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Medication and Self-Efficacy of Patients Living with Heart Failure: A Mixed-Methods Study

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Medication and Self-Efficacy of Patients Living with Heart Failure:

A Mixed-Methods Study

Janet Gavin Knecht, PhD

University of Connecticut, 2014

Although prescription medication adherence has been studied in the Heart Failure (HF) population, little attention has focused on the patient's overall medication practices including over the counter medications and their confidence in following their prescribed therapeutic regime. The primary aim of this study is twofold: 1) Measure and gain a more complete understanding of HF medication management self-efficacy and 2). Quantify self-medication practices. Patients with HF live with the certainty that their quality of life depends on the proper management of multiple medications and innumerable therapeutic regimes. Failure to properly manage prescription medications increases the risk of exacerbation of HF and increased rates of rehospitalization. The prevention agenda for the United States, Healthy People 2020, calls for identification of the most significant, preventable threats to US health and establishes national goals to reduce these threats. This project identifies adverse medication practices in patients with HF, a significant threat to the health of the nation's older adults. Older adults have significant knowledge deficits with respect to interactions of prescription and over the counter (OTC) medicines. This mixed-method study employed a convergent parallel mixed-methods design (Creswell & Plano Clark, 2011). A telephone interview was used to complete the ActualMeds™ and HF medication self-efficacy instrument. Concurrently, qualitative interviews are conducted on the patients who scored high and low on HF medication self-efficacy to discover their perspective of their therapeutic regime. The qualitative

interviews inform the researcher and validate the data from the quantitative strand providing greater depth to the process of patients' self-medication practices and adherence along with self-efficacy when living with HF. Data reveal that polypharmacy is pervasive and patients are prescribed medications not recommended for the gerontologic population and / or risk anticholinergic burden. Future study is required to enhance this technology to provide seamless communication between providers and patients to decrease the risk to patients.

Medication and Self-Efficacy of Patients Living with Heart Failure:

A Mixed-Methods Study

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A Dissertation

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Doctor of Philosophy Dissertation

Medication and Self-Efficacy of Patients Living with Heart Failure:

A Mixed-Methods Study

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Table of Contents

Chapter 1: Introduction	1
Background and significance	2
Purpose	3
Research Questions	4
Methodology Worldview	5
Definition of Essential Concepts	5
Chapter 2: Theoretical Framework	8
Theory of Self-Efficacy	8
Concepts	9
Research on Self Efficacy	12
Review of Literature	14
Quantitative Issues of Self Medication and Self Care	14
Qualitative Issues of Living with Heart Failure	18
Mixed Methods Research	21
Chapter 3: Design and Methodology	23
Design	23
Instruments	25
Ethical Considerations	29
Sample	29
Quantitative and Qualitative Procedure	30
Threats to Quantitative Internal Validity	31
Threats to Quantitative External Validity	32

Threats to Integrity	32
Quantitative Data Analysis	33
Qualitative Data Analysis	34
Mixed Methods Data Analysis	34
Chapter 4: Results	36
Data Collection	37
Quantitative Results	38
Outcome Expectation Scores	42
Medication Regime Self Efficacy	43
Qualitative Results	43
Social Support	45
Attitudes and Beliefs	46
Formulating Coping Strategies	47
Mixed-Methods Results	50
Integrity	52
Despair	53
Chapter 5: Discussion	56
Summary of Findings	56
Anticholinergic Risk	58
Clinical Implications	60
Depression	61
Case Highlights	62
Strengths	64

Limitations	64
Implications for Nursing Education and Practice	65
Implications for Nursing Research	68
References	71
Tables	87
Figures	94

Chapter 1

Introduction

Defining the Problem

Heart failure (HF) is a major public health problem in the United States. It is defined as a clinical syndrome that results from any structural or functional disorder that decreases the ability of the ventricles to fill or eject blood. HF is diagnosed from a myriad of symptoms that result in dyspnea and fatigue (Yancy et al., 2013). More than five million people have been diagnosed with HF, and more than 650,000 people are diagnosed each year (Yancy et al., 2013). Approximately 5.7 million Americans are living with HF in this country (Roger et al., 2012). The cost of HF was sustained at almost 35 billion dollars annually from 2008 to 2011 (Heidenreich et al., 2013) and more Medicare dollars are spent on the primary diagnosis of HF than any other diagnosis related group (Jencks, Williams, & Coleman, 2009; Zhang, Rathouz, & Chin, 2003). HF is responsible for over one million admissions annually and is the most common cause for hospital admission in persons over 65 years of age. A hospitalization stay usually lasts 7-10 days (Jencks, Williams, & Coleman, 2009). Patients with HF have the highest readmission rates, most often within weeks of discharge (Hernandez et al., 2010). Finally, HF carries a 50% mortality rate in 5 years (Go et al., 2014).

HF has been labeled a cardiovascular disorder of aging with the incidence approaching 10 per 1000 after 65 years of age. More than half of all patients diagnosed are over the age of 75 (Falk, Ekman, Anderson, Fu, & Granger, 2013; Go et al., 2014). Sixty-nine percent of total HF expenditures in 2012 were used to treat patients \geq 65 years of age (Heidenreich et al., 2013).

Failure of older adults (≥ 65 years) to take medications properly is estimated to be a factor in more than one quarter of emergency department (ED) visits (Budnitz et al., 2006). Upon admission, medication reconciliation records are often inaccurate (Balon & Thomas, 2011; Gurwitz et al., 2003). Medication nonadherence in the HF population is associated with an increased risk of all-cause mortality and cardiovascular hospitalizations (Fitzgerald et al., 2011; Wu, Moser, Chung, & Lennie, 2008; Wu, Moser, De Jong, Rayens, Chung, Riegel, et al., 2009). Failure of the healthcare system to identify and remediate poor adherence and adverse self-medication behaviors adds to the overall cost of treatment as providers typically intensify antihypertensive and HF therapy and add additional agents to the regimen further increasing the risk of adverse drug side effects as well as cost (Jencks, Williams, & Coleman, 2009; Ho, et al, 2008; Peterson, 2008). Seventy-three percent of HF patients have HTN upon admission to the hospital (Fitzgerald et al., 2011). An estimated \$100 billion is spent annually in the United States on health care for patients with poorly controlled BP in part due to poor antihypertensive medication adherence and other adverse self-medication behaviors (Institute of Medicine, 2010). Uncontrolled hypertensive HF leads to high rates of intensive care admission, prolonged hospitalization, and increased 90-day readmission (Jencks, Williams, & Coleman, 2009; Peacock et al., 2011; Hernandez et al., 2010).

Background and Significance

The prevention agenda for the United States (US), Healthy People 2020, calls for identification of the most significant, preventable threats to US health and establishes national goals to reduce these threats. This project identifies adverse self-medication practices in patients with HF, a significant threat to the health of the nation's older adults.

Older adults have significant knowledge deficits with respect to interactions of prescription and over the counter (OTC) medicines, and have low self-efficacy levels in how to avoid serious interactions (Neafsey & Shellman, 2002a). The project also promotes patients' rights delineated by the Institute of Medicine (2010) to: 1) be the primary source of control for all medication management decisions that affect them, 2) be adequately informed about their medication therapy and alternative treatments.

Patients with HF live with the certainty that their quality of life depends on the proper management of multiple medications with potential interactions, and also innumerable therapeutic regimes. Failure to properly manage prescription medications increases the risk of exacerbation of HF and increased rates of rehospitalization (Fitzgerald et al., 2011; Wu, Moser, Chung, & Lennie, 2008; Wu, Moser, De Jong, Rayens, Chung, Riegel, et al., 2009). Although prescription medication adherence has been studied in the HF population, little attention has focused on the patient's overall self-medication practices including OTC medications and their confidence in following their prescribed therapeutic regime.

Purpose

This mixed methods study addressed medication practices and HF management self-efficacy. The study used a convergent parallel mixed-methods design (Creswell & Plano Clark, 2011). Quantitative data was collected on each patient diagnosed with HF, ≥ 50 years old, and recently discharged from home care following hospitalization for any cause. Following descriptive quantitative data collection, an in depth qualitative interview was conducted on patients who scored higher (≥ 4) and lower (≤ 3) in HF medication self-efficacy. This quantitative component was meant to produce a more complete

understanding of the qualitative results. A telephone interview was employed to collect data via an online instrument that guided a structured interview by the principal researcher. The primary aim of this study was twofold: 1) measure and gain a more complete understanding of HF medication management self-efficacy and 2) quantify self-medication practices. Immediately following the completion of the quantitative interviews, qualitative interviews were conducted to discover the patients' perspective of their therapeutic regime. The results of these quantitative interviews were meant to inform the researcher and provide insight into the qualitative strand. It was to provide greater understanding and depth to the process of patients' self-medication practices and adherence along with self-efficacy when living with HF.

Research Questions

Quantitative: What are the HF medication self-efficacy scores of patients following his/her HF medication regime?

What are the self-medication practices of patients living with HF?

What is the relationship between self-efficacy scores and the number of medications or risk score of HF patients in this study?

Qualitative: What are the themes described by patients living with HF who score high and low measures on a HF medication self-efficacy instrument?

Mixed-Methods: To what extent do the quantitative scores of patients living with HF, who scored high and low in self-efficacy, inform the themes derived from qualitative interviews?

Methodology Worldview: Pragmatism

The philosophical foundation of the mixed methods approach to research is pragmatism (Creswell and Tashakkori, 2007). Truth is discovered through the test of usefulness. Within a pragmatic approach, one recognizes that there is both “a single ‘real world’ and that all individuals have their own unique interpretations of that world” (Morgan, 2007, p. 73). It evolved from the constructivist perspective, which sought to describe a problem within the social political landscape (Morgan, 2007). Mixed methods research blends the singular and multiple views of reality (Creswell & Plano Clark, 2011). Morgan (2007) advocates that the abduction-intersubjectivity-transferability approach provides an opportunity to “move back and forth between”(p. 71) the induction/deduction and subjectivity/objectivity throughout the research process. It is through this working back and forth between the theory and approaches to knowledge that the depth of the pragmatic approach is discovered. Ultimately, Morgan (2007) suggests an emphasis on “abduction, intersubjectivity, and transferability” promotes new opportunities for methodologic perspectives in research.

Definition of Essential Concepts**Heart Failure**

HF is a complex condition that results from structural or functional disease. Ultimately, it decreases the ability of the ventricles to fill or eject blood and results in dyspnea and fatigue (Yancy et al., 2013). Evolving over the past decade is the identification of two distinct etiologies resulting in HF. Long recognized and most cited in the literature, is left ventricular systolic abnormalities resulting in reduced left ventricular ejection fraction (HFrEF). More recently, a form of HF has been identified

with preserved left ventricular ejection fraction (HFpEF) in which the abnormality occurs during diastole resulting in decreased filling (Yancy et al., 2013). The American College of Cardiology (2013) has defined both etiologies and has recognized that presentation and treatment required differ (Table 1). However in its staging of the severity of HF, the American College of Cardiology defined HF by the degree of left ventricular impairment. Investigating the recommendations further, it is clear that the preponderance of evidence supporting the treatment of HF is based on the study of decreased left ventricular ejection fraction. (American College of Cardiology, 2013). While 11 of the 12 Class I recommendations for treatment of left ventricular systolic function are supported by level A or B evidence, the evidence supporting the treatment of preserved systolic function is noted briefly and supported by level C evidence.

Self-Medication Practices

Self-medication practices are patient self-reported data on use of prescription and OTC medications, nutrition and herbal supplements, alcohol and tobacco. Dose, frequency, and timing of administration of these agents were entered into the ActualMeds™ system and analyzed by the software designed for this purpose and previously validated (Neafsey et al., 2011). A Risk Score calculated by the rules engine was used as a measure of patient status.

Self-Efficacy Score

Bandura (1982) described two constructs used in self-efficacy theory: *self-efficacy expectations* and *outcome expectations*. He defined self-efficacy expectations as an individual's perceived ability to successfully complete the task. A proposition of self-

efficacy theory is that self-efficacy expectations change over time with experience and the opportunity to develop skills. It is an adaptive process. The construct of outcome expectations endorses that if a behavior were mastered, a desired outcome would result. Propositions related to outcome expectations and self-efficacy expectations differ in that, a person may expect that a certain outcome will result from a certain behavior, but not have confidence in his/ her own ability to complete the task. Prior to this study, the HF Medication Self-Efficacy Instrument (Knecht, 2012) was developed to assess these outcomes and validity was established. A score for each concept is derived from the patient responses.

Summary

This chapter has defined the problem, background and significance that patients living with HF face in their daily management of their medication regime. It has also stated the purpose and proposed the research questions. Essential concepts that will be examined throughout the paper, including HF, self-medication practices, and self-efficacy score were defined.

HF has a significant impact on patients' lives. With the population of the US aging, more people are living with this syndrome. The healthcare team must be cognizant of the problem of polypharmacy and the myriad of interactions that result from this practice. The data resulting from this research will substantiate the problem of polypharmacy and inform nurses of patients' perceptions of living with the medication regime that HF carries.

Chapter 2

Theoretical Framework and Review of Literature

This chapter presents Bandura's Social Cognitive Theory of Self-Efficacy (Bandura, 1977). It describes the foundational assumptions, definition of concepts, and the essential constructs. It reports pertinent nursing research that has employed Self-Efficacy theory for specific populations and instruments that have been developed for these populations. This chapter also presents the review of current literature. A search of the English language literature was conducted using online reference databases from 1990-2014. CINAHL Plus with Full Text, PubMed, Scopus, PsycINFO and Dissertation Abstracts were searched using the keywords HF, qualitative, experience, symptoms, quality of life, and self-care.

Self-Efficacy

Self-efficacy theory has been derived from social cognitive theory, a theory that attempts to explain and predict behavior (Bandura, 1977). Social cognitive theory is based on three paradigmatic concepts: behavior, cognitive factors, and environmental influences. These concepts form the basis of the model with the relationship of triadic reciprocal determinism. The three concepts interact bidirectionally, but not necessarily equally.

Self-efficacy theory is a psychologic theory that must be evaluated on its ability to improve the lives of individuals. As it has been adapted to nursing, interventions are designed to promote health and to improve the lives of patients in many settings. Self-efficacy theory states that a person's judgment of his or her capabilities to organize and execute courses of action will determine behavior. The goal is not to provide care but

facilitate the patient to view a successful outcome. One of the underlying assumptions is the freedom of the individual to decide behavior (Bandura, 1977). A philosophic component of self-efficacy theory is free will. However, within free will, the theory recognizes that most behavior is related to a myriad of factors that ultimately influence behavior.

Self-efficacy theory is based on several underlying assumptions. Individuals have some influence on their actions and this intentionality is described as personal agency. This influence does not guarantee control of outcomes. Most behavior is related to countless factors, which infers the possibility of many outcomes. In order for individuals to develop self-efficacy, they must be able to self-evaluate. In comparing themselves to some evaluative process, individuals determine their likelihood of success. Finally, one last underlying assumption of self-efficacy theory is individual freedom; that is, the ability to decide how to behave. Freedom is an underlying value in our culture; Bandura (1982, 1997) rejects the assumption that behavior change is an inborn drive.

Concepts

Human agency (person) is an individual's action toward a purpose; that is, individuals conceive of an idea to act, analyze the perceived consequences of the act, and choose whether or not to complete the actions. Individuals draw on prior experience to make their choices. Human agency has been derived from social cognitive theory and functions within the framework of triadic reciprocal causation. Again, the triad consists of cognitive, behavioral, and environmental influences and these concepts interact bidirectionally to influence outcomes (Resnick, 2009). At different times, any one concept might have more influence on the outcome than another concept. For the

population of patients living with HF, patients self evaluate the benefit of self-care practices. There are facilitators and barriers.

Self-efficacy expectations is a construct defined as an individual's perceived confidence in his/ her ability to successfully complete the task (Bandura, 1982). A proposition of self-efficacy theory is that self-efficacy expectations change over time with experience and the opportunity to develop skills. It is an adaptive process. *Outcome expectations* are based on a person's self-efficacy expectations; that is, if one has high self-efficacy, she will expect a successful outcome (Bandura, 1982). The proposition related to outcome expectations endorses that if a behavior were mastered, a desired outcome would result. Alternatively, propositions related to outcome expectations and self-efficacy expectations differ in that, a person may expect that a certain outcome will result from a certain behavior, but not have confidence in her own ability to complete the task. Additionally, in relation to HF, a person might believe that she is able to execute the task; however the patient might not believe that it will provide any benefit (low outcome expectations).

Within self-efficacy theory are four sources of self-efficacy information: enactive attainment, vicarious experience, verbal persuasion, and physiologic feedback. Enactive attainment, which is also referred to as enactive mastery, is the knowledge that performing an activity strengthens self-efficacy (Bandura, Adams, Hardy, & Howells, 1980). Vicarious experience is the belief that seeing others around you succeed at a task will increase your self-efficacy. Verbal persuasion is the power of influencing a participant's behavior through verbal persuasion (Bandura, 1977). Within the theory of self-efficacy, *Verbal persuasion* is also sometimes referred to as *verbal encouragement*.

Persuasion and encouragement could be viewed quite differently in clinical situations. Finally, physiological feedback states that an individual's self-efficacy is influenced by her physiologic state. Improved feelings of the patient will provide positive feedback that will enhance a favorable transition to living with HF.

There is no direct relationship between person, environment, and behavior (Figure 1). All arrows are unidirectional, moving out from the four sources of information. This theory proposes that self-efficacy expectations are impacted by the person, environment, and the four sources of information. Outcome expectations are impacted only by the person and information sources. Self-efficacy expectations and outcome expectations in turn influence behavior. It is adaptive and changes over time. For this study, *transition* was added to Bandura's model to represent the patient's *transition* through the process of living with HF.

Transition is a process that transpires with changes in our lives. Meleis, Sawyer, Im, Messiaas, and Schumacher (2000) suggest, "vulnerability is related to transition experiences, interactions, and environmental conditions that expose individuals to potential damage, problematic or extended recovery, or delayed or unhealthy coping" (p 12). At times of illness, patients are compelled to confront their symptoms and challenges they pose within the framework of their social support systems. Meleis et al. (2000) suggest there are both facilitators and inhibitors to transitions.

The model does not represent any feedback; however, feedback is reflected in the theory description. Within the definition of the concept of human agency is the assumption that individuals draw on prior experience to make decisions related to behavior. A proposition is that self-efficacy expectations change over time with

experience and the opportunity to develop skills. There is an element of pragmatism in the patient's evaluative process. As the patient develops self-efficacy and outcome expectations, he/she evaluates his/ her own ability to successfully complete the task. Studies have supported the proposition that interventions designed to reinforce the four sources of knowledge promote the adoption of healthy behavior choices.

Research on Self-Efficacy

Self-efficacy theory was developed as a psychological theory and has been adapted to nursing research for the gerontologic population by Resnick (Resnick, 2000; Resnick et al., 2006; Shaughnessy, Resnick, & Macko, 2005), Perkins and Jenkins (1998) in the area of cardiac nursing, and Lin and Ward (1996) in pain management. Self-efficacy theory has been adapted to transcultural care (Jeffreys & Smodlaka, 1999) and health promotion practices (Adderley-Kelly & Green, 2000). Self-efficacy theory continues to be used across disciplines to promote behavior change (Marks, Allegrante, & Lorig, 2005a; Marks, Allegrante, & Lorig, 2005b; Linde, Tothman, Baldwin & Jeffery, 2006; Neafsey et al., 2011).

Tests of concepts and their interplay are measured by instruments developed within different areas of research. Bandura proposed that self-efficacy is situation or behavior specific. Different instruments to measure self-efficacy in older adults, specific to a task and adapted for each population have been developed (Resnick & Jenkins, 2000). Bandura developed a standard instrument which included a 100 point Likert scale, divided into 10-unit intervals, used to rate a participant's confidence in performing a task: zero being completely uncertain, to 10, being completely certain. This scale has been used extensively. Resnick has adapted the scales she has created to have nine-unit

interval items to measure with a five point Likert scale to rate a participant's confidence at performing the task: one representing strongly agree, to five, representing strongly disagree. Her Self-Efficacy for Functional Ability (SEFA) scale (Resnick, 1999) randomly ordered the items in the nine item scale as opposed to Bandura's procedure of ordering tasks from easiest to most difficult (Bandura, 1997). Although there was no empirical difference in self-efficacy related to ordering of items, Resnick began to test instruments for each situation. She also developed the Self-Efficacy for Osteoporosis Medication Adherence (SEOMA) scale (Resnick, Wehren, & Orwig, 2003) and the Outcome Expectations for Exercise (OEE) (Resnick & Spellbring, 2000). For this current study, the HF Medications Self-Efficacy instrument was developed and previously validated (Knecht, 2012).

A patient may see his/her outcome expectations improve if his/her environment is more conducive to change and therefore have improved self-efficacy. Health is a dynamic state that can be impacted by behavioral decisions. This project aims to discover the constructs that patients describe that enhance their ability to care for themselves and believe that their medications provide some benefit. Furthermore, it is important to determine that patients may present high levels of confidence to providers yet exhibit multiple adverse medication and lifestyle behaviors. It is essential that researchers understand the patient's perspective in order to design interventions to support them and improve their overall SE.

Review of Literature

Quantitative Issues of Self Medication and Self Care

Studies were found that addressed prescription medication adherence (Wu et al., 2008; Wu et al., 2009; Cooper et al., 2009; Bohm et al., 2013) and adherence to medical advice (Powell, et al., 2010; Lama Tamang, Tang, Chuang, Patel, & Wong, 2013) in the HF population. Wu et al. (2008) first sought to describe predictors of medication adherence in HF. The population was drawn from a busy HF clinic in Kentucky and included 70% men with ischemic etiology. The authors used the World Health Organization's multidimensional adherence model to measure three indicators: dose-count, the percentage of prescribed doses taken; dose-days, the percentage of days the correct number of doses were taken; and dose-time, the percentage of doses taken at the prescribed time. They cited barriers to each measurement with perceived social and financial support as having the greatest impact.

In a follow up study, Wu et al. (2009) sought to identify at what point the degree of medication adherence impacts current HF status, rehospitalization, and morbidity. They conducted a longitudinal study (3.5 years) of 135 participants with HF. They used the Medication Event Monitoring System (MEMS) to identify dose count and dose days. MEMS is considered a test standard for the measurement of medication adherence and employs an electronic chip to record the date and time the cap is removed from the medication bottle. Patients were also given a medication diary in order to remove openings for other reasons, for example to refill the bottle. Outcome data analysis consisted of a series of Kaplan-Meier plots with log-rank tests, Cox regression analyses, controlling for age, gender, ejection fraction, New York Heart Association, ACEI use and

B-blocker use. They concluded that patients were significantly more event free when adherence to the prescribed regime was >88%.

(Albert et al., 2013) revealed that patients seeking emergency care for HF decompensation demonstrated inaccurate HF beliefs and poor self-care adherence. Participants included 195 adults living with HF who presented to the ED for exacerbation. Validated instruments for HF illness beliefs and self-care adherence were used. Illness beliefs are based on a perceived level of danger by the patient and determine how he will cope. There was a lack of association between HF beliefs and self-care adherence, which reflects a need for improved HF education.

Mahramus et al. (2013) sought to discover nurses' knowledge of HF to determine the effectiveness of their discharge education for the complex regime. Nurses (n = 90) completed an online test of HF knowledge using an instrument developed for this purpose that was previously validated. Only 8.9% of nurses achieved a passing score of 85%.

Bohm et al. (2013) studied the effects of nonpersistence of study medications, 80 mg telmisartan daily as compared with 10 mg ramipril, on outcomes and events associated with nonadherence on patients with cardiovascular disease. Patients enrolled in the ONgoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial (ONTARGET) were compared (n = 20,991) with patients who had permanently stopped study medications (n = 4,629). Nonpersistence in HF was associated with death, myocardial infarction, stroke, and hospitalization (p < .001). Nonpersistence was also associated with older age, female gender, less physical activity, less education, and history of stroke/transient ischemic attack, depression, and diabetes.

Lama Tamang, Tang, Chuang, Patel, and Wong (2013) studied 371 patients with HF to describe risk factor control and adherence to recommended therapies. In patients living at home, only 16.7% were taking all four of the ACC recommended four classes of drugs [β -blockers, angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACEIs/ARBs), diuretics, and digoxin]. A majority (83.3%) were taking only one drug of the recommended 4-drug regimen. Additionally, only 69.1% were at goal for blood pressure. The authors concluded a significant gap between adherence to medication regime and control of significant risk factors in the population of HF patients living at home.

Cooper et al. (2009) sought to identify prescription medication adherence in patients from both employer groups and health plan groups for a subset of diagnoses groups: coronary artery disease, hypertension, HF, diabetes mellitus, and hyperlipidemia. They used eligibility data and administrative pharmacy claims as the data source. Claims were reviewed for a 12-month period in 2007. The HF group represented eight percent of the total population studied. Medication adherence with angiotensin converting enzyme inhibitors was 76.2% in the employer group and 80.6% in the health plan group. Other medication groups reported on were b-blockers at 81.5% for the health plan group and 76.5% for the employer group, angiotensin receptor blocker at 81.0% and 75.2% respectively, and diuretics at 78.2% and 75.5% respectively. The authors identify an important next step is to understand the factors that influence adherence behavior.

Toh, Jackson, Gascard, Manning, and Tuck (2010) sought to identify barriers to prescription medication adherence during home visits of patients with HF and propose possible solutions to these problems. They conducted a descriptive study of home visits

of patients with HF by pharmacists consulted as part of a multidisciplinary team. A total of 66 patients were observed in the study and barriers to medication adherence and subsequent interventions were recorded. Interventions included education, counseling, motivational interviews, and reducing dosing frequency. Poor or complex medication instructions was cited by 71% of patients, 33% cited running out of medications and 20% reported adverse drug reactions. Multiple strategies were necessary to overcome barriers.

(Dunlay, Eveleth, Shah, McNallan, & Roger, 2011) studied 209 patients with HF to determine factors associated with poor adherence, which was defined as the proportion of days covered (PDC) less than 80%. The median number of medications in the population was 11 (interquartile range, 8-17) with 26 patients (12%) filling more than 20 medications. Nineteen percent of patients had poor adherence to *B*-blockers and ACEIs/ARBs. Patients with poor adherence to ACEIs/ARBs were younger ($p < .05$) and men had lower ACEIs/ARBs adherence than women ($p < .04$). Cost related to statin medications was the most often cited issue by patients for this category. Other factors cited included prior history of depression, marital status, and dosing frequency of medications.

Delaney, Apostolidis, Bartos, Morrison, Smith, & Fortinsky (2013) conducted a randomized control trial that included both telemonitoring and self-care education interventions for 93 patients to determine if these variables impacted rehospitalization rates, knowledge scores and quality of life (QOL). The primary outcome of 90-day rehospitalization post-home care discharge was significantly reduced in the intervention group ($p < .046$). HF knowledge ($p < .013$) and QOL ($p < .004$) were significantly increased in the intervention group as compared to the control group.

Buck et al. (2012) sought to describe the relationship between self-care and health-related quality of life (HRQOL) in older patients (≥ 65 years) with moderate to severe HF. Self-care was measured using the Self-care of HF Index, which was previously validated. HRQOL was measured using the Minnesota Living With HF Questionnaire. Pearson correlation, independent-samples *t*-tests, and linear and logistic regression were used in analysis of the data. The authors concluded that confidence in HF self-care is related to HRQOL and interventions to improve confidence would be beneficial in older adults living with HF.

None of the quantitative studies incorporated potential adverse drug interactions between prescribed medications and OTC medications that patients confront upon dealing with a diagnosis of HF; nor did they try to discover an understanding for the medication behaviors of patients. For a deeper understanding of patients, the researcher turned to qualitative research. Studies were discovered that sought to explain and describe what it is to live with HF. Upon closer inspection, the majority of these studies used quantitative methods to answer a research question related to one facet of the experience of living with HF. Of those that were qualitative, most were excluded since they did not relate to the aim of this study.

Qualitative issues of Living with HF

Whitty, Carrington, Stewart, Holliday, Marwick, and Scuffham (2011) conducted a pilot study to discover patients' preferences with HF management program. No philosophic worldview or theoretical framework was mentioned to guide the study. A purposeful sample of 12 patients were interviewed and themes drawn from NVivo 8 included patients' perception of the value of the program beyond those related to health,

social and peer support, other themes related to barriers in participating in the clinic, transportation, cost, and ill health. The authors concluded that in-home delivery of HF management programs was necessary for this population.

Thornhill, Lyons, Nouwen, and Lip (2008) conducted an interpretive phenomenological study in both outpatient and inpatient units at a metropolitan hospital to improve the understanding of patients living with HF. Semi-structured interviews were completed on 25 patients; 21 were men. Although medication adherence was not the focus, four themes were identified: the diagnostic process, change in activities, the role of others, and emotional reactions. The authors concluded that interventions to promote self-care would benefit this population.

Waterworth and Jorgensen (2010) conducted a descriptive qualitative study to describe the process living with a new diagnosis of HF. The 25 patients interviewed were ages 70-90 years (15 men, 10 women) and were newly diagnosed with New York Heart Association classes II-IV HF. Interviews were conducted in participants' home every three months for a 12-month period. The 79 interviews with 25 people and were transcribed verbatim. NVivo 8 was used for analysis of reoccurring themes. Their findings suggested that the transition was not a linear process, rather an experience of complexity, forward and backward and required further study to provide the resources and education necessary to ease the transition.

Dickson, Buck, and Riegel (2011) sought to discover how comorbidity influences HF self-care in a qualitative meta-analysis. They cite Noblit and Hare (1988) but cite few of the steps of meta-ethnography; however, they also discuss Byrne's (2001) strategies for qualitative research and approaches to meta-analysis (McCormick, Rodney, &Varcoe,

2003). They examined and analyzed transcripts from three mixed methods studies (n=99). The authors described themes about the perception of HF and self-care and explore the influence on HF self-care. Self-care was defined as adherence to diet, symptom monitoring and differentiating symptoms. Themes included 1) attitudes drive self-care and 2) fragmented self-care instruction leads to poor self-care integration of self-care skill deficits. The authors concluded that research testing coaching, with integration of self-care and a focus on developing skill in self-care, was warranted.

Crowder (2006) sought to explore what influences patient attendance and continued participation in a HF clinic. She conducted an ethnographic qualitative study. Her study included 15 participants from a HF clinic in Arkansas, including 11 women, five of whom were widowed, 73% were married. She conducted audiotaped interviews to uncover influences on enrolling and continued participation in the HF clinic. Results the author identified as beneficial influences were a sense of belonging and education; identified as barriers were travel and cost.

Gary (2006) conducted a descriptive study to describe the performance of self-care behaviors and demographic and symptom characteristics that impacted self-care practices. Thirty-two women, diagnosed with diastolic HF were recruited from a busy HF clinic to participate in the study. Data was collected using semi-structured interviews. Descriptive statistics were used to analyze the data. Although participants felt that they had a good level understanding of prescribed self-care practices, only 19% weighed themselves daily, few followed sodium guidelines and 91% were not exercising. Seventy-two percent of participants followed their medication regimes. Poor socioeconomic status was found to increase vulnerability to poor clinical outcomes. Women in this bracket

were more likely to delay medication refill, which resulted in hospitalization in several cases. The authors concluded that current HF clinic education was not enough to impact self-care practices in this population.

Mixed Methods Research

Two mixed-method studies were discovered on patients living with HF. Dickson, Lee, and Riegel (2011) conducted a concurrent triangulation mixed method study to explore how knowledge and cognitive function impact self-care. Interviews were conducted on 41 adults with HF on self-care practices. This was followed by completion of standardized instruments designed to measure knowledge, cognitive function and self-care. Although the authors sought to associate the concepts, no mixed methods questions were posed. The study sample was limiting for purposes of this proposal: predominantly male, relatively young, with some level of college education, drawn from a HF specialty clinic.

Riegel et al. (2009) conducted a cross sectional mixed methods study on 29 HF patients to determine their ability to detect shortness of breath and report it. They compared two groups, younger (< 73 years) and older (\geq 73 years) to assess whether aging impacted a patient's ability to interpret her HF symptoms. A 6-minute walk test was employed to stimulate shortness of breath using the Borg measure of perceived exertion. The two groups were compared for accuracy of ratings and in depth interviews were conducted to inform symptom interpretation ability. The data reflected a decreased ability to detect and interpret shortness of breath supporting the authors' theory of an age-related decline in ability to sense physical symptoms.

Summary

This chapter has presented the theoretical foundation for this research. The philosophical underpinnings and essential constructs of the Self-Efficacy Theory have been described. Pertinent literature was discussed as it relates to this study. Finally, instruments that were developed using Self-Efficacy Theory were described.

Patients with HF face significant barriers in managing their prescribed regime at multiple points on the health care continuum. To begin, HF guidelines are not employed universally and patients' medication records are often inaccurate. Furthermore nurses, whose primary responsibility is education, are ill equipped to provide the necessary instruction for HF patients when discharged from the hospital. Once home, patients confront personal barriers including complex therapeutic regimes, inability to recognize symptoms, declining self-care ability, and a lack of support systems.

Finally, this chapter summarized pertinent literature as it relates to the constructs of this study. Quantitative issues related to self-medication and self-care practices of HF patients were presented. This was followed by an overview of qualitative literature as it sought to inform nursing on one component of a HF patient's life. Limitations and conclusions of the research cited were identified. The lack of existing literature on the self-medication practices and self-efficacy of HF patients living independently at home was concluded.

Chapter 3

Design and Methodology

This chapter presents the philosophical underpinnings of mixed-methods research. Quantitative and qualitative research designs and the methodologies of each are described. The procedures for protection of human subjects, recruitment, quantitative and qualitative data collection procedures and analyses of all data are presented. Threats to validity and integrity are also described.

Methods

Design

The mixed methods design fulfills two purposes of research: elaboration and development (St. Arnault & Fetters, 2011). Elaboration is the adaptation of data from one source to clarify and elucidate data from another source. Development is the utilization of the data from that source to create an instrument or to select methods of data analysis. Within the mixed method design the inductive contextual approach is integrated with the deductive generalizing approach (Morgan, 2007). The central premise of mixed methods research is, “the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone” (Creswell & Plano Clark, 2007, p. 5). Mixed methods research, in its combination of methodologies, increases the depth and breadth of resulting data and is more apt to discover knowledge and explain results.

In 2009, the National Institute of Health hosted a summit on health disparities that concluded that mixed methods research was ideal for addressing the complex issues of inequities (as cited in St. Arnault & Fetters, 2011). HF, with its complicating presentation

of symptoms and comorbid conditions, lends itself to this method of research with its' worldview of pragmatism to explain both the qualitative and quantitative components of the disease.

This study used a convergent parallel mixed methods design (Figure 2). It involved collecting quantitative data on patients, ≥ 50 years old, living with HF. This was followed by an in depth qualitative component. The quantitative strand was meant to validate and provide greater insight into the qualitative results (Creswell & Plano Clark, 2011). Following the completion of the quantitative interview, HF medication self-efficacy and/ or outcome expectation self-efficacy mean scores were calculated independently. Patients were asked if they would be willing to participate in the qualitative interview if they scored higher (≥ 4) and lower (≤ 3) in either measure to discover the experience of following the prescribed regime. The results of these qualitative interviews informed the researcher on the process of patients' medication adherence and self-efficacy related to their regime when living with HF.

A myriad of challenges are confronted when using this design. To begin, a researcher must be knowledgeable in both the inductive and deductive methods of research to honor the fundamental structure and underlying philosophy of each method while utilizing an integrative framework (Creswell & Plano Clark, 2011). She must also be aware of the framework that guides mixed methods research and construct a study that integrates the data using the back and forth blending of the singular and multiple views of reality (Morgan, 2007). The researcher proposing this study has studied the different elements constructing the mixed methods design and has excellent expert resources to guide the study.

Furthermore, Ivankova, Creswell, and Stick (2006) emphasize the mixed method design demands clarification on many levels, including priority of weight given to quantitative versus qualitative strands, sampling issues and timing for the integration of the data. For this study, the quantitative and qualitative components were given equal weight due to the lack of research in both areas. At the completion of the quantitative interview, participants who scored high or low in HF medication self-efficacy were asked if they would be interested in continuing the interview. Patients were asked to describe in as much detail as possible their thoughts and feelings related to living with the medication regime. This ensured an adequate sample of patients to complete the second component of the study.

Instruments

ActualMeds™

ActualMeds™ is a medication use instrument that was developed from The Personal Education Program-Next Generation (PEP-NG), an interactive computer-based educational intervention (Neafsey et al., 2011). The PEP-NG has been shown to be effective in increasing knowledge and self-efficacy related to the patient's medication regime and decrease adverse self-medication practices in older adults with hypertension (Lin et al., 2009; Neafsey, Strickler, Shellman, & Chartier, 2002; Neafsey et al., 2008, Neafsey et al., 2011). The University of Connecticut granted an exclusive license for the PEP-NG to AdhereTx Corp (now Actual Meds Corp) for commercial development as a data capture and analysis instrument. Key elements of the PEP-NG that were commercialized as a part of the ActualMeds™ system include a structured patient interview and risk rules / scoring that were re-developed for secure, HIPAA-compliant

commercial delivery in a variety of healthcare settings. Additional functional capabilities were developed by ActualMeds™ to support integrated team-based care, provider-based comprehensive medication review / Medication Therapy Management (MTM), and automated medication reconciliation between external data sources including electronic health records (EHR), medical and pharmacy claims and patient-reported medications. A rules engine analyzes patient data (including what, when and how often self-reported Rx) and lifestyle behavior (including tobacco use, alcohol consumption, and hours of sleep) to calculate risks (High ≥ 25 ; Medium ≥ 10 ; Low < 10). The rules engine delivers a highly targeted medication interaction list to stratify patient-reported behaviors with the highest risk scores. A total risk score is generated which is the sum of all of the risks identified.

Interactions/lifestyle behaviors generating risk scores are derived from a Lexicomp database (Wolters-Kluwer) rule set (with risks scored on a 1-5 point scale, where a score of 5 is a high risk that is likely to cause an adverse outcome, thus the interaction/ lifestyle behavior should be avoided). Additional rules are derived from published guidelines from the Beers Criteria for Potentially Inappropriate Medication Use in Older adults (American Geriatrics Society, 2012), American Diabetes Association, American Heart Association, World Health Organization, Centers for Disease Control, National Heart, Lung and Blood Institute, US Food and Drug Administration, and US Department of Agriculture. Interactions/behaviors not already in the Lexicomp database or in national guidelines are also derived from the peer-reviewed literature and subjected to a modified Delphi review method using a 5-member expert panel to review the published evidence and select those interactions/behaviors having the greatest likelihood of an adverse outcome. The expert panel members have experience and research

expertise concerning clinical drug-interactions and self-medication behaviors. The Delphi panel uses the same Lexicomp 5-point scale to assign an importance weight for each behavior. The risk score for each behavior is the mean of the expert panel ratings. Those behaviors with a mean score of 1 or higher are retained for the rules engine.

The HF Medication Self-Efficacy Instrument

The HF Medication Self-Efficacy Instrument (Knecht, 2012) was developed based on previously validated instruments that measure self-efficacy related to medication adherence in different populations: older women with osteoporosis (Resnick et al., 2003) and persons living with HIV (Erlen et al., 2010). Patients were given a set of 5 response options, with 1 being *not at all confident* and 5 being *totally confident*. Lower scores were associated with negative feelings related to confidence and higher scores were associated with increased confidence. This 15-item instrument (Figure 3) was pilot tested on patients aged 60 and over taking cardiac medications recruited from senior centers throughout central CT; 6 participants for each item, 93 participants total.

Principle component analysis was performed using SPSS (version 19) on the 15 items. Using Kaiser's criterion (Eigenvalues > 1) and examination of the Scree Plot, 3 components were derived which accounted for 82.85% of the total variance. Using an oblique rotation with the Oblimin and Kaiser normalization procedure, the pattern matrix resulted as represented in Table 3. Assessing the pattern matrix, 6 items with the highest loadings formed Component 1, *Outcome Expectations*. The Varimax rotation was employed to discern the proper order of the components in accounting for the variance (Gable & Wolf, 1993). The Varimax reversed the order of components 2 and 3. Questions 1, 2, 3, 5, and 8 were reflected in Component 2, *Illness*. Finally, items 7, 6, 4,

and 9 comprised the third component, *Disruption*.

Cronbach's alpha for the data from Component 1, Outcome Expectations, was .98, with a mean inter-item correlation of .89. The corrected item-total correlation was $>.90$ and Cronbach's alpha if item deleted remained $>.97$ for all items within the factor, hence no items were deleted.

Component 2, named Illness, resulted in an alpha reliability from the data of .89 and a mean inter-item correlation of .64. Again, no items were deleted because corrected item-total correlation and Cronbach's alpha if item deleted were all within a desirable range.

Finally, the third component named Disruption, reported a Cronbach's alpha for the data of .91 and a mean inter-item correlation of .72. Since the weakest item, question 9 Reminders, if omitted, resulted in an alpha reliability of .91 - the same as with the item; the question was deemed relevant and kept within the aggregate. The empirically derived components, represented in Table 3, matched that of the outcome expectations for medications from the literature. However, whereas the researcher thought that the first 7 items were a single component related to self-efficacy in knowledge related to ability to take medications, two factors were derived from the analysis. Component 2 and component 3 were recognized are not distinct constructs because they correlated (0.51)(Table 4). Accordingly, Component 3 constructs were merged into Component 2, Illness.

The HF Medication Self-Efficacy Instrument was developed and validated to measure two dimensions of medication adherence. With relevance toward patients with HF, the constructs that were defined included perceived ability in taking prescription

medication (Self-Efficacy) and perception of the medications' value (Outcome Expectations). Self-efficacy expectations were measured by asking a series of questions to discern the participant's confidence in his/her ability to self-medicate accurately and safely and outcome expectations were measured by asking a series of questions to discern the participant's confidence in his/her medications improving his/her quality of life.

Ethical Considerations

Approval of the Institutional Review Board from Middlesex Hospital was sought and obtained prior to initiation of the study. Patients were given an information sheet explaining the research study. It was explained to patients that participation was voluntary and at any time they were able to withdraw from the study. Completion of the phone interview was deemed consent.

Sample

Middlesex Hospital Home Care reported enrolling over 50 HF patients each quarter of a year. The population served by the home health agency was ethnically diverse with varied levels of education and socioeconomic status. Inclusion criteria for this study were: 1) diagnosed with HF, 2) over the age of 50, 3) taking prescribed medications for HF, 4) independent physical and cognitive functioning, and 5) English speaking. The telehealth nurse manager reviewed the patient records to exclude terminal Stage IV HF patients who had been referred to hospice. Patients with Stage II, Stage III, and IV were referred to the primary nurse caring for the patient. Independent functioning was assessed by the home care nurse, based on the patient's ability to perform activities of daily living and complete self-care required for a patient living independently with HF.

The primary nurses recruited the patients to participate in the study and provided contact information for the researcher.

Procedure

Quantitative and Qualitative Strand

Patients with HF, who had been engaged in home health were given a poster by the visiting nurse to inform them of the research study, along with an information sheet and the self-efficacy instrument. If the patient was not actively participating in home health care, the documents were mailed to the patients from the Middlesex Home Health Agency. The primary researcher followed up with a phone call to discuss the study and answer questions.

Following a description of the study, patients who wished to participate spoke to the primary researcher on the telephone. The nurse researcher (graduate nursing research student): 1) collected demographic information including: age, sex, race, last year of completed education, 2) completed the ActualMeds™ structured interview (that queries recent symptoms, lifestyle behaviors, prescription medications, self-medication and OTC behaviors), 3) compared patient reported medication behavior to a paper medication adherence record obtained electronically from the primary care nurse (including all Rx and OTC medications the patient reported taking in the previous month), and 4) obtained blood pressure (BP) and weight measurements via biometric devices or self-reported (Pickering et al., 2010).

ActualMeds™ uses a virtual private network. Data collected, including demographic and medication use survey, were downloaded onto the nurse researcher's hard drive and then to the research database via a secure server. Private information including patient's

name was not collected. The principle investigator (PI) and the nurse researcher were the only individuals with access to the raw data.

After completion of the quantitative strand, participants who scored higher (≥ 4 - confident) and lower (≤ 3 - not as confident) in self-efficacy were asked to participate in the qualitative component of the study. This strand was comprised of an audiotaped interview in which the participant was asked to answer two open-ended questions. The first question was intended to uncover the patient's experience living with HF and is aligned with qualitative method of inquiry. The second is congruent with self-efficacy theory.

1.) Please describe your experience of living with HF since your diagnosis. Please describe for me in as much detail as possible a day that you feel represents what it means to live with your diagnosis.

2.) Can you tell me about your level of confidence related to following your prescribed regime? Probing questions were asked when the researcher wanted the patient to elaborate on a scenario the participant recounted.

Threats to Quantitative Internal Validity

Rigor was examined and potential threats were identified. History was addressed during the study. Any news related to HF was noted as a possible threat to validity. Mortality was a potential threat and could have occurred with this population; it did not. Patients might have had different levels of understanding of their illness, based on their own level of education, years since diagnosis, and their family history. Patients recruited were nearing the end of home health service. Due to the time elapsed in connecting with patients, they had different levels of acuity. Selection might have affected internal validity. Those patients agreeing to participate might have been more highly informed.

The researcher strived to recruit an ethnically, economically and educationally diverse population. All instruments used were previously validated (Neafsey et al., 2011; Knecht, 2012).

Threats to Quantitative External Validity

There may have been some influence rendered by the quantitative interview to change the patient's perception of his/ her health status; however, the value of the design and the data collected outweighed the threat. Only patients that were enrolled in the HF home health program had the ability to participate in the study. These patients may not have been representative of the general population living with HF. For the purpose of this study, one location was used; however, future studies will extend to other settings.

Distractions were minimal because data collection took place in the privacy of the patient's home and the nurse researcher was on the phone. If the patient were busy, the nurse researcher offered to call back at a more convenient time and a date and time was planned.

Threats to Integrity

The definition of the concepts and the theoretical foundation provided the qualitative researcher with the framework to guide the study and ensure the reliability of data generated. Further protection was assured through the careful application of Krippendorff's method of content analysis for qualitative study (Krippendorff, 2004).

The researcher was committed to reflexivity; that is, required to set aside any prior experience or bias with the population in order to enter the qualitative data collection phase and continue to self-reflect throughout the data collection and analysis (Beck & Gable, 2012).

Peer debriefing was employed to ensure reliability of results. The nurse researcher discussed the process with peers who are expert in qualitative methods. Member checking was completed in order to provide verification of the preliminary results (Beck & Gable, 2012). An audit trail was maintained in order to provide a reference for future researchers.

Quantitative Data Analysis

Coded data were downloaded via the secure, HIPAA-compliant ActualMeds™ database and entered into an SPSS (version 19) data file. Descriptive analyses were conducted on all variables organized by gender, race and age. Frequency distributions of the HF medication self-efficacy, ActualMeds™ risk score, and BP were analyzed. Correlation statistical analyses were conducted between SE scores and ActualMeds™ risk scores.

In a post hoc analysis, anticholinergic burden was measured. Anticholinergic burden has been identified as a potential risk of morbidity and mortality in older adults (Cai, Campbell, Khan, Callahan, & Boustani, 2013; Campbell et al., 2009; Carnahan, Lund, Perry, Pollock, & Culp, 2006; Rudolph, Salow, Angelini, & McGlinchey, 2008). The anticholinergic cognitive burden (ACB) scale (Cai, Campbell, Khan, Callahan & Boustani, 2012) further details the level of anticholinergic activity and the level of associated risk for the medications identified. Three panel members including a geriatrician and two geriatric pharmacists reviewed the 500 most prescribed medications and medical literature related to their anticholinergic adverse effects (Cai et al., 2012). They ranked the medications according to associated anticholinergic burden identified: 0; limited or none; 1, moderate; 2, strong; and 3, very strong.

Qualitative Data Analysis

Audiotaped sessions recorded during the qualitative interviews were transcribed verbatim by the researcher. Transcripts were analyzed using Krippendorff's (2004) method of qualitative content analysis to derive themes. Krippendorff (2004) advocates "each body of text is unique, affords multiple interpretations, and needs to be treated accordingly" (p. 87). According to Krippendorff, qualitative content analysis enables the researcher to select text that is relevant, interpreting that text and returning to earlier interpretations based on later readings and interpretations. The researcher "settles for nothing less than interpretations that do justice to a whole body of texts" (p. 88). Interpretations were supported by quotes of participants (Krippendorff, 2004). The quotes constructed parallels and elaborated on metaphors (Krippendorff, 2004). Triangulation further enhanced the results (Krippendorff, 2004). A meticulous audit trail was recorded to afford readers the process of conclusions drawn by the researcher. Finally, the researcher continued to engage with methodologic peer experts throughout the process to insure that alternative perspectives are considered (Krippendorff, 2004).

Mixed Methods Data Analysis

According to Creswell and Plano Clark (2011), when employing the convergent parallel design, data from the quantitative and qualitative strand are analyzed independently using procedures suited for the methodologic approaches, as described previously. Data were collected and analyzed as patients entered the study. Following consent, the quantitative interviews were conducted. Qualitative interviews were conducted on a purposeful sample of patients who scored high and low in HF medication self-efficacy. As the researcher examined the quantitative scores and the qualitative

transcripts, the researcher identified the dimensions that were compared and defined those constructs. Side-by-side comparison was conducted during the merging process. Quotes from the qualitative interviews were used to further enrich the quantitative results. The comparisons were articulated and the researcher interpreted the combined results. Ultimately, the results were compared to the research questions.

Summary

This chapter presented the research design, sample, protection of human subject procedure, and instruments used in the study. The methodology and study procedure were reported. Potential threats to integrity and limitations were described. Data analysis procedures were illustrated for the quantitative, qualitative and mixed-methods components.

Chapter 4

Results

This chapter will describe the sample and elements of the quantitative, qualitative, and mixed-methods results from the study. Relevant findings will be presented as they relate to the research questions. Data, with pertinent statistics, and its significance to nursing will be described.

Purpose

The primary aim of this study was twofold: 1) to describe HF patients' overall self-medication and life-style practices and determine their self-efficacy as it relates to these practices and 2) to describe the themes derived from qualitative interviews of patients who scored high and low in HF medication self-efficacy. This study used scores derived from the ActualMeds™ instrument that queries recent symptoms, lifestyle behaviors, prescription medications and OTC behaviors to stratify risk of medication interaction. The study also analyzed self-efficacy scores of medication use and outcome expectations. The data presented within will answer the following questions.

Quantitative Research Questions

What are the self-medication practices of patients living with HF?

What are the medication self-efficacy (SE) scores of patients following his/her HF medication regime?

What is the relationship between self-efficacy scores and the number of medications or risk score of HF patients in this study?

Data Collection

If the patient were deemed eligible, the primary nurse would give the patient the research information sheet, describe the study and pose the question of participation. If the patient was amenable to participation, the medication self-efficacy instrument was given to the patient to consider until the nurse researcher contacted the patient.

Fifty patients were referred to the nurse researcher and contacted by telephone. If patients answered the telephone, they were asked if it were a convenient time to discuss their medications. If they were not home or did not answer, a message was left introducing the researcher, briefly describing the interview procedure, providing the researcher's phone number and informing them a return phone call was welcome or the researcher would try again. Four patients answered during this time stating, "I did not recognize the number," and proceeded to complete the interview process. Due to lack of response to telephone calls, eight patients were dropped after three attempts to contact. One declined to participate stating, "I don't remember the nurse asking... I am not comfortable." In all, 41 patients participated in the study. Data collection was at a single point in time. Phone interviews ranged in duration from 21 minutes to 49 minutes.

The participants were primarily Caucasian (98%) females (58%) ranging in age from 52-94 (see Table 5). African-Americans represented the other 2%. Fifteen percent reported less than 12 years of education, while 54% reported high school as their terminal degree. The mean age was 81 (SD \pm 8) years. The participants were English speaking, living independently at home.

Part I: Quantitative Results

The comorbid conditions reported by patients are represented in table 6. A majority of patients reported a history of high blood pressure (N=23, 56%). Only 11 patients reported having diabetes. Two patients reported their HF began as a result of a virus. One patient reported he had been an alcoholic. One patient had lupus. One fourth (N=9) of the population reported having chronic obstructive pulmonary disease, asthma, or emphysema. Thirty percent of patients self-reported their health as good, 14% average, 22% fair, and 17% poor. Thirty-three percent reported some combination of anxiety and depression (Table 5).

Patients reported a mean number of 12.6 (SD \pm 5) medications (range 6-25), 38 of 41 patients (93%) with multiple dose times and multiple prescribers. OTCs accounted for 29% of medications. All patients reported taking five or more prescription medications. Most patients reported medication adherence (95%). Only two patients admitted that they knew they missed doses due to failing to remember to take them.

A total of 16 medications were prescribed for HF in the participants interviewed. The most commonly prescribed categories of medications are represented in Table 7. Anti-hypertensive medications included metoprolol, prescribed to 13 patients (32%), Coreg (carvedilol) 12 patients, lisinopril 8 patients, followed by diltiazem 5 patients, Diovan (valsartan) 4 patients, Norvasc (amlodipine) 2 patients, and Corgard (nadolol) 1 patient. The most common categories of anti-hypertensive medications were *beta* blockers (61%), ACEIs (20%), calcium channel blockers (17%) and angiotensin receptor blockers (ARB) (10%). Loop diuretics were prescribed to 26 patients (61.9%) with Lasix (furosemide)

most common; Bumex (bumetanide) was prescribed to one patient. Aspirin was prescribed to 16 patients. Anticoagulation therapy was prescribed to 14 patients: Coumadin (warfarin) 11 patients, Xarelto (rivaroxaban) 3 patients.

Despite the extensive number of medications that patients were prescribed, only 46% met three recommended concurrent medications for HF per prescription guidelines: ACEI or ARB, *beta*-blocker, and loop diuretic (Yancy et al., 2013). Digoxin is the fourth recommended medication for HF but remains highly controversial in this aged population due to its potential to cause dysrhythmias, increase myocardial oxygen consumption (Kaiser Permanente, 2013), and it is on the Beers list (AGS, 2012) (see below). Therefore, the 46% who were prescribed the ACEI/ ARB, *beta*-blocker, and loop diuretic concurrently will be reported as met current (2013) guidelines. (Of the patients interviewed, 17% took digoxin as well as the three aforementioned medications for HF in the 2013 guidelines.)

Discrepancies in the medication regime when compared with the EHR received from the home care agency were identified for 26 patients (51%). Sixteen (39%) of these discrepancies were due to recovery from an acute exacerbation of respiratory failure or recovery from a musculoskeletal injury/ surgery and the indicated medications were no longer needed. Examples included stool softeners, pain medications and treatment for acute respiratory failure. In addition, 13 patients (34%) reported taking medications (range 1-9) not listed on the EHR. These included changes made the HF regime since discharge and other OTCs. One patient had misunderstood his discharge instructions and simply stopped taking his newly prescribed HF medications including his diuretic, nitrate, and ARB after completion of the month's regime because there were no refills.

The mean medication risk score calculated from the total medication profile by the ActualMeds™ system was 63 (SD ± 50; range 17 to 276) (Table 8; Figure 4). There was a strong positive correlation between the risk score and the number of medications ($r = .70, n = 41, p < .001$) (Figure 5). The ActualMeds™ instrument generated a high-risk total score (high ≥ 25 ; medium ≥ 10 ; low < 10) for 86% of patients indicating the patient's regime had multiple, high-risk medications and/or drug-drug interactions. Ninety-five percent had at least one “5” score indicating and urgent need for medication reconciliation and review. Most of the high risks were related to medications that appear on the Beers list of potentially harmful drugs (AGS, 2012) for the gerontologic population. The Beers list was originally intended for use in the long-term care setting, but it has been adapted to all environments (AGS, 2012). It is a consensus list with level of evidence referenced citing medications deemed inappropriate in the elderly. The results demonstrated 29 patients (71%) took at least 1 Beers medication; 51% had two or more Beers medications (Table 9). Of those taking medications on the Beers list, 48% had related symptoms. In particular, five patients (17%) reported they had fallen in the last year. Other symptoms reported that were related to Beers medications included unsteadiness, near fall, fatigue, dizziness, leg cramps, and constipation. Cognitive changes may also present as a side effect in patients prescribed Beers medications with anticholinergic side effects (see below).

Ninety-five percent of patients surveyed in this study reported medications with anticholinergic side effects and risk of cognitive impairment (Table 10). Applying the Anticholinergic Cognitive Burden (ACB) Scale (Cai, Campbell, Khan, Callahan & Boustani, 2012) to the current results, 78% had at least a moderate anticholinergic burden

(ACB) score (2 or more) and 54% had a high anticholinergic burden score (≥ 3 , range 3-10). Of the 41 patients interviewed in this study, 28 reported they were prescribed the loop diuretic furosemide that has an ACB score of 1 and is one of the medications recommended for HF in the ACC guidelines. Another 12 patients reported the *beta*-blocker metoprolol, which also carries an ACB score of 1 and is one of the ACC recommended medications for HF. Finally, 12 patients were prescribed warfarin for atrial fibrillation. Patients prescribed these three medications for HF would carry an ACB burden of 3 if they were taking nothing else. Six patients (15%) were prescribed this combination. Patients were also prescribed other medications with anticholinergic side effects including those with ACB scores of 3: Bentyl (dicyclomine), Ditropan (oxybutynin), Paxil (paroxetine), and an ACB score of 2: Tegretol (carbamazepine), Flexeril (cyclobenzaprine), and various opioid pain containing medications. A total of 14 other medications with ACB scores of 1 were prescribed to patients. Also, one of these patients self-medicated with OTC diphenhydramine (ACB score = 3) and two patients took other OTC antihistamines (cetirizine and loratadine) (ACB score = 2). Only one patient was prescribed donepezil, the recommended treatment to allay the impairment caused by the anticholinergic side effects.

Of the seven patients who reported anxiety as a symptom, three were untreated. Four patients were treated with either a selective serotonin reuptake inhibitor (SSRI) (2 patients) or a benzodiazepine (2 patients); all medications on the Beers list. Of the 5 that reported both anxiety and depression, all received treatment; all were treated with medications from the Beers list (AGS, 2012).

Outcome Expectation Scores

To determine if there were a relationship between demographic variables and the patient's *outcome expectation* self-efficacy (OESE) score, statistical tests of association were conducted. Exploratory descriptive analyses were conducted on all variables to assess normality of the distributions and to insure the basic assumptions of the statistical tests were not violated.

The OESE score was generated from the average of all constructs measuring self-efficacy outcome expectations. This score reflected the patient's confidence that his/ her medications were improving his health. The outcome expectation scores were not normally distributed, therefore a non-parametric correlation test was conducted to explore the relationship between OESE scores and risk scores. There was a small negative correlation between the two variable ($r = -.27, n = 41, p < .095$) (Figure 6). Because of the evidence of non-normality, the Mann-Whitney test, a rank-based non-parametric technique was conducted to compare the outcome expectation scores between males and females. The test yielded a p-value that was not significant ($p < .17$). However, both the mean and median outcome expectation score were somewhat lower for men than women (male mean = 3.6, SD \pm 1.3, female mean = 4.2, SD \pm .85, male median = 3.8, female median = 4.5). In addition, the outcome expectation scores were more variable in men (male interquartile range = 2.4, female interquartile range = 1.7)

Age was normally distributed for the population sampled. The relationship between age and outcome expectation score was investigated using the Pearson product – moment correlation coefficient. Because outcome expectation scores were not normally distributed, a nonparametric correlation was conducted. The test yielded no significant

($p < .62$) correlation between age and outcome expectation score in the sample measured; however, on average, the outcome expectation score went down as the participant's age increased.

The ActualMeds™ risk scores, number of medications, education level and systolic and diastolic blood pressure measurements were normally distributed. No significant relationships were found between the outcome expectation score and the ActualMeds™ risk score ($p < .22$), number of medications ($p < .059$), education level ($p < .80$), systolic blood pressure ($p < .59$) or diastolic blood pressure ($p < .22$).

Medication Regime Self-Efficacy

The average medication self-efficacy (MSE) scores of a patient measured the patient's confidence that he or she were managing the regime correctly (5- totally confident and 1- not at all confident). This sample was highly confident that they were following their regime correctly. Of the 41 patients, 34 (83%) were very confident (MSE = 4) to totally confident (MSE = 5) that they were following their regime correctly. Eleven patients (17%) scored ≤ 3 on the MSE.

Part II: Qualitative Results

The data presented will answer the proposed research question: what are the themes described by patients living with HF who score high and low in HF medication regime self-efficacy and outcome expectations on the *HF Medication Self-Efficacy Instrument*? Patients who had a mean score higher (≥ 4) or lower (≤ 3) in medication self-efficacy and/ or outcome expectation self-efficacy were asked if they were willing to answer an open-ended question related to living with their prescribed regime. The interviews were audiotaped and transcribed verbatim. A total of 21 patients were

interviewed to reach saturation: 10 patients with lower self-efficacy scores and 11 with higher self-efficacy scores (Polit & Beck, 2012). Throughout the data three themes were revealed: *social support, attitudes and beliefs, and formulating coping strategies*.

Through listening to the words of the patients, a story emerged that related either a positive or negative transition to management of the regime (Meleis et al., 2000). Social support as well as the patient's own philosophy of life either promote a positive or negative transition. Patients often described symptoms within the context of a situation. Patients with higher self-efficacy related a sense of confidence in their ability to manage daily life; however, patients with lower self-efficacy recounted feelings of discouragement. Patients with low medication regime and outcome expectation self-efficacy presented a narrative of being lost, alone, often overwhelmed due to the complexity of routine care. Throughout the interviews, these factors and the themes derived became clearly articulated in the words of patients.

Overall patients remained highly confident that they were following their regime correctly. Only a few patients did not report confidence in their regime. This cohort of patients chronicled a life with little hope and loneliness.

Social Support

Social support included family, friends, neighbors, and peers. Family included spouses, partners, sons and daughters, nephews and grandchildren. Patients with high self-efficacy scores described support systems and the comfort they provided. Patients who did live alone, but who felt they could depend on a family member nearby related more positive self-efficacy scores.

A young woman with a left ventricular assist device (LVAD) awaiting transplant had succumbed to HF as a result of a virus. She had never taken a medication prior to this event; hence she explained she was not totally confident that she took them correctly when she has a busy day or her normal routine was interrupted; otherwise she was totally confident in her medications' ability to improve her health. She ascribed her positive feelings to the support she received from her partner. She stated, *"I live with my domestic partner, I couldn't do it without her."*

Social networks were carefully constructed by individuals to enhance their ability to continue to function successfully within the confines of their limitations.

"We have a good support system through the church. Thursday we are going to Yale... to see if a pacemaker or defibrillator might help me. A fellow from the church and his wife are going to drive us...."

Patients relied on different individuals for different assistance. One patient stated,

"We have fantastic neighbors...no matter how little the snow, he or his wife come over and clear our driveway. We call them our snow angels."

Patients described the adjustments made to their daily routines and goals set to maintain social connections. *"I know on Monday mornings I have to take it easy, because I like to go to Tai chi. If I start cleaning up, I will get too tired. I go mostly to see my friends."* Another grandmother stayed home on Fridays, looking forward to Saturdays, *"I like to get out with a goal... because I will see my grandchildren in their soccer games."*

One woman who lived with her daughter and grandchildren stated she took care of herself, meaning personal care, but she didn't have to worry about cooking and cleaning. Her daughter accompanied her to appointments and helped her with her medications. If she wanted something, there was always someone to get it for her.

Patients stated it was critical to have someone help with the regime. They reflected on those who helped them and related a sense of bewilderment at the thought of having no one to do so. It is clear that social support has improved the self-efficacy and facilitated the transition of the patients interviewed in this study.

Patients with lower self-efficacy often lived alone and their story related a sense of discouragement. One gentleman stated, *“I live alone, my children don’t live near me. I use my medicine box, but I still find that I miss some medications. I don’t remember, the days run together...”* Another widower stated, *“I am home most of the time, I don’t go anywhere... I am legally blind. I cannot read print.”*

Finally, a recovering alcoholic who had been sober for 17 years and lived alone without family support apologized when he self-rated his health as poor. *“It is not very encouraging, I am sorry.”* He was fairly confident he took them correctly, most were taken early in the morning; but when asked if he felt they were helping he stated, *“I am not sure...I’ll be honest with you I am not sure how much good they are...I really don’t know. I am overwhelmed really, I am taking so much stuff”*.

Attitudes and Beliefs

The patient’s perspective of life was influenced by his own attitudes toward spirituality, life’s purpose, and current quality of life. Patients offered a myriad of thoughts and feelings encountered within the framework of transitioning to their altered daily lives. Attitudes and beliefs, as well as personal characteristics played a role in the adaptation of patients to living with HF. Confronted with unfamiliar situations, patients drew on inner strength and personal beliefs to successfully live with HF. Patients with high self-efficacy related that one could not expect to feel well every day.

Spirituality was embodied differently to different patients. One patient related, *“I believe that medication helps and God gave all of you the knowledge to do what you do...”* Another patient professed his faith and spirituality more literally, *“See I am a very Christian person. I believe I am going to be ok because my God said it. He said he would take care of me and I am a strong believer in that.”*

Patients with high self-efficacy outcome expectations believed that their medications were of benefit to them. They believed that they helped them feel better and improved their quality of life. Patients described positive attitudes and beliefs.

One woman stated, *“I have a very good attitude toward the whole thing. I think you have to think positively, not dwell on what you think might happen.”*

Another gentleman stated, *“I like to think positively about the future.”* Finally, a patient related, *“I don’t let anything stress me out, I can’t have that in my life.”*

Patients with low self-efficacy related feelings of defeat or despair. One man stated, *“It is getting tiresome. I am seeing a psychiatrist once a week. I am 70... It is not very encouraging, I am sorry.”* Patients often were ambivalent about their daily routines due to fatigue resulting from daily care. A man stated, *“I feel beat most of the time.”*

Formulating Coping Strategies

Patients with high overall self-efficacy described behaviors used to adhere to their regime. Patients with a longer history of required medications described the process of medication adherence as a matter of routine. One patient was diagnosed with Lupus at a young age; she was highly educated and had been on medications her whole life. When she developed HF, medications were already part of her regime. She stated, *“I have been*

taking them for such a long time. I know what I am doing. We are a medical family. My son is a doctor. My daughter is a nurse....”

Patients with high medication regime self-efficacy scores were totally confident.

One patient simply stated:

Oh I am sure I take them correctly. They told me exactly how to take them when I was in the hospital and that is what I do. If I am taking them wrong, well they were wrong then”

As for daily routines, patients recounted their belief in the importance of the medications and their own adherence regime. *“The most important are in the morning.... And I just do it.”* Others related careful discipline to routine. This woman worked with her daughter with whom she lived,

“I have a two-week medicine box. I live next to my daughter and we do my box together. We fill it on the second week, we keep track of all of the substitutions, and we write them down. She fills it up for me, like today they cut something in half, so she came right in and took the second one out of my box.”

Collaboration was imperative. Another patient stated, *“I live with my husband and he has his medications also. We each use a medicine box...we do them Saturday morning for the entire week.* A woman whose husband had died stated, *“I live with my daughter. My husband died last August. It is too many for a pillbox. I use a chart. I am very confident. I take them correctly.”*

They were masters at adjusting activities, collaborating with others, and using creative solutions. Planning had become an integral part in their day-to-day success. Patients related many creative solutions to enhance adherence to self-monitoring and self-regulating behaviors necessary to maintain equilibrium. One elderly patient stated, *“I have bought some glasses that are magnifying glasses that help. I have macular*

degeneration.... I am contemplating hiring the girl next door to come up and check my medicines.”

A retired army officer related a story of the systematic approach required to successfully maintain a level of wellness, which included daily exercise. Patients related the careful details of charts, pill-boxes, and alarms used to remember medications along with anyone who would work with them to insure the accuracy of the procedure. Patients actively worked to maintain equilibrium and prevent decompensation in order to maintain some level of normalcy in their life. They related the self-care daily weight requirement and the prescribed Lasix if they were retaining water.

Maintaining balance also entailed careful planning. If they knew they were going out in the afternoon, patients rested in the morning. They kept daily diaries of activities, rest periods and symptoms, and the changes in daily life and treatment regimes made as a result. They recognized that they were not as strong as they once had been, but understood the changes required to accomplish their goals. A few patients related that they needed to “*get off of the chair*”. It was hard to initiate the exercise routine every day, due to fatigue; however, once started they would feel better the whole day. “*I walk ½ hour every day, briskly for me*” with a chuckle. One patient stated he knew when he had over done it,

Sometimes when I go to the grocery store, I buy too much and the bags are too heavy. I pick up one of the bags and say ‘whoa these things are too heavy’ ...I get a little pain, so I put them down and rest until I am back to normal. Then I remember for the next time.

Also critical to maintaining equilibrium is balancing the regime and the fear of the onset of symptoms. Another retired army officer stated he knew how to take care of

himself. He cooked for himself but confessed he wasn't a very good housecleaner; cleaning required more energy, it made him too tired. He was totally confident he followed his regime correctly; however scored only 2.5 on outcome expectations. "*I am totally confident that I take them correctly, that is no problem at all.*" He was a widower, and lived alone. He stated, "*I think about taking them every day, but I know people are trying to help so....I don't seem to be getting any worse.*" He confided that the regime was restrictive, "*I am getting to be a homebody because of the medicine.*" Sadly, avoidance of activities was described by patients with low outcome expectation self-efficacy in an attempt to allay the onset of symptoms.

Patients with high outcome expectation felt better as a result of their medications. One gentleman stated, "*Oh they have definitely improved my health. My heart rate would have been 130...not too good.*" Positive feelings related to the illness ascribed a transition to acceptance of the required changes in lifestyle.

Ultimately, the themes described by patients living with HF seemed to parallel Erikson's final stage of development, *Integrity vs. Despair* (Erikson, 1997). Integrity is demonstrated by individuals who are self-assured and find order and meaning in their world. Despair is marked by persons who fear death and have lost independence and significant others. For the patients in this study who have been living with HF for some time, these descriptives seem to uncover the essence of the patients' experience.

Part III: Mixed Methods Results

Most patients interviewed in this study described both positive and negative feelings; however, those with positive self-efficacy reported a greater sense of control over variables in their lives. In the analysis of qualitative data, themes derived aligned

with Erikson's final stage of development, *Integrity vs. Despair*. In those patients whose descriptions of daily life illustrated *integrity*, obstacles were challenges to overcome, as opposed to those with lower self-efficacy whose stories illustrated *despair*; barriers encountered in daily life were described as too great to overcome. This section will answer the research question:

To what extent do the quantitative scores of patients living with HF who scored higher and lower in self-efficacy inform the themes derived from qualitative interviews?

The quantitative and qualitative data were analyzed bidirectionally in adherence with the methodological philosophy of mixed-methods research.

Following analysis of risk scores generated from the ActualMeds™ rules' engine derived from the calculated risk of behaviors and medication interactions, self-efficacy scores, and the derived themes, all data were analyzed side by side. There was a moderate negative correlation ($r = -.32$) between the OESE and the number of medications patients reported. Although not statistically significant, patients with higher OESE tended to be prescribed fewer medications; and would risk fewer interactions. There was a strong positive correlation between number of medications and risk score ($r = .70, p < .001$) (Figure 1). For example, a patient with a calculated risk score of 17 reported the fewest medications (5). There was a small negative correlation between OESE and risk score ($r = -.27$). Although not statistically significant, patients with lower risk scores tended to be more confident that their medications would improve how they feel and conversely, patients with higher risk scores tended to have less confidence in their medications ability to improve how they feel (Figure 2). Patients with higher self-efficacy scores described support systems, positive attitudes and confidence in their ability to manage their regime.

Higher risk scores were generated when patients described behaviors that added to overall risk or were prescribed medications with potential interactions, such as medications published on the Beers' list. Patients with lower self-efficacy scores described themes of being alone and often overwhelmed with daily life. These data reveal the complexity of daily life and the evolving self-identified cognitive changes of this aging population.

Finally, despite patient reporting of high confidence, the interview data reveal that a myriad of errors and omissions occur. Patients living with HF warrant extended interventions to assist in daily care. Description of the mixed-methods results will transpire within the constructs of *Integrity vs. Despair* (Erikson, 1997).

Integrity

Patients with high medication regime self-efficacy and outcome expectation self-efficacy scores present a description of understanding of their prescribed regime. They maintain a positive outlook and are comfortable functioning within a role of interdependency. Spirituality is woven throughout the stories imparted by patients who maintain integrity. A married patient on the fewest number of prescription medications (7) but self-supplemented with 10 OTC medications, with a moderate risk score of 65 stated, "*I think that is enough!*" and the patient chuckled, not overwhelmed in the least by her regime.

Relationships with children and grandchildren were also important, both for love and support. One woman reported her level of wellness as *fair*, had a moderate risk score of 51, and an anticholinergic cognitive burden score (ACB) of 3, but reported high self-efficacy in both constructs. She lived with her daughter and felt strongly that you needed

to maintain a positive attitude. She said it was helpful that her daughter checked her regime regularly to ensure she was on track. She had some ambivalence related to her confidence, but ultimately stated, *“In the last year we have made an awful lot of changes, so I am not always sure that they have made me feel better... but I know they are helping me.”*

When patients maintain some decision-making authority, they have choices. Patients recognized they still had a mission. A gentleman, 80 years old who had his bladder removed and could not explain why, continued to feel a sense of contribution despite his poor health rating. He lived with his daughter, a single mother with two young sons. On 13 medications with a high-risk score of 89 and an ACB score of 5, he stated, *“I forget a lot, I am a little woosie...”* but his living with them enabled his daughter to go to work and study to be a nurse; hence he felt he was contributing. His blood pressure on the day of the interview was very high; again the primary care provider was notified and follow up was completed.

Despair

The incidence of depression in cardiac disease is well documented (Dobbels et al., 2002; Freedland et al., 2003; Rumsfeld & Ho, 2005; Yu, Lee, Kwong, Thompson, & Woo, 2008). Patients confided frustration and grief at the loss of prior level of functioning. In a study on patients living with HF (Ryan & Farrelly, 2009) use the analogy of an “illness-imposed incarceration (p.227).”

A recovering alcoholic with a high-risk score of 95 and an ACB score of 4 was on multiple Beers medications as he recovered from a broken hip. Further complicating his risk, he stated, *“I smoke those electronic cigarettes ... whatever the hell they are...a couple times a day. I don't go crazy with it.”* He continued to reveal that he was orphaned

at birth without any family; he stated with a sigh, *“I’ll be honest with you, I am not sure how much good they are doing... I really don’t know. I am taking so much crap.”* He finished his interview with, *“it is getting tiresome. I am seeing a psychiatrist once a week. I am 70....”*

A woman with a moderate risk score of 52 on 11 medications (ACB = 4; 2 Beers medications) stated, *“Sometimes I wish they weren’t working so well. I get so tired.”* A patient who had recently fallen stated, *“I take a lot of medications and I don’t feel any better. You never dream that you will take so many.... I don’t see how they can all help.”*

Unfortunately, at times the confidence was unwarranted. Stress, anxiety, and inadequate knowledge related to HF were also factors in management. In fact, patients were making medication decision errors and failing to take all of their medications as prescribed. A gentleman with a medication SE score of 5, who had been diagnosed within the last year, stated that he was no longer taking his Lasix, *“I had been taking them, but I ran out of the pills and it just says no refill of the bottle... I thought that it meant I did not have to take it anymore....”* An ActualMeds™ action plan was created and the PCP was notified with follow-up the next day. Patients confessed that they did not weigh themselves daily because they didn’t have a scale. When they had been under the care of the home health agency, it had been provided. *“I took my weight every day when the machine was here... but I haven’t taken it lately.”*

Patients could ascribe to being totally confident, but in fact used no medicine box or chart, and described poor regime practices. A patient who scored a five on medication regime SE confided, *“I am not as regular on the hydralazine... it says I should take 3 tablets a day. Honestly I don’t take three tablets every day. On most days I take 2 tablets*

a day... I don't remember it." Another patient stated, *"I do it myself... I just remember... I have them all lined up... what I take every day."* Prescribed 12 medications and caregiver to his wife in a wheelchair, this patient related multiple medication regime errors and his primary care provider was notified and an action plan was created.

Finally, Patients would describe rationales for medications that they realized were not part of their prescribed regime. A patient who had difficulty sleeping took a sleeping pill, *"I know you are not supposed to be on one, I don't have to take more and more of it, I have been on only one."* An older woman related a story of progressive disinterest in things she had previously enjoyed: cooking, sewing, and shopping. She proceeded to describe the following scenario,

"We call it the happy pill. We take that once a day. My husband was in the convalescent home, they put him on it and he seemed so changed with it...they called it the happy pill. When I went to my doctor, I had no interest in anything... so I asked the doctor, 'do you think the happy pill would work for me?' and it did."

Chapter 5

Introduction

This final chapter will present a summary of findings with discussion of pertinent published research. Limitations will be examined. Finally, implications for nursing education, research, and practice will be presented.

Discussion

Summary of Findings

Patients living with HF find themselves in a complex world. The average age of patients in this study was 81 ± 8 and they took an average of 12.6 medications, many with multiple dose times. All patients reported at least five medications, a burden that increases the risk of adverse drug side effects as well as cost (Budnitz, Lovegrove, Shehab, & Richards, 2011; Gnjidic, Le Couteur, Kouladjian, & Hilmer, 2012; Obreli-Neto et al., 2012). The average computed ActualMeds™ risk score of the patients sampled was high, 63 ± 31 . Most (71%) were prescribed medications not recommended for the gerontologic population (AGS, 2012). Patients recognized cognitive changes and of the patients reporting AGS (2012) medications, 18% had fallen within the last year. Others reported a myriad of associated symptoms including unsteadiness, memory change, constipation, and urinary incontinence.

Of the patients prescribed medications contraindicated in the elderly population, 71% were prescribed at least one and 51% had two or more (AGS, 2012). Patients prescribed these medications reported a 48% incidence of related side effects. Polypharmacy was pervasive, often with multiple prescribers, and OTCs accounted for 29% of medications reported. Although there are no Healthcare Effectiveness Data and

Information Set (HEDIS) performance measures specific to HF, there are HEDIS measures for use of high-risk medications in the elderly (NCQA, 2014). The measures include the percentage of Medicare members, 65 years of age and older who were prescribed at least one high-risk medication and the percentage of patients who received at least two different high-risk medications. For both measures, lower rates represent better performance. HF is the most frequent cause of hospitalization; HEDIS measures should be developed for this diagnosis.

Of the patients surveyed, two-thirds reported discrepancies with their medication record from the Home Care agency. Most of these were due to patient recovery from an acute HF episode hospitalization or from other cause hospitalization and medications were no longer required. Some overlap was noted and one-third of patients reported taking medication not on their medication record. These included changes to the HF medication regime and OTCs, including NSAIDs and antihistamines. One patient reported a potentially harmful misunderstanding of his discharge instructions and had stopped taking his HF medications.

All of these patients would benefit from a medication therapy review by a nurse, pharmacist, or eligible provider (EP) at the time of discharge from the hospital and again during home health care treatment to address regime adherence to ACC guidelines and minimize the number of prescribed Beers medications. In addition, these results demonstrate that following discharge from home health, patients living with HF require medication oversight of their regime. According to Centers for Medicare and Medicaid Services (CMS, 2013), the EP who receives a patient from another setting of care or provider of care should perform medication reconciliation. CMS also recommends

reconciliation during transitions of care, such as upon hospitalization and discharge to home. In this study, patients were contacted at least two weeks following discharge from home care. Contacting patients one-week post discharge would provide the prescribing team (EP, nurse, and pharmacist) a good assessment of changes patients are making to their regime and be early enough to prevent complications. At that point the nurse or pharmacist would be able to reinforce rationales for the prescribed regime. Furthermore, when prescribers discontinue or add new medications, a member of the prescribing team should reconcile the medication regime.

Self-efficacy theory has demonstrated its usefulness with medication adherence in the gerontologic population and it provides four sources for interventions to improve a patient's self-medication practices. However, caution must be used because patients may demonstrate a false sense of confidence to providers who don't have the time required to delve into issues in the patient's self-medication practices. The current system in which patients return to the provider within one week of discharge is failing. Ultimately, due to the dire effects of polypharmacy on the gerontologic patient, routine reconciliation and assessment of the medication profile is required. These results from patients with HF support the current CMS recommendation; however, these data reinforce the need for continued diligence after transition.

Anticholinergic Risk

Despite high levels of confidence in their management of their regime, patients admitted to a plethora of errors, most often because they didn't remember. Potential risk factors for cognitive impairment include anticholinergic drug use and age (Ancelin et al., 2006; Roe, Anderson, & Spivack, 2002). Ancelin et al. (2006) found the only highly

significant predictors of mild cognitive impairment were anticholinergic drug use ($p < 0.001$) and age ($p < 0.001$) after adjustment for other possible causes. Again, 71% of the patients interviewed in this study were prescribed at least one medication contraindicated for the older adult and 51% reported two or more (AGS, 2012). AGS (2012) provides alternative medications for all medications that have high anticholinergic effects in older adults.

A stunning 95% of patients surveyed in this study were taking medications with anticholinergic side effects and risk of cognitive impairment. Seventy-eight percent had at least a moderate anticholinergic burden (ACB) score (2 or more) and 54% had a high anticholinergic burden score (≥ 3 , range 3-10). It is recommended that patients be prescribed medications with lower levels of anticholinergic activity; however, it warns that patients prescribed multiple medications with lower levels of activity would be at risk for cumulative effects. Also, patients prescribed a single medication with higher-level activity would be at risk when self-medicating with OTCs with anticholinergic activity such as loperamide, ranitidine, cimetidine, diphenhydramine, clemastine, and cetirizine.

Patients with HF are placed in a difficult situation because the HF medication guidelines (ACC, 2013) include medications that carry mild cholinergic burden. As seen in this study, patients may be prescribed multiple medications according to these guidelines that engender an anticholinergic burden. Two of the most commonly prescribed medications for the patients, metoprolol and furosemide, both yield a mild ACB. Carvedilol has no associated ACB and would be a better choice for patients with HF. If the patient also has atrial fibrillation and is prescribed warfarin, the patient already

carries a high burden (ACB=3). Because of the compounding effects of additional medications, the regime warrants review at times of transition, within one week of discharge from the hospital and/ or home care, and again at a minimum of every two months. These reviews require continuity and should be conducted with ongoing assessment of symptoms and education around the importance of adherence to their regimen and avoidance of adverse self-medication behaviors, particularly with OTCs on the Beers list. Phone interventions could be warranted more often in patients with high-risk scores, or high anticholinergic burden, and/ or taking Beers medications (AGS, 2012) and should be investigated in future research.

Clinical Implications

Other variables to consider when assessing patients for increased risk are those who live alone and report poor health. Iloabuchi, Deming Mi, Wanzhu, and Counsell (2014) identified independent risk factors of early readmission to the hospital were living alone and poor communication with the primary care provider (PCP). Older adults living alone were at greater risk of decompensation (Iloabuchi, et al., 2014). Other risk factors for poor self-care care regime identified by Iloabuchi et. al (2014) include <12 years of education, and poor satisfaction with primary care provider. Berner (2012) describes the need for greater numbers of geriatricians who understand the time required to foster and build confidence in the relationship with the aging patient. Geriatric nurse practitioners (NP) could fill the void in number of geriatricians. Once again, a prescribing team would be the most beneficial to the patient due to the complexity of the regime of the older adult with HF. Pharmacists certified in geriatric pharmacy working in tandem with the HF nurse and the EP need to collaborate to minimize risk associated with the prescribed

regime. Ultimately, it is evident that medication review cannot be left to a primary care visit with a median time of 14 minutes in duration (Hing, Cherry, & Woodwell, 2006). The average length of the focused interview on medications in this study was 15 minutes. A solution such as ActualMeds™ would facilitate seamless workflow between the entire prescribing team and afford the opportunity for productive dialogue during patient visits with the PCP.

Not only are geriatricians necessary to build the relationship with the patient, they would be knowledgeable of the medications not recommended for this population. In this study, patients were prescribed many different medications contraindicated by the AGS (2012). Finally, 6 of the 10 patients who reported cognitive changes and other side effects of anticholinergic medications reported lower self-efficacy.

Depression

Furthermore, depressive symptoms have been identified as an independent risk factor for mortality in the elderly (Teng, Yeh, Lee, Lin, & Lai, 2013). The incidence of depression in HF is well documented (Bekelman et al., 2007; Delaney & Apostolidis, 2010; Jaarsma, Johansson, Agren, & Stromberg, 2010). Depression is reported in up to 60%-78% of patients living with HF, depending on the method of measurement. Nonadherence to medication was reported in 25-35% of HF patients who reported depression and anxiety (Wu, 2008). Sadly, often patients living with HF are not offered psychosocial consultations (Ryan & Farrelly, 2009). Patients cannot perform as they once did. Regime restrictions impose constraints on the patient's ability to interact outside of the home. Expressions of grief were common due the frustrations of the patient's current

health status. Of patients who reported depression, 3 of the 5 had lower OESE scores and all 6 who reported anxiety had lower OESE scores. Only one patient in this study admitted that he was offered psychosocial services.

Case Highlights

A patient living with her husband had multiple comorbid conditions and was prescribed 2 medications with strong anticholinergic effects. She reported depression and had a high calculated risk score. She wasn't totally confident that her medications were improving the quality of her life; however with the reported high MSE scores, a provider might find it difficult in a brief visit to uncover the issues with the patient's regime.

Sadly, as made evident in the words of patients with lower SE scores presented within, too many patients' experiences with HF end in *Despair* (Erikson, 1997). Patients described discontentment with the restrictions of the imposed medication regime. Another patient confided that her regime had been to take 80 mg of Lasix in the morning; however, her PCP changed her prescription to 40 mg in the morning and 40 mg in the afternoon. She confessed she could no longer leave the house for fear of a bladder accident. Many patients reported similar restrictions and with similar dismay. Unfortunately, it is avoidance that intensifies deterioration in physical conditioning (Pihl, Fridlund & Mårtensson, 2011). The patient stated she had not reported her dissatisfaction regarding the change in regime to her PCP, but rather wouldn't take the second dose if there were something that required she leave her home.

There were 6 patients whose interviews yielded very high-risk scores. An 80-year-old woman, who lived alone, was prescribed 11 medications, 6 of these with mild anticholinergic burden and 2 were Beers medications (AGS, 2012). In addition, she took

5 OTC medications, one of which contributed further anticholinergic burden (ACB = 7). Both her MSE and OESE scores were lower. Another man on 21 medications, 2 with low anticholinergic burden and 3 other Beers medications, reported anxiety, DM, and HF described his health as poor. Because he lived with his wife and she helped him with his medications he reported confidence in his medication regime; however he reported very low scores in OESE. Another man, who reported comorbid conditions of emphysema and depression, had a total risk score of 155. He was prescribed 12 medications, 4 with anticholinergic side effects (total ACB score = 4) one additional Beers medication, and he self-medicated with 4 OTC medications. He lived alone and used no adherence tool, yet he reported high MSE, but very low OESE scores. Finally, another gentleman with a very high calculated risk score (137) reported 21 medications, 8 with multiple dose times (ACB = 3; Beers medications – 2). He lived with his wife, used an adherence tool, and reported good support systems. He reported confidence in his MSE. His comorbid conditions included DM and depression. Sadly, he had very little confidence in his medications' ability to improve his life. The combination of reported SE measures, high-risk scores, and words uncover the precarious state that many patients living with HF function within.

It is evident from the summary of data that living alone, advancing age, medications contraindicated by AGS (2012), a history of depression or anxiety, low MSE and/ or OESE scores, and a calculated ActualMeds™ high risk score operate as barriers to successful transition for these patients. Captured together, these data paint a more clear illustration into the patient's transition (Meleis, et al., 2000) to living with HF.

Strengths

The design of this study had several strengths. Due to the complexity of the regime required for successful management of daily self-care in patients living with HF, the mixed-methods design afforded the opportunity to collect data from multiple perspectives to capture a more complete understanding of the process. The pragmatic lens enabled the threading of the objective/ subjective realm to the inductive/ deductive one.

There were enough patients with both lower and higher MSE and OESE scores for the qualitative interviews to yield rich data that provided vivid descriptions of the patients' perceptions of their imposed regime. Patients were interviewed over the phone at their convenience. The patients remained anonymous and would be honest in their answers.

Limitations

The limitations in this study include its small sample size with participants from one home care agency in Central Connecticut. Due to the small sample size, sufficient power was not reached to find significance in the differences in OESE between males and females and correlations between OESE and risk scores. Although age and education were normally distributed, most patients were Caucasian. In addition, no instrument was used to measure cognitive function at baseline. While the demographics (Caucasian with > 50% reporting high school education) of this sample has been cited as a limitation, the findings are worrisome. This sample might be considered the best-case scenario because of the patients' level of education, their access to care, and the sample patients volunteered for the study. Patients who live alone with low literacy/ numeracy skills and poor cognitive functioning must be considered.

Finally, patients may have felt obliged to report high levels of confidence in their regime. Social desirability and its influence on participant responses have been identified in the literature (Osborne, Middleton, Jones, Ford, & Noble, 2013; Reese et al., 2013). While Reese et al. (2013) found that participant responses were not inflated or influenced by the presence of the therapist, Osborne et al. (2013) question the validity of self-reported data in interviews. Future studies will continue to add to the body of evidence on social desirability and its impact on survey responses and qualitative interviews. Two patients in this current study stated that they knew what was expected of them.

Implications for Nursing Education and Practice

The results of this study build on the increasing body of evidence to support continued oversight of adherence to ACC guideline recommendations (Lama Tamang et al., 2013) and patient education following hospitalization (Crowder, 2006; Delaney et al., 2013; Hernandez et al., 2010). Similar to Lama Tamang et al. (2013) in which 16.7% of patients were prescribed all four of the ACC recommended classes of medications [β -blockers, angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACEIs/ARBs), diuretics, and digoxin], the patients interviewed for this study were prescribed all four at a rate of 17%. Unlike Lama Tamang where 83.3% of patients were taking only one medication of the recommended 4-drug regimen, a majority of patients in this study were taking more than one medication (88%).

Additionally, this study highlights the necessity of seamless communication between the health care team in an effort to prevent the potential harmful effects of polypharmacy. This study illustrates the compounding risks of prescribed and OTC medications either from a gerontologic or anticholinergic burden perspective. Despite

patients' high levels of confidence in their management of their regime, they asked a myriad of questions during the interviews and confessed to errors.

HF is a complex etiology that requires patients to expertly manage multiple therapeutic regimes simultaneously. Nurses require education to provide this information to patients prior to discharge. Failure to properly manage these increases the risk of adverse drug events, exacerbation of HF and increased rates of rehospitalization. Ultimately, care within our current system is driven by health care costs. The medicalization of care attempts to describe quality of life in rehospitalization statistics, complication rates, and severity of disease. Because of the exorbitant costs related to these, nursing has a unique opportunity. By entering an engaged relationship, coaching patients on the telephone or visiting patients in their home, interventions designed to facilitate successful management of the patient's regime have the potential for a sustained effect. Research aimed at the four sources of knowledge in self-efficacy and to allay inhibitors of a successful transition requires immediate attention.

Operationalized within the population living with HF, it is proposed that with the presence of an engaged nursing relationship, the process of transitioning to living with the sequelae is optimized. Meleis et al. (2000) advocates multiple realities can exist within the experience of a phenomenon. Transitions are complex, operating within the fabric of society, and cannot be interpreted in isolation. She concludes transitions exist along a continuum resulting both from and in change. These underlying assumptions seem compatible with patients diagnosed with HF *transitioning to living with* that diagnosis.

Meleis et al. (2000) includes in her theory of transition, properties of the transition

experience: awareness, engagement, change and difference, time span, and critical points or events. Once again, they are interrelated properties of a complex process. When patients have a new diagnosis, it is considered a critical point in which they are confronted with barriers and supported by facilitators. Engagement is relevant to HF patients, defined as the degree to which a person embraces in the process required to transition (Meleis et al., 2000). It includes a patient's seeking health information, using role models, and modifying activities. It is within engagement that nursing has an opportunity to improve patients' self-efficacy and *quality* of life.

This presents an enormous opportunity for nurses to facilitate a positive transition through a relationship of support and creativity. We know that providing patients with information or therapeutic interventions does not always change behavior. Schroeder (2003) suggests that relationship in nursing is an outcome itself. With this approach, there is a continued negotiation between the nurse and the patient. It is within the relationship and the dialogue between the nurse and patient that engagement occurs. When carefully "co-constructed," the environment becomes a safe haven for the patient and the nurse to explore together. The nurse would come to know the subtleties of change demonstrated by a patient. Early recognition might afford the avoidance of the barriers and facilitation of optimized wellness. Presented with success, patients would have increased self-efficacy expectations and outcome expectations. Patients would have the opportunity to remain engaged. As their lives change, the sustained relationship may facilitate patients to maintain connections. Research to enhance positive relationships and to allay inhibitors of a successful transition are needed.

Implications for Nursing Research

Programs such as The Care Transitions Program (Coleman, 2014) present a successful option for patients with fewer support systems. This program was developed through the University of Colorado School of Medicine and is a division of Health Care Policy and Research. It aims to support patients through transitions and increase skills among healthcare providers by enhancing health information technology and implementing system level interventions to improve the quality of care. One instrument that might prove beneficial for the population in this study is the Medication Discrepancy Instrument (Coleman, 2014). The elements in this tool include the causes and contributing factors related to adherence across the spectrum: patient level, system level, and resolution level. It has been previously validated and is widely used.

Another interdisciplinary program whose aim is to minimize disparities among vulnerable community-based elder populations is the Transitional Care Model, a nurse-led, team-based care delivery model that focuses on providing synchronous delivery of care among disciplines (Naylor, 2004). It calls for enhanced patient engagement with a focus on barriers to elders along with shared decision-making in resolution (Naylor, Hirschman, O'Connor, Barg, & Pauly, 2013). The Hospital Discharge Screening Criteria for High Risk Older Adults instrument could address the need to establish those at greatest risk at the time of discharge (Bixby & Naylor, 2009). The assessment of this instrument would assist nurses in the identification of those in need and trigger post discharge interventions to insure coordination of care to those at risk after discharge. The TCM responds to the greatest threats to our health care system: the increasing numbers of chronically ill elderly patients generating a disproportionate amount of health care expenditures (Naylor, 2012).

Future studies must incorporate a cognitive assessment instrument to assess cognitive impairment in order to provide data to support conclusions related to the participant's ability to manage his or her regime. Cai, Campbell, Khan, Callahan, and Boustani, (2013) demonstrated that anticholinergic medications in the gerontologic population may be a risk factor for developing mild cognitive impairment. Monitoring of these medications used in the HF population is warranted.

A report released by the National Alliance for Caregiving and the American Association for Retired Persons (2004) estimates that 22.9 million American families or 44.4 million individuals are involved in caring for a person over the age of 50 (Sanford, Townsend-Rocchicciolli, Horigan, & Hall, 2011). High caregiver burden is associated with increased need for assistance (Garlo, O'Leary, Van Ness, & Fried, 2010). Clark, Reid, Morrison, Capewell, Murdoch and McMurray (2008) studied the complexity of informal care of patients with HF and concluded that future interventions must include caregivers in order to improve quality of care and reduce escalating health care costs. High-level social caregiver support in Stage III HF patients improves communication with the primary care provider and overall self-care practices (Galleger, Luttk, & Jaarsma, 2011). These studies highlight the importance of enabling caregivers to make the best decisions related to caring for the patient with HF.

Symptoms associated with HF in community-dwelling adults and older adults have been shown to be a source of concern as well as support among their family members. As supported in this study, family caregivers have been shown to play important roles in facilitating HF patients' adherence to complex medication regimens, promoting patients' self-care behavior, and monitoring HF symptoms. Family support has

been associated with improved self-care among HF patients (Dunbar, et al, 2008); however, these roles can weigh heavily on caregivers. Family caregiver burden levels have been found higher when the physical health of their relative with HF is more impaired, even after controlling for caregiver knowledge about HF and perceived control over their relatives' cardiovascular health (Agren, et al, 2010). Recently published qualitative research with family caregivers of HF patients has shown that many caregivers are unprepared to manage the disease burden without consistent information and assistance by health care professionals (Imes, et al, 2011). In 2006, the HF Society of America recommended that HF care improvement should include assessment and intervention of needs among both patients and family caregivers (HFSA, 2006).

Finally, a model for the triadic relationship between the patient, caregiver, and primary care provider would enable the measurement of the impact of these important variables on the patient's adherence and understanding of his regime (Fortinsky, 2001). Following discharge from the hospital or home care, a phone interview conducted by a nurse would identify risks that could lead to rehospitalization. Self-medication and other patient reported status (symptoms, sleep patterns, etc.) would provide early insight into care gaps and possible interactions. Finally, communication of Action Plans from risk assessment of the ActualMeds™ instrument would have the potential for use in care coordination system-wide for high risk cohorts with complex regimens.

Improving the transitions in living with HF is critical in the effective treatment of the disease. Strategies aimed at facilitating supportive care to those diagnosed with HF would ultimately improve the quality of life in this population. Presented with success patients would have increased self-efficacy expectations and outcome expectations.

Patients would have the opportunity to remain engaged. As their lives change, facilitators are required to assist patients to maintain connections. Research to enhance positive relationships and to allay inhibitors of a successful transition is needed. Barriers to a positive transition cannot be ignored. Patients living alone are at risk and depression remains underdiagnosed and undertreated. Effective strategies would focus on patient concerns and perhaps require gender specificity. The goal to decrease adverse sequelae from medication interactions and improve how patients *feel* would be observed.

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Table 1

Baseline characteristics of HF symptoms

Characteristic	Diastolic (HFpEF)	Systolic (HFrEF)
Diagnosis	Preserved LV function	Impaired LV function
Gender	Greater in women	Greater in men
HF Guideline Evidence	Small studies Level C	RCTs Level A & B
Symptoms	Overwhelming fatigue Shortness of breath	Chest Pain Edema
Treatment	Treat comorbid conditions Patients sensitive to volume changes Caution with diuresis	Optimize LV function Diuresis

Table 2*Principal-Component Analysis with Oblique Rotation (N = 93)*

	Item Number	Stem	Loading
<i>Factor I</i>			
Confidence	12	Keep you out of the hospital	0.97
Medications will have prescribed effect	15	Make you feel better	0.95
	14	Lead a normal life	0.95
	10	Improve your health	0.95
	13	Live a long life	0.94
	11	Improve your quality of life	0.94
<i>Factor II</i>			
Medication Adherence with Disruption	7	When you are interrupted	0.96
	6	When you are busy	0.93
	4	When you are sad	0.78
	9	When no one reminds you	0.51
<i>Factor III</i>			
Confidence that you will take medications correctly when...	3	You have an upset stomach	0.92
	2	You have pain	0.88
	1	You have a cold	0.86
	5	You take vitamins	0.70
	8	The drug is expensive	0.51

Table 3*Pattern Matrix Oblique Rotation* (N=93)*

Item	Factor I	Factor II	Factor III
12	0.97		
15	0.95		
14	0.95		
10	0.95		
13	0.94		
11	0.94		
7		0.96	
6		0.93	
4		0.78	
9		0.51	
3			0.92
2			0.88
1			0.86
5			0.70

8

0.51

*For ease of interpretation only entries above 0.30 have been included. Items are sorted by loadings in descending order.

Table 4

Inter-correlation Matrix Oblique Rotation: (N=93)

Component	1	2	3
1	1.000	0.31	0.57
2	0.31	1.000	0.51
3	0.57	0.51	1.000

Table 5

Baseline characteristics of patient population

Characteristic	Frequency	Percent
Sex		
Female	24	58.5
Male	17	41.5
Race		
Caucasian	39	95.1
African American	2	4.9
Last year of completed education		
10 th grade	6	14.6
12 th grade	22	53.7
14 years	2	4.9
16 years	10	24.4
18 years	1	2.4

Number of medications		
5 – 9 medications	8	22.9
10 – 14 medications	19	54.2
15 – 19 medications	4	11.5
20 – 26 medications	4	11.5
Self-health rating		
Very good	4	11.1
Good	11	30.6
Average	5	13.9
Fair	8	22.2
Poor	6	16.7
Depressive symptoms		
Anxiety	7	19.4
Anxiety, Depression	5	13.9
None	22	61.

Table 6*Self-reported comorbid conditions*

	Frequency	Percent
Hypertension	23	56
Diabetes Mellitus	11	27
Chronic obstructive pulmonary disease asthma, or emphysema	9	22

Table 7*Self-reported medication use*

Medication category	Frequency	Percent
Diuretic	26	62
Beta blocker	25	61
Angiotensin converting enzyme inhibitor	8	20
Aspirin	16	39
Anticoagulant	13	32
Calcium channel blocker	7	17
Angiotensin receptor blocker	5	10

Table 8*Mean self-efficacy, risk score, and BP values*

Characteristic	Mean	SD
Age in years	81.1	8.5
Mean self-efficacy	3.9	1.1
Outcome expectations	4.01	1.0
ActualMeds TM risk score	62.6	50.6
Systolic blood pressure	123.4	20.5
Diastolic blood pressure	64.6	13.0

Table 9*Beers medications reported and number of patients prescribed each*

Medication	Brand Name	Number of patients prescribed
<i>Alpha blockers</i>		
terazosin	Hytrin	2
<i>Antispasmodics</i>		
dicyclomine	Bentyl	2
<i>Antidysrhythmics</i>		
sotalol		1
<i>Antimuscarinics</i>		
oxybutynin	Ditropan	1
<i>Antithrombotics</i>		

Medication	Brand Name	Number of patients prescribed
dabigatran	Pradaxa	3
rivaroxaben	Xarelto	1
<i>Tertiary TCAs</i>		
amitriptyline		1
<i>Benzodiazepines</i>		
alprazolam	Xanax	7
lorazepam	Ativan	1
<i>Cardiovascular medications</i>		
sotalol	Betapace	1
spironolactone	Aldactone	6
<i>Endocrine estrogens</i>		
estradiol	Estrace	1
<i>Endocrine sulfonylureas</i>		
glimepiride	Ameryl	1
glipizide	Glucotrol	1
<i>Insulin sliding scale</i>		
Insulin	Regular	7
<i>Nonbenzodiazepine hypnotics</i>		
zolpidem	Ambien	2
eszopiclone	Lunesta	1
<i>Non-COX NSAIDS</i>		
ibuprofen	Advil	4
<i>Oral decongestants</i>		
methylphenidate	Ritalin	1
<i>Skeletal muscle relaxants</i>		
cyclobenzaprine	Flexeril	2
metaxalone	Skelaxin	1
<i>Seizure medications</i>		
nortriptyline	Tegretol	2
tramadol	Ultram	3
<i>SSRIs</i>		
citalopram	Celexa	4
escitalopram oxalate	Lexapro	3
sertraline	Zoloft	1
<i>Thyroid medication</i>		
	ArmourThyroid	1

Table 10*Anticholinergic medications reported and number of patients reporting each*

ACB Score 1	ACB Score 2	ACB Score 3			
alprazolam	5	carbamazepine	1	amitriptyline	1
atenolol	2	cyclobenzapine	1	dicyclomine	1
codeine	5	cetirizine	1	diphenhydramine	1
colchicine (OTC)	1	loratadine	1	nortriptyline	1
digoxin	3			oxybutynin	1
diltiazem	1			paroxetine	1
fluticasone	2				1

ACB Score 1	ACB Score 2	ACB Score 3
furosemide	27	
isosorbide		
loperamide (OTC)	1	
lorazepam	1	
metoprolol	13	
mirtazepine	1	
prednisone	4	
ranitidine (OTC)	4	
sertraline	1	
tramadol	3	
warfarin	12	

Figure 1

Self-Efficacy model

Self Efficacy operating within the *Theory of Transition*

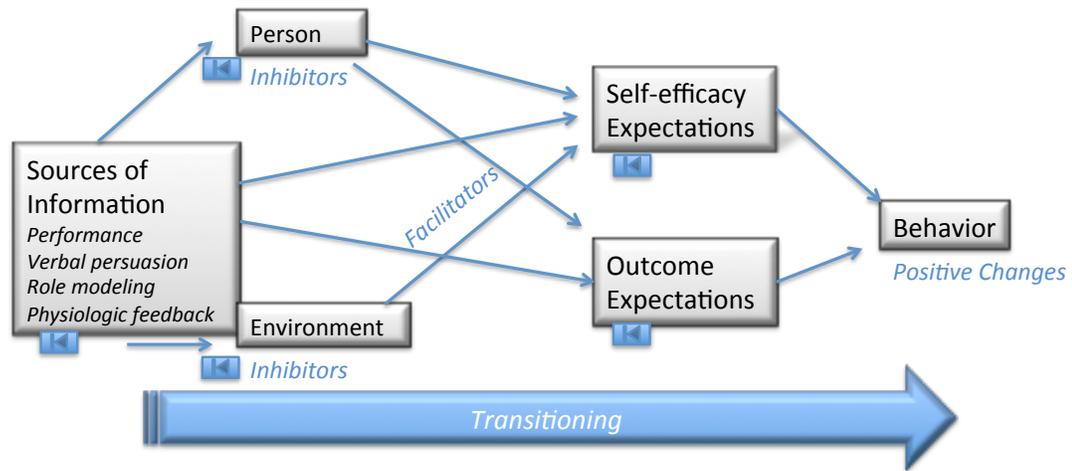


Figure 2

Convergent parallel mixed methods design

Convergent Parallel Mixed Methods Design

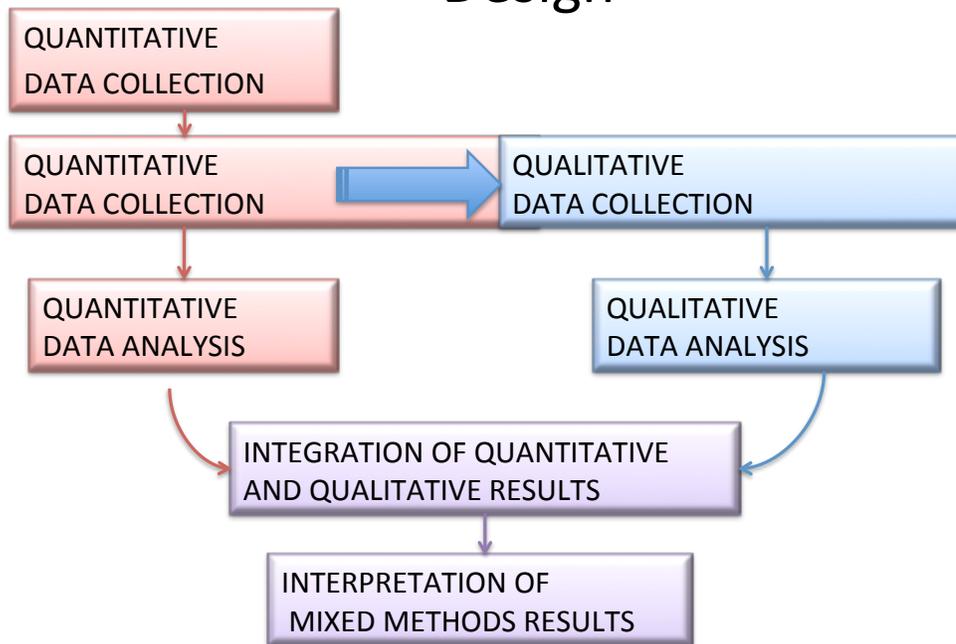


Figure 3

HF medication self-efficacy instrument

Please rate the following statements on a scale of:

1 (*not at all confident*) to 5 (*totally confident*)

<i>How confident are you that you take your prescription medication correctly when...</i>	<i>Not at all confident</i>				<i>Totally confident</i>
1. you have a cold.	1	2	3	4	5
2. you are having pain.	1	2	3	4	5
3. you are taking medication for an upset stomach.	1	2	3	4	5
4. you are feeling sad.	1	2	3	4	5
5. you are taking your vitamins.	1	2	3	4	5
6. you have a busy day.	1	2	3	4	5
7. your normal routine is interrupted.	1	2	3	4	5
8. the drug is expensive.	1	2	4	4	5
9. when no one reminds you to take your medication.	1	2	3	4	5
<i>How confident are you that your medication will...</i>	1	2	3	4	5
10. improve your health.	1	2	3	4	5
11. improve your quality of life.	1	2	3	4	5
12. keep you out of the hospital.	1	2	3	4	5
13. allow you to live a long life.	1	2	3	4	5
14. allow you to live a near normal life.	1	2	3	4	5
15. make you feel better.	1	2	3	4	5

Please provide this information about you: Age: _____ Gender: M or F

Do you take medications for your heart? Yes or No

Figure 4

Histogram of risk scores

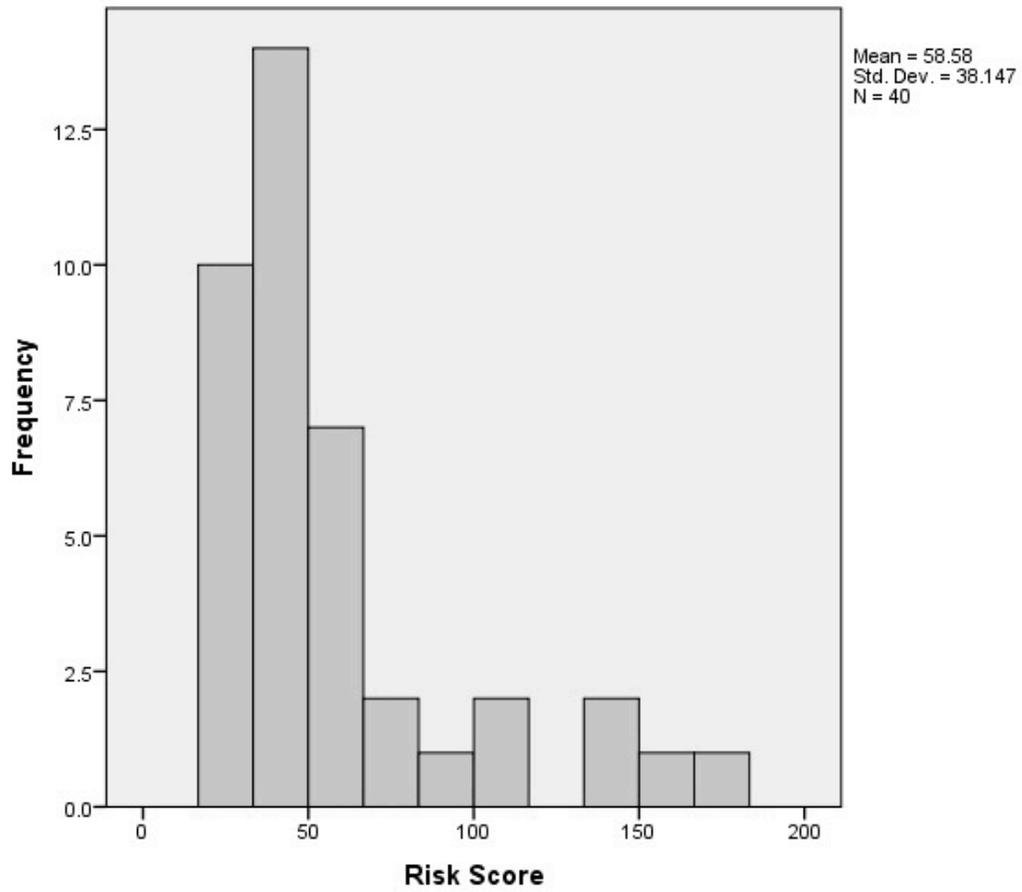


Figure 5

Number of medications correlated to risk score

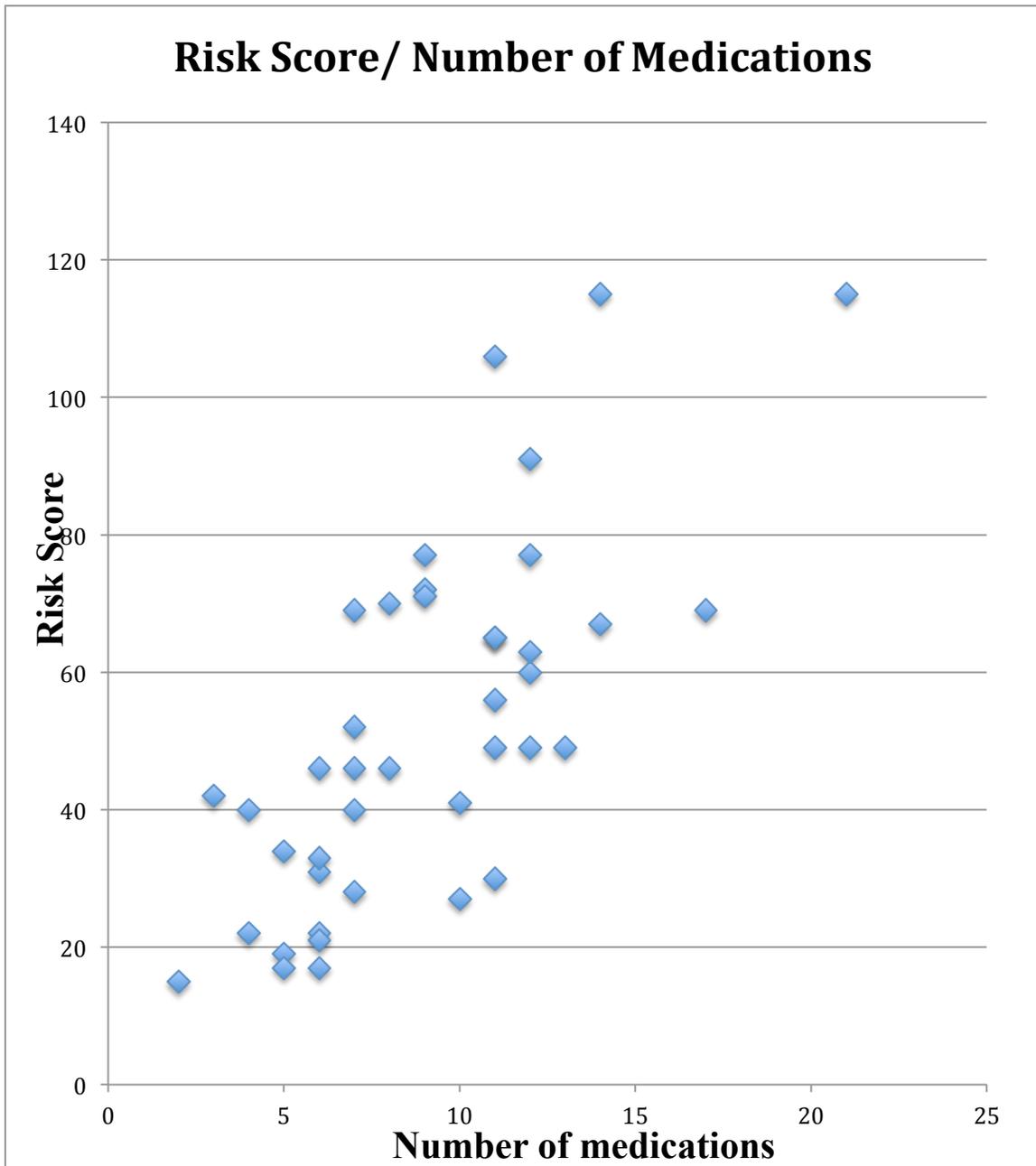


Figure 6

Outcome expectations correlated to risk score

