

2001

Perceived Knowledge of Heart Failure and Adherence to Self-Care Recommendations

Cheryl Lynn Van Ess
Grand Valley State University

Follow this and additional works at: <http://scholarworks.gvsu.edu/theses>

 Part of the [Nursing Commons](#)

Recommended Citation

Van Ess, Cheryl Lynn, "Perceived Knowledge of Heart Failure and Adherence to Self-Care Recommendations" (2001). *Masters Theses*. 575.
<http://scholarworks.gvsu.edu/theses/575>

This Thesis is brought to you for free and open access by the Graduate Research and Creative Practice at ScholarWorks@GVSU. It has been accepted for inclusion in Masters Theses by an authorized administrator of ScholarWorks@GVSU. For more information, please contact scholarworks@gvsu.edu.

**Perceived Knowledge of Heart Failure and Adherence to Self-Care
Recommendations**

By

Cheryl Lynn Van Ess

A Thesis

**Submitted to
Grand Valley State University
In partial fulfillment of the requirements for the
Degree of**

MASTERS OF SCIENCE IN NURSING

**Kirkhof School of Nursing
2001**

Thesis Committe Members:

Linda Scott, PhD, RN

Kay Setter Kline, PhD, RN

James Scott, MA, PES

ABSTRACT

PERCEIVED KNOWLEDGE OF HEART FAILURE AND ADHERENCE TO SELF-CARE RECOMMENDATIONS

By

Cheryl L. Van Ess

During the last decade, research has indicated that patient education is an essential component in the comprehensive management of heart failure. However, few data are available that evaluate how effective that education is and the relationship between knowledge and self-care adherence. Therefore, the purpose of this study was to examine the relationship between patients' perceived knowledge of heart failure and their reported self-care adherence with diet, exercise, and medication in the management of their chronic disease. Orem's self-care theory provided the framework for this study.

This study was a secondary analysis of the baseline data collected from a self-reporting questionnaire used in the experimental study conducted by Kay Setter Kline, PhD, RN and colleagues. The results from the participants (n = 86) indicated that there was a positive weak relationship between perceived knowledge of heart failure and adherence to taking the prescribed medication dose and to exercise. No significant differences were found between length of heart failure diagnosis and perceived knowledge or adherence to self-care recommendations to diet, exercise, and medications.

Acknowledgements

I would like to extend my deepest gratitude to Linda D. Scott, Ph.D., RN, my thesis chair, for her wisdom and expertise in guiding me through the process of thesis development and implementation. Her knowledge in care of the heart failure patient and positive enthusiasm for the research process was an inspiration throughout the development and completion of my research project.

I would also like to thank Kay Setter Kline Ph.D., RN, for the opportunity to use data from her exciting research in education of the heart failure patient. Her wisdom and enthusiasm for research in this area is inspiring to others researching self-care in the heart failure patients.

I would also like to show appreciation to James Scott, MA, PES, for his knowledge and expertise in the area of exercise and research. His insights and observations strengthened my research project and helped me reflect on the scope of research to the healthcare community.

Last of all, I would like to extend my deepest appreciation to my parents, sister, and friends at Metropolitan Hospital, who supported me through each step of the way. I could not have made it without all the love and encouragement they gave me throughout the completion of this project.

Table of Contents

List of Tables	vi
List of Appendices	vii
CHAPTER	
1 INTRODUCTION	1
2 CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW.....	5
Conceptual Framework	5
Self-care	5
Self-care agency	6
Therapeutic self-care demand	6
Self-care requisites	7
Literature Review	9
Heart failure management	10
Medication compliance	12
Exercise adherence	14
Education, knowledge and self-care adherence	17
Factors affecting knowledge and self-care	19
Strengths and Limitations	22
Summary	23
Research Questions	24
Definition of Terms	24
3 METHODOLOGY	26
Research Design	26
Overview of Primary Study	26
Characteristics of the participants	27
Instruments	28
Reliability and validity	31
Procedure	32
Secondary Analysis	33
Threats to Validity	33

Table of Contents

4	RESULTS	35
	Research Questions	35
	Perceived Knowledge of Heart Failure	36
	Exercise	36
	Diet	38
	Medication	39
	Knowledge and Self-Care Adherence	40
	Knowledge, Self-Care Adherence and Length of Heart Failure Diagnosis	41
5	DISCUSSION AND IMPLICATIONS	43
	Discussion of Findings	43
	Strengths and Limitations	48
	Implications	49
	Significance to Nursing Practice	49
	Significance to Nursing Education	51
	Significance to Nursing Administration	52
	Significance to Nursing Research	53
	APPENDICES	55
	REFERENCES	61

List of Tables

TABLE

1	Sociodemographic Data	29
2	Perceived Knowledge of Heart Failure.	37
3	Frequency of Exercise.	38
4	Frequency of Diet Adherence	39
5	Medications	40
6	Correlations Between Knowledge, Exercise, Diet, and Medication	42

List of Appendices

APPENDIX

A	Perceived Knowledge Scale	55
B	Exercise Self Management Scale	57
C	Diet Self Management Scale	58
D	Medication Self Management Scale.	59
E	Grand Valley State University's Human Subjects Approval . . .	60

CHAPTER 1

INTRODUCTION

According to the National Institutes of Health (National Heart, Lung, and Blood Institute [NHLBI], 1996), there are an estimated 4.8 million Americans with heart failure (HF), with approximately 400,000 new cases diagnosed annually. This syndrome usually develops gradually and may be a result of cardiac disorders such as hypertension, myocardial infarction, and atherosclerosis. These disorders can lead to a damaged and overworked heart. When the heart cannot pump efficiently, the blood flow decreases and less blood is pumped. The amount of oxygen-rich blood circulating from the heart to other major organs, such as the brain, lungs, and kidneys decreases, making these organs unable to function properly.

As the heart's efficiency in pumping decreases, the blood returning to the heart backs up into the veins forcing fluid from the vessels, leading to congestion in surrounding tissues of the feet and legs in left-sided HF, and the lungs in right-sided HF. Thus, a sequela of signs and symptoms of HF ensues, including peripheral and pulmonary edema, fatigue, weakness, and disrupted sleep patterns. Early detection and prompt, effective treatment of HF may improve survival rates, reduce symptom exacerbation and enhance quality of life (NHLBI, 1996).

The majority of the individuals diagnosed with HF are older than 65 years. Of the estimated 4.8 million Americans with HF, only 1.4 million are under 60 years of age. According to NHLBI (1996), the prevalence of HF in men and women are approximately equal in number. The National Health and Nutrition Examination Survey found HF present in two percent of persons age 40 to 59, more than five percent of the individuals age 60 to 69, and ten percent among individuals age 70 and older. The significance of this increases as, the “baby boomer” generation ages during the next 40 years and expands the population group over age 65. Furthermore, with the advances in medical technology, this generation will have an increase in average life expectancy. This will lead to an overall upsurge in the general elderly population.

According to the Framingham Heart study, the incidence of HF is twice as common in people with hypertension compared with normotensive individuals. Moreover, HF is five times more likely to occur in people who have experienced a myocardial infarction. While the survival rate for those diagnosed with HF is six to eight years, one in five die within one year (NHLBI, 1996). Consequently, HF contributes to approximately 260,000 deaths each year (NHLBI, 1996).

One fifth of all hospitalizations of people age 65 years and older have a primary or secondary diagnosis of HF (NHLBI, 1996). Repeated exacerbation of HF is responsible for 17.2% of the national hospital readmissions within 30 days after discharge (Hafferkamp-Venner & Seelbinder, 1996). Many of these hospitalizations are preventable with appropriate intervention (Vinson, Rich, Sperry, Shah, & McNamara, 1990). Education and effective use of medications early in the diagnosis and treatment of HF may decrease the severity of this disease and increase the chances of survival.

Investigators have attempted to reduce readmission rates by implementing various management approaches for HF patients. For example, multidisciplinary interventions (Rich et al., 1995), focused educational plans with close follow up (Fonarow et al., 1997), and telephone surveillance (West et al., 1997) have been used as disease management approaches. Each of these studies illustrate a strong emphasis on general treatment principles that could be considered quality markers, such as aggressive patient education and close clinical follow-up. Unfortunately, none of these studies showed the effectiveness of these strategies by measuring patient comprehension and retention, and linking any changes to improved quality of life.

Learning to manage a chronic condition is the cornerstone of self-care (Wehby & Brenner, 1999). As hospital lengths of stay decrease, priorities must be set for patient education. However, patients and their nurses may perceive different facets of HF education as important and realistic to learn during their hospital stay. Wehby and Brenner found that nurses recognized signs/symptoms, medications, and diet as the top three important topics to learn during a hospitalization of HF patients, while physical activity, psychological state, and prognosis were perceived as areas of least importance for education while during hospitalization. In contrast, patients identified medications, signs/symptoms, and general information as the top three important topics to learn. Patients perceived the physical activity, psychological state, and dietary content as the least important and realistic to learn during the hospital stay (Wehby & Brenner, 1999). Educational objectives need to be collaboratively developed so that a nurse can ensure that baseline knowledge of HF self-care management can be learned prior to discharge

from the hospital. Education should be continued by healthcare providers on an outpatient basis to have an impact on behavioral changes (Wehby & Brenner, 1999).

Although knowledge does not mean compliance, being confronted with a life-threatening situation may result in increased motivation for self-care adherence. According to Hulka (1976), compliance increases when patients believe they are susceptible to serious problems. Hospitalizations may be a motivator and opportunity for obtaining necessary information regarding self-care for one's disease.

Whether it is with the use of a clinical pathway, clinics, or tele-management of patients, improving the outcome of HF is one of the goals for disease management. However, there is a lack of empirical data on the relationship between the patient's perceived knowledge and reported self-care adherence to the multiple aspects of HF management. Therefore, the purpose of this study was to examine the relationship of patients' perceived knowledge of HF and their reported self-care adherence in management of their chronic disease. By understanding this relationship, healthcare providers can focus education in the areas of greatest need, thereby reducing frequency of hospitalizations and healthcare expenses associated with HF.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The phenomenon of the relationship between perceived knowledge of HF and self-care adherence to recommendations was evaluated using Dorothy Orem's Self-Care Deficit (1995) nursing theory. A review of the literature on knowledge and self-care in HF patients evaluated the need for further study of this phenomenon.

Conceptual Framework

Self-care. Orem's Self-Care Deficit theory identifies self-care as a learned, goal-oriented activity of individuals. "It is the practice of activities that individuals initiate and perform on their own behalf in maintaining life, healthy functioning, personal development, and well being" (Orem, 1995, p.104).

Individuals who can produce effective self-care have knowledge of themselves and knowledge of their environmental condition. Before they can establish the appropriate care measures to follow, they must gain knowledge of the options available to them, as well as their effectiveness and desirability. Health care providers can assist individuals with HF in obtaining this knowledge by educating them while they are hospitalized. Home care nurses can also promote further learning with follow-up counseling after discharge. This would empower HF patients to be effective producers of self-care as they make decisions about actions to take and those to avoid.

Self-care agency. To engage in effective self-care, individuals must have an adequate self-care agency. According to Orem (1991), self-care agency is the complex acquired ability to meet one's continuing requirements for care that regulates life processes; maintains or promotes integrity of human structure; facilitates human development and functioning; and promotes well-being. A self-care agency is made up of learned capabilities needed to perform self-care for healthy human life.

There are three types of human capabilities needed for an adequate self-care agency. First, are the estimative self-care operations or the ability to determine what must be done to regulate health and well being. Second, are the transitional self-care operations or the ability to decide what to do from the information obtained. Third, are the productive self-care operations or the ability to actually perform the self-care actions once the knowledge is obtained and the decision to act has been made (Orem, 1995). By empowering individuals' capabilities to perform their self-care operations, health care providers may enhance the adequacy of the self-care agent.

Therapeutic self-care demand. Whether self-care is performed or not depends on the individual's capability to perform the necessary actions to meet the therapeutic self-care demands. Therapeutic self-care demand is "the summation of the kinds and numbers of care measures that are known or presumed to be regulatory of an individual's human functioning and development within some time frame" (Orem, 1995, p. 187).

Therapeutic self-care demand is formed after investigating and understanding what self-care requisites exist and deciding how they can be met.

According to Orem (1991), individuals must have some understanding of the meaning and value of self-care to make rational and reasonable self-care decisions. Level

of maturity, knowledge, life experiences, habits of thought, and health status will affect this understanding and valuing of self-care. Knowledge of self-care measures useful in meeting self-care requisites varies with one's life experiences surrounding different events or conditions. Furthermore, this learning process continues throughout one's life.

When individuals are admitted to the hospital with HF, their recovery and coping with the effects of HF has a major impact on their self-care demand. They become dependent on health care providers to assist them in meeting their self-care needs. Health care providers have a unique responsibility to facilitate the learning and understanding among individuals with HF of their new universal and health deviation self-care requisites for effective provision and fulfillment of self-care.

Self-care requisites. Adequacy in self-care agency is measured against the care measures needed to meet self-care requisites. Orem (1995) defined self-care requisites as generalizations or expressions of purposes to be attained. They are the goals of the engagement in self-care. There are three types of self-care requisites: universal, developmental, and health-deviation.

The universal self-care requisites are common to all human beings during all stages of the life cycle. Some examples are maintaining sufficient intake of air, water and food; providing care associated with eliminative processes and excrement; maintaining a balance between activity and rest and solitude and social interaction; preventing hazards to life, functioning, and well-being; and promoting normalcy (Orem, 1991). Effectively meeting these requisites are essential in preventative health care to maintain human structure and functioning, while promoting development.

Developmental self-care requisites are either specialized expressions of universal self-care requisites that have been individualized for developmental processes or they are new requisites derived from a condition or an event. These self-care requisites are divided into two categories. The first category is the “bringing about and maintaining conditions that support life processes and promote the processes of development, that is human progress toward higher levels of the organization of human structures and toward maturation during the developmental stages of life” (Orem, 1991, p. 131). The second category includes the provision of care to prevent or overcome the effects of conditions such as education deprivation, losses, abrupt changes, social adaptation problems and more, which can adversely affect human development. Meeting these requisites is also fundamental to preventative, primary health care.

Health deviation self-care requisites exist for persons who are ill or injured. According to Orem (1991), they include seeking appropriate medical assistance; being aware of the effects of the pathological conditions and states; effectively following the prescribed treatment measures; and being aware of the side-effects of medical care measures and how to regulate them. Other self-care requisites in this group include modifying the self-concept in accepting oneself as being in a particular state of health and in need of specific forms of healthcare. One must also learn to live in a lifestyle that promotes continued personal development with the effects of a health state and treatment plan. By understanding and investigating what self-care requisites exist and judging what can and should be done to meet them, a therapeutic self-care demand can be formulated to meet those self-care requisites.

The new universal self-care requisites essential for individuals with HF to learn and understand are symptoms of the onset of dyspnea, cough, edema, loss of appetite, constipation from increased inactivity, and an increase in urine output from the prescribed diuretics. Individuals with HF also have to discover how to deal with other symptoms such as, fatigue from a low ejection fraction, sleeping problems, decreased social activity, and an increase in vulnerability for infections.

Individuals with HF also need to learn about and understand their new health deviation self-care requisites. These include awareness and recognition of symptoms of HF such as fatigue and dyspnea, understanding when to seek medical treatment, and keeping doctor appointments. Other self-care requisites include taking medications and understanding their purpose and side effects, understanding dietary changes, understanding the need to pace activity and include mild to moderate exercise, and dealing with a change in self concept from independency to a feeling of dependency or disability. By understanding and knowing the care measures to meet these self-care requisites, HF patients can have an adequate self-care agency for self-care.

Literature Review

When reviewing the literature on knowledge of HF and self-care adherence to recommendations for HF management in diet, medication, and exercise, few research articles were found using Cinahl, Med Line, and Social Sciences databases. Articles were evaluated for research information regarding areas of outcomes of a multidisciplinary HF management, compliance with medications, effects of education on self-care in HF patients, exercise compliance, knowledge and exercise, and the relationship between knowledge and self-care of HF patients.

Heart failure management. When researching articles that studied outcomes of multidisciplinary programs for HF self-management, two significant studies were identified. Vinson et al. (1990) evaluated the factors associated with an increased likelihood in the early readmission of HF patients age 70 years and older (n = 140). This prospective study found that within 90 days of discharge from the hospital, 47% of the patients were readmitted at least once. A moderate correlation between multiple prior admissions and a previous history of HF ($r = .41, p < .001$) was discovered, with each as an independent risk factor for readmission. In addition, “patients with HF attributable to either acute myocardial infarction or poorly controlled hypertension were more likely to be readmitted (39.1% vs. 19.7%, $p = .02$)” (Vinson et al., 1990, p. 1292).

Vinson et al. (1990) subjectively classified 58% of the readmissions as possibly or probably preventable. A physician and nurse investigator team reviewed the readmission data and interviewed the patient and family to determine whether to classify the readmission as not preventable, possibly preventable, or probably preventable. Classification of being preventable was based on the answers received to the following questions. Could dietary and medication noncompliance be avoided with better education? Was the readmission related to inadequate follow-up? Did the failure to involve social services or other ancillary support staff lead to the readmission? Was the readmission related to an inadequate social support system or did a failure to seek proper medical attention when symptoms reoccurred lead to the readmission? Each of these six factors was found to contribute to readmission in 15% to 21% of cases. In most preventable readmissions, multiple factors were influential.

According to these results, Vinson et al. (1990) identified factors contributing to a preventable readmission included noncompliance with medications (15%) or diets (18%). These findings also demonstrated that further study of nonpharmacologic interventions designed to improve self-care adherence was needed. This may lead to effective HF self-care and an outcome of a decreased readmission rate.

A limitation of this study was the subjective method for determining whether readmissions were preventable, especially since criteria for a preventable readmission were not clearly defined. Another limitation relative to the study was that it did not test whether specific interventions could decrease readmission frequency, while maintaining cost effectiveness.

Rich et al. (1995) furthered the Vinson et al. (1990) study by evaluating the feasibility and potential impact of a nonpharmacologic multidisciplinary intervention for reducing hospital readmission in elderly patients with HF. Rich et al. (1995) performed a prospective study, which included 282 patients aged 70 or older, admitted with documented HF to a large university teaching hospital.

The patients in the Rich et al. (1995) study were randomized into an intervention or a control group. The intervention group (n = 142) received intense individual education by a geriatric cardiac nurse using a teaching booklet developed by study investigators. A geriatric cardiologist provided the patients with a detailed medication review and gave recommendations designed to improve medication compliance and reduce side effects. The intervention group also received dietary education from a hospital dietitian, early consultation by social services for discharge planning and follow-up home visits by a study nurse during the first week after discharge.

The control group (n = 140) received all conventional treatments as requested by the patient's attending physician. They did not receive the study's education material, a formal medication analysis, or intense individual education. Additionally, these patients experienced less home-care referrals.

In the study, Rich et al. (1995) found 78 of the 147 readmissions (53.1%) were for recurrent HF. "In the control group, there were 54 readmissions due to HF, compared to only 24 in the treatment group (risk ratio = 0.44, p = .04)" (Rich et al., 1995, p. 1192). The researchers also found that the quality of life improved in both groups, but there was significantly more improvement among the treatment group participants (22.1 ± 20.8 vs. 11.3 ± 16.4 , p = .001).

These findings demonstrated that a multidisciplinary intervention might significantly reduce hospital readmissions and improve the quality of life for elderly patients with HF. Two limitations to the Rich et al. (1995) study were the age of the participants and the intervention itself. The sample in this study was limited to patients with HF that were over 70 years of age (Mdn age, 79 years), which decreases the ability to generalize the findings. Furthermore, due to the multidisciplinary nature of the intervention, the researchers were unable to determine which elements such as medication compliance, dietary compliance, or knowledge were the most important in improving the outcomes of HF management by decreasing the hospital readmission rate and improving the quality of life.

Medication compliance. Vinson et al.'s (1990) study determined that noncompliance with medication recommendations may lead to preventable hospital admissions. Rich, Gray, Beckham, Wittenberg, and Luther (1996) sought to address this

issue and evaluate a limitation noted in the previous Rich et al. (1995) study. This was achieved by assessing the effects of a multidisciplinary intervention on medication compliance in relation to the readmission rates in elderly HF patients.

Patients aged 70 years and older were randomized into an intervention or conventional treatment group. The intervention group (n=80) received comprehensive education on HF and its management using a 15-page teaching guide prepared by the study team. The education team consisted of a multidisciplinary group that included a geriatric cardiology nurse, a dietitian, a social services representative, and a geriatric cardiologist. The control group (n= 76) received conventional care under the direction of their regular physician, including all the standard hospital services.

Medication compliance was assessed in both groups by two methods. In the first method, the percentage of pills taken correctly for each medication was determined, and these values were averaged. The second method used the total number of pills that should have been taken, divided into the total number of pills taken correctly.

Rich et al. (1996) found that compliance with medication in the intervention group was 85% compared to a 69% compliance rate in the control group ($p = .036$). This study also found a lower readmission rate of 22.5% in the intervention group, compared to 28.9% in the control group during the first 90 days following hospital discharge ($p = .087$). While this difference was not statistically significant, it was consistent with previous findings with a larger randomized sample (Rich et al., 1995).

To determine factors associated with readmission during the 90-day follow-up period, univariate and multivariate analyses were performed. Although medication compliance was not predictive of readmission by statistical analysis, there was a trend

toward fewer multiple readmissions in patients with 90% or greater compliance (2.8% versus 9.4%, risk ratio 0.30, $p = .087$ by Fisher's exact test).

When evaluating the compliance rates in previous studies, the rates in the Rich et al. (1996) study were higher. According to Rich et al. (1996), this finding may be associated with two possibilities. The first possibility may be a "Hawthorne effect". Since patients were aware that they were in a study, they might be more likely to be compliant. A second explanation for higher compliance rates could be that patients with dementia and other severe disabilities were excluded. Compliance was also assessed within 30 days of discharge when compliance rates might be expected to be high. The high compliance rates may also reflect the efficacy of the intensive intervention in the experimental group.

Rich et al. (1996) also found that the Caucasian race was an independent predictor of compliance ($p = .044$) and subjects not living alone tended to be more compliant. The researchers found that this trend was not related to education level or marital status, since neither variable significantly affected compliance. The researchers did find that the strongest independent predictor of compliance was the assignment to the treatment group. The findings of this study did suggest that improved outcomes of a decreased readmission rate in elderly HF patients might be increased through compliance with medications and a multidisciplinary treatment strategy.

Exercise adherence. Another part of multidisciplinary education includes physical activity. Studies have shown that patients with HF can exercise safely and that regular exercise may improve functional status and decrease symptoms (Bernardi, Spadacini, Bellwon, & Hajtic, 1998; Coats et al., 1992; Sullivan, Higginbotham, &

Cobb, 1988). In a review of articles on exercise compliance in HF and cardiac patients, very few articles were found. A study by Gottlieb et al. (1999) evaluated the impact of exercise performance on daily activities and quality of life in 33 elderly patients with moderate to severe HF. After a baseline assessment, these patients were randomly assigned to either exercise rehabilitation or nonintervention control groups.

The exercise rehabilitation program consisted of supervised aerobic training sessions three times per week for six months. Patients initially rode a Schwinn Aerdyne bike and after familiarization and increasing exercise capacity, they were introduced to walking on a treadmill. The patients were monitored by a cardiac rehabilitation nurse or exercise physiologist. The final exercise program consisted of 15 minutes on bike and 30 minutes on treadmill to a perceived level on the Borg Scale of 12 to 13. The intensity of training increased as tolerated by the patient. The control group was provided with usual care of cardiac rehabilitation without the scaled exercise program.

Both groups were evaluated before randomization and after six months. The Minnesota Living with Heart Failure, Functional Status Assessment (FSA), Medical Outcome Study, Short form (MOS, SF-36), and Center for Epidemiologic Studies Depression (CES-D) questionnaires were used to assess the patients' perception of their disease and its impact on their life. Maximal exercise and submaximal exercise were measured by peak oxygen consumption, exercise duration on a maximal stress test, and by a 6-minute walk test. The impact of exercise on daily activity was measured by looking at activity energy expenditure with the assessment of hip acceleration and the doubly labeled water technique. The doubly water technique provides a direct integrated

measure of daily energy expenditure over a period of time by calculating carbon dioxide production using ingested hydrogen and oxygen-labeled water.

Gottlieb et al. (1999) found a 78% compliance rate of attending the exercise sessions in those that complied with the exercise program. Patients who exercised for six months improved their performance on the maximal treadmill test by 4.9 ± 3.4 minutes, but in the control group ($n = 16$), the performance was unchanged (-0.2 ± 3.4 minutes, $p < .005$). The distance walked in 6 minutes increased by 147 ± 194 feet in the exercise group, but decreased 61 ± 134 feet ($p < .05$) in the control group. The peak oxygen consumption in the exercise group also increased (2.4 ± 2.8 mL/kg/min) compared with the controls (0.1 ± 2.6 mL/kg/min $p < .05$).

However, Gottlieb et al. (1999) did not find a significant impact of exercise on the daily activity expenditure as measured by the doubly labeled water technique and with the Caltrac hip accelerometer to measure hip acceleration. The researchers also found no significant change in the perceived quality of life or depression. They did observe that the patients who did not complete the exercise intervention tended to have worse baseline function as defined by the measures. The patients also tended to perceive themselves as more ill with lower scores on the questionnaires.

A limitation to the study by Gottlieb et al. (1999) was the small number of patients in the study. This may be a reason for the lack of statistical significance with assessments of daily energy expenditure or quality of life. However, the questionnaires were able to show the consistency of scores over time in the patients who exercised.

The concept that elderly patients with severe HF can safely exercise was supported by the research by Gottlieb et al. (1999). However, the researchers do

recommend that exercise programs be individualized to each patient as to their age and severity of their HF for added adherence to exercise recommendations and benefit.

Education, knowledge and self-care adherence. Adherence to the recommended medical treatment plan or compliance is a preferred outcome by health-care providers for effective disease self-management. A variable that contributes to the adherence to a medical treatment plan is an individual's health knowledge of their disease, which is usually a result of past experiences or some type of education. Research on the effects of education and self-care adherence is scarce. Jaarsma et al. (1999) tested the effects of education by a nurse on self-care and resource utilization of patients with HF. Patients who were admitted to the cardiology ward of the University Hospital in Maastricht, Netherlands, with symptoms of HF were potentially eligible for this study. During a three-year period, 179 patients were randomly assigned to receive either 'care as usual' or the supportive-educative intervention.

Patients in the intervention group (n = 84) were individually given structured patient education by a study nurse, a follow-up telephone call or a home visit by a nurse and encouraged to call their cardiologist, general practitioner or emergency heart center in case of difficulties. Patients in the control group (n=95) received standard care without structured education and either follow up visits or telephone calls. Data were collected at one, three and nine months after discharge. The Appraisal of Self-Care Agency Scale was used to assess the patient's ability to care for him/herself. This 24-item self-appraisal instrument was administered at the time of enrollment and at three and nine months after discharge. A 19-item questionnaire called the Heart Failure Self-Care Behavior Scale was utilized to assess specific HF-related behavior. Follow-up interviews

(one, three, and nine months after discharge) were performed to determine resource contacts and usage.

According to Jaarsma et al. (1999), the ability of patients to care for themselves in general was not significantly different between the two groups at any time. While patients in the control group significantly increased their self-care abilities between baseline and nine months ($t = 2.5$, $df = 109$, $p = .013$), the patients in the intervention group were able to increase their self-care abilities within three months ($t = 2.4$, $df = 109$, $p = .020$).

Jaarsma et al. (1999) found significantly higher HF-related self-care behavior in both groups at one month after discharge ($t = 6.1$, $df = 126$, $p < .001$; $t = 11.4$, $df = 126$, $p < .001$) when comparing their baseline score. However, patients in both the control and intervention groups demonstrated a decrease their self-care behavior over time. Yet, patients from the intervention group still reported complying with significantly more behaviors than the control group patients at three months ($t = 6.1$, $df = 126$, $p = 0.005$). They also showed an increase in self-care behavior between baseline and nine months ($t = 4.9$, $df = 126$, $p < .001$).

Jaarsma et al. (1999) discovered that most HF patients in their study already paced their activity as tolerated throughout the day related to their poor physical condition. The supportive-educative intervention in this study did not include a focus on regular exercise. Jaarsma et al. (1999) suggested that encouragement for regular exercise at their own pace may be needed with their intervention, since exercise can improve functional capacity.

Jaarsma et al. (1999) found that the intervention did not have a significant effect on readmission rates. When the researchers compared their readmission rates to other studies, they found that readmission for cardiac reasons after 90 days (23%) in their study, was close to the 17% readmission rate of the intervention group in the study conducted by Rich et al. (1995). The researchers' findings suggest that organizational changes with longer follow-up and the availability of a HF specialist may enhance the effects of education and support, and might facilitate the prevention of an unnecessary readmission.

Factors affecting knowledge and self-care. Patient education is one of the essential components for HF management, but in a review of the literature, few studies were found evaluating the relationship between knowledge and self-care adherence. Only one study was found which evaluates the quality outcomes of the education such as patients' knowledge and adherence to self-care recommendations for HF.

A study by Fowler (1996) evaluated the relationship of women's knowledge level of menopause to their level of adherence to the plan for exercise, calcium supplementation, and hormonal replacement therapy (HRT). This was a secondary analysis of the data obtained from a previous study that evaluated an educational intervention to aid women to become more effective decision-makers regarding menopause and HRT. The primary study (Rothert, 1990) collected data on menopause disease management after randomly assigning the women in the study to three different groups where they received written material on menopause, written material and discussion sessions, or written material and interactive decision support. Information was obtained regarding the participants' reported knowledge of menopause, perceptions of

menopause and its management, self-care efficacy, and adherence to a plan for self-care initially, and then at three weeks, six months and at twelve months post intervention.

The secondary analysis by Fowler (1996) evaluated the data obtained at month 12 of the primary study and found that women ($n = 201$) adhered to the plan of exercise 59% of the time. The researcher also found no relationship between level of knowledge and adherence to exercise ($r = .06$, $p = .25$). Adherence to the plan for calcium supplementation was 77% with a non-significant negative relationship between the knowledge level of menopause and calcium supplementation ($r = -.09$, $p = .18$). Fowler (1996) also found that adherence to the plan of HRT was 95% of the time, but noted no relationship between the level of knowledge of menopause and adherence to the plan of HRT ($r = -.08$, $p = .30$).

Although Fowler (1996) did not find a significant relationship in the level of knowledge of menopause and the adherence to plans of exercise, calcium supplementation, and HRT, this study demonstrated that further research was necessary to evaluate the different variables affecting adherence to plans for self-care in menopausal women. This study also demonstrated that further study of the relationship between adherence to recommended medical plans for self-care in disease management and different variables was needed.

Ni et al. (1999) performed a study to assess the knowledge level of and adherence to self-care among patients with HF to determine influencing factors. Patients referred to a HF treatment program and who fit the criteria for diagnosis of HF were asked to participate. Those consenting to participate ($n = 113$) completed a patient survey developed for this study. The survey assessed the overall knowledge level of self-care,

symptom-reporting ability, self-care adherence, demographic characteristics, and patient self-efficacy.

Ni et al. (1999) found that most patients recognized the symptoms of progressive HF, but 37.2% of the patients could not recognize the risk of weight gain as a sign of progressing HF. Results of this study also showed that 40% of the patients reported knowing little or nothing about HF, suggesting a wide gap between receiving and retaining information that was provided. “The average knowledge score showed no difference between patients who reported ‘knowing a lot about HF’ and those who reported knowing ‘little or nothing about HF’” (Ni et al., 1999, p.1617). In addition, the length of time after the HF diagnosis did not appear to be related to a higher knowledge score ($r = .12$, $p = .78$).

When Ni et al. (1999) evaluated the adherence to self-care behaviors, medication dosage compliance was 74%, yet dietary compliance was less than half (39%), and daily weight-monitoring compliance was 58%. Ni et al. (1999) also found that a higher percentage of patients with New York Heart Association (NYHA) Class I or II status reported doing physical exercise 2 to 4 times a week compared with patients with NYHA Class III or IV status (62% vs 53%, $p < .001$). The most common type of physical exercise for patients with NYHA Class I or II status was walking (78%) and bicycling (24%).

This study noted that adherence scores were significantly correlated with the knowledge scores ($r = 0.33$, $p < .001$), although the magnitude of the correlation was found not to be profound. The researchers’ findings suggest that the poor adherence behavior was associated with being unmarried ($p = .03$), having lower self-efficacy

($p = .05$), a lack of knowledge of self-care ($p = .07$), no prior hospitalization ($p = .08$) and not being referred by a cardiologist ($p = .05$).

Strength and Limitations

A major strength of these studies is that they continue to build on each other, advancing our knowledge concerning the care of HF patients. In an initial study, Vinson et al. (1990) demonstrated that some readmissions might be preventable. Rich et al. (1995) evaluated the effect of a multidisciplinary intervention in assisting to reduce readmission rates and then reevaluated a specific area of education and its effect on readmission rates. Jaarsma et al. (1999) also looked at the effects of education on support, self care, and resource utilization and found similar results of readmission rates as the Rich et al. (1995) study. These studies consistently demonstrate improved patient outcomes with a multidisciplinary education and increased compliance in self-care behavior.

These studies also used a prospective method in their designs. They studied areas of HF management and examined the effects of interventions on HF outcomes. Vinson et al. (1990) evaluated what factors led to repetitive HF hospitalizations and Rich et al. (1995) and Jaarsma et al. (1999) evaluated the effects of a randomized intervention on readmission rates. Ni et al. (1999) evaluated the presumed areas of HF management with the use of a needs assessment survey to determine areas for improved management. Moreover, the focus of all these studies was to evaluate how to improve HF management.

Another strength is that Rich et al. (1996), Jaarsma et al. (1999) and Ni et al. (1999) noted a decrease in self-care adherence in HF patients that lived alone or were unmarried. The importance of including spouses and families when educating patients is

supported in other studies on chronic diseases. Gottlieb et al. (1999) and Ni et al. (1999) also noted a lack of exercise adherence in patients with severe HF.

One limitation to these studies is the sample of HF patients and the generalizability of the results to other healthcare settings. Vinson et al. (1990), Rich et al. (1995), and Rich et al. (1996) took a sample of elderly HF patients admitted to the same hospital in St. Louis. The sample in Rich et al.'s (1996) study is actually a subgroup of the patients in the earlier study. The Gottlieb et al. (1999) sample included elderly patients with severe HF and only contained a final sample size of 25. The patient sample in the Jaarsma et al. (1999) study was from an in-patient cardiac ward at a university hospital in the Netherlands. The sample that participated in Ni et al.'s (1999) study was drawn from patients referred to their HF clinic from a specialized HF center that commonly accepts patients for cardiac transplantation.

Another limitation to these studies is that only Fowler (1996), Jaarsma et al. (1999), and Ni et al. (1999) evaluated education and self-care. Ni et al. (1999) was the only study that evaluated the acquired knowledge of HF as an outcome of education. Therefore, there were little data regarding the efficacy of HF education. By understanding the issues that affect a patient's knowledge of HF and self-care adherence, health care members can target specific patient populations and areas of compliance to improve patient education.

Summary

In summary, many studies in HF disease have evaluated the effects of multidisciplinary interventions on readmission rates of HF patients. However, limited data were found that appraises the specific outcomes of multidisciplinary interventions on

patients' perceived knowledge and adherence to self-care recommendations. Ni et al. (1999) attempted to address this area, but the patients included in the study had advanced HF disease and generalizability of their results may be limited.

By further understanding the barriers to knowledge and adherence to self-care recommendations among the general HF patients, multidisciplinary interventions can be developed to enhance individual self-management. Therefore, the purpose of this study was to evaluate HF patients' perceived knowledge and their reported self-care adherence to recommendations for HF management.

Research Questions

What is the relationship between perceived knowledge of HF and reported self-care adherence to recommendations for diet, exercise, and medications?

What are the differences in perceived knowledge of HF and self-care adherence to recommendations for diet, exercise, and medications based on length of HF diagnosis?

Definition of Terms

Perceived Knowledge of HF: A patient's confidence in his/her understanding of the facts or principles of HF.

Self-care: "The practice of activities that maturing and mature persons initiate and perform within time frames, on their own behalf in the interests of maintaining life, healthful functioning, continuing personal development, and well-being" (Orem, 1995, p. 461)

Adherence: To hold closely to an idea or course (Morehead & Morehead, 1981, p.17).

Recommendations: The courses of action patients are advised to follow for appropriate disease management.

Self-care adherence in HF patients: To closely follow the course of action HF patients are medically advised regarding diet, medications, and exercise.

CHAPTER 3

METHODOLOGY

Research Design

This study was a secondary analysis of the baseline data collected in a primary study conducted by Kay Setter Kline, PhD, RN and colleagues. With funding by the Midwest Affiliate of the American Heart Association, the primary study evaluated the effects of different approaches to HF education on the outcomes of HF home care. The initial data obtained on admission into the primary study were used to evaluate the relationship between HF patients' perceived knowledge of their disease and adherence to recommendations in exercise, diet, and medication. The researcher of this secondary analysis assumed that participants in the primary study (n = 86) had received some form of basic education regarding their diagnosis of HF from their referring health care provider.

Overview of the Primary Study

The primary study used an experimental design to evaluate the effects of two nursing approaches on home care outcomes for HF. The specific nursing interventions included mutual goal setting and supportive educative approaches to enhance self-care management among HF patients. In addition, a placebo nursing care approach was used as a control to evaluate the effects of the interventions. Data collection for the primary

study occurred during the initial interview of the study and again at 3, 6, 9, and 12 months.

Convenience samples of the patients admitted to two home health care agencies with the primary diagnosis of HF (ICD-9 code 428.0) were included in the primary study. Other criteria for inclusion in the experimental study were being over 18 years of age and having the capability to speak and understand English.

Before randomization into the intervention and control groups, baseline data were collected from all participants. After obtaining the sociodemographic data and completing the questionnaire during the initial interview, the participants in the primary study were randomly divided into the three study groups. The questionnaire was completed again at the 3, 6, 9 and 12 month interviews for further data collection. This secondary analysis evaluated the initial data obtained from 86 participants enrolled in the study before randomization into the study groups.

Characteristics of the participants. In the primary study, a convenience sample of patients admitted to two home health-care agencies with the primary diagnosis of HF (ICD-9 code 428.0) was included. The number of participants from each of the sites were approximately equal with 52.3% (n = 45) from one home health-care agency and 47.7% (n = 41) from the second home health-care agency.

The age range of the participants was 35 to 94 (M = 75.27, SD = 11.63). Fifty one percent of the participants were age 77 or older. While more than half of the participants (54.7%) had attended or completed 11th or 12th grade education, 19 of the participants (22.1%) had attended college. Sixteen of the participants (18.6%) completed

their education between the 8th and 10th grades. Only four individuals reported completing school between 1st and 7th grades.

Further review of the sociodemographic data revealed 43% of the participants were married. The remaining participants were widowed (46.5%), divorced (7%), or never married (3.5%). The participants were largely unemployed (96%) with a majority reporting an average income between \$10,000 to \$30,000 (69.8%). Almost one quarter of the participants reported incomes less than \$10,000 (23.3%).

While 61 of the participants (70.9 %) had been diagnosed with HF within the last five years, 33 had (38.4 %) been diagnosed with HF within the past year of data collection. However, the remaining participants (n = 25) reported living with HF for more than five years. These data are summarized in Table 1.

Instruments. The primary study incorporated a multidimensional self-reporting questionnaire to evaluate perceived understanding of HF, self-management of activity, medications, diet, social support systems, health status, and quality of life. Major aspects of the questionnaire, including the areas of perceived understanding of HF and HF self-management were developed for this study. The questions in these areas were formed using recommendations made by the Agency for Health Care Policy and Research (AHCPR) guidelines for HF and modifications from the chronic disease self-management survey developed by Lorig et al. (1996). The questions regarding patients' understanding of HF and the activity, diet, and medication portion of self-management tool were utilized for this secondary analysis. These tools assisted the researcher in evaluating the

relationship between perceived knowledge of HF and adherence to recommendations for diet, exercise, and medications.

Table 1

Sociodemographic Data

Characteristic	Frequency	Percent	
Marital status:	Never married	3	3.5
	Married	37	43.0
	Divorced	6	7.0
	Widowed	40	46.5
Education:	1-7 th grade	4	4.7
	8-10 th grade	16	18.6
	11-12 th grade	47	54.7
	Associate	15	17.4
	Bachelors	3	3.5
	Masters	1	1.2
Annual income	< 10,000	20	23.3
	10-20,000	38	44.2
	20-30,000	22	25.6
	30-40,000	5	5.8
Length of HF:	< 1 year	33	38.4
	1-2 years	11	12.8
	3-5 years	17	19.8
	> 5 years	25	29.1

The perceived knowledge portion of the primary study evaluated the HF patients' understanding of HF using a 10-point scale (Appendix A). It asked the participants to rate their confidence in the understanding of 13 statements about HF, ranging from not

confident (1) to totally confident (10). These statements included what HF is; what caused their HF; reason for symptoms; what symptoms they could expect; which symptoms indicate a worsening situation; and what to do if they have any of these symptoms. They also assessed their confidence in understanding self-monitoring with daily weights, the treatment/care plan, their responsibilities for self-management, and the role of family or other caregivers in the treatment plan. The statements also assessed the participants' confidence in understanding the availability and value of qualified local support group, the importance of obtaining vaccinations against flu and pneumonia, and the importance of not using tobacco. The total possible scores for perceived knowledge range from 13 to 130, with higher scores indicating an increased confidence in understanding HF.

Adherence to exercise recommendations was evaluated by assessing the total time spent exercising weekly (Appendix B). The self-management tool assessed how much time the patient spent walking, swimming, cycling, stretching, strengthening, and aerobic exercises each week. Specific periods spent exercising were listed as none, less than 30 minutes per week, 30-60 minutes per week, 1-3 hours per week, and more than three hours per week. These were each given a value of zero to four. The total possible scores for adherence to exercise recommendations range from zero to 24.

Adherence to diet recommendation was measured using a six-point scale to assess how often the patient was able to follow dietary recommendations of restricted sodium intake, fluid restriction of two liters per day, and avoidance of drinking alcohol (Appendix C). If dietary recommendations were followed none of the time, a value of zero was

circled. If dietary recommendations were followed all of the time, a value of five was circled. The total possible scores for the dietary self-adherence range from zero to 15. The higher scores indicated a higher frequency in following recommendations.

The measurement of medication adherence was assessed for each medication that the patient was currently taking up to 10 medications (Appendix D). These questions evaluated the HF patients' frequency of taking the prescribed dose, their understanding of why the medication was prescribed, and their ability to recognize side effects. In addition, these questions evaluated the HF patients' ability to take proper action when side effects occur, their ability to work the medication into their regular routine, and to obtain the medication. A mean score for each question ranging from zero to five was calculated across up to ten medications. A higher score indicated a higher understanding of the medication and perceived adherence to the medical recommendations.

Reliability and validity. The instrument for the primary study was created by following recommendations stated in the AHCRP guidelines for HF management. The questionnaire was also developed with modifications from the chronic disease self-management survey developed by Lorig et al. (1996). During the development, a panel of experts reviewed the tools to establish content validity in the primary investigation.

Reliability of the instruments was examined in the secondary analysis. In the 13-item questionnaire portion of perceived knowledge of HF, an internal consistency coefficient of .80 was obtained. An internal consistency of .56 was determined for the 6-item exercise portion of the questionnaire. The three items in the diet portion of the self-management questionnaire was found to have an internal consistency coefficient of .60.

An internal consistency coefficient of .58 was determined for the medication portion of the questionnaire (6 items).

According to Polit and Hungler (1999), reliability coefficients of .70 or greater are sufficient to make group comparisons. Yet, only the perceived knowledge questionnaire exceeded this criterion. The lower internal consistency coefficients on the remaining questionnaires may be reflective of the number of items on each scale, the size of the sample, or the recency of the developed questionnaire.

Procedure. Permission to conduct the primary study was obtained from Grand Valley State University Human Subjects Committee and the home health care agencies. Patients admitted to each home care agency were reviewed to ascertain eligibility for inclusion in the study. Patients meeting the criteria were approached to introduce the study and explain the purpose, procedure, risks, and benefits of the study. Confidentiality was maintained through a double blind random assignment of participants to an intervention group. A written consent was obtained from the participants before inclusion to the study.

Upon receiving consent to participate in the study, an appointment was made with a registered nurse (RN) that collected the data. The RN interviewed the patient and collected sociodemographical data and baseline information regarding the understanding of HF, self-management practices and the perception of their quality of life with HF. The patients were then randomly assigned to one of two intervention groups or a control group. The RNs initially interviewing the patient and giving the self-management survey were blind as to which group a patient would be assigned.

Secondary Analysis

This design evaluated the data resulting from the self-management survey of the primary study. Permission to conduct this secondary analysis was obtained from the Grand Valley State University Human Subjects Committee (Appendix E). Participants in this study met all the criteria for inclusion in the primary study. They signed the consent and completed the initial self-management questionnaire for the primary study, which provided the data for the secondary analysis.

Threats to Validity

A secondary analysis has many advantages. It allows for the exploration of new relationships in data already gathered from a previous study. Typically, research projects collect more data than the investigator actually analyzes. A secondary analysis of the data can test a new hypothesis by investigating new relationships between variables of the original study. This can offer a new perspective to an area of concern (Polit & Hungler, 1999).

Another advantage to conducting a secondary analysis is that it is efficient and economical. With the use of previously obtained data, it is possible for the investigator to bypass the time-consuming and expensive steps of data collection (Polit & Hungler, 1999).

However, there are also disadvantages of working with existing data. One disadvantage is that the investigator in the secondary analysis usually does not play a role in collecting the data. The investigator does not have input into the sample used, the

variables studied, and the instruments utilized in the original study that the data came from.

A possible threat to the validity of this study was that the diet, exercise, and medication portion of tools had reliability coefficients less than the desired criterion. This may reflect in an increase in the random, extraneous fluctuations in the scores obtained for the study (Polit & Hungler, 1999). This may also threaten the results of the secondary analysis and the evaluation of a relationship between two variables causing the investigator to question “what if” (Polit & Hungler, 1999). However, it is important to note that this was the initial analysis of the questionnaire. Therefore, further analysis may be warranted.

Another threat to this study was the use of data obtained from a tool using a self-report method. The investigator must trust that the information provided by the participants is actually what they feel and act. There are potential biases of seeing ourselves in the best light. For example, a participant may respond on the survey that he/she adheres to dietary recommendations of restricted sodium all of the time, but in every day practice adheres to dietary recommendations only some of the time.

The investigator also assumed that the participants had received some form of initial education regarding HF from previous hospitalizations, physician education, or written documents. Patients may have been referred to the health care agency for HF education as a new HF patient with little education. The investigator must trust that the information presented in the knowledge portion of the survey to be accurate and unbiased to cover inadequacies they may fear.

CHAPTER 4

RESULTS

The purpose of this study was to examine the relationships between perceived knowledge of HF and self-care adherence to recommendations for exercise, diet, and medication. A second aim was to identify differences in perceived knowledge of HF and self-care adherence to recommendations for exercise, diet, and medication by length of diagnosis. The Statistical Package for the Social Sciences (SPSS) was utilized for data analysis of the questionnaire results from the participants ($n = 86$). The level of significance was set at $p < .05$ for all statistical procedures.

Research Questions

There were two research questions evaluated in this study. The first was: Is there a relationship between the perceived knowledge of HF and the self-care adherence to recommendations for diet, exercise, and medication? The second question was: What are the differences in perceived knowledge of HF and self-care adherence to recommendations for diet, exercise, and medication based on length of diagnosis with HF?

Descriptive statistics were used to describe variables of interest in this analysis: the summative scores of perceived understanding of HF and adherence to recommendations for HF self-management in exercise, diet, and medication. A Pearson's product-moment correlation was utilized to explore the relationships between perceived knowledge of HF

and adherence to recommendations in exercise, diet, and medication. An analysis of variance (ANOVA) was used to evaluate differences in perceived knowledge of HF and adherence to recommendations for exercise, diet, and medication by length of diagnosis.

Perceived Knowledge of Heart Failure

The possible score for the 13-item summative scale used to measure perceived knowledge of HF is 13-130. The actual scores for the participants (n =86) ranged from 46 to 126 with a mean of 95.98 (S.D. = 18.20). The mean score of 95.98 indicated that the participants had confidence in their knowledge regarding HF. As depicted in Table 2, the participants reported that they were more confident in understanding the importance of abstinence from tobacco (M=9.34), daily weight monitoring (M=9.16), obtaining vaccinations (M = 8.59), understanding the role of family in their care (M = 8.70), and their own responsibilities for self-management (M = 8.24). However, they were least confident in understanding reasons for symptoms of HF (M = 5.84), what caused HF (M = 5.20), and the value and availability of support groups for their diagnosis (M = 4.24).

Exercise

The participants (n = 86) reported that they generally exercised by stretching-strengthening, walking or bicycling. Of the participants that reported exercising by stretching-strengthening (n = 54), 26% (n = 23) indicated that they spent less than 30 minutes per week exercising. As depicted in Table 3, a majority of the participants (n = 61, 47%) that reported exercising by walking, indicated that they spent less than 30

minutes or 30-60 minutes per week exercising. Only five participants reported exercising by bicycling.

Table 2

Perceived Knowledge of Heart Failure

Areas of Confidence	Mean	SD
Abstinence of tobacco	9.34	2.19
Daily weight monitoring	9.16	1.88
Role of family/caregiver in care	8.70	2.20
Importance of vaccinations	8.59	2.72
What to do if signs/symptoms occur	8.28	2.34
Responsibilities for self management	8.24	1.96
Treatment-care plan	8.16	2.12
Which signs/symptoms indicate worsening HF	7.39	2.60
What symptoms to expect with HF	6.73	2.74
What HF is	6.42	2.59
Reasons for symptoms	5.84	2.87
What caused HF	5.20	3.22
The availability and value of support groups	4.24	3.54

The mean of the summative score indicating adherence to recommendations for exercise was 3.08 (S.D.= 2.72) with a total score range of 0 to 12 (possible range = 0 to 24). This mean summative score of 3.08 indicates that the participants infrequently engaged in exercise activity.

Table 3

Frequency of Exercise

	None	<30 min/ wk	30-60min/ wk	1-3hrs/ wk	<3hrs/ wk	Total
1. Stretching or strengthening	32	23	10	9	12	86
2. Walking	25	22	19	14	6	86
3. Swimming	85	0	0	0	0	85
4. Bicycling	80	0	2	1	2	85
5. Other aerobic exercise equipment	85	0	0	0	0	85
6. Other aerobic exercise	74	0	0	0	0	74

Diet

The summative results for the adherence to diet recommendations indicated a mean of 13.13 (SD = 2.53) and an overall score range of 2 to 15 (possible range = 0 to 15). This indicated that on average, the participants reported following the dietary recommendations most of the time.

As depicted in Table 4, HF management with the diet restrictions of sodium and no more than two liters of fluids per day were adhered to most or all of the time by 79.1% (n = 68) of the participants (n = 86). Also, a majority of the participants (96.5%, n = 83) reported they were able to avoid alcohol most or all of the time.

Table 4

Frequency of Diet Adherence

Item	None	A little	Some	Good bit	Most	All	Total
Restrict sodium	4	1	3	10	28	40	86
Drink \leq 2 L of fluid/day	1	4	7	6	11	57	86
Avoid alcohol	2	0	0	1	2	81	86

Medication

The primary study included the evaluation of adherence to recommendations of up to ten medications. On average, the participants reported taking eight medications (M = 7.99, SD = 2.04). When the participants were asked how often they were able to follow their prescribed medication plan (0 = none of the time, 5 = all of the time), they noted that most of the time they understood why they were taking the medication (M = 3.82, SD = 1.51). The participants also reported taking the proper dose (M = 4.98, SD = .12), working the medication into their regular schedule (M = 4.95, SD = .21) and obtaining medication without difficulty (M = 4.95, SD = .21) all of the time. However,

while they were following the prescribed medication plan, they were only able to recognize side effects of medication (M = 2.03, SD = 2.02) and take proper action when side effects occurred some of the time (M = 2.40, SD = 2.11).

Table 5

Medications

Item	Mean	SD
Take prescribed dose	4.98	.12
Work this medication into regular schedule	4.95	.21
Obtain this medication	4.95	.21
Understand why take medication	3.82	1.51
Recognize side effects	2.03	2.02
Take proper action when side effects occur	2.40	2.11

Knowledge and Self-Care Adherence

A Pearson's correlation coefficient was utilized to evaluate the relationships between the knowledge scores and the self-management data for exercise, diet, and medication. The Pearson's correlation coefficient indicated that there was a weak, positive relationship between exercise and level of knowledge ($r = .25, p = .04$). Although

the knowledge scores suggested that the participants were fairly confident in their knowledge of HF, they did not routinely exercise.

A Pearson's correlation coefficient also indicated that there was a significant, yet weak relationship between the level of knowledge of HF and taking the proper dose of medication ($r = .29$, $p = .009$). However, as Table 6 depicts, there were no significant relationships between the level of knowledge and the understanding of why they were taking the medication, the understanding of the side effects for the medication, or the ability to take proper action for side effects. There were also no significant relationships between the level of knowledge and the ability to work the medication into their daily routine, the ability to obtain medication or to adhere to the diet plan.

Knowledge, Self-Care Adherence and Length of Heart Failure Diagnosis

Analysis of variance procedures were conducted to explore the perceived knowledge level and self-care adherence to recommendations for exercise, diet, and medication in relation to the length of diagnosis with HF. The results of the ANOVA procedure indicated that there was a significant difference between the length of diagnosis with HF and being able to work the medications into their routine schedule [$(F(3, 82) = 3.00$; $p = .035$]. However, when a post hoc Scheffe procedure was performed, there was no significant difference between the length of HF and the ability to work the medication into their routine schedule.

Table 6

Correlations Between Knowledge, Exercise, Diet, and Medication

Variable	Correlation to Knowledge
Medication dose	.288**
Exercise	.246*
Side effects of medication	.193
Action for side effects	.167
Diet	.142
Why taking medication	.122
Take medication in routine	.067
Obtain medication	.090

Note: * Correlation is significant at the .05 level (2 – tailed); ** Correlation is significant at the .01 level (2 – tailed).

CHAPTER 5

DISCUSSION AND IMPLICATIONS

The purpose of this study was to examine the relationships between perceived knowledge of HF and self-care adherence to recommendations for exercise, diet, and medication. This study also evaluated the data to distinguish differences in the perceived knowledge of HF and self-care adherence to recommendations in exercise, diet, and medication by length of diagnosis. The data analysis revealed that there were weak, significant relationships between knowledge level and exercise and taking the prescribed dose of medication as recommended. Orem's Self-care Deficit (1995) nursing theory provided the conceptual framework for the study and a mechanism for describing the results.

Discussion of the Findings

Heart failure has a major impact on patients' lives, especially normal functioning and feelings of well being. The severe symptoms of HF and its treatments can affect the physical, personal, and social aspects of a person's life. In response to the new deviation from health, patients have to learn to make adjustments in their lives to meet these new self-care requisites of HF. Health care professionals have an integral part in assisting HF patients with adjusting to the new self-care requisites.

This study evaluated components of a questionnaire that assessed individuals' perceived knowledge of HF and their adherence to self-care recommendations. Results

showed that the participants were fairly confident in the HF self-care operations of abstinence of tobacco, monitoring weights daily, and obtaining vaccinations. They also reported they were able to obtain their medication, take the prescribed medication dose, and work their medication into their schedule most of the time. Each of these operations may be described as productive self-care operations. They are distinct actions or skills needed to reach the self-care requisites of following a treatment program and a continued healthy state. Confrontation with the exacerbation of HF or signs and symptoms of the disease may have motivated these individuals to learn the activities needed to meet these self-care requisites and maintain an adequate self-care agency.

The participants also reported they were fairly confident in the roles of family or caregivers in their care, their responsibilities in self management, and their treatment-care plan. They also were fairly confident in identifying which signs or symptoms indicated worsening of HF, and what to do if these signs or symptoms occur. According to Orem, these would be defined as transitional operations of self-care as individuals decide which course of self-care should be followed.

However, the participants noted a lower confidence level in the understanding of what HF is, what causes HF, and the reasons for the symptoms of HF. They also reported understanding their medication only a good bit of the time. According to Orem (1995), these areas are the estimative operations needed for the understanding of HF and for the motivation to perform the skills needed for the self-care requisites of HF. A lack of confidence in the knowledge of these areas may lead to difficulties in attaching meaning to observations, and correlating the meaning of events and conditions with possible courses of action.

Adequate knowledge of the physiological and psychological factors of HF affecting their healthy state is the basis for individuals to understand their disease, determine which self-care is appropriate, and perform a deliberate action of self-care. A study by Jaarsma et al. (1999) demonstrated the results of further education on the self-care agent. They found that supportive education on various aspects of HF and its self-care initially resulted in decreased trips to the emergency department. Patients were able to identify symptoms early and were able to take adequate self-care action to alleviate the symptoms. Rich et al. (1995) also found that a detailed educational plan by a multidisciplinary team and routine follow-up effectively increased the medication compliance in HF patients.

This study did not show a significant relationship between the knowledge level of HF and the adherence to self-care recommendations for diet and medication. However, it did show that there was a significant, yet weak relationship between knowledge and adherence to recommendations for exercise and taking the proper dose of medication. These results are similar to Fowler's (1996) study, which also demonstrated a weak relationship between knowledge and adherence to exercise and to the medication recommendations for calcium supplements and hormone replacement therapy.

The evaluation of self-care adherence to exercise revealed a weak positive relationship between the level of knowledge and exercise, but on average, the participants exercised infrequently. A majority of the participants reported exercising mainly by performing stretching and strengthening exercise or walking. These exercises may be easily paced throughout the day and worked into a routine schedule. In addition,

stretching and strengthening exercises and walking require less exertion to perform than bicycling or aerobic exercise.

The low average time for exercising weekly may be related to their health status or their perceived quality of life. According to Ni et al. (1999), a high percentage of patients with NYHA Class I or II exercised more often than patients with NYHA Class III or IV HF. Gottleib et al. (1999) also reported that patients that did not complete the exercise study tended to have worse baseline function, and they tended to perceive themselves as more ill. This was not evaluated in this study. However, a majority of the participants were recently diagnosed with HF within the last 5 years and may have been experiencing dyspnea, depression, or a lack of support for exercise. Further evaluation of knowledge and exercise is warranted since Gottleib et al. demonstrated that exercise is safe and can increase exercise capacity if tailored to the individual.

The participants of this study were recruited from a group of patients with HF admitted to a visiting nurse service for further treatment, follow-up, and possible education. They reported having a moderate confidence level in understanding the fundamental knowledge of what HF is which is needed for adequate self-care judgements. These data support the need for more education and visiting nurse services to assist in arriving at valid judgements for individual self-care. The findings also indicate that the education they received before admittance to the study may have focused on the transitional and production operations of self-care for the disease and less on how the disease developed and how symptoms occur. However, the source of initial education was not evaluated in the primary study.

The knowledge scores from this study were similar to the results obtained from Ni et al. (1999). Ni et al. reported that approximately half of the patients (49%) said they knew “some” about HF and 38% said they knew “little or nothing”. The researchers also found that the patients could recognize symptoms of HF, but they could not recognize the reasons for the symptoms. When Ni et al. evaluated knowledge scores with duration of HF, they found that longer duration of HF diagnosis did not tend to increase knowledge scores. This study also found no significant differences between length of HF diagnosis and knowledge.

The data from this study evaluating dietary self-care adherence revealed that the participants on average followed recommendations most of the time. The results are similar to those presented by Ni et al. (1999), with a majority of the participants adhering to diet restrictions of sodium, alcohol, and fluids most or all of the time. However, there was no significant relationship found between the knowledge of HF and adherence to dietary recommendations. According to Orem (1995), this indicates that an individual’s self-initiated, self-directed, and controlled actions which have been developed to meet the self-care requisite to maintain a sufficient intake of food and water are adequate to meet the therapeutic demand of prevention of HF exacerbation. Monitoring sodium intake, salty snacks, and abstinence from alcohol are all concrete and distinct steps followed by individuals to meet the new self-care requisite for the health care deviation of HF. The results suggest that the participants perceived little difficulty with modifying their dietary intake regime with the new steps required to meet the therapeutic demand of HF.

the relationships of knowledge and self-care before an education intervention and relationships after the intervention is warranted.

Second, the sample size of the participants may be too small to evaluate the relationships between knowledge and self-care sufficiently. A larger sample size may reveal a more significant relationship between perceived knowledge and the specific aspects of self-care and strengthen the relationships found in this study.

Another limitation was that a self-reporting questionnaire was utilized to evaluate knowledge of HF and self-care adherence to diet, medication, and exercise. The participants may tend to over report healthy behaviors such as sodium intake, medication dosage compliance, and exercise. The extent of over reporting is difficult to assess, but it could affect the over estimation of self-care adherence in HF patients. Further application of this new tool in research will determine the need for possible modifications to strengthen the reliability of the tool.

Implications for the Study

Significance to Nursing Practice

Education about the self-care measures needed for disease management has been one of the essential components for individuals with HF. Multidisciplinary teams have been utilized to assist with HF education and HF management in attempts to reduce expensive hospital stays and readmissions. Nurses have an important role in this education since they experience a longer and sometimes closer contact with individuals in health care and their families.

Before individuals are taught about their disease, it is good to establish what they understand about their disease. After establishing their knowledge base, education can be

Strengths and Limitations

When conducting the literature review on the relationship between knowledge and self-care in HF patients, there was only one study found. One of the strengths of this secondary analysis was that it added to the research in that area. In addition, data supported findings obtained in the previous study regarding knowledge of HF and self-care adherence by Ni et al. (1999).

Another strength of this study was that it was efficient and economical. Collection of the data can be very time consuming and an expensive part of the research project. A secondary analysis reduced the need for screening of the subjects for inclusion in the study, data collection, and data entry. By taking a subgroup from the primary data, variables and relationships previously unexamined were analyzed and added to the body of research obtained from this group.

Yet, there are also some limitations to this secondary analysis. First, this study evaluated the perceived knowledge level and self-care adherence before interventions. The researcher assumed that the participants had received some education regarding their disease and evaluated their initial knowledge and self-care adherence. One measure of the outcome of education would be to compare the initial results with the data obtained post intervention. The researcher of the study wanted to evaluate the perceived baseline knowledge that individuals with HF reported. This may assist with the development of a tool for educating HF patients to be better self-care agents of their disease. Effectively educating individuals with HF to be adequate self-care agents would hopefully cause a decreased readmission rate and reduce the cost to healthcare. Further research comparing

individualized to expound on what the individuals already know. In HF patients, this study suggests that information regarding the survival skills for HF management such as monitoring daily weights, abstinence from tobacco, taking the proper medication dosage, adhering to the low sodium diet, and following the treatment plan are confidently comprehended. However, information regarding what HF is, the causes of HF, and the side effects of medication for HF seem harder to understand and recall. This information is fundamental for individuals to make adequate transitional decisions in their self-care to meet the demands of a healthy state when exacerbation of symptoms arise.

Continued patient education through home care should focus on what is defined as HF, how symptoms of exacerbation evolve, how the prescribed medication helps to manage their disease, and how possible side effects from their medication may develop. Individuals need continued support throughout their disease process to assist with decision making and understanding the different circumstances that develop. This education and support should continue with each hospital admission, during office visits, and through established support groups. With continued education and support from health care providers and peers, HF individuals can develop a foundation to be adequate self-care agents in their disease management.

This study also suggests that nurses should focus continued educational programs on the importance of exercise with HF and how to follow their individualized exercise program. Education regarding exercise with HF should begin with identifying individuals' knowledge level of exercise, their definition of exercise, and their activity tolerance level. Individuals need to be instructed that although they have a weakened heart muscle, paced activity and exercise is safe and can increase endurance and activity

levels. Exacerbation of HF symptoms can lead to physical deconditioning, so exercises should be paced to the individual's tolerance and increased gradually.

Significance to Nursing Education

In nursing education, a large focus is initially on teaching the survival skills of HF management such as abstaining from tobacco, monitoring daily weights, restricting dietary sodium intake, taking HF medication regularly, and pacing activity. Nurses are also taught the pathophysiology of HF, what causes exacerbation, side effects of medication, and other aspects of the disease. However, nurses are not taught how to effectively empower individuals to become adequate self-care agents.

Education needs to focus on how to help individuals become more aware of the new disease they have and how it affects their life. Nurses need to look at what life experiences an individual has had, what one's knowledge base is, and how one can build on that knowledge through education. Nurses need to learn how to teach individuals to transition to an improved healthy state. They need to learn how to establish an effective partnership with their patients and then empower them through mutual goal setting. This may be taught through scenarios, role-playing, or development of health promotion goals with individuals in clinical settings.

It seems easy to teach individuals about the different pieces of HF management. However, helping them understand how the all pieces relate and fit together in the big picture of HF and empowering individuals to incorporate these recommendations in their life takes education and practice.

Significance to Nursing Administration

Nurse administrators have an important role in supporting the provision of HF education. Providing the resources necessary for the education and facilitating a supportive environment for individuals with HF are mechanisms for nurse administrators to implement. In particular, accessibility to educational materials for describing what HF is, diet and medication recommendations, exercise plans, and smoking cessation pamphlets are essential. Provision of an educational guideline with a reliable and valid knowledge evaluation tool would be valuable to evaluate the outcome of the education program.

Nurse administrators can also facilitate a supportive environment by maintaining an effective working relationship with the health care departments involved in the educational process and by keeping nurse-patient ratios adequate for education and follow-up. Effective communication between disciplines and adequate nurse-patient ratios may decrease some of the stresses that arise with the multidisciplinary educational process of HF management.

Nurse administrators should also make certain that their staff remains current with the changes in HF management and they understand the importance of fundamental aspects of HF. Incorporating educational opportunities regarding the fundamental aspects of HF and access to up to date health care journals and literature will provide the staff with the resources necessary to meet the educational needs of HF individuals. Health care management of HF is continuously changing with the research into different aspects of its management. By remaining current with changes in HF management,

nurses can be proficient supporters of individuals as they develop into adequate self-care agents.

Significance to Nursing Research

There has been little research performed on the relationship of knowledge and being an adequate self-care agent in HF individuals. This study does strengthen the findings of the research in this phenomenon, but also demonstrates a need for further research. To further evaluate this phenomenon, one must first evaluate the influence of different methods of education on an individual's perceived level of knowledge of HF. Secondly, further research should assess the relationship between the method of education and self-care adherence to recommendations in HF. With study of these areas of this phenomenon, HF education may be enhanced to be more individualized and effective in assisting individuals to become better self-care agents with their HF.

Further research utilizing this questionnaire is also warranted. Continuing research with application of this tool will help strengthen its validity and reliability. It will also allow opportunity for refining and clarification of the tool. Developing a valid and reliable assessment tool for the evaluation of HF education will help enhance the further examination of this area.

Nursing research should also further evaluate which factors effect adherence to recommendations in HF management or the levels for the perceived knowledge of HF. By identifying factors that affect adherence to recommendations and perceived knowledge, HF education can be more tailored to meet the individualized needs of specific groups of individuals with HF.

Identifying the perceived knowledge base of individuals with HF and how that knowledge is utilized will assist nurses with the development of an education plan. This can assist nurses and the health care team in supporting individuals through the new changes experienced in their new health-deviation. Identifying the factors for improving self-management of HF may improve the length of survival for individuals with HF, the individual's feelings of well being, and potentially reduce costs to the health care system.

APPENDICES

APPENDIX A

Perceived Knowledge Scale

Appendix A

Perceived Knowledge Scale

Directions:

How confident are you that you **understand** the following information? (Circle **ONE** number for each)

	1	2	3	4	5	6	7	8	9	10
	Not Confident					Totally Confident				
1. What heart failure is.	1	2	3	4	5	6	7	8	9	10
2. The reason for symptoms.	1	2	3	4	5	6	7	8	9	10
3. What caused your heart failure.	1	2	3	4	5	6	7	8	9	10
4. What symptoms you can expect.	1	2	3	4	5	6	7	8	9	10
5. Which symptoms indicate a worsening situation.	1	2	3	4	5	6	7	8	9	10
6. What to do if you have any of these symptoms.	1	2	3	4	5	6	7	8	9	10
7. Self-monitoring with daily weights.	1	2	3	4	5	6	7	8	9	10
8. The treatment/care plan.	1	2	3	4	5	6	7	8	9	10
9. Your responsibilities for self-management.	1	2	3	4	5	6	7	8	9	10
10. The importance of not using tobacco.	1	2	3	4	5	6	7	8	9	10

Perceived Knowledge Scale

	Not Confident										Totally Confident
11. The role of your family or other care-givers in your treatment/care plan.	1	2	3	4	5	6	7	8	9	10	
12. Availability and value of qualified local support group.	1	2	3	4	5	6	7	8	9	10	
13. The importance of obtaining vaccinations against flu and pneumonia.	1	2	3	4	5	6	7	8	9	10	

APPENDIX B

Exercise Self Management Scale

Appendix B

Exercise Self Management Scale

Directions:

During the past week (even if it was not a typical week), how much total time (for the entire week) did you spend on each of the following? (Please circle **ONE** number for each question.)

	None	Less than 30 minutes/ week	30-60 minutes/ week	1-3 hours/ week	More than 3 hours/ week
1. Stretching or strengthening exercises (range of motion, using weights, etc.)	0	1	2	3	4
2. Walk for exercise.	0	1	2	3	4
3. Swimming or aquatic exercise	0	1	2	3	4
4. Bicycling (including stationary exercise bike)	0	1	2	3	4
5. Other aerobic exercise equipment (Stairmaster, rowing or skiing machine)	0	1	2	3	4
6. Other aerobic exercise specify:	0	1	2	3	4

APPENDIX C

Diet Self Management Scale

Appendix C

Diet Self Management Scale

Directions:

We would like to know how often you are able to follow your dietary recommendations. During the past month I was able to follow the recommendations to (circle **ONE** answer for each question.)

	None of the time	A little of the time	Some of the time	A good bit of the time	Most of the time	All of the time
1. Restrict sodium	0	1	2	3	4	5
2. Drink not more than 2 Liters of fluids per day	0	1	2	3	4	5
3. Avoid drinking alcohol	0	1	2	3	4	5

APPENDIX D

Medication Self Management Scale

Appendix D

Medication Self Management Scale

Directions:

We would like to know how often you are able to follow your prescribed medication plan. During the past 4 weeks I was able to (circle **ONE** answer for each question.)

Name of medication:	None of the time	A little of the time	Some of the time	A good bit of the time	Most of the time	All of the time
1. Take the prescribed dose.	0	1	2	3	4	5
2. Understand why I was taking the medication.	0	1	2	3	4	5
3. Recognize side effects.	0	1	2	3	4	5
4. Take proper action when side effects occurred.	0	1	2	3	4	5
5. Work this medication into my regular routine.	0	1	2	3	4	5
6. Obtain this medication	0	1	2	3	4	5

APPENDIX E

Grand Valley State University's Human Subjects Approval

LISTS OF REFERENCES



**GRAND VALLEY
STATE UNIVERSITY**

1 CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

January 24, 2001

Cheryl Van Ess
6768 Argyle Road
Grand Rapids, MI 49548

RE: Proposal #01-114-H

Dear Cheryl:

Your proposed project entitled **Perceived Knowledge of Heart Failure and Adherence to Self-care Recommendations** has been reviewed. It has been approved as a study, which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,



Paul A. Huizenga, Chair
Human Research Review Committee

REFERENCES

Bernardi, L., Spadacini, G., Bellwon, J., & Hajric, R. (1998). Effect of breathing rate on oxygen saturation and exercise performance in chronic heart failure. Lancet, 351, 1308-1311.

Coates, A. J., Adamopoulos, S., Radaelli, A., McClance, A., Meyer, T. E., Bernardi, L., Solda, P. L., Davey, P., Ormerod, O., Forfar, C., Conway, J., Sleight, P. (1992). Controlled trial of physical training in chronic heart failure: Exercise performance, hemodynamics, ventilation and autonomic function. Circulation, 85, 2119-2131.

Fonarow, G. C., Stevenson, L. W., Walden, J. A., Livingston, N. A., Steimle, A. E., Hamilton, M. A., Moriguchi, J., Tillisch, J. H., & Woo, M. A. (1997). Impact of a comprehensive heart failure management program on hospital readmission and functional status of patients with advanced heart failure. Journal of American College of Cardiology, 30, 725-732.

Fowler, A. W. (1996). The relationship of level of women's knowledge of menopause to level of adherence to plan for exercise, calcium supplementation, and hormonal replacement therapy (Masters thesis, Michigan State University, 1996). Masters Abstracts International, 35 (3), 0790.

Gottlieb, S. S., Fisher, M. L., Freudenberger, R., Robinson, S., Zietowski, G., Alves, L., Krichten, C., Vaitkevicius, P., & McCarter, R. (1999). Effects of exercise training on peak performance and quality of life in congestive heart failure patients. Journal of Cardiac Failure, *5*, 188-194.

Hafferkamp-Venner, G., & Seelbinder, J. S. (1996). Team management of congestive heart failure across the continuum. Journal of Cardiovascular Nursing, *10*, 71-84.

Hulka, B. S. (1976). Communication and compliance between physicians and patients with prescribed medications. American Journal of Public Health, *66*, 847.

Jaarsma, T., Halfens, R., Abu-Saad, H., Dracup, K., Gorgeis, T., van Ree, J., & Stappers, J. (1999). Effects of education and support on self-care and resource utilization in patients with heart failure. European Heart Journal, *20*, 673-682.

Morehead, A., & Morehead, P. (1981). The New American Webster Handy College Dictionary. New York, NY: Signet Book.

National Heart, Lung and Blood Institute National Institutes of Health. (1996). Congestive heart failure in the United States: A new epidemic. Available on-line at <http://www.nhlbi.nih.gov/health/public/heart/other/CHF.htm>.

Ni, H., Nauman, D., Burgess, D., Wise, K., Crispell, K., & Hershberger, R. E. (1999). Factors influencing knowledge of and adherence to self-care among patients with heart failure. Archives of Internal Medicine, *159*, 1613-1619.

Orem, D. (1991). Nursing: Concepts in practice (4th ed.). St. Louis, MO: Mosby Year Book.

- Orem, D. (1995). Nursing: Concepts in practice (5th ed.). St. Louis, MO: Mosby.
- Polit, D. F., & Hungler, B. P. (1999). Nursing Research: Principles and methods (6th ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Rich, M. W., Beckham, V., Wittenberg, C., Leven, C. L., Freedland, K. E., & Carney, R. M. (1995). A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. New England Journal of Medicine, *333*, 1190-1195.
- Rich, M. W., Gray, D. B., Beckham, V., Wittenberg, C., & Luther, P. (1996). Effect of a multidisciplinary intervention on medication compliance in elderly patients with congestive heart failure. The American Journal of Medicine, *101*, 270-276.
- Rothert, M. (1990), Women's judgements of estrogen replacement therapy. (Research Grant No. NR1245-04A2) Washington DC : U.S. Department of Health and Human Services, National Center for Nursing Research.
- Sullivan, M. J., Higginbotham, M. B. & Cobb F. R. (1988). Increased exercise ventilation in patients with chronic heart failure: Intact ventilatory control despite hemodynamic and pulmonary abnormalities. Circulation, *77*, 552-59.
- Vinson, J. M., Rich, M. W., Sperry, J. C., Shah, A. S., & McNamara, T. (1990). Early readmission of elderly patients with congestive heart failure. Journal of the American Geriatrics Society, *38*, 1290-1295.
- Wehby, D., & Brenner, P. S. (1999). Perceived learning needs of patients with heart failure. Heart and Lung, *28*(1), 31-40.

West, J. A., Miller, N. H., Parker, K. M., Senneca, D., Ghandour, G., Clark, M., Greenwald, G., Heller, R. S., Fowler, M. B., & DeBusk, R. F. (1997). A comprehensive management system for heart failure improves clinical outcomes and reduces medical resource utilization. American Journal of Cardiology, 79(1), 58-63.