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Relationships Between Knowledge, Attitude
and Frequency of Hospitalization in Heart Failure Patients

By

Leslie D. Erickson

A thesis submitted in partial fulfillment

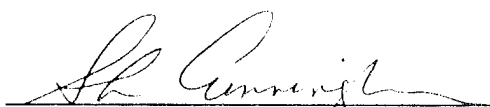
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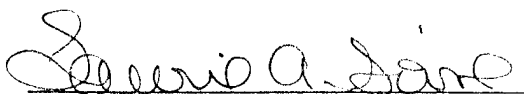
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Abstract

Relationships Between Knowledge, Attitude and Frequency
of Hospitalization in Heart Failure Patients

By Leslie D. Erickson

Chairperson of the Supervisory Committee:

Associate Professor Susanna G. Cunningham

Department of Biobehavioral Nursing and Health Systems

The purpose of this study was to determine if relationships existed between levels of knowledge about heart failure, attitude towards adhering to prescribed medical care and frequency of hospitalization among heart failure patients. The study also tested the reliability and validity of the Shih Heart Failure Knowledge Test. The test was used to measure subjects knowledge about their illness. Selected assessment areas were signs and symptoms of heart failure, medications, exercise and dietary restrictions. The Miller Health Attitude Scale was used to measure subjects predicted adherence to prescribed medical care. Selected assessment areas were cardiac diet, medications, physical activity, stress reduction, and smoking. A convenience sample of 21 subjects was used. All subjects were pre-cardiac transplant heart failure patients being treated at a large Northwest medical center. Subjects received a packet containing the knowledge test, the attitude scale and a demographic data survey. Nine subjects were selected to repeat the knowledge test two weeks later. The data was used to test the reliability of the knowledge test. At the end of four months subjects returned a hospitalization self-report survey documenting the number of times they were hospitalized, length of stay for each hospitalization, and reason for admission. Data was confirmed using subjects medical records.

The mean score for the knowledge test was 86 ± 6 . The mean score for the repeated knowledge test was 85 ± 6 . Subscale scores were highest in dietary restrictions and exercise and lowest in recognition of heart failure signs and symptoms and medications on both tests. The mean score for the health attitude scale was 49 ± 4 . Subscale scores were highest in the areas of cardiac diet and medications while scores were lowest in smoking, physical activity and stress reduction. Subjects in the 40 to 60 age group had seven hospitalizations over the course of the study compared to one hospitalization for the over 60 age group and none for the 20 to 39 age group.

Knowledge and frequency of hospitalization were found have no significant relationship ($r = -0.13$, $p = .60$). Attitude and frequency of hospitalization had no significant relationship ($r = -0.30$, $p = .22$). Knowledge and attitude were found to have a non-significant relationship ($r = 0.24$, $p = .28$). Rates of hospital admissions were found to have low level associations with patient years of heart failure ($r = 0.40$, $p = .09$), and NYHA classification ($r = 0.34$, $p = .13$).

Reliability testing of the Shih Heart Failure Test was completed using t-test for paired samples and paired differences of the means between the two test scores and a reliability coefficient of the mean test scores. Test results were, T-test: -0.04 ; Paired differences of the means: mean 0.92 , SD 5.38 , Std error 1.8 , t-value $.58$ ($df = 8$). The test for correlational coefficient was not meaningful. The results showed no significant differences between the two test scores confirming the reliability of the instrument in this sample population.

The results of this study showed that the Shih Heart Failure Knowledge Test was reliable for measuring patient knowledge about heart failure. Heart failure knowledge and attitude were not significantly related to frequency of hospitalization within the study population. Knowledge and attitude were not related. However, the data suggest that NYHA classification, and years of heart failure may be significant factors for increasing frequency of hospitalization if studied using a larger, more diverse heart failure population.

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Chapter 1

Introduction

Heart failure is one of the leading causes of death in Americans accounting for over 38 billion dollars in total annual medical costs (O'Connell, 1994). It is estimated that 2.3 to 3 million Americans suffer some degree of heart failure (MMWR, 1994). In 1990 heart failure accounted for 40,000 fatalities and contributed to complications leading to 200,000 more deaths. The aging US population contributes 428,000 new cases each year, an incidence rate of 7.2 cases per 1000 for men and 4.7 cases per 1000 for women (Ho, 1993). The five year mortality rate is estimated to be 71.8 percent for men and 39.1 percent for women (Schocken, 1992).

Heart failure accounts for over 2 million hospital admissions yearly at an annual cost of 23.1 billion dollars (O'Connell, 1994). In 1990 heart failure accounted for 643,000 new hospital admissions and 231,000 readmissions (Konstam, 1994; Vinson, 1990). In addition, there were 700,000 new patients seen in cardiovascular outpatient clinics, a net increase of 12 percent for the year. Anderson and Steinberg (1984) studying 270,266 Medicare beneficiaries reported a 22 percent readmission rate within 60 days of discharge resulting in Medicare costs of 2.5 billion dollars. Gooding and Jette (1985) studied six month hospital readmission rates among 444 patients age 65 and older. They found that patients diagnosed with heart failure had 36 percent more readmissions than all other medical diagnoses. Vinson's (1990) study of 161 congestive heart failure patients reported 57 percent readmission rates within 90 days of discharge. Factors contributing to the rate of readmission were, non-compliance with medications or diet, inadequate discharge

planning and follow-up, failed support systems, and failure to seek medical care promptly when heart failure symptoms recurred.

As the US population ages the medical costs of heart failure are sure to rise. Health care professionals must take a proactive role in identifying the clinical and psycho-social factors associated with the relentless progression of this disease, the high hospitalization rates, and the resulting morbidity and mortality.

Problem Statement

Because of its' increasing incidence and prevalence within the US population and it's significant morbidity and mortality heart failure has been described as the most important public health problem in cardiovascular medicine (English, 1995). The physical, emotional and functional burdens these patients experience plays a major role in their ability to meet their personal health care needs and the treatment requirements mandated by their health care provider.

Pharmacologic and non-pharmacologic research has lead to treatment advances resulting in improvement in the prognosis and outcome of heart failure patients. However, successful management depends upon the ability and willingness of the patient to contribute to the treatment plan. To actively participate in their care patients must have a functional knowledge of their illness, the competence to enact essential self-care and prescribed medical care regimens, and a positive attitude to sustain both the interest and desire to deal with their illness.

Nursing and medical research literature suggests that patients who possess greater knowledge about their illness may have better outcomes (Dracup, 1994; Rideout, 1994; Chan, 1990) . Patient attitudes toward their contribution to the health care plan may play an important role in disease progression and hospitalization rates. In a series of studies on patients with coronary heart disease Miller (1982) suggested that patient attitudes toward compliance with prescribed medical care was as significant as knowledge about illness in determining long term health care outcomes.

Current health care literature indicates that heart failure is a major health problem now and will continue to grow as the US population ages. If hospital readmission rates remain unchanged as this cardiac population continues to grow the annual medical costs could exceed 50 billion dollars within the next ten years, 10 percent of US health care dollars.

To reduce the economic burden of heart failure more must be done to understand pathophysiologic mechanisms, develop new treatment strategies, and prepare patients to manage their medical care more effectively at home. Nursing is contributing to the management of heart failure through clinical research and direct patient care. An area in which nurses can make a significant impact is in patient education and training. Studies suggest that patients who are instructed in self-care medical activities and who are well supported by experienced, knowledgeable nurses have fewer problems at home and are less often hospitalized (Dracup, 1994; Hawthorne, 1992).

The majority of patients in the early stages of heart failure have few medical problems. However, as the illness progresses more patients experience increasing problems associated with progressive heart failure and are hospitalized more frequently. Currently

there is little that can be done to identify patients most likely to have increasing health problems and increasing hospitalizations. The ability to identify patients with illness related knowledge deficits or with a greater potential to non-adhere with prescribed medical care may be beneficial to nurses in their efforts to focus education and training or provide close monitoring as they follow the patient through their illness trajectory. This study may provide nurses a better understanding of some of the factors which may affect the chronic heart failure patients ability to learn about their illness and comply with prescribed medical activities. Knowledge gained from the study may assist nurses to develop training and outpatient management programs. The result could be slower progression to later stages of heart failure and fewer hospitalizations for the patient.

Statement of Purpose

The purpose of this study was to determine if any relationships existed between levels of knowledge about heart failure, attitude towards adhering to prescribed medical care, and frequency of hospitalizations among heart failure patients. The study also tested the reliability and validity of the Shih Heart Failure Knowledge Tool. To accomplish these purposes the following objectives were undertaken:

- 1) Measure patient knowledge about heart failure and it's management.
- 2) Measure patient attitudes toward adhering to a prescribed medical regimen.
- 3) Correlate the effects of knowledge and attitude with the frequency of heart failure related hospital admissions experience by a population of heart failure patients.
- 4) Test the reliability and validity of the Shih Heart Failure Knowledge Tool.

Chapter II Review of the Literature

Pathophysiology of Heart Failure

Heart failure is a syndrome characterized by reduced force and speed of ventricular contractions, and neurohormonal responses leading to peripheral, central and pulmonary vascular congestion. Heart failure has a wide range of causes some of which include; myocardial infarction, valvular disease, systemic and pulmonary vascular disease, viral infections, illegal drug use and alcoholism. These conditions lead to alterations of contractility and changes in preload and afterload affecting the ratio of oxygen supply to demand in both the myocardium and peripheral tissues (Parker-Cohen, 1990). Current research into the etiology of disease progression suggests the neurohormonal mechanisms, antidiuretic hormone, atrial natriuretic hormone, and the renin-angiotensin system play a significant role in the breakdown of myocardial tissue (Packer, 1992). Although seen increasingly in younger adults, heart failure is a disease of age; among persons 70 years old the incidence of heart failure exceeds 10 percent. Once clinical symptoms of dyspnea, fatigue, edema or pulmonary congestion become evident the mortality rate exceeds that of many cancers (Cohn, 1994). Death in this population stems from progressive left ventricular pump failure or sudden lethal arrhythmias.

Nursing Management of Heart Failure

Although some nurses are involved in the pharmacologic management of heart failure the majority of nurses use non-pharmacologic therapies. Intervention is aimed at providing

patients with basic information about their illness, signs and symptoms of worsening heart failure, pharmacologic interventions, diet modification and exercise activities (Bushnell, 1992). Dracup (1994) completed a comprehensive MEDLINE and EMBASE review of nursing research in the area of heart failure management. Her findings suggested that comprehensive, nursing based counseling and education programs could have a positive impact upon patient outcomes and could play a role in decreasing the number of unnecessary hospitalizations in the heart failure patient population.

Patient Knowledge and Education

Studies on the knowledge and learning interests of heart failure patients show evidence of a strong desire to learn, but poor information retention by many patients. Fox's (1975) study of 20 patients with heart failure who had participated in a pre-discharge education program reported only 20 percent of subjects were able to recognize signs and symptoms of worsening heart failure, 65 percent had limited knowledge of their prescribed medications or of related medication side-effects, and 35 percent were not self-weighing at home. The use of a small potentially biased, sample population and an open-ended questionnaire limited representation to the study's sample population. However, the findings helped shed light on the learning needs of this cardiac population.

Soine (1991) studied the relationship of knowledge to rates of rejection, infection, and rehospitalization in post-cardiac transplant patients. The sample of 47 patients and their significant others were given a tool designed to measure their knowledge about transplant rejection, immunosuppressive therapy, infections, and myocardial biopsy. When controlled

for age the findings suggested that knowledge may be a modifiable risk factor for reducing rates of hospital readmissions in this population.

Shih's (1994) study of the knowledge level of 23 outpatients with diagnosed heart failure found that of the subjects who completed a structured heart failure education program 79 percent demonstrated good to excellent information recall. However, 21 percent had poor recall of signs and symptoms of heart failure, medications and their side-effects, and diet restrictions. The small sample size and use of a newly developed knowledge tool biased the study's findings and limits its' generalizability to other heart failure populations. But the study also highlights the fact that a significant percentage of patients may be at potential risk for acute heart failure symptoms and higher rates of hospital readmissions.

Studies looking at the learning needs of patients have found that while patients and nurses agree on what heart failure related information is important, there are differences in perceptions about what can realistically be learned in the pre-discharge setting (Gerard & Peterson, 1990; Karlik & Yarcheski, 1987). Hagenhoff's (1994) study of 30 hospitalized congestive heart failure patients and 26 staff nurses perceptions of pre-discharge learning needs showed that both patients and nurses agreed on the topics of most importance. However, there were differences in what patients and nurses felt should be emphasized. Patients learning interests focused on cause of injury, reoccurrence prevention, and medications requirements. Whereas nurses focused on anatomy and physiology, diet and medications. The study's findings suggest that incongruity between information presented and patients learning interests may result in a poor educational outcome affecting the

patients ability to function successfully at home. Chan (1990) studied 30 post-myocardial infarction patients to determine what medical information patients thought was important and how realistic it was for patients to learn information in the various phases of recovery from myocardial infarction. The findings showed patients were most interested in information focusing on medications, anatomy and physiology, and risk factor reduction. The investigator observed that patients believed they were least able to learn in the pre-discharge hospital setting.

Attitude, Intention and Performance

Heart failure patients have exceptionally high mortality rates and the highest hospitalization rate of all patient populations (Hawthorne, 1994). Cardiac rehabilitation programs designed to increase patient knowledge and understanding have been successful in providing educational information. However, prescribed medical treatments are frequently neglected after patients return home (Miller, 1982). Patients with heart disease appear to receive and understand information, yet they find it difficult to comply with the medical treatment plan. Thorne (1990) investigated a phenomenon she described as constructive non-compliance among 77 chronic illness patients. The study found that chronically ill patients often described themselves as making conscious efforts not to adhere to their health care providers advice. Three types of non-adherence were found to be most prominent in the study population. First, patients felt they could modify their treatment regimen without consulting a health care professional if that action was significant toward meeting an important personal need. Such action was thought to be derived from the patients analysis of the risks and benefits of deviating from the treatment

plan and the feeling that one should be able to adapt one's treatment plan to meet personal or business needs. Second, patients selectively complied with some aspects of a treatment regimen while rejecting other aspects. This was believed to occur as patients become more experienced, and began to develop a sense of mastery over their illness. Third, patients would agree to a treatment recommendation with no intention to follow through. This was seen as attempting to establish some control over their medical care while preserving the provider-patient relationship.

Although the study was limited in size its findings are provocative. Thorne's study suggests that patient attitudes toward their medical treatment are dynamic and deserve greater attention from health care providers than previously given.

Miller (1982) investigated the attitudes, intentions and adherence behaviors of 27 male and female cardiac rehabilitation patients with ischemic heart disease toward their medical regimen. Data collected initially and six months later measured subjects intent to perform medically directed actions and their actual behavior. The findings demonstrated a significant correlation between intention and behavior. Behavior was consistent with their intention to follow prescribed diets and for work and social situations. Intention and behavior was not as well correlated for medications, exercise, smoking and stress reduction. Because of the study's small population and single gender focus its findings may be representative of other cardiac populations. However, replication with large, more diversified populations may further substantiate its findings.

To further study the impact of attitude on patient intentions and behavior Miller and Wickoff (1988) developed the Health Attitude Scale. The intent of the scale was to assess

the attitudes of patients with ischemic heart disease towards performing prescribed health care behaviors. Two populations with histories of ischemic heart disease were tested. Group one consisted of 480 members of the Mended Hearts Association from six geographic locations. Group two consisted of 35 patients from four hospitals with newly diagnoses myocardial infarction. The tool was administered initially and at six months. Findings indicated that accrued knowledge by the patient did not assure compliance with the prescribed medical regimen. Positive attitudes, as indicated by higher scores on the Health Attitude Scale, were significantly correlated to greater adherence to prescribed plans of care. Patients saw their treatment plan as dependent upon internal and external factors. Internal factors included a sense of control and comfort with the prescribed activities. External factors included stressful situations in their environment, interactions with health care providers, and social support, especially within the family. The study results suggest that assisting patients in gaining some control over these factors may increase adherence to prescribed medical activities and reduce the number of hospitalizations they experience.

There has been only one study correlating personality attributes to frequency of hospitalization. Hawthorne and Hixon (1994) conducted a pilot study which compared functional status, mood disturbance, and quality of life in 21 patients with heart failure. Twenty-one subjects in the experimental group received structured symptom management instruction and participated in a nurse -monitored symptom management program. The control group, twelve subjects, received structured symptom management instruction and standard medical follow-up care. Data was collected on patient outcomes, hospital

admission rates, functional capacity and quality of life. The findings showed that there was no appreciable difference between the groups. However, it was noted that subjects who had higher functional status scores, higher mood scores, and higher quality of life scores had fewer hospitalizations than subjects who scored lower. The investigators noted that the non-supported group tended to be less compliant with planned medical care and were more dependent on health care providers and family members to manage their care needs. Because of a small sample population consisting of white, middle-aged New York Heart Association category III and IV heart failure patients the findings may not be representative of other heart failure populations. But they demonstrate evidence of a possible link between patient emotional and behavioral attitudes and hospitalization rates.

Rideout's (1986) study of hope, morale, and adaptation in 23 patients with chronic heart failure showed no correlation between high hope, morale scores, and higher levels of physical function. The investigators concluded that a lack of correlation between physical function, hope and morale suggests that individuals with chronic illness may have an ability to ignore or suppress the realities of their illness and, as a result, may have more difficulty accepting the physical limitations and responsibilities associated with their chronic illness.

Research into patient education and learning interests shows that cardiac patients are interested and motivated to learn about aspects of their illness which will speed recovery, slow progression, or prevent a recurrence. However, hospital admissions statistics show heart failure patients continue to have high admission rates. Implications are that prescribed treatment plans may not be adequate to prevent the progression of heart failure in some patients, and that patient education programs may need to change their approach

toward patient learning and motivation in order to improve adherence to prescribed treatment plans once the patient returns home.

Studying the relationship between levels of knowledge and attitudes towards compliance with prescribed health care measures may provide insight into the progression of heart failure, reasons for the high hospitalization rates within this population and what nurses can do to help alter this illness trajectory.

Chapter III Methodology

Study Design

This study used a descriptive, prospective, correlational design to examine and describe the relationships between the variables of knowledge about heart failure, attitudes toward performing prescribed health care activities, and hospital admission rates among patients with heart failure. The study also analyzed the Shih Heart Failure Knowledge Test to determine its reliability and usefulness as a means of assessing levels of knowledge among heart failure patients.

Sample

Selection of subjects for the study was by convenience sampling. Potential subjects were approached by the investigator while they were visiting the heart failure clinic of a large northwest medical center. Each patient was screened according the study inclusion-exclusion criteria; patients with documented heart failure and ejection fractions less than 40 percent, New York Heart Association Heart Failure Classification I through IV, able to read and write in English, no diagnosis of chronic pulmonary disease or chronic renal failure, no cognitive deficits causing problems with self-management of heart failure symptoms or completion of data collection tools (see appendix A). If the patient met the inclusion criteria they were briefed on the study protocol and offered an opportunity to participate. A consent of agreement to participate in the study was obtained from each

subject. There were 30 patients who initially agreed to participate, however, 21 actually completed the study.

Procedures for Data Collection

Data collection was in two phases (see Table 1). Phase I involved the completion of three instruments designed to gather data on knowledge levels, attitudes toward health care and demographic information. Phase II involved collection of data on the number of hospitalizations occurring over the four month study period.

In phase I subjects were given a packet containing a heart failure knowledge test, a health attitude survey, and a demographic data survey. Each instrument was reviewed with the patient and sufficient time allotted to clarify any misconceptions and discuss any questions or concerns. Initially subjects were to have completed the data packet during the initial interview. However, diagnostic test requirements, clinic operating needs, and personal time constraints resulted in the development of an option for completing the packet at home and returning the contents via postage-paid mail pouches. The majority of subjects chose this option for completing the data packet. Forty-nine percent of the subjects completing the initial data packet were mailed a second knowledge test two weeks later. Data from this test was later used to assess the test-retest reliability of the Shih Heart Failure Knowledge Test.

In phase II subjects were mailed a survey which asked them to document the number of times they had been admitted to a hospital with heart failure related symptoms over the four month period of the study. Additional data included length of stay for each hospitalization and subjective identification of symptoms leading to their hospitalization.

To assure confidentiality each subject was assigned a two digit identification number which was used on all survey documents in lieu of names.

Definition of Terms

The following are operational definitions for the variables used in this study.

Knowledge: Information the subject could recall and demonstrate on a written test about heart failure in regards to medication, dietary management, physical activity, and recognition of signs and symptoms of decompensating cardiac function.

Attitude: A subjects intention to perform prescribed or directed health care behaviors of their medical regimen. Prescribed or directed medical behaviors include taking prescribed medications, following dietary and fluid restrictions, cessation of smoking, maintenance of a physical activity program, and stress reduction.

Hospitalization: The number of heart failure related hospital admissions experienced by subjects over a four month period from the time of initial heart failure knowledge and attitude measurements.

Instruments

The instruments used for data collection in this study were a knowledge test, a health attitude survey, a demographic data survey, and a hospitalization survey. Data on knowledge about heart failure was collected using a tool developed by Shih (1994) to measure levels of knowledge in patients with congestive heart failure (appendix B). This tool was developed and piloted using 23 outpatient heart failure patients. The tool consisted of 60 items grouped in 15 question blocks. It was formatted to allow subjects to read each question and respond as either True, False, and Don't Know. Content validity

was established by current literature review and by content review by experienced cardiovascular nurse specialists. Test reliability was reported to be high with individual item test-retest correlation scores of 0.91 and Cronbach's Alpha scores of 0.65. The tool was used as it was designed and written, except for some grammatic changes intended to simplify reading for the subjects. To perform reliability testing of the tool a second version was created using the same questions, but altering their location within the instrument. This alteration was made to minimize test familiarity and practice improvements.

The Miller Health Attitude Scale (Miller, 1982) was used to collected data on subjects' intention to adhere to a prescribed medical regimen (see Appendix C) . The scale was developed to assess attitudes of patients with coronary artery disease toward performing the prescribed behaviors of their medical regimen. It has been tested using 513 inpatients and outpatients with ischemic heart disease. Attitude and adherence behavior were significantly correlated for the subscales of diet ($r=.31, p<.05$), activity ($r=.46, p<.01$), smoking ($r=.62, p<.001$). Indications were that this tool had significant predictive value for measuring attitude and adherence to prescribed medical care.

A demographic data survey was used to collect information about age, gender, ethnicity, occupation, cardiac functional status, and any education received about heart failure prior to the study (appendix D). Data on hospitalizations experienced during the study period were collected using a subject self-report survey tool (see appendix E). The instrument documented the number of subject hospitalizations over the period of the study, length of hospital stay, and subjective reasons for admission. Self-report data was corroborated by a review of the subject's heart failure clinic medical record.

Data Analysis

Data analysis was accomplished with an IBM-PC compatible computer using the analytical program Statistical Package for the Social Sciences (SPSS®).

Knowledge scores from test 1 and test 2, attitude scale scores, hospitalization data, and demographic data were obtained. The heart failure data was analyzed in two ways.

Descriptive and frequency statistics were used to characterize the study sample, knowledge test performances, attitude scale scores, hospital admission rates, and the reliability and accuracy of the Shih Heart Failure Knowledge Test. Correlational statistics were used to measure the magnitude of relationships between knowledge of heart failure and attitude, knowledge and hospital admission rates, attitude and hospital admission rates. Correlational statistics were also used to measure the strength of the relationship between knowledge test 1 and knowledge test 2 scores in those subjects who completed both tests.

Study sample characteristics; age, gender, ethnicity, employment status and cardiac functional status; performance scores on the knowledge tests and the health attitude scale, and hospital admission rates were analyzed and described using measures for frequency distribution and central tendency. The knowledge test reliability was analyzed using a t-test for paired samples.

Correlations of the magnitude of relationship between knowledge and hospital admission rates, attitude and hospital admission rates, and knowledge and attitude scores were measured using Spearman's Rho. Spearman's Rho is a non-parametric test designed to test degrees of relationships between selected variables using ordinal scales of data

(Polit, 1991). This non-parametric test was also used to analyze the strength of relationship between subject scores on knowledge tests 1 and 2.

Protection of Human Subjects

This study was approved by the University of Washington Human Subjects Committee and by the University of Washington Medical Center Review Board prior to its implementation. Subjects were briefed on the nature of the study and their prospective role. The investigator reviewed the study consent form and each data collection instrument with each subject. All subjects were advised of the option to discontinue participation in the study at any time. To assure anonymity all subjects were assigned a specific two digit identification number. Identification numbers were used during the study and will be used for any written reports or papers. A master list of subject names and assigned numbers will be kept in a separate, secured file by the investigator. Subject consent forms will be maintained by the University of Washington School of Nursing. Minimal risks were associated with the study. Prescribed treatment regimens or protocols were not altered. Subjects reported anxiety associated with test taking, frustration with the format of some data collection tools, and loss of personal time as the only negative aspects of participation in the study. The majority of subjects felt they benefited from knowing their level of knowledge about their illness.

Chapter IV Results

The purpose of this study was to determine if any significant relationships existed between levels of knowledge about heart failure, attitudes toward performing prescribed health care measures, and frequency of hospital admissions among heart failure patients. The study also tested the reliability and validity of the Shih Heart Failure Knowledge Tool.

In the attempt to study the potential relationships between the variables of knowledge, attitude and hospitalization rate the following hypothesis was proposed: Heart failure patients who have higher knowledge test and attitude scale scores will experience fewer heart failure related hospital admissions than patients who have lower knowledge test and attitude scale scores. The results of the data analysis follow.

Sample Description

The sample population for this study consisted of 21 adults aged 26 to 64 who were receiving out-patient treatment for heart failure at a large northwest medical center. Selection of subjects for the study was by convenience sampling. Subjects were approached at the heart failure clinic at random, interviewed and offered an opportunity to participate in the study; 30 subjects agreed to participate and signed consent forms. One received a heart transplant, two withdrew from the study, three did not complete the initial survey packets, and three only partially completed the knowledge test and health attitude scale.

There were 13 males and 8 females in the study (see Table 1). All the subjects were white. The mean age of the subjects was 48.9 years. Cardiac functional status was determined using the New York Heart Association Functional Classifications (1966):

Class I: No limitations. Ordinary physical activity does not cause dyspnea, palpitations or angina.

Class II: Slight limitations of physical activity. Comfortable at rest, but symptomatic with ordinary physical activity.

Class III: Marked limitation of physical activity. Comfortable at rest, but markedly symptomatic with less than ordinary physical activity.

Class IV: Inability to carry on any physical activity. Symptomatic at rest or with any activity.

Seven subjects were classified as having advanced heart failure, class III and IV. Fourteen were classified as having mild to moderate heart failure, class I and II. Fifteen subjects were medically retired because of health problems associated with heart failure and other co-morbid conditions or were fully retired because of age and employment considerations. Three were working full or part time and three were unemployed. Nineteen subjects had received initial education about heart failure either through hospital pre-discharge planning programs or through formal education classes presented by the hospital clinical staff.

Table I. Study Population Characteristics.
(n = 21)

	n	%
Gender		
Male	13	62%
Female	8	38%
Ethnicity		
White	21	100%
Black	0	
Hispanic/Latin	0	
Asian	0	
Other	0	
Employment		
Full-time	2	9%
Part-time	1	5%
Unemployed	2	9%
Retired	2	9%
Medically retired	13	64%
Never employed	1	4%
NYHA Functional Level		
Class I	4	19%
Class II	10	48%
Class III	5	24%
Class IV	2	9%
Age		
21-40	3	14%
40-59	14	67%
> 60	4	19%
Length of Illness (years)	3.9	Range 0.5 to 17 yrs

Heart Failure Knowledge Test

The Shih Heart Failure Knowledge Test (appendix B) was used to measure the current level of knowledge about heart failure in the study population. The instrument was composed of 15 question blocks each with four statements which can be responded to as True, False or Don't Know. The questions were designed to measure four subscales; signs and symptoms of heart failure, medications, dietary restrictions, and exercise. Prior to completion the test was reviewed with the subject and sufficient time was allotted to clarify any misconceptions or concerns. Three subjects misunderstood the format of the test and did not provide enough responses to sufficiently measure their knowledge level. Their test scores were not included in the final data analysis.

The instrument was scored by assigning a value of 1 to each correct response and a value of 0 to incorrect responses. For the purposes of this study Don't Know responses were considered as incorrect and assigned a value of 0. The maximum score for the test was 60 points. Raw data scores were converted to percentage scores for ease of interpretation.

The study population knowledge scores ranged from 68 to 97 percent with a mean score of 86 ± 6 . Mean subscale scores were as follows (see Table 2 for standard deviations and range for each subscale); Signs and symptoms 80, medications 82, dietary restrictions 94, and exercise 94.

A sub-group of subjects ($n=9$) was randomly selected to complete a second knowledge test (test 2). Data from this test was used in test reliability calculations. The overall score and subscales scores were similar to the initial test scores (see Table 3).

Table II. Total Score and Subscale Scores for Knowledge Test .

<u>(n=21)</u>	<u>Mean Score +SD</u>	<u>Min.</u>	<u>Max.</u>
<u>Total Score</u>	86.4±6	68	98
<u>Subscale Scores</u>			
Signs and Symptoms	80±9	60	95
Medications	82±12	56	100
Dietary Restrictions	94±6	74	99
Exercise	94±7	74	99

Table III. Total Score and Subscale Scores for Repeated Knowledge Test .

<u>(n=9)</u>	<u>Mean Score +SD</u>	<u>Min.</u>	<u>Max.</u>
<u>Total Score</u>	85±6	76	99
<u>Subscale Scores</u>			
Signs and Symptoms	80±9	70	100
Exercise	84±9	74	99
Medications	89±9	68	100
Dietary Restrictions	91±10	66	99

Table IV. Heart Failure Knowledge Test Responses

Test Item	Response	% Correct	% Incorrect	Std Dev.
1. The following may be symptoms of heart failure.				
A. difficulty breathing	T	100	0	.00
B. increased appetite	F	86	14	.36
C. fatigue	T	100	0	.00
D. Headache	F	29	72	.46
2. The following may be signs of heart failure.				
A. Skin rash	F	72	29	.46
B. Swollen ankles and legs	T	100	0	.00
C. Increased blood pressure	F	14	86	.36
D. Fever	F	43	57	.50
3. If my body weight increased by 5 lbs. over 3 days I would				
A. Eat less to control my weight	F	76	24	.43
B. Continue to observe for 2 more days	F	76	24	.43
C. Call my doctor or nurse specialist	T	100	0	.00
D. Stop drinking until weight decreased	F	95	5	.22
4. If I noticed a persistent cough and increased shortness of breath, I would				
A. Rest more to save energy	T	48	52	.51
B. Drink more water and take Vitamin C	F	81	19	.40
C. Take an over-the-counter medicine	F	95	5	.21
D. Call my doctor	T	100	0	.00
5. To determine if I am retaining water I would				
A. weigh any time of the day I please	F	95	5	.21
B. Weigh at the same time every day	T	100	0	.00
C. Weigh once a week	F	100	0	.00
D. Weigh only if I feel bad	F	100	0	.00

Table IV. (continued) Correct Response % Correct %Incorrect Std Dev.

	Correct Response	% Correct	%Incorrect	Std Dev.
6. I take vasodilators because they				
A. Dilate my trachea and help me breath	F	76	24	.44
B. Reduce the pressure my heart must pump against	T	86	14	.36
C. Improve kidney function and decrease my urine output	F	100	0	.00
D. Help prevent upper respiratory infections	F	81	19	.40
7. If after taking a medication I feel dizzy or very lightheaded, I would:				
A. Call and report this to my doctor	T	95	5	.22
B. Reduce the dose and frequency of the medication	F	100	0	.00
C. Sit down and elevate my feet	T	57	43	.50
D. Keep taking the medication, because it is ordered by my doctor	F	62	38	.49
8. If I forget to take my diurectics I may experience:				
A. Dizziness	F	62	38	.49
B. Ankle or leg swelling	T	100	0	.00
C. Shortness of breath	T	81	19	.42
D. Fever	F	86	14	.35
9. Patients with heart failure have blood tests performed to:				
A. Check kidney function	T	62	38	.49
B. Check blood levels of medications	T	86	14	.35
C. Check energy levels	F	91	9	.30
D. Check Sodium and Potassium levels	T	91	9	.30
10. I must watch my intake of Sodium to:				
A. Prevent retention of fluid	T	100	0	.00
B. Prevent elevation of Calcium	F	76	24	.43
C. Reduce my muscle mass	F	95	5	.21
D. Lower my cholesterol level	F	91	9	.30

Table IV. (continued) Correct Response % Correct %Incorrect Std Dev.**11. To decrease the Sodium in my diet****I would:**

A. Avoid using table salt	T	100	0	.00
B. Eat fresh instead of pre-packaged food	T	95	5	.21
C. Use soy-sauce instead of table salt	F	100	0	.00
D. Eat only in fast food restaurants	F	100	0	.00

12. Which of the following are low-sodium

A. Potato chips	F	100	0	.00
B. Baked potato	T	95	5	.21
C. Canned beans	F	95	5	.21
D. Fresh meat	T	81	19	.40

13. I should choose my activity level according to:

A. Guidelines in exercise books	F	100	0	.00
B. My energy level	T	91	5	.30
C. Comments from other HF patients	F	95	5	.21
D. Discussions with my doctor	T	100	0	.00

14. The following may be signs of worsening heart failure:

A. Increased energy levels	F	100	0	.00
B. Fatigue	T	100	0	.00
C. Shortness of breath	T	100	0	.00
D. Increased urination	F	62	38	.49

15. While exercising I experience chest pain and my heart races, this may indicate:

A. I have achieved my exercise goal	F	100	0	.00
B. I am over-exerting myself	T	95	5	.21
C. My medications are not working	F	76	24	.43
D. I need to discuss this with my doctor	T	100	0	.00

A review of subject responses on the knowledge test was done (see Table 4). Specific questions were analyzed if correct responses were less than 80 percent. In the subscale of heart failure signs and symptoms four items were most commonly missed. In question 1D 72 percent of subjects incorrectly associated headache as a sign of heart failure. In question 2C 86 percent of subjects incorrectly associated elevated blood pressure as a sign of heart failure rather than a causative factor. In question 2D 57 percent of subjects incorrectly associated fever with signs of heart failure. In question 14D 38 percent of subjects incorrectly associated increased urination as a sign of worsening heart failure. Subject confusion may exist in recognizing heart failure signs and symptoms.

In the subscale of dietary restrictions four items were answered incorrectly by more than 20 percent of subjects. In questions 3A and 3 B 24 percent of subjects associated control of fluid weight gains with restricted eating and passive monitoring and 76 percent did not recognize the need to communicate with their health care provider. In question 10B 24 percent of subjects associated serum calcium elevations with sodium intake.

In the subscale of medications four questions were answered incorrectly by more than 20 percent of subjects. In question 6A 24 percent of subjects associated bronchodilator activity with vasodilators. In question 7C 43 percent of subjects did not recognize the benefit of lower extremity elevation in the presence of dizziness. In question 7D 38 percent of subjects considered it important to continue taking a medication in the presence of significant side effects rather than contacting their health care provider. In question 8A 38 percent of subjects did not recognize dizziness as a significant side effect

of diuretic therapy. Other subscales had questions subjects answered incorrectly by more than 20 percent of subjects. In question 9A 38 percent of subjects did not associate evaluation of renal function with required periodic blood testing. In question 15C 24 percent of subjects associated chest pain and tachycardia during exercise as indications of medication failure. The high rate of errors in these questions suggests that subjects need reinforced education in the areas of heart failure signs and symptoms, medications, sodium and fluid control, exercise tolerance, and blood testing.

Health Attitude Scale

The Miller Health Attitude Scale (Miller, 1982) was used to measure subject attitudes. The instrument was designed to predict attitudes of patients with cardiac disease towards adherence with medically related self-care activities prescribed by their health care provider. High scores predict greater adherence while lower scores predict less adherence. The instrument consists of five subscales; cardiac diet, medications, physical activity, stress reduction, and smoking. Each subscale has 12 value statements arranged into a seven point Likert Scale. Three of the statements use non-sense values and are intended to verify the subject is answering accurately. These statements were deleted when calculating individual subject scores. The maximum score for each subscale was 63 points. To determine an overall attitude score the five subscales were summed and divided by 5. The resulting score was then considered the attitude score. The maximum possible score for the instrument was 63 points. The mean score for the attitude scale was 49.0 ± 4 ; the range of scores was 41 to 58 points. Mean scores for each of the

subscales were as follows; Cardiac diet 51, physical activity 48, medications 56, stress reduction 49, and smoking 42 (see Table 5).

Hospitalization Rates

Eight subjects (38 percent) experienced at least one hospitalization for heart failure related symptoms over the four month course of the study. Admission rate by age was examined by dividing the sample population into three age groups; 20 to 39, 40 to 60 and over 60. Seven hospital admissions were reported in the 40 to 60 age group and one hospitalization was reported in the over 60 age group (see Table 6). Several variables were examined for potential correlations to hospital admission rates of these two showed some low level significance; years of heart failure ($r= 0.40$, $p = .09$), and New York Heart Association heart failure classification ($r= 0.31$, $p = .12$).

Table V. Overall Score and Subscale Scores for Miller Attitude Scale.

<u>n=21</u>	<u>Mean Score + SD</u>	<u>Min.</u>	<u>Max.</u>
<u>Overall</u>	49±4	40	57
<u>Subscale scores</u>			
Smoking	42±8	36	63
Physical Activity	48±8	28	62
Stress Reduction	49±8	30	61
Cardiac Diet	51±6	36	62
Medications	56±5	45	63

Table VI. Hospitalizations and Knowledge Scores of Study Population

<u>Age Group</u>	<u>Hospitalizations</u>	<u>No Hospitalizations</u>	<u>Mean Knowledge Scores</u>
20 to 40	0	3	89
40 to 60	7	9	86
>60	1	1	87

Reliability of the Shih Heart Failure Knowledge Test

Reliability testing is a measure of the degree of dependability or accuracy by which an instrument measures the attribute it is designed to measure (Polit, p.249). Reliability tests were done on the Shih Heart Failure Instrument to determine if it could accurately measure the degree of patient knowledge about management of heart failure. Three statistical analyses were used to perform reliability evaluations. A test-retest of scores from two versions of the Shih Instrument given two weeks apart, a paired difference of the means of the two tests, and a reliability coefficient of the mean test scores.

These tests are used to determine if an instrument is capable of producing similar results from the same test sample when administered at two different time frames. If the means of the two tests are within a narrow range of tolerance the test is considered to be reliable.

The test-retest of the mean scores of the knowledge test (test 1) and the repeated knowledge test (test 2) was done using nine paired samples of scores from subjects randomly selected to complete the second knowledge test. A t-test for paired samples of the two test scores showed a negative correlation (-0.04). A paired difference of the means between the two scores showed a mean of 0.92, a standard deviation of 5.38 with a standard error of 1.795 and a t-value of .51(df=8). The correlation coefficient between the means of test one and test two was not meaningful. The minimal difference between the mean scores and the low standard deviation suggest that the Shih Heart Failure Knowledge Test had good reliability.

Correlations Between Knowledge, Attitude and Hospital Admission Rates

A correlational analysis using Spearman's Rho was completed to determine the magnitude of relationship between knowledge, determined by subject scores on the knowledge test, and rates of hospital admissions for heart failure symptoms. Results showed a non-significant correlation between the two variables ($r = -0.13$, $p = .60$).

A correlational analysis using Spearman's Rho was completed to determine the magnitude of relationship between attitude, determined by subject scores on the Miller Attitude Scale, and rates of hospital admissions for heart failure symptoms. Results showed a non-significant correlation between the variables ($r = -0.30$, $p = .22$).

It was considered that a potential relationship between knowledge and attitude may exist and may be significant in determining rates of hospital admissions within the study population. To assess for this a correlational analysis of the magnitude of relationship between the two variables was done. The magnitude of relationship was found to have a low correlation ($r = 0.24$, $p = .28$).

Chapter V

Discussion

The Agency for Health Care Policy and Research (AHCPR) has established guidelines for the clinical management and care of patients with heart failure (1994). The guidelines contain clinical recommendations for patient and family education and counseling, dietary management, pharmacological management, exercise programs, and support systems. The AHCPR recommendations depend strongly upon supportive interactions between the client, physician, nurse and other support staff. Inherent in these recommendations is the willingness of the patient to take an active role in the management of their illness by individual learning and adherence to a plan of care.

The purpose of this study was to determine if knowledge about heart failure and attitude toward adhering to a medical regimen play significant roles in predicting rates of hospital readmissions for heart failure patients. The secondary purpose was to validate the effectiveness of the Shih Heart Failure Knowledge Test for measuring patient knowledge about heart failure.

Heart failure knowledge test scores were found to be high for this population, mean score 86 ± 6 . Scores were also found to be high in the subscales of dietary restrictions and exercise. Scores were lowest in the subscales of heart failure signs and symptoms recognition and in medications (see Table 2). Subjects selected to complete a second knowledge test maintained high test scores, mean score 85 ± 6 . Subscale scores improved

for medications, remained low for heart failure signs and symptoms recognition, and lowered for exercise (see Table 3).

The Miller Attitude Scale was designed to predict patient adherence to prescribed medical care. A score of 63 implies high predicted adherence and a score of 15 implies low predicted adherence. Scores for the Miller Health Attitude Scale were found to be good for this population, mean score 49 ± 4 . Scores were highest in the subscales of medications and cardiac diet. They were lowest in smoking avoidance and physical exercise activity (see Table 5).

The frequency of hospitalizations for the study group was low, eight hospitalizations over the four month period of the study. Two subjects had three hospitalizations for heart failure related symptoms and six other subjects had one hospitalization. Average length of stay for all hospitalizations was 3 days. There were no deaths in the study group during the study period, one subject received a cardiac transplant.

The study's findings show the sample population retained a significant portion of their initial heart failure instruction and may be expected to adhere closely to medical treatment plans developed by their health care providers.

Study Population Demographics

The population for this study was derived from the University of Washington Medical Center Cardiology Diagnostic Clinic. This clinic serves as a regional referral site for patients with heart failure who may be candidates for cardiac transplant.

The mean age of the sample population, 48.9 years, was young in comparison to other studies of heart failure patients. Because heart failure is recognized as a disease of the

elderly it was expected that the mean age would be 15 to 20 years older. The mean age of heart failure patients in other studies was 71 (Rich, 1995; Dracup, 1992; Bushnell, 1992; Rideout, 1986). The wide age range of this population, age 26 to 64 years, suggests that heart failure afflicts a wider range of patients than previously thought. This population was unique in that they were referred from health care providers all over western Washington. Although there were undoubtedly more elderly patients within the pool of potential subjects they were not represented. As such, the findings of this study may not be representative of older heart failure patients.

Eight of the twenty-one subjects in the study were women, mean age 47 years. This low representation of women is common in many published cardiovascular studies. A study of heart failure treatment in women Johnson (1995) reported that women were underrepresented in the V-Heft I and II, CONSENSUS, and SOLVD treatment and prevention trials. Average representation of women in all the studies was 12 percent. Dracup (1995) and Linde (1979) reported female representation of 17 percent and 4 percent, respectively, in their studies. Most female patients with heart failure are much older than this study sample. A Framingham Study report (Ho, 1993) showed the prevalence of heart failure in women to be less than 10 per 1000 persons in women under 59 years of age. Perhaps that explains their under-representation in this study.

There was no ethnic representation in this study. One black and one native Alaskan entered the study, but their data was not included because they only partially completed the survey instruments. The few published studies on heart failure patients have also had limited ethnic representation. Hagenhoff (1994), Bushnell (1992), and Rideout (1986)

completed their research using all white patients or did not report ethnic representation. Historically ethnic representation has been low in cardiac research. Ghalil's (1988) study of factors leading to heart failure in urban blacks was one of the few studies involving ethnic groups. Perhaps this sector of the population is under treated because of their cultural values and beliefs, their socioeconomic status, or their access to health care.

The findings generated from this study may be representative of the larger population of heart failure patients being treated at the University of Washington Medical Center. Being pre-transplant may make them non-representative of other heart failure populations because of age limitations for cardiac transplant surgery. Additionally the small sample size and use of convenient sampling procedures may make the study findings non-representative of other heart failure populations.

Heart Failure Knowledge Test Performance

The knowledge test scores for the study population were considered to be high, mean score 86 percent. Few studies exist which document patient performance on heart failure knowledge tests. However, the subjects in this study performed well when compared to those studies. Shih (1994) developed an instrument designed to measure patients knowledge about heart failure. The test was trialed using 19 patients from a large, university teaching hospital. The mean test score for that sample population was 83 percent. Bushnell (1992) administered a heart failure knowledge test to 41 subjects prior to and after providing them with a structured heart failure teaching program. Although information about the knowledge measuring instrument and subject scores were not provided the study's findings reported only 16 percent of subjects could identify four signs

and symptoms of heart failure. Documentation of knowledge about medications, dietary restrictions and exercise was not presented.

The knowledge test subscale scores showed good retention of information by the study subjects (see Table 2). High scores were noted in the areas of dietary restriction, 94, and exercise, 94. Lower scores were noted in the areas of medications, 82 and heart failure sign and symptom recognition, 80. The lower scores indicate areas where further instruction and close follow up care may improve patient knowledge and possibly increase patient adherence to prescribed treatment plans.

An analysis of the range of subject responses on the knowledge test showed that test items incorrectly answered were not always consistent with the subscale scores. Although the mean score for the subscale dietary restrictions was high 24 percent of subjects had some confusion about how to manage fluid and sodium intake and when to call their health care provider for excess water retention. Some incorrect responses items were more consistent with subscale scores. In the subscale for signs and symptoms of heart failure the mean score was 80. Test item errors in this area were found to be consistent with the low subscale score. Questions 1B, 1D, 2C and 2D (see Table 4) all had greater than 50 percent incorrect responses suggesting patient uncertainty at recognizing signs and symptoms of impending heart failure. These findings were consistent with Bushnell's research experience at educating heart failure patients.

The Shih Heart Failure Knowledge Test was one of a very few instruments available for measuring the knowledge level of this unique cardiac population. Furthermore, it was the only instrument the investigator found which focused on specific knowledge areas

which would be useful to nurses and other health care providers charged with educating and following heart failure patients. Although the instrument yielded useful data on patient knowledge about heart failure many subjects found it difficult to understand. The format of the instrument required that subjects respond to 60 individual items. Although the majority of subjects completed the instrument many complained it was too long and too detailed. Four subjects returned the instrument without completing it. Three subjects only partially complete the instrument resulting in their data being unusable. The development of a shorter, more precise instrument may result in the collection of equivalent data, increase subject satisfaction, and may result in better participation by future subjects.

Attitude Scale Performance

Knowledge alone will not determine the willingness of a patient to agree with or adhere to a prescribed plan of care. Health care providers must look to other measures to identify alternate ways of gaining increased patient compliance (Bushnell, 1992). The Miller Health Attitude Scale (appendix C) was designed to predict a patient's likelihood of adhering to prescribed medical care in the cardiovascular disease population. High scores indicate expected higher adherence to prescribed care and low scores predict lower adherence. The scale range was for the instrument was 15 to 63 points. This instrument was used to measure attitude in the study population.

The attitude scale scores for this population were considered to be good, mean score 49, indicating subjects were more likely to adhere to an individualized, prescribed plan of care. The instrument had five subscales each designed to look at an aspect of cardiac care considered to be important. The mean subscale scores for this population were; Smoking

42, physical activity 48, stress reduction 49, cardiac diet 51, and medications 56 (see Table 5). The moderate scores in the subscales of smoking, physical activity and stress reduction suggest that nurses and other health care providers may need to further assess patient values and beliefs and emphasize education and support in these areas.

The study populations scores were consistent with the findings in Miller and Johnson's (1982) pilot study trial of 24 patients with coronary artery disease and Miller and Wickoff's (1982) findings in their sample population of 500 post-myocardial infarction patients. The researchers found that sharing scale scores with their patients allowed opportunities to explore personal beliefs, concerns and biases and encouraged active negotiation and conflicting beliefs resolution between the provider and patient. In studying the effects of knowledge and compliance with medical care in 60 coronary revascularization patients Marshall (1986) reported high knowledge test scores were not always indicative of good patient outcomes. Compliance with medical treatment plans was found to be a significant factor in having consistently good patient outcomes. Marshall advocated a need for developing more valid and reliable measures of patient compliance.

The Miller Health Attitude Scale was the only published instrument available for measuring patient attitudes toward adhering to prescribed medical care. The instrument was designed and tested using myocardial infarction and coronary artery bypass patients. It was used to collect data about attitude towards prescribed medical care in the heart failure population without any modifications. The format of the instrument, a Likert Scale using opposing terms, was difficult for subjects to understand. The use of non-sense statements within the data sets caused confusion and frustration for many of the subjects.

As a result four subjects refused to complete the instrument and three others did not provide responses to all the statement pairs. The use of five sets of 12 paired statements (60 individual responses) resulted in a long, complicated instrument and may have contributed to a reduced subject response rate. The use of a shorter, more precise scale may elicit equivalent data and encourage more subject participation in future studies.

Correlations Between Knowledge, Attitude and Hospitalization Rates

The correlation between knowledge, as measured by heart failure knowledge test scores, and rates of heart failure related hospital admissions among the study population was found to be non-significant ($r = - 0.13$, $p = .60$). The mean test scores of subjects who were hospitalized were 85 ± 1 . The mean test scores of those who reported no hospitalizations during the course of the study were 87.2 ± 1 . Subjects with test scores greater than 90 percent accounted for three admissions, subjects with test scores 80 to 90 percent accounted for four admissions, and subjects with test scores less than 80 percent had one admission. The correlational data and hospital admission findings showed knowledge scores could not be associated with hospital admission rates in the study population.

The correlation between attitude, measured by the Miller Health Attitude Scale, and hospitalization rates among the study population was determined to be non-significant ($r = 0.29$, $p = .22$). The mean attitude scores of subjects who were hospitalized was 47.8. The mean score of subjects who reported no hospitalizations was 50.5.

It was interesting to note, however, that subjects with attitude scores greater than the mean score of 49 had six percent less admissions than subjects with attitude scores lower

than 49. This suggests that the correlation between attitude and hospital admission rates among the heart failure patients in this study may have been more significant if the statistical power of the study had been greater. Attitude as a factor in hospitalization among heart failure patients may warrant greater investigation.

Eight of the 21 subjects (38 percent) were hospitalized for heart failure symptoms over the four month course of the study. This is consistent with the 38 to 42 percent readmission rates quoted in the Geriatric, Cardiology and Health Services heart failure literature (Burns, 1991; Vinson, 1990; Berkman, 1987). Seven hospital admissions were in the 40 to 60 age group and one hospitalization was in the greater than 60 age group. There were very few hospitalizations within other age groups in part because of the small sample size and because of the generally good health of the study population. Knowledge scores were not a significant factor in determining rates of hospitalization between age groups. The mean knowledge score for the group with the greatest number of admissions, 40 to 60 age group, was 85.9. Mean knowledge test scores were 89.3 for the 26 to 40 age group and 87.5 for the over 60 age group.

When examined for their potential impact on hospitalization rates among heart failure patients the variables age, years of heart failure and cardiac functional status were found to be non-significant. Their effect may have been greater if the study had more statistical power. These variables warrant closer investigation in future studies.

Reliability Testing of the Shih Knowledge Test

The reliability of the Shih Knowledge Test was evaluated using three statistical measures; a t-test for paired samples of knowledge test one and two, a paired difference of the means and a correlation coefficient of the test-retest mean scores.

The t-test for the paired samples of test one and test two indicated that the mean scores of the two tests were not significantly different (-0.04). This was reinforced by a paired difference of the means between the two tests of .92, standard deviation of 5.38, standard error of 1.79, t-value .51 (df=8). The correlation coefficient of the test-retest mean scores was not meaningful because of low variances in the range of test scores. The data showed the Heart Failure Knowledge Test was reliable in this sample population. Because of the small sample size and the low variation in test scores it was not possible to determine if the instrument could accurately distinguish between high and low test scores as a measure of true knowledge. The instrument may provide researchers that data with larger sample sizes where greater variation in test scores occur. The data obtained from this study underscored the homogeneity of the sample population and emphasized the remarkable degree of knowledge possessed by this population of heart failure patients.

Limitations of the Study

This study was bounded by several limitations. The small sample size and use of convenience sampling reduced the study's statistical power. The variables which showed weak correlations to higher hospital admission rates within the study sample may have had more statistical significance within a larger, more diverse population. The investigator

interviewed 54 heart failure patients of that number 21 completed the study. This population was derived from a pool of patients who have been extensively involved with medical research. Subjects who volunteered to participate may have been more self-confident, more knowledgeable and may have been more motivated to participate in their medical care plans than the larger patient population undergoing treatment at this heart failure clinic. All members of the sample population had been through a heart failure training course provided by the clinic's clinical nurse specialist. The resulting homogeneity of the sample may have accounted for the low variation in both the knowledge test and attitude scale scores. Many subjects commented that, inspite of instructional briefings from the investigator, the instruments used to measure heart failure knowledge and attitude were too long and difficult to understand. These concerns may have resulted in less than optimal subject performance and could account for the failure of three subjects to complete the instruments.

Inspite of these limitations the study results yielded useful information for nurses and other health care providers involved with educating heart failure patients. The data suggests that the use of a written knowledge test may help nurses identify and correct patient knowledge deficits. The data also suggest that measuring a patient's willingness to adhere to a prescribed care plan may help nurses identify potential cultural beliefs or values that may be barriers to successful treatment and self-directed care.

Recommendations for further study

Bushnell (1992) and Rich (1995) recognized that knowledge about an illness is only one part in the constellation of factors which lead to a patient's clinical outcome. The

authors noted that compliance, or associated beliefs and attitudes leading to compliance, must play a significant role in a patient's willingness and ability to adhere to personal and health care provider care demands. Although they may act independently, knowledge and attitude may prove to be important in assessing a patient's ability to be an active participant in the treatment of their heart failure. Identifying knowledge deficits and recognizing attitudinal barriers to treatment may help nurses reduce the frequency of hospitalization experienced by this population.

The Shih Heart Failure Knowledge Test was shown to be reliable in a pilot study (Shih, 1994). However, its reliability could not be confirmed in this study population. Simplifying the instrument may improve its reliability, improve acceptability among future study participants and result in better return rates. The Miller Health Attitude Scale was shown to provide data predictive of patient attitudes toward medical care in prior studies (Miller and Johnson, 1982; Miller and Wickoff, 1982). The complexity of the instrument resulted in subject dissatisfaction and less than desirable return rates. Simplifying the instrument or the use of a less complex instrument may result in better subject satisfaction and better subject retention.

This study did not find significant correlations between knowledge, attitude and frequency of hospitalization among this population of heart failure patients. However, the weak correlations that were found between attitude, cardiac functional status, and years of heart failure suggest that statistical significance may be present if studied in a larger, more diverse population of heart failure patients.

Managing Heart Failure Patients in the Air Force Medical System

The health care literature reflects the increasing economic impact of heart failure in the United States. In 1991 the estimated total healthcare costs for heart failure was 38.1 billion dollars (O'Connell, 1994). In 1994 over 2.5 million people were diagnosed with heart failure. The aging US population is adding 428,000 new cases per year, an estimated growth rate of 12 percent (English, 1995). The increasing number of new cases has resulted in increasing numbers of hospital admissions for heart failure; 2 million admissions in 1991 costing more than 23.1 billion dollars (O'Connell, 1994). This data suggests health care costs for managing heart failure patients will continue to rise as the US population ages.

Based upon projected incidence and prevalence rates it can be expected that a significant portion of heart failure patients will be seen in the Air Force medical system as military retirees age. Projected medical costs and admission data for heart failure patients indicates that Air Force medical health care costs will rise at rates proportional to that of the general US population. This means a significant portion of medical dollars will be spent on heart failure patients in future years. If these future costs are to be controlled heart failure patients will need to be identified early and carefully managed to slow disease progression and reduce hospital admission rates.

The advent of Tricare and implementation of managed care programs has placed a greater emphasis on medical cost control and the need for matching resource utilization to patient need. The heart failure population can place a high demand on medical resources if

not carefully managed. These patients would receive the best cost to benefit ratio if they were placed into a case management system. Case management is a clinical system with goals of achieving expected patient outcomes within effective and appropriate timeframes and medical resources (Bower, 1993). Case management reflects three factors; (1) the needs and characteristics of the patient population (2) the actual and projected use of medical resources (3) the goals of the organizations case management system. Case managers work with primary care nurses, ancillary health care personnel and home health care personnel to ensure the patient progresses optimally toward their outcome goals. The use of case management models for patient populations with the potential for high medical resource utilization has proven to be cost effective (McDonagh, 1993). The Air Force Medical System must take a proactive stance in the management of heart failure patients if quality care is to be maintained while long term health care costs are controlled.

This study investigated the relationships between heart failure knowledge, attitude toward adhering to prescribed care and hospitalization frequencies among heart failure patients. The findings suggest that identifying heart failure knowledge deficits and barriers to adherence with prescribed care may be useful in developing patient education and monitoring programs and could help reduce hospital admission rates within this population. Case managers, primary care nurses, social workers and other health care professionals must recognize that the patient's experience, beliefs and values must be assessed and considered in order to develop an individualized plan of care. The patient's willingness to learn about their illness and their willingness to contribute to the health care process is critical to achieving desired outcomes.

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Appendix A

University of Washington School of Nursing Heart Failure Patient Study Protocol

1. Potential study subjects will be screened according to established inclusion-exclusion criteria. Subjects meeting the criteria will be briefed on the purpose of this study, participant requirements, and offered a copy of the consent form for signature.

Inclusion criteria:

- (1) patients with documented heart failure, with ejection fractions calculated as less than 40 percent
- (2) New York Heart Association (NYHA) Failure Class I through IV
- (3) able to read and write in English.

Exclusion criteria:

- (1) diagnosis of chronic pulmonary disease
- (2) diagnosis of chronic renal failure
- (3) cognitive deficits which would preclude self-management of symptoms or completion of data collection forms.

2. Each participant will receive or will have received initial educational instruction on heart failure as offered by hospital discharge planners, personal physicians or their staff or a formal heart failure class from the heart failure treatment center they attend.

3. Study participants will have their name, home address and phone number recorded in a confidential file maintained at each medical facility during initial data collection. Each subject will be assigned a random two digit study identification number. This number will be placed on each test and survey completed by the subject. References to study subjects will be through use of the assigned identification number to assure their anonymity.

4. Study participants will complete the measurement tools while at the treatment center and return it to the investigator or research assistant.

5. A packet containing the Demographic, Knowledge and Attitude measurement instruments will be provided to each participant. The investigator or research assistant will:

- a. Review the contents of the packet.
- b. Review directions for completing the measurement tools
- c. Insure the participant has a pencil or pen available
- d. Insure the participant understands that they may be asked to complete second knowledge test in two weeks.
- e. Verify all measurement tools are collected and seal the packet
- f. Store the packet in the pre-designated site.

6. Randomly selected subjects will receive a second knowledge test two weeks after completing the initial data collection packet. These subjects will be identified by comparing their study identification number to a list of number selected using a random numbers table. Test identification data will include the subjects ID number, the facility ID number and the date the test was completed. A packet containing a cover letter, the knowledge test and a stamped return envelope will mailed to the selected subjects.

7. Data on frequency of hospitalization for heart failure related symptoms will be collected four months from subject completion of the knowledge test and health survey packet. Each subject will have a hospitalization self-report form mailed to them along with a return addressed, stamped envelope. The form will include instructions to complete and return the form as soon as possible. Data generated from the form will include; Name of admission hospital, symptoms prompting admission, and length of stay. Subjects will be allowed seven days to answer and return the form. At the end of seven days the investigator will send a reminder card. At two weeks the investigator will contact the subject by phone, request compliance and send another self-report form. This process will continue until at least 60 percent of self-report forms have been returned.

8. If questions arise about data collection, or subjects are unable or unwilling to continue in the study research assistants may reach the investigator at the following numbers:

Home: 206-672-7851
School of Nursing: 543- 8650.

Les Erickson, BSN, MA, RN
Graduate Student, Department of Physiologic Nursing
University of Washington

Les Erickson is a regularly enrolled student in the Physiologic Nursing Department

Susanna Cunningham, PhD, RN
Associate Professor, Physiologic Nursing

Laurie Soine, MN, RN
Cardiothoracic Transplant
Clinical Nurse Specialist

Appendix B

University of Washington School of Nursing
Heart Failure Knowledge Assessment
(Shih, 1994)

This is the second of three questionnaires you will be asked to complete as part of this study on heart failure patients. This questionnaire will measure how much you currently know about heart failure and self care practices at home.

Directions: Read each question carefully. Circle your answer to the question from the choices to the immediate right of the question. T is for True, F is for False, DK is for Don't Know. Each question may have more than one answer, so read carefully. Select the answer or answers that most closely matches the information you know. Please answer every question.

	<u>T</u> <u>r</u> <u>e</u>	<u>F</u> <u>a</u> <u>l</u> <u>s</u> <u>e</u>	<u>D</u> <u>o</u> <u>n</u> <u>'</u> <u>t</u> <u>K</u> <u>n</u> <u>o</u> <u>w</u>
1. The following may be symptoms of heart failure.			
A. difficulty breathing (shortness of breath)	T	F	DK
B. increased appetite	T	F	DK
C. fatigue	T	F	DK
D. headache	T	F	DK
2. The following may be signs of heart failure.			
A. skin rash	T	F	DK
B. swollen ankles and legs	T	F	DK
C. increased blood pressure	T	F	DK
D. fever	T	F	DK
3. If my body weight increased by 5 lbs. over 3 days,			
A. I would eat less to control my body weight	T	F	DK
B. I would continue to observe for two more days	T	F	DK
C. I would call my doctor or my nurse specialist	T	F	DK
D. I would stop drinking until my weight decreased	T	F	DK
4. If I noticed a persistent cough and increasing shortness of breath, I would,			
A. rest more to save energy	T	F	DK
B. drink more water and take Vitamin C	T	F	DK
C. take an over-the-counter medication to relieve the cough	T	F	DK
D. call my doctor	T	F	DK

Appendix B

5. To determine if I am retaining water I would:

- | | | | |
|---------------------------------------|---|---|----|
| A. weigh any time of the day I please | T | F | DK |
| B. weigh at the same every day | T | F | DK |
| C. weigh once a week | T | F | DK |
| D. weigh only if I feel bad | T | F | DK |

6. I take vasodilators because they:

- | | | | |
|---|---|---|----|
| A. dilate my trachea (airway) and help me breathe | T | F | DK |
| B. reduce the pressure that my heart must pump against | T | F | DK |
| C. improve kidney function and decrease my urine output | T | F | DK |
| D. help prevent upper respiratory infections | T | F | DK |

7. If after taking a medication I feel dizzy or very lightheaded, I would:

- | | | | |
|---|---|---|----|
| A. call and report this to my doctor | T | F | DK |
| B. reduce the dose and frequency of the medication | T | F | DK |
| C. sit down and elevate my feet | T | F | DK |
| D. keep taking the medicine, because it is ordered by my doctor | T | F | DK |

8. If I forget to take my diuretics (water pills), I may experience:

- | | | | |
|--------------------------|---|---|----|
| A. dizziness | T | F | DK |
| B. ankle or leg swelling | T | F | DK |
| C. shortness of breath | T | F | DK |
| D. fever | T | F | DK |

9. For patients with heart failure, blood tests are often performed for the following purposes:

- | | | | |
|---|---|---|----|
| A. to check kidney function | T | F | DK |
| B. to check blood levels of medications | T | F | DK |
| C. to check energy levels | T | F | DK |
| D. to check sodium and potassium level | T | F | DK |

Appendix B

10. I must watch my intake of sodium to:
- | | | | |
|-------------------------------------|---|---|----|
| A. prevent retention of fluid | T | F | DK |
| B. prevent the elevation of Calcium | T | F | DK |
| C. reduce my muscle mass | T | F | DK |
| D. lower my cholesterol level | T | F | DK |
11. To decrease the sodium in my diet I would:
- | | | | |
|--|---|---|----|
| A. avoid using table salt | T | F | DK |
| B. eat fresh food instead of pre-packed food | T | F | DK |
| C. use soy-sauce instead of table salt | T | F | DK |
| D. eat only in fast food restaurants | T | F | DK |
12. Which of the following are low in sodium?
- | | | | |
|-----------------|---|---|----|
| A. potato chips | T | F | DK |
| B. baked potato | T | F | DK |
| C. canned beans | T | F | DK |
| D. fresh meat | T | F | DK |
13. I should choose my activity level according to:
- | | | | |
|--|---|---|----|
| A. the guidelines in exercise books | T | F | DK |
| B. my energy level | T | F | DK |
| C. comments from other patients with heart failure | T | F | DK |
| D. discussions with my doctor | T | F | DK |
14. The following may be signs of worsening heart failure:
- | | | | |
|----------------------------|---|---|----|
| A. increased energy levels | T | F | DK |
| B. fatigue | T | F | DK |
| C. shortness of breath | T | F | DK |
| D. increased urination | T | F | DK |
15. While exercising, I begin to experience chest pain and my heart begins racing, this may indicate:
- | | | | |
|--|---|---|----|
| A. I have achieved the goal of exercise | T | F | DK |
| B. I am over-exerting myself | T | F | DK |
| C. My medications are not working | T | F | DK |
| D. I need to discuss this situation with my doctor | T | F | DK |

Appendix C

Miller Health Attitude Scale

The purpose of these scales is to measure the value of certain activities or actions to different people by having them choose between descriptive words. You have heart failure and are being asked to follow a medical regimen that includes prescriptions for: diet, physical activity, smoking, medication and stress. As you complete this scale, please make your judgements on the basis of what the activity listed means to you.

Directions: This scale has six pages, on each page you will find an activity and beneath it a set of scales. Look at each pair of words and place an X in the space which best describes how you feel about the activity. If any activity does not apply, such as smoking, skip that section. If you have questions about this test please ask.

Example:

Keeping Doctors Appointment

1. Foolish : : : : : : : : Wise

2. Valuable : : : : : : : : Worthless

Appendix C

Taking Medications

- | | | |
|-----------------|-----------------|--------------|
| 1. Successful | : : : : : : : : | Unsuccessful |
| 2. Valuable | : : : : : : : : | Worthless |
| 3. Harmful | : : : : : : : : | Helpful |
| 4. Passive | : : : : : : : : | Alert |
| 5. Difficult | : : : : : : : : | Easy |
| 6. Good | : : : : : : : : | Bad |
| 7. Rigid | : : : : : : : : | Flexible |
| 8. Healthy | : : : : : : : : | Unhealthy |
| 9. Sharp | : : : : : : : : | Blunt |
| 10. Unnecessary | : : : : : : : : | Essential |
| 11. Aggravating | : : : : : : : : | Soothing |
| 12. Fair | : : : : : : : : | Unfair |

Appendix C

Quitting Smoking

- | | | |
|-----------------|---------|--------------|
| 1. Successful | :_____: | Unsuccessful |
| 2. Valuable | :_____: | Worthless |
| 3. Harmful | :_____: | Helpful |
| 4. Passive | :_____: | Alert |
| 5. Difficult | :_____: | Easy |
| 6. Good | :_____: | Bad |
| 7. Rigid | :_____: | Flexible |
| 8. Healthy | :_____: | Unhealthy |
| 9. Sharp | :_____: | Blunt |
| 10. Unnecessary | :_____: | Essential |
| 11. Aggravating | :_____: | Soothing |
| 12. Fair | :_____: | Unfair |

Appendix D

5. Please indicate your activity level by circling the response that best fits you:

- A. Ordinary physical activity **does not** cause me to have fatigue, heart palpitations, shortness of breath or chest pain.
- B. I am comfortable at rest, but physical activity (yard work, housework, climbing stairs or walking long distances) causes me to have one or more of the following; fatigue, heart palpitations, shortness of breath, or chest pain.
- C. I am comfortable at rest, but simple activity (short walks, bathing, cooking) causes me to have one or more of the following; fatigue, heart palpitations, shortness of breath, chest pain.
- D. I experience fatigue, palpitations, shortness of breath or chest pains with any kind of activity. I spend most of my time resting.

6. How many years have you had heart failure?

_____ years

7. Have you ever received any information about heart failure (circle one):

1. Yes 2. No

8. If you received information about heart failure when was it **first** presented?

- 1. In-hospital information from a nurse, doctor, or other health care professional
- 2. Out of hospital information from your personal doctor or their staff
- 3. Classroom instruction at your hospital or clinic
- 4. Other (please specify): _____

Appendix E

University of Washington School of Nursing
Heart Failure Survey Hospitalization Self-Report Form

Dear study participant,

I hope this letter finds you well. This form is a part of the heart failure study in which you agreed to participate. The information being collected is about the number of times you have been hospitalized for heart failure symptoms over the last four months. Please complete the following questions and return this form as soon as possible. Thank you.

Your study ID number _____

Directions: Please complete one box for each hospitalization you experienced over the last four months. If not hospitalized write "NONE" in the first box.

Hospital name	Days spent in hospital	Admission symptoms (Circle each that apply) weight gain over 4 lbs irregular heart rate persistent wet cough low or high potassium level shortness of breath fatigue chest pain increased blood pressure increased weakness excessive swelling low blood pressure
Hospital name	Days spent in hospital	Admission symptoms (Circle each that apply) weight gain over 4 lbs irregular heart rate persistent wet cough low or high potassium level shortness of breath fatigue chest pain increased blood pressure increased weakness excessive swelling low blood pressure

Hospital name	Days spent in hospital	Admission symptoms (Circle each that apply) weight gain over 4 lbs irregular heart rate persistent wet cough low or high potassium level shortness of breath fatigue chest pain increased blood pressure increased weakness excessive swelling low blood pressure
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