, exercise intolerance, chest tightness, and syncope/fainting. Freeman et al. (2015) and Golwala et al. (2016) found that palpitations, dyspnea with exertion, and fatigue as common symptoms of atrial fibrillation reported by about 32% and 28%, and 26% of study subjects, respectively. In contrast, the results of this study showed that

palpitations/funny beating of the heart, shortness of breath, unusual fatigue/tiredness reported by 48.6%, 52.7%, and 48.6% of study subjects, respectively. The reason for such differences in the symptoms reported between the ORBIT-AF registry and the present study is likely due to ORBIT-AF is a multicenter outpatient database study, while patients in the present study are those who exhibited symptoms triggering care-seeking in the Emergency Department.

Palpitations, often reported as the most common symptom in patients with atrial fibrillation (Buccelletti et al., 2013; Freeman et al., 2015; Golwala et al., 2016; Lip et al., 2015; Lok & Lau, 1995; Siontis et al., 2016), was also reported by almost half of the subjects (n = 36; 48.6%) in the present study. In this study, unusual fatigue/tiredness was reported by almost half of subjects. Unusual fatigue/tiredness, reported by 73% of study subjects in McCabe et al.'s studies (McCabe, Chamberlain, Rhudy, & DeVon, 2016a; McCabe, Rhudy, Chamberlain, & DeVon, 2016b) was reported in less than 30% of subjects in two studies (Freeman et al., 2015; Golwala et al., 2016). This discrepancy may be due to methods used to evaluate atrial fibrillation symptoms. For example, Freeman et al. (2015) and Golwala et al. (2016) performed medical records review to evaluate atrial fibrillation symptoms, while McCabe et al. (2016a) and McCabe et al. (2016b) evaluated symptoms using structured face to face hospital interview or telephone interview following hospital discharge.

McCabe et al. (2016a) and McCabe et al. (2016b) evaluated six symptoms of atrial fibrillation in hospitalized patients and reported that fatigue, dyspnea, and rapid heartbeat as the most common symptoms, reported by 73% and 68% and 67% of study

subjects, respectively. In contrast, the results of the present study showed unusual fatigue/tiredness, shortness of breath, and palpitations/funny beating of the heart reported only by 48.6%, 52.7%, and 48.6% of study subjects, respectively. In addition, chest discomfort, the least common symptom reported by 29% of the subjects in the studies by McCabe et al. (2016a, 2016b), is the most common symptom reported by 67.6% participants in the present study. McCabe et al. (2016a) and McCabe et al. (2016b) utilizing face to face structured interview or telephone interview after discharge. The reason for such differences in symptoms reported between studies by McCabe et al. (2016a, 2016b) and the present study is likely due to patient population. This DNP project included more men (75.7% vs. 49%) and retired subjects (66.2% vs. 43%) than in the study by McCabe et al. (2016b). Study subjects for this project reported high percentage of hypertension (74.3%), coronary artery disease (43.2%), diabetes (24.3%) history of percutaneous coronary interventions (24.3%); however (27.0%) reported congestive heart failure. Subjects in the study by McCabe et al. (2016b) reported less frequent comorbidities: hypertension (71%), heart failure (38%), coronary artery disease (28%), and diabetes (13%). It is possible that differences in comorbidities may contribute to the disparity between symptoms reported in this DNP project and in the study by McCabe et al. (2016b).

Buccelletti et al. (2013) evaluated six symptoms of atrial fibrillation using a symptom checklist at the time patients experienced symptoms in patients diagnosed with recent onset atrial fibrillation in the emergency department. Palpitations, dyspnea, chest pain, and weakness were reported by 73.5%, 18.8%, 16.5%, and 12.5% of study subjects,

respectively. In contrast, the results of the present study showed palpitations/funny beating of the heart, shortness of breath, chest pain, and general weakness reported by 48.6%, 52.7%, 45.9%, and 52.7%, respectively. The reason for such differences in symptoms reported between Buccelletti et al. (2013) and the present study is likely due to methodology and patient population. Buccelletti et al. (2013) utilized medical records review conducted outside the U.S. In contrast, this study evaluated data gathered via structured interview in subjects that presented to the emergency department in the U.S. Buccelletti et al. (2013) enrolled study subjects with the primary admission/ discharge diagnosis of atrial fibrillation that presented to the emergency department and excluded subjects with permanent atrial fibrillation or an ongoing acute coronary syndrome. Subjects enrolled in the present study presented with angina or angina equivalent symptoms with suspected acute coronary syndrome in the emergency room department that were diagnosed with atrial fibrillation. This DNP project included a small sample size ( $n = 74$  versus  $n = 3085$ , respectively) and more men (75.7% vs. 50.8%, respectively) than in the study by Buccelletti et al. (2013). Study subjects in this project also have a high percentage of hypertension (74.3%), history of coronary artery disease (43.2%), diabetes mellitus (24.3%), and heart failure (27.0%). Subjects in the study by Buccelletti et al. (2013) reported less frequent comorbidities: hypertension (59.3%), history of coronary artery disease (14.6%), diabetes mellitus (12.2%), and heart failure (7.1%). It is possible that differences in comorbidities may contribute to the disparity between symptoms reported in this DNP project and in the study by Buccelletti et al. (2013).

The objective of this DNP project was not to determine symptom clusters in patients that seek medical attention in the emergency department for atrial fibrillation; however several symptoms are frequently reported. Streur et al. (2016) found seven common symptoms in patients that present to the emergency department with more than one symptom of atrial fibrillation. Shortness of breath with activity and exercise intolerance made up the “With Activity” symptom cluster; while chest pain, shortness of breath, dizziness, and fatigue at rest made up the “At Rest” symptom cluster and the symptom of palpitations did not cluster with other symptoms (Streur et al., 2016). The theory of unpleasant symptoms endorses that multiple symptoms can be experienced simultaneously and contribute to the interactive nature and complexity of the symptoms experience (Lenz et al., 1997). Symptom cluster analysis could provide key insight into understanding and determining the combination of symptoms that contribute to the symptoms presentation in atrial fibrillation patients that seek emergency medical treatment.

The secondary objective of this DNP project was to compare the symptoms presentation between age groups, younger (< 65 years of age) adults and older ( $\geq$  65 years of age) adults. This is the first study comparing symptoms between age groups. Salam et al. (2014) identified the need to determine if palpitations in patients under the age of 65 are as common as symptoms of dyspnea and fatigue are in older patients. Palpitations, dyspnea and fatigue did not reach statistical significance when comparing two age groups. Instead, finding from this study showed that the only symptom reaching statistical significance between groups is that sweating was reported by over 50% of

subjects in the younger age group as compared with 40% reported by the older age group. The difference in sweating found between these two age groups could potentially be due to subclinical hyperthyroidism, hypertension, or age related structural and functional changes in the cardiovascular system. There is a possibility that heart rate, like tachycardia, may account for the symptom of sweating found in younger adults. Future studies are needed to determine such correlation.

Sweating aids in maintaining thermoregulation by cooling the body down when exposed to environmental conditions (i.e. exercise or hot summer day), in response to emotional stimuli or stressors (i.e. feeling anxious, embarrassed, or mad), and/or in response to processors due to regulatory system competition in the body (i.e. osmoregulation, respiratory control, and circulatory). The majority of existing research in age related sweating changes focuses on temperature regulation. Healthy men and women over age 60 generally have a lower body internal core temperature than their younger adult counterparts (Blatteis, 2012). Corrective measures to regulate body temperature occur when thermosensors inside and/or outside the body signal the brain indicating core body temperature is at risk leading to the activation of corrective measures to avoid indecent up or down variation in body temperature (Blatteis, 2012). Sweat rate and skin blood flow increase due to exposure to a hot environment or exercise raises the internal and skin temperature (Shibasaki & Crandall, 2010). There is a decrease in sweat gland function and the number of sweat gland activated by heat decrease with age (Blatteis, 2012). Dehydration in the elderly is common and predisposes the patient to produce less sweat, because the production of sweat depends on an adequate supply of blood (Blatteis,

2012). Water deficit reduce intracellular and extracellular fluid volume may result in impaired sweating in older adults.

Increased sweating is a sign of hyperthyroidism in younger (< 50 years of age) but not in older patients ( $\geq 70$  years of age) (Trivalle et al., 1996). Although hyperthyroidism is a recognized and relatively rare causative agent of atrial fibrillation (Reddy, Taha, Kundumadam, & Khan, 2017), it was not part of the comorbidities reported in this research project. Therefore it is speculated that subclinical hyperthyroidism could be the potential cause of atrial fibrillation and recognized that medical records review is needed to confirm or deny this speculation. Further research is needed to determine if inclusion of sweating in the younger adult patient may contribute to the identification of atrial fibrillation in these subjects and its association with subclinical hyperthyroidism.

The variability in the clinical presentation and lack of symptom specificity of atrial fibrillation could potentially contribute to the utilization of common descriptors (e.g. palpitations, chest pain, lightheadedness, fatigue, and shortness of breath) shared between several cardiac and non-cardiac disorders. Such lack of atrial fibrillation specific symptoms may contribute to the lack of a practical assessment tool. It is likely that future effort for the assessment of atrial fibrillation symptoms should focus on dissemination of these common but nonspecific symptoms so that atrial fibrillation can be included in formulating differentials rather than trying to develop common language for the assessment of atrial fibrillation symptoms. This research project analyzed data collected utilizing the symptoms checklist (see Appendix A) to evaluate for angina or angina equivalent symptoms in patients that seek care in the emergency department, of which,

74 subjects were later diagnosed with atrial fibrillation. The findings of this DNP project are based on the secondary analysis of existing data and the assessment tool utilized in the primary study was not designed specifically to evaluate for symptoms of atrial fibrillation. The results of this study clearly reflect the need to incorporate the assessment of symptomatology into the clinical guidelines. The symptoms identified in this project can be used to aid in the identification of patients that present to the emergency department with symptomatic atrial fibrillation.

Symptoms aid the clinician in formulating the differential diagnosis. In patients that present to the emergency department with angina or angina like symptoms, the clinician must consider atrial fibrillation in the differential diagnosis. The (EHRA) and (AFNET) panel recommend assessing for symptoms and disease related quality of life as secondary outcome parameters (Kirchhof et al., 2017). The lack of guidelines to address assessing atrial fibrillation symptomatology and recommendations for assessing atrial fibrillation symptoms as secondary outcomes have the potential to exclude patients that present to the emergency department with symptoms of atrial fibrillation. Patients that seek medical attention in the emergency department for atrial fibrillation symptoms have common symptoms that may be helpful when evaluating these patients. Based on the findings in this DNP project the guidelines need to incorporate symptomology assessment in patients that present to the emergency department with symptoms of atrial fibrillation. The results of this project endorse that a comprehensive evaluation of symptoms need to include chest discomfort, generalized weakness, shortness of breath, palpitations/ funny beating of the heart, unusual fatigue/ tiredness, chest pressure, chest

pain, chest tightness, lightheaded, dizziness, sweating, and dull ache as these symptoms are reported in over 40 percent of study subjects.

### **Strengths and Limitations**

The general approach for this DNP project is data driven by the variables contained within a dataset that dictate the development of the research questions as well as the determination of the analytic plan. Consultation with the original study primary investigator ensured the match between this DNP project research questions with the existing dataset as well as the exchange of information with respect to the original study methodology, and the instrument used to collect data. An additional strength to the project is the setting where the structured interview took place and the time of the interview. In the original study, subjects were interviewed in the emergency department increasing the potential for data to accurately reflect the symptoms that lead to seeking emergency medical treatment of atrial fibrillation. Conducting the structured interview while the patient is in the emergency department for treatment contributes to collection of real time symptom data to determine the symptoms experienced and thereby reduces the potential for recall delay that subjects may experience outside the emergency department. The final strengths of this secondary analysis of existing data are the availability of data. Data collection is “typically the most time-consuming and expensive part of a study” and the utilization of existing data permits the researcher to detour past this step, which contributes to cost reduction (Polit & Beck, 2012).

The limitations for this DNP project are the lack of control over the subjects and data collection. Primary studies provide the opportunity to tightly control the study

population and to collect data specifically to address the research question or hypothesis (Smith et al., 2011). The subjects in this project are a subset identified from the original study and may not represent all possible subjects that present to the emergency department with atrial fibrillation. The researcher for this project was not part of the original study team and therefore not present during the interview process, which brings about the lack of ability to observe the respondents during the structured interview and/or participate in data collection. Researcher bias is a potential limitation founded on the structured interview format for data collection by trained representatives in the original study that required the interviewer to select the corresponding yes or no answer selection for each question based on the answer provided by the study participant. The variables identified and results obtained are derived from the existing data collected to evaluate symptoms in patients that present to the emergency department with angina or angina equivalent symptoms that were later diagnosed with atrial fibrillation. The utilization of the symptom checklist comprised of both cardiac and non-cardiac symptoms to collect data obtained from structured interviews that petitioned yes or no responses may have influenced participant responses. The list of symptoms (see Table 5) are abstracted from the list of symptom descriptors found within the existing data set then categorized to formulate the list of common symptoms based on the yes or no response documented within the data set.

### **Future Research**

The large number of symptom descriptors identified in this project should be studied in a larger and more diverse patient population as this study included a small

sample size and lacked racial diversity. An expansive symptom evaluation can provide valuable information for the clinician; however time constraints and hectic emergency department environment necessitate the implementation of brief and focused symptom inquiry. The clinician in the emergency department must perform a thorough but yet efficient evaluation. Further research is needed to determine if the symptoms identified in this research project have a significant impact on the diagnosis of atrial fibrillation, to determine the most efficient and effective mechanism to evaluate atrial fibrillation symptom descriptors, and to formulate an appropriate tool to evaluate these patients in the emergency department. Further research is also needed to determine if symptoms clusters can be found that can offer clinicians a new approach to the assessment and management of atrial fibrillation patients that present to the emergency department. Further research is needed to confirm the statistically significant finding of sweating in the younger adult age group.

In the general population, more women than men have atrial fibrillation. The present study consisted of 75.7% men and 23.0% women. It is likely that gender distribution may influence the results found in the present study. Future larger studies are needed to determine gender differences in symptom descriptors in patients with atrial fibrillation that seek medical attention in the emergency department.

### **Conclusion**

In conclusion, atrial fibrillation is the most predominant arrhythmia encountered upon hospital admission in the U.S. (Heidt et al., 2016). Chest discomfort was the most common symptom reported by all study subjects, followed by general weakness and

shortness, palpitations/funny beating of the heart and unusual fatigue/ tiredness, chest pressure and chest pain, and chest tightness and lightheadedness. Sweating is found to be the only symptom significantly more common in the younger age group (< 65 year of age) when compare to the older age group ( $\geq 65$  years of age). Findings from this project may facilitate early and effective identification of patients that present to the emergency department with atrial fibrillation to reduce adverse events and improve patient outcomes.

APPENDIX A

QUESTIONNAIRE DEVELOPED BY DR. JULIE ZERWIC

**ANGINA & MYOCARDIAL INFARCTION SYMPTOMS PROFILE  
POSTERIOR MI STUDY**

PI: SHU-FEN WUNG, PHD, RN, ACNP, UNIVERSITY OF ARIZONA, COLLEGE OF NURSING

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1. Date & time arrived in the emergency room: \_\_\_\_/\_\_\_\_/\_\_\_\_ (MM/DD/YY); \_\_\_\_:\_\_\_\_ (HH:MM in military time)
2. Date & time of this interview: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ (MM/DD/YY); \_\_\_\_: \_\_\_\_ (HH:MM in military time)

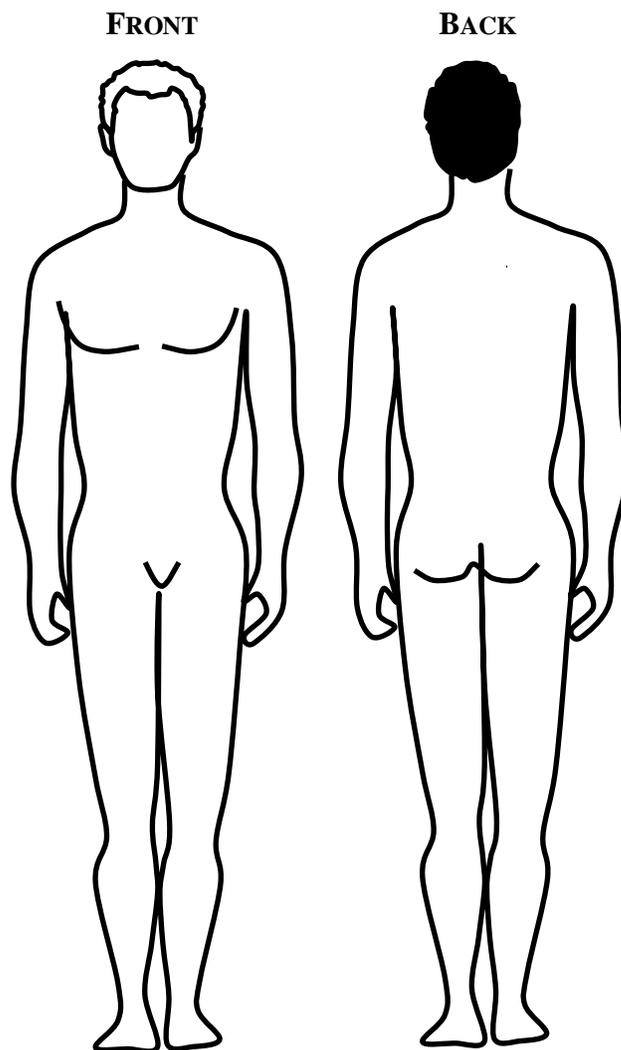
**This is a questionnaire designed to gather a complete description of what you felt during and prior to your visit to the hospital. First, I would like to talk about how you are feeling today.**

3. What brought you to the hospital today?  
**PROMPT QUESTION:** 3.1. What made you decide to come to the hospital today?
  
4. Please describe the symptoms you experienced and their locations, in the order in which they occurred.  
(Skip this question *ONLY* if already answered in question 3, re: symptoms, location, sequence)  
  
SYMPTOMS:  
LOCATIONS:  
SEQUENCE/ORDER:
  
5. What concerned you the most about \_\_\_\_\_?  
(How you felt re: symptoms)
  
6. What was going through your mind when you were experiencing these symptoms?
  
7. If patient mentioned that they ignored their symptoms at any point prior to the hospital visit, be sure to ask “Why did you ignore/disregard these symptoms at that time?”
  
8. When did you start feeling \_\_\_\_\_? **OR** When did you first notice \_\_\_\_\_?  
(fill out symptoms from Quest. 3&4) (fill out symptoms from Quest. 3 &4)  
When: \_\_\_\_\_
- 8.1 How long did the(se) feeling(s) last? \_\_\_\_\_ (minutes, hours, etc.)
- 8.2 How did your symptoms start (abruptly or gradually)? \_\_\_\_\_

8.3 (for RAs) Please calculate the time (in half-hour) from the onset of symptom to care-seeking (contact someone for professional help): \_\_\_\_\_.\_\_ hours

8.4 (for RAs) Please calculate the time (in half-hour) from the onset of symptom to hospital arrival: \_\_\_\_\_.\_\_ hours

9. What activity were you doing when \_\_\_\_\_ started?  
(fill out symptoms from questions 3 &4)
10. How frequently have you been having the(se) symptom(s)? (e.g. occurrences per day, week, or month)
11. Was there anything you did that made you feel worse?  
 No (0),  Yes (1), If yes, what was it?  
\_\_\_\_\_
12. Do you have symptom(s) during physical exertion (such as, walking/exercising)?  
 No (0),  Yes (1), other:  
\_\_\_\_\_
13. Was there anything you did that would always bring on your symptoms? (i.e., walking, housework etc.)  
 No (0),  Yes (1), What was it?  
\_\_\_\_\_
14. Are there things you avoided because of how you felt?  
 No (0),  Yes (1), What was it?  
\_\_\_\_\_
15. Was there anything you did that helped you feel better?  
 No (0),  Yes (1), If yes, what was it?  
\_\_\_\_\_
16. Do you still have the(se) symptom(s) when you are resting quietly?  
 No (0),  Yes (1), other:  
\_\_\_\_\_
17. I am going to show you a diagram of locations where you may have experienced discomfort. I would like you to “circle” the areas where your symptoms occurred. Mark an “X” which represents the area where the feeling was most intense/severe.



18. How would you describe these feelings? List words next to corresponding location marked.
19. Of the symptoms you experienced, which symptom bothered you the most?
- 20.1. Please rate how much this symptom \_\_\_\_\_ (list symptom) bothered or upset you on a scale of 0 to 10, with 0 being not upsetting/bothersome at all, and 10 being the most upsetting/bothersome you can imagine?

None \_\_\_\_\_  
 The most upsetting  
 0 1 2 3 4 5 6 7 8 9 10  
 bothersome you can imagine

- 20.2. How would you rate the intensity of this symptom (at its peak), on a scale of 0–10, with 0 being not intense, 10 being the worst intensity you can imagine?

None \_\_\_\_\_  
 The worst you  
 0 1 2 3 4 5 6 7 8 9 10  
 can imagine

21. I am going to read to you a list of words people use to describe what they were feeling. Please tell me which words described what you were feeling prior to your visit to the hospital.

	<b>No</b>	<b>Yes</b>
1. Pressure.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
2. Squeezing.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
3. Knife-like.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
4. Dull ache.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
5. Burning.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
6. Band across my chest.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
7. Weight in the center of my chest.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
8. Pain.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
9. Discomfort.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
10. Stabbing.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
11. Vise-like.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
12. Suffocating.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
13. Crushing.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
14. Heaviness.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
15. Numbness.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
16. Cutting.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
17. Tightness.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
18. Sharp.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)

22. Did you experience any other feelings that we have not discussed? No  (0) Yes  (1)  
 If yes, please describe.

23. Some people experience other feelings. I am going to read a list of other possible feelings or sensations. Please tell me if you experienced any of these.

	<b>No</b>	<b>Yes</b>
1...Belching.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
2...Nausea.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
3...Indigestion.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
4...Dizziness.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)
5...Sweating.....	<input type="checkbox"/> (0)	<input type="checkbox"/> (1)

- 6...General weakness .....  (0)  (1)
- 7...Numbness or tingling in your hands .....  (0)  (1)
- 8...Numbness or tingling in your feet .....  (0)  (1)
- 9...Shortness of breath .....  (0)  (1)
- 10..Vomiting .....  (0)  (1)
- 11..Palpitations/funny beating of your heart ...  (0)  (1)
- 12..Fainting .....  (0)  (1)
- 13..Lightheaded .....  (0)  (1)
- 14..Leg cramps .....  (0)  (1)
- 15..Fearful or frightened .....  (0)  (1)
- 16..Unusual fatigue/tiredness .....  (0)  (1)
- 17..Headache .....  (0)  (1)
- 18..Anxious/nervous .....  (0)  (1)
- 19..Hot sensation or flushed .....  (0)  (1)

24. Do you have a prescription for Nitroglycerine? No  (0) Yes  (1)  
*\*For those subjects who have used Nitroglycerine, please ask the following questions:*

24.1. Did you use Nitroglycerine when your symptoms started?

No  (0) Yes  (1)

24.2. When you used Nitroglycerine, did your symptoms go away?

No  (0) Yes  (1)

- If yes, how long (in minutes) did it take for your symptoms to go away?  
 \_\_\_\_\_ minutes
- If yes, how many Nitroglycerine tablets did it take to make your symptoms go away? \_\_\_\_\_

24.3 Do you use Nitroglycerine every time you experience symptoms?

No  (0) Yes  (1)

- If no, why not?
- 

**Now we are going to talk about how you felt in the last week or so.**

25. Did you experience any symptoms that might be related to your heart in the last week or so?

No  (0) Yes  (1)

*If yes, ask the following questions:*

25.1 What were your symptoms? \_\_\_\_\_

25.2 When did you first notice these feeling? \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_(MM/DD/YY)

25.3 Have you felt this way more than once? ..... No  (0) Yes  (1)

- If yes, how often?

\_\_\_\_\_

25.4 Were your symptoms exactly the same way ( *e.g. intensity and same exact symptoms*) each time?.....No  (0) Yes  (1)

25.5 If *no*, please describe the difference in how you felt.

\_\_\_\_\_

**Now we are going to talk about your symptoms in general.**

26. Have any of the symptoms we discussed today affected your day to day life over the last two years?

- No (0)  
 Yes (1)

26.1 If so, what symptoms have affected your life?

26.2 How have the symptoms affected your life?

27. Has the frequency of symptoms changed in the last two years?

- No (0)  
 Yes (1), I felt \_\_\_\_\_ more frequently.  
(List symptoms)  
 Yes (2), I felt \_\_\_\_\_ less frequently  
(List symptoms)

*If the subject responded that the frequency of episodes changed ask the following questions:*

28. When did you notice this change in your symptoms?

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_ (MM/DD/YY)

28.1 What was the frequency of your symptoms before this change?  
 \_\_\_\_\_ (e.g. occurrences per day, week, or month)

28.2 What was the frequency of your symptoms after this change?  
 \_\_\_\_\_ (e.g. occurrences per day, week, or month)

Thank you very much for your help.

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