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Nursing Knowledge of Heart Failure


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Abstract

Nursing Knowledge of Heart Failure

Beth Ann White

Heart failure is a constellation of signs and symptoms reflecting a physiologic change in the hearts ability to keep up with demand.  Heart failure is considered a global pandemic and is a complex disease that oftentimes is progressive.  Heart failure is often associated with underlying coronary atherosclerosis, and its associated risks, including hypertension, diabetes mellitus, metabolic syndrome and dyslipidemia.  To slow the progression and improve quality of life patients should be educated about the disease and in most health care settings nurses provide this education.  However, nurses may lack sufficient knowledge of the processes that lead to heart failure.  The purpose of this study was to determine the level of understanding nurses possess regarding heart failure, and whether additional evidence-based education regarding heart failure, sufficiently improves the nurses' knowledge of heart failure.  A pre/posttest design using a convenience sample of nurses at Marshall Health was used in this study.  All nurses at Marshall Health cardiology and internal medicine were included without exclusion of hours worked or nursing degree.  By using Rogers Diffusion of Innovations theory, nurses received heart failure education consisting of a video approximately 60 minutes long created by Qualidigm. Participants took a pretest just prior to the education video and one month later a posttest.  The results showed that heart failure knowledge did increase from pre to posttest, however it was not significant ($p = 0.2$).

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Nursing Knowledge of Heart Failure

**Background and Significance of Problem**

**Epidemiology of the Problem**

Heart failure is prevalent throughout the entire world (Ambrosy et al., 2014). It is estimated that over 23 million individuals in the world are living with heart failure (Bui, Horwich, & Fonarow, 2011). Data on heart failure in many countries is limited or nonexistent. However, the incidence of heart failure is expected to increase (Bui et al., 2011).

According to Mozaffarian et al., (2015) in 2011 heart failure was mentioned as a primary or secondary cause of death on 284,388 death certificates, which is approximately 1 of every 9 deaths. Heart failure as the main cause of death accounted for 58,309 of the 284, 388 deaths. Percentage of deaths from heart failure remained stable between 1995 and 2011 (Mozaffarian et al., 2015).

It is estimated that 5.7 million people in the United States had heart failure between 2009 and 2012 (Mozaffarian et al., 2015). Heart failure is estimated to increase by an addition 3 million individuals from 2010 to 2030 (Heidenreich et al., 2011).

It is reported by the Center for Disease Control and Prevention (CDC) (2015), West Virginia has a higher rate of deaths from heart failure than the national average. Heart failure deaths in 2008-2010 in West Virginia were 121.8 per 100,000 and 85.4 per 100,000 in the United States. Hospitalizations for heart failure in West Virginia in 2008-2010 were 20.6 per 100,000and patients who were discharged home in 2008-2010 with a diagnosis of heart failure were 70.9 per 100,000 in West Virginia (Centers for Disease control and Prevention [CDC], 2015).

**Cost/ Burden of Heart Failure**

Over $40 billion was spent for heart failure in the United states in 2012 (Go et al., 2013). The direct medical cost (costs of medical services utilized) for heart failure in 2010 was $24.7 billion and expected to increase to $77.7 billion in 2030 which is a 215% increase.  The indirect cost (lost days of productivity by those too sick to work and those still working, lost productivity at home, and premature mortality) is expected to increase by 80% from 2010-2030.  In 2010 the indirect cost of heart failure was $9.7 billion and expected to increase to $17.4 billion in 2030 (Heidenreich et al., 2011).

**Problem Statement**

According to several studies nurses' knowledge is lacking in heart failure education (Albert et al., 2002; Delaney, Apostolidis, Lachapelle, & Fortinsky, 2011;Fowler, 2012; Goodlin, Trupp, Bernhardt, Grady, & Dracup, 2007; Hart, Spiva, & Kimble, 2011; Kalogirou, Lambrinou, Middleton, & Sourtzi, 2012; Kalowes et al., 2011; Sterne, Grossman, Migliardi, & Swallow, 2014; Strong, Lyon, Stern, Vavasour, & Milne, 2014; Washburn, Hornberger, Klutman, & Skinner, 2005; Willette, Surrells, Davis, & Bush, 2007).  Heart failure is a complicated disease (Yancy et al., 2013) and affects many individuals (Ambrosy et al., 2014).  Therefore, nurses need to understand heart failure, in order to implement supportive and effective programs that will benefit their patients (Willette et al., 2007).  Nurses' knowledge, related to evidence based practice or use of the best evidence available in making decisions, has been found to be inadequate (Melnyk et al., 2004).  Working with multiple professions, knowledge and confidence increased in one study of students attending a one day educational program (Lewis, 2011).

Having nurses educated in heart failure is important, yet nurses have reported barriers to participating in continuing education.  These barriers might include money, awareness of programs, alternative commitments, lack of encouragement from management, staff shortages

and lack of opportunities (Gallagher, 2007).  Nurses have also reported a lack of support from

supervisors both financially and related to time off from work for continuing education (Beatty,

2001).

## Literature Review and Synthesis

### Pathophysiology of Heart Failure

Rodeheffer et al. (2013), state  "Heart failure has been defined as the pathophysiologic

state in which an abnormality of cardiac function prevents the heart from pumping blood at a rate

commensurate with metabolic requirements or allows it to do so only when ventricular filling

pressures are excessively increased" (p. 858).  According to the 2013 ACCF/AHA Heart Failure

Guidelines, heart failure is a "complex clinical syndrome that results from any structural or

functional impairment of ventricular filling or ejection of blood" (Yancy et al., 2013, p. 12).

Cardiomyopathy or Left Ventricular (LV) dysfunctions is a way to describe structural or

functional abnormalities of the heart, and are not the same as heart failure syndrome.  Heart

failure syndrome is due to a disorder of any of the following: pericardium, myocardium,

endocardium, heart valves, or great vessels (Yancy et al., 2013).

### Types of Heart Failure

Heart failure is divided into two types: heart failure with reduced ejection fraction

(HFrEF), also known as systolic heart failure and heart failure with preserved EF (HFpEF), also

known as diastolic heart failure (Rodeheffer & Redfield, 2013).  The two types are

approximately equal in prevalence with heart failure preserved ejection fraction diagnosis

ranging from 40%-71% of the time with an average of 50% (Fonarow et al., 2007).

The ACCF/AHA 2013 Heart Failure Guidelines define heart failure with reduced ejection

fraction as a clinical diagnosis of heart failure with an ejection fraction of $\leq$40%.  According to

the guidelines, heart failure with preserved ejection fraction is more difficult to diagnosis

because noncardiac causes of symptoms also have to be excluded.  Heart failure symptoms with

an ejection fraction of ≥50% is known as heart failure with preserved ejection fraction.  Heart

failure with preserved ejection fraction (HFpEF) may be further classified into two categories:

HFpEF borderline and HFpEF improved.

Patients with an ejection fraction of 41% to 49% are classified as HFpEF borderline, and

bear more similarity to the HFpEF patients, than the HFrEF patients.  HFpEF improved are those

heart failure patients with an ejection fraction of >40%.  It is believed that patients with HFpEF

improved are perhaps different from both classification of HFpEF and HFrEF.  Patients with

HFpEF improved previously having a reduced ejection fraction ≤40% and have seen an

improvement or recovery (Yancy et al., 2013).

Heart failure is also classified into stages.  For years, the New York Heart Association

(NYHA) Functional Classification has been used. With the NYHA Functional Classification

only symptoms and functional/physical activity are described.  The new ACCF/AHA heart

failure guidelines suggest using a system rating from A-D risk factors, cardiac abnormalities and

symptoms.

Classification A signifies a patient who is at high risk of developing heart failure or heart

failure symptoms.  Classification B signifies a patient who does not have any heart failure

symptoms, but has structural heart disease.  Classification C signifies a patient who has had

symptoms of heart failure and structural heart disease.  Classification D signifies a patient who

has developed severe symptoms and management has been maximized (Ammar et al., 2007).

**Contributing Factors to Heart Failure**

According to the ACC/AHA heart failure guidelines, an individual is at risk for heart failure if he/she has hypertension, diabetes, metabolic syndrome and or atherosclerotic disease. The onset of heart failure can be delayed if these comorbidities are diagnosed and treated early with good control of the disease.  Other causes of heart failure syndrome include structural cardiac diseases such as cardiomyopathy, including dilated cardiomyopathies, familial cardiomyopathy and tachycardia-induced cardiomyopathy (Yancy et al., 2013).

While some cardiomyopathies may be genetic, patients may increase their risk for cardiomyopathy through behavioral choices thus increasing the risk of developing heart failure. For example, chronic use of alcohol and/or cocaine increases one's risk.  Other toxins may include chronic exposure to: ephedra, cobalt, anabolic steroids, chloroquine, clozapine, amphetamine, methylphenidate, iron overload, catecholamines, and some cancer treatments such as cytotoxic antineoplastic drugs (Yancy et al., 2013).

Heart failure can also be induced by inflammation (myocarditis), or as a result of concomitant infections such as Chagas' disease, acquired immunodeficiency syndrome, or Rheumatologic disorders (Yancy et al., 2013).  Other causes include Amyloidosis, cardiac sarcoidosis, Takotsubo (stress cardiomyopathy), Pregnancy (peripartum cardiomyopathy) and child birth (Yancy et al., 2013).

**Signs and Symptoms of Heart Failure and Physical Exam**

A careful history and physical examination is just as important, or more important, than advanced imaging in diagnosing or treating heart failure.  When assessing an individual it is important to obtain a family history, duration of illness, severity and triggers of symptoms, weight loss/gain or anorexia, edema, palpitations, stroke symptoms, dyspnea symptoms, medications and medication/diet adherence (Yancy et al., 2013).  Physical examination should

include: body mass index, blood pressure, pulse, presence of orthostasis, presence and degree of jugular vein distention, heart sounds (3$^{rd}$ or 4$^{th}$), size and location of point of maximal impulse, palpation of right ventricular heave, pulmonary status, presence of ascites or hepatomegaly, edema (especially peripheral) and lower extremity temperature (Januzzi & Mann, 2015). Heart failure patients may present as asymptomatic. Heart failure symptoms of a decompensated patient can include: exertional dyspnea, fatigue, orthopnea, paroxysmal nocturnal dyspnea, peripheral edema, ascites, tachycardia, and weight gain (Borlaug, 2013).

**Role of the Nurse as Educator**

Nurses are a key provider for heart failure education and coordination of care (Washburn, Hornberger, Klutman, & Skinner, 2005) and, in most settings provide the majority of patient education (Albert et al., 2002). The Joint Commission on Accreditation of Health Organizations, the National Committee on Quality Assurance and employers all endorse the importance of the nurse's role in patient education (Saarmann, Daugherty, & Riegel, 2000). In the hospital setting nurses have been found to be the primary source of discharge instructions (Laker, 2011).

To better help the patient, it is not only important to educate them but also to know the stages of change and motivation (Saarmann et al., 2000). Ewardson (2007) suggest that roles of nurses should also include developing evidence based patient education protocols. These protocols would focus on documenting education, timing and the outcome of the teaching. By educating the patient about medications, diet, and activity interventions may take place sooner and may decrease hospitalizations and worsening of quality of life for the patient (Willette, Surrells, Davis, & Bush, 2007). A study by Dickinson & Riegel (2008) suggested that many heart failure patients learned self-care skills from family and friends rather than by healthcare providers.

Several studies have been conducted examining the role of patient education (Jaarsma et al., 2000; Kutzleb & Reiner, 2006 & Dickinson & Riegel, 2008).  Jaarsma et al. (2000) showed that patient self-care behavior was significantly improved after receiving supplemental instruction from a supportive educational nursing intervention program.  They found that self-care behaviors were greater in heart failure patients at 1 and 3 months for those in the experimental group.  Patients in the experimental group received a follow up phone call from a nurse within 1 week of discharge followed by a home visit within 10 days of discharge.  Both the control group and experimental group were given a list of possible signs and symptoms, medications, diet pamphlet and booklet about fluid restrictions (Jaarsma et al., 2000).  In another study by Kutzleb & Reiner (2006), quality of life (QOL) paralleled improved self-management in a nurse-directed patient education group.

**Knowledge of the Nurse**

A literature review was undertaken to determine nurses' knowledge of heart failure and to see if nurses' knowledge increased after an educational opportunity.  The literature search revealed 11 studies examining nursing knowledge related to heart failure. Of these studies, seven used a 20 item true or false nurses' knowledge of heart failure self-management education principles survey, created by Albert et al. (2002), with no educational opportunity or posttest (Albert et al., 2002; Washburn et al., 2005; Willette, Surrells, Davis, & Bush, 2007; Delaney, Apostolidis, Lachapelle, & Fortinsky, 2011; Kalogirou, Lambrinou, Middleton, & Sourtzi, 2012; Kalowes et al., 2011 & Mahramus et al., 2013).  Two studies also used Alberts nurses' knowledge of heart failure self-management education principles survey, but also provided an educational opportunity and a posttest (Fowler, 2012 & Sterne, Grossman, Migliardi, & Swallow, 2014).  One study, (Hart, Spiva & Kimble, 2011) used Alberts nurses' knowledge of

heart failure self-management education principles survey, comparing the dichotomously

(true/false) scored survey to a Lickert scale (scored as options 1-5) scored version with no

education or posttest.  One study used the Advance Heart Failure Clinical Competence Survey

with no educational opportunity or posttest (Goodlin, Trupp, Bernhardt, Grady, & Dracup,

2007).  All of the studies concluded that nurses are lacking in heart failure knowledge.

All of the seven studies using the nurses' knowledge of heart failure self-management

education principles survey with no education or posttest showed that nurses were deficient in

heart failure knowledge.  These studies also showed that the same three questions related to dry

or ideal weight for daily monitoring, nonsymptomatic low blood pressure and short-term

dizziness when rising, were consistently answered incorrectly by most in all the studies (Albert

et al., 2002; Washburn et al., 2005; Willette et al., 2007; Kalogirou et al., 2012; Kalowes et al.,

2011; Mahramus et al., 2013 & Delaney et al., 2011).  Nurses consistently missing the same

questions, (relating to dry or ideal weight for daily monitoring, nonsymptomatic low blood

pressure and short-term dizziness) suggest either lack of education in the particular area, or

poorly written questions.  Of these seven studies, two studies examined differences in heart

failure knowledge between nursing units (Kalogirou et al., 2012 & Kalowes et al., 2011).

Kalogirou et al., (2012) studied intensive care unit (ICU) nurses, cardiology unit nurses and

internal medicine unit nurses and found that ICU nurses scored significantly higher than the

other two groups.  While Kalowes et al. (2011) studied telemetry nurses and floor nurses and did

not find a significant difference between the groups.  Two other studies (Albert et al., 2002 &

Mahramus et al., 2013) found a difference between scores of Registered Nurses (RN) and

Licensed Practical Nurses (LPN) with RN's scoring higher.  Kalowes et al. (2011) and Delaney

et al. (2011) found no difference in scores between educational levels.

Fowler (2012) and Sterne, Grossman, Migliardi & Swallow (2014) used Albert's Nurses' Knowledge of Heart Failure Self-Management Education Principles Survey as a pre and post survey with an education opportunity about heart failure between surveys. Both of the previous studies showed that nurses' knowledge of heart failure was lacking when given the pretest and that similar questions were missed consistently as seen in other studies.

In Fowler's study, a posttest was administered to those attending one year after the half day heart failure education, but only received a 25% response, therefore results could not be used on posttest scores (Fowler, 2012). The poor response may have been due to the long interval between the educational opportunity and the posttest. Alternatively, Stern et al. (2014) studied nurses given The Nurses' Knowledge of Heart Failure Self-Management Educational Principles survey, both as a pre and posttest, immediately following a 30 minute educational power point presentation. The presentation was comprised of reviews of the Joint Commissions Heart Failure guidelines and the American Heart Association's (AHA) "Get with the Guidelines" (Sterne et al., 2014). Also examined was the 30-day hospital readmission rate at three months prior to the pretest and three months after the posttest was given. Results demonstrated there was no significant difference of pre and post test scores based on education level (diploma, associate, bachelorette, masters, or doctorate). However; a significant difference of increased scores by nurses was seen in pretest scores as compared to posttest scores. The 30-day hospital readmission rates decreased from 25.4% pretest to 9% posttest (Sterne et al., 2014).

A study testing the psychometrics of the Nurses' Knowledge of Heart Failure Self-Management Education Principals survey found similar results as in previous studies (Hart, Spiva, & Kimble, 2011). The same three questions (relating to dry or ideal weight for daily monitoring, nonsymptomatic low blood pressure and short-term dizziness when rising) were

answered incorrectly by a majority of nurses and nurses were found to lack in heart failure knowledge (Hart et al., 2011).

Goodlin et al. (2007) measured self-assessment of competency and knowledge of heart failure using the "Advanced Heart Failure Clinical Competence Survey". The self-assessment of competency "experts" (nurses with > 1 year experience) rated themselves higher than "novice" (hospice) nurses. A significant difference was also seen in knowledge scores with "expert" nurses scoring higher than "novice" nurses (Goodlin, Trupp, Bernhardt, Grady, & Dracup, 2007).

**Tools to measure Nurses Knowledge**

Three tools were found to assess nurses' knowledge related to heart failure: 1) Albert et al. (2002) Nurses' Knowledge of Heart Failure Education Principles Survey, 2) Goodlin et al. (2007) Advanced Heart Failure Clinical Competency Survey and 3) Heart Failure Video Health Care Professional pre/posttest by Qualidigm.

Nurses' Knowledge of Heart Failure Education Principles Survey is a 20 item true/false survey, reviewed by expert heart failure nurses and patient education specialists (Albert et al., 2002). The survey, revised in 2012 (N. Albert, personal communication, April 7, 2015) demonstrated a test-retest reliability of 100% (onadeo.com).

Hart et al. (2011) did a study comparing the original unrevised Nurses Knowledge of Heart Failure Education Principles Survey dichotomously (true/false) scored to a Lickert scale version (options 1-5). It was found that the Likert scale version was stronger psychometrically with better internal consistency reliability and that test-retest reliability approached stability after the three frequently missed questions were removed. Test-retest reliability was not conducted on the dichotomously sored survey because of the low internal consistency reliability (Hart et al., 2011).

The Advanced Heart Failure Clinical Competence Survey is a tool to measure self-assessed competency and knowledge of heart failure (Goodlin et al., 2007). The survey consists of 54 questions, 11 multiple choice and 43 true/false. The test was able to discriminate between "expert" nurses, those who had greater than 1 year experience in heart failure and "novice" those with less than 1 year experience. There was no mention of test-retest reliability (Goodlin et al., 2007).

Qualidigm, a healthcare consulting and research company based in Connecticut serves both the public and private sectors. This company, in collaboration with the Connecticut hospitals, healthcare professionals and physicians (Community of Care) created a heart failure video to help educate providers and patients. The heart failure video for providers has a both a pre and posttest. The test has been examined by the community of care, but it does not have statistical data available (Qualidigm website, n.d.).

**Summary of Literature**

There have been multiple studies examing nurses' knowledge of heart failure, all demonstrate that nursing knowledge is lacking with respect to heart failure education (Albert et al., 2002; Washburn et al., 2005; Willette et al., 2007; Delaney et al., 2011; Kalogirou et al., 2012; Kalowes et al., 2011; Mahramus et al., 2013; Fowler, 2012; Sterne et al., 2014; Hart et al., 2011; Goodlin et al., 2007). Patient education is part of the nurse's role (Saarmann et al., 2000). Management of heart failure is complex, and the patient must understand how to become involved in his/her daily self-care including symptoms, weight monitoring, diet intake, including fluid and sodium, physical activity and medications (Yancy et al., 2013). Studies have shown that, with proper education, hospitalization admissions and time spent in the hospital are decreased. Education also increases knowledge of heart failure, improved self-monitoring,

adherence to medications and diet restrictions (Yancy et al., 2013).  The role of the nurse in

educating patients about heart failure is important and thus, their knowledge of heart failure is

critical.

## Project

**Purpose/Significance of Proposed Project**

Since nurses have been found lacking heart failure knowledge (Albert, 2002) and are the

main providers of education to patients (Washburn et al., 2005), this project focused on

providing nurses with heart failure education.  Marshall Health provides educational

opportunities for nurses through an online program called "Health streams".  However, they do

not provide any regular scheduled time for live educational opportunities during regular working

hours.  This study provided the opportunity for convenient education on an important topic

relevant to the practice of cardiology and internal medicine.

The evidence based heart failure education was provided while nurses were at work and

at no charge, decreasing barriers to continuing education.  Nurses were provided continuing

education credits provided through Cabell Huntington Hospital (A. Crisp, personal

communication, August 18, 2015).   The nurses first took a pretest concerning their knowledge

of heart failure, then watch a 60 minute video on heart failure. One month later at their regularly

scheduled staff meeting, the nurses completed a posttest to assess knowledge of heart failure.

The expectation of the project leader was, that by participating in the education opportunity

nurses would have a greater knowledge of heart failure and be better prepared to educate heart

failure patients.

**Theoretical Framework**

Rogers (1995) states, "diffusion is a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system" (Rogers, 1995, p. 6).  He uses the word diffusion for new ideas whether they are planned or spontaneous.  There are four components to Rogers' Diffusion of Innovations Theory: innovation, communication, time and a social system.  He believes new ideas are diffused and either accepted or rejected, causing a change in the social system (Rogers, 1995).

Rogers' Theory of Diffusion of Innovations was used in this study by applying all four components of the theory.  According to Rogers an innovation is an idea or practice which is seen as new by an individual.  New is not necessarily a measurement of time but can be an idea which has not been adopted or an attitude formed about the idea.  There are five characteristics to an innovation: relative advantage, compatibility, complexity, trialability, and observability.  Relative advantage is how an idea is viewed as superior.  Compatibility is how an idea is congruent with preexisting values.  Complexity refers to how difficult the idea is to understand.  Trialability is defined as how the idea can have a limited experimental period.  The observability is just how visible the idea is to others (Rogers, 1995).

The innovation in this project was the heart failure education being presented.  The relative advantage was convenience with education being presented at work and on work time.  In this project compatibility was that nurses help take care of heart failure patients so learning new information may be seen as a need and Marshall Health is committed to excellence.  The video pre/posttest is presented at a basic level therefore complexity should have been viewed as easy to understand.  Trialability is that the educational opportunity is a onetime trial for the nurses.  Observability should be high since nurses are receiving education as a group and later they work closely together making it easy to see the implementation of others.

Communication channel represents how the idea gets from an individual to another individual or group. Rogers describes a mass media approach and an interpersonal approach as channels. He believes a more effective channel is the interpersonal channel for it places individuals together with some common ground (Rogers, 1995). The common ground in this study was that information was brought to the department of nurses by a nurse practitioner who has worked at the facility even though the presentation will be a video presented by a physician (cardiologist).

Time has three categories: 1) innovation-decision process, 2) innovativeness and adopter categories and 3) rate of adoption. Innovation-decision process is the concept of an idea passing from first knowledge (exposure) to either adoption of the idea, or rejection. Innovativeness and adoption is the comparison of how late the idea is accepted by. Rate of adoption refers to how many adopt the idea (Rogers, 1995). With this study, the focus was on innovation-decision process. In this process, time is measured from the nurses' first exposure to the heart failure education, ultimately forming an attitude and either accepting or rejecting the idea. The implementation of the idea in this project was the use of the heart failure education received by nurses to have a better understanding and pass the information or knowledge along to patients.

Rogers believes in a social system. A structure exists, and while not everyone is identical in behavior, it is an interrelated unit (Rogers, 1995). The social system was a group of nurses with first line contact with heart failure patients which is how they are interrelated. Types of educational degrees varied in this group from a Licensed Practical Nurse to doctorates of nursing. Also, the social system was looked at as a large system consisting of the managers and nurse practitioner who have created the educational opportunity with the nurses.

**Project Design**

This study was designed to evaluate nurses' heart failure knowledge, using a convenience sample. The design of the study included a pretest, heart failure educational intervention video and a post test. The study intervention was provided at Marshall Health in Huntington, West Virginia. Given the resource constraints of this project (time, personnel and finance) it was attempted to recruit 100% of the nurses between February and March 2016 from this location.

**Population**

A convenience sample of nurses working at Marshall Health cardiology and internal medicine offices were included. The sample included all part time and full time nurses working in the cardiology and internal medicine offices, whether they were Licensed Practical Nurse (LPN), Registered Nurse (RN) with a diploma degree, Associate Degree (ADN), Bachelor (BSN), Master of Science (MSN), Doctorate of Nursing (DNP) or Doctorate of Philosophy in nursing (PhD). Both males and females were included in the study.

**Evidence Based Project/Intervention Plan**

Study approval was obtained from department chairs and managers at Marshall Health (see Appendix A). Permission from both West Virginia University (WVU) and Marshall University Institutional Review Boards (IRB) was obtained. The nurses were given an IRB approved consent form (see Appendix B) describing the study including the purpose, procedures, risks and/or benefits of the study.

At the regularly scheduled nurses' staff meeting (which is monthly) subjects were invited to participate in the study. There were two different scheduled meetings; one for cardiology staff and the other for internal medicine staff and each was told about the others meeting in case they could not attend their regularly scheduled department meeting. Also, a makeup day for nurses who were unable to attend during their regularly scheduled staff meeting was offered, however

no one accepted the opportunity.  The study was explained and the consent form was signed at

that time.  The subjects were given a copy of the consent form.   The nurses completed the 27

item pretest (see Appendix C) which consisted of demographic questions and 18 multiple choice

questions.  Thirty minutes was given to complete the pretest and nurses were supervised during

testing to decrease the risk of collaboration.  Immediately following the pretest the nurses

watched an educational video on heart failure education provided by Qualidigm which had

previously been funded by the Center for Medicare and Medicaid Services.  The video was

approximately 60 minutes of evidence based education on heart failure.  Following the

educational video there was an opportunity for questions and answers.  The nurses received

continuing education credits through Cabell Huntington Hospital for attending the educational

video and pre/posttest.

One month after the educational video, during the regular scheduled staff meeting, the

subjects were brought together again for a posttest (see Appendix D).  The posttest consisted of

the same questions as the pretest: eight demographic questions, one question pertaining to online

refreshers and 18 multiple choice questions.  Thirty minutes was given for subjects to complete

the posttest and once again the staff was supervised.  The subjects were given a consent form and

there was one at the testing site if needed for referencing.

**Research question**

What is the heart failure knowledge of nurses at a university outpatient clinic and does it

increase after a 60 minute evidence based Heart Failure education video and is this knowledge

retained after one month?

**Timeline/Project Phases**

Organization of subject packets including consent forms and pre/posttest were created after notification of IRB approval.  The pretest and educational video were presented to subjects followed by question and answer session.  A posttest was given one month after the pretest and video.  Data began to be compiled immediately after the posttests had been completed.

**Project Objectives**

1. To assess nurses knowledge of heart failure.

2. Is there an increase in knowledge 1 month after viewing a 60 minute evidence based heart failure educational video?

3. Is there a correlation between knowledge and nursing degree?

4. Did nurses use online heart failure refreshers?

**Evaluation Plan**

The investigator served as the evaluator.  The pre and posttest and video were measures used and were based on the evidence-based guideline: 2013 ACCF/AHA Guideline for the Management of Heart Failure (Yancy et al., 2013).

1. Descriptive statistics of basic data such as highest degree obtained, use of online refresher and organization name with department are reported on all participants enrolled in the nursing knowledge study.

2. Comparison of mean scores from pretest and posttest 1 month after the educational video using a 2 sample test of proportions.

3. Comparison of mean scores from pretest and posttest of different nursing degrees 1 month after the educational video using a 2 sample test of proportions.

**Results**

A total of 33 nurses met the inclusion criteria however only 14 subjects (42% of qualifying nurses) participated in the study. All 14 subjects which started the study also completed the study thus making the attrition rate 0%. Of the 14 participating 21.43% (n=3) work in cardiology and 78.57% (n=11) work in internal medicine. The majority of subjects (42.86%) were between the ages of 35-54, 35.71% were between ages of 18-35 years and 21.4% were 55 years of age or older. Female subjects made up 92.85% (n=13) and males made up7.15% (n=1) of the total study. Both Registered nurses (RN) and Licensed Professional Nurses (LPN) were included. Of this group RN's made up 71.43% (10 subjects) and LPN's 28.57% (4 subjects). RN's were further divided into type of degree they had obtained. RN's with an associate degree made up the majority of subjects (35.71% or 5 subjects), RN's with either a diploma (2 subjects) or Bachelor's degree (2 subjects) were the next largest group each making up 14.29% ( total of 28.58%) and Doctorate of Nursing Practice (1 subject) made up 7.14% of the total group. Nine subjects (64.29%) had greater than 10 years of experience and 5 subjects (35.71%) had less than 10 years of experience as a nurse. For population characteristics see table 1 below.

Table 1 population characteristics

|  | Frequency | Percentage |
| --- | --- | --- |
| AGE |  |  |
| <35 | 5 | 35.71% |
| 35-54 | 6 | 42.86% |
| >55 | 3 | 21.43% |
| DEGREE |  |  |
| DNP | 1 | 7.14% |
| LPN | 4 | 28.57% |

| | | |
|---|---|---|
| RN ADN | 5 | 35.71% |
| RN BSN | 2 | 14.29% |
| RN Diploma | 2 | 14.29% |

| | | |
|---|---|---|
| DEPARTMENT | | |
| Internal Med | 11 | 78.57% |
| Cardiology | 3 | 21.43% |
| Experience | | |
| 0-10 yrs | 9 | 64.29% |
| >10 yrs | 5 | 35.71% |
| LICENSE | | |
| RN | 10 | 71.43% |
| LPN | 4 | 28.57% |
| GENDER | | |
| Male | 1 | 7.15% |
| Female | 13 | 92.85% |

RN's were the group that benefited most from the educational opportunity or retained more information from the education with an increase of correct answers by 6.92% where LPN's increased their correct answers by 4.44%. Scores increased in the internal medicine group by 9.92% where the cardiology group decreased their correct answers by 4.55%.

Heart failure questionnaire scores increased from pretest with a mean of .6944 to a posttest mean of .7380. Even though scores did increase it was not a significant increase in scores (p= .277). Only one participant admitted to using an online refresher between pre and posttest. Online refreshers could be any additional information on heart failure in which they

used the internet to obtain between pretest and posttest.  The subjects were verbally given the

name of the website in which the educational video was found, but no written data was given to

subjects about where to find online refreshers.

Examining the questions individually only one question improved significantly (p= .043)

from pre to posttest.  This question was related to symptoms which represent the "classic triad"

in heart failure the mean of correct answers on pretest was .50 and posttest .857 (p=.043).

Results of individual questions can be viewed in table 2 means of heart failure questionnaire.

Table 2 Mean score of heart failure questionnaire

| Question | pretest mean | posttest mean | significance | |
|---|---|---|---|---|
| 10. Which set of symptoms represents the "classic triad" in heart failure? | 0.5 | 0.857 | p=0.043 | |
| 11. All of the following are common reasons for medication non-adherence in patients with heart failure except… | 0.714 | 0.714 | p=1.00 | |
| 12.  Which symptom is least likely to be associated with heart failure? | 0.786 | 0.643 | p=0.403 | |
| 13. What is the rule of thumb for teaching patients when to report changes in weight for heart failure management? | 0.929 | 0.929 | p=1.00 | |
| 14. What is true about I's and O's in monitoring heart failure? | 0.857 | 0.571 | p=0.094 | |
| 15. Patients with well-controlled heart failure should do all of the following except… | 0.929 | 0.857 | p=0.541 | |
| 16. If a person with heart failure is restricted to 2000mg of sodium daily, what is the masimum number of full servings of french fries (230mg of sodium per serving) the person can have if that is all they eat on a given day (however inadvisable)? | 0.857 | 1 | p=0.142 | |
| 17. Which food item would not count as a liquid in calculating fluid intake in patients with heart failure? | 0.643 | 0.357 | p=0.131 | |
| 18. The intake of which of the following is not safe in patients with heart failure, even in moderation? | 0.5 | 0.786 | p=0.115 | |
| 19. What is always true about exercise in patients with heart failure? | 0.929 | 1 | p=0.309 | |
| 20. Which option is consistent with the New York Heart Association diagnosis of Class 3 heart failure? | 0.571 | 0.571 | p=1.00 | |
| 21. Acute diastolic heart failure may be treated with all of the following except: | 0.143 | 0.143 | p=1.00 | |
| 22. What is the most common class of medications in the chronic treatment of diastolic heart failure? | 0.857 | 0.714 | p=0.357 | |
| 23. The mainstay of chronic treatment of patients with systolic heart failure may include… | 0.929 | 1 | p=0.309 | |
| 24. Biventricular pacemakers in patients with systolic heart failure are useful when… | 0.5 | 0.643 | p=0.445 | |
| 25. Which vital sign may become abnoraml last in patients with acute heart failure? | 0.357 | 0.5 | p=0.445 | |
| 26. Health literacy refers to one's ability to… | 0.786 | 1 | p=0.067 | |
| 27. Palliative care is best described as… | 0.714 | 0.714 | p=1.00 | |

Four questions showed no difference in scores from pre to posttest, these four questions

were 11, 13, 20 and 27.  Question 11 had a mean correct answers of  0.714 (p=1.00) both at pre

and posttest and pertained to medication non-adherence.  Reporting changes in weight was

question 13 with a mean correct at pre and posttest of 0.929 (p=1.00).  A mean correct of 0.571

on both pre and posttest was seen in question 20 when asking about the New York Heart

Association Classification.  Palliative care question 27 also did not see a change from pre to posttest with a mean correct of 0.714 (p=1.00).

Five questions were correct more often at pretest versus posttest and consisted of questions 12,14,15,17, and 22.  A question (12) pertaining to symptoms least likely to be associated with heart failure received correct answers greater at pretest with a mean of 0.786 than at posttest mean 0.643 (p=0.403).  Intake and output monitoring (14 &17) were also seen to have more correct answers at pretest 0.857 and posttest 0.571 (P=0.094) for question 14 where question 17 had a mean correct at pretest of 0.643 and posttest mean of .357 (p=0.131).  A question about heart failure patients weighing themselves (15) had a worse outcome at posttest with a mean of 0.857 and a pretest mean of 0.929 (p=0.541).  When asking about most common class of medication for diastolic heart failure more nurses answered correctly at pretest with a mean of 0.857 than on posttest 0.714 (p=0.357).

Correct answers increased from pre to posttest on eight questions (16, 18, 19, 21, 23, 24, 25, & 26) however it was not significant.  Of these question 16 and 18 pertained to diet with a mean of .857 at pretest and 1 at posttest (p=0.142) and a mean of .5 pretest and 0.786 posttest (p=0.115) respectively.  Question 19 asked about exercise in patients with heart failure at pretest the mean correct was 0.929 and posttest 1 (p=0.309).  Medication questions 21 and 23 improved at posttest with a mean correct of.0143 at pre and 0.429 at posttest (p= 0.094) and pretest mean of 0.929 with posttest mean of 1 (p=0.309) respectively.  One question pertained to cardiac device treatment (24) which had a pretest mean of .5 and a posttest mean of 0.643 (p=0.445).  Question 25 pertaining to signs and symptoms was answered correctly with a mean of 0.357 at pretest and 0.5 at posttest (p=0.445).  Health literacy (26) had a mean of 0.786 at pretest and at posttest 1 (p=0.067).

## Summary, Discussion and Implications

### Congruency of Theoretical Framework

Rogers' (1995) Diffusion of Innovations theory guided this research project effectively. Even though the theory was a good fit for the project some parts of the theory could have been emphasized more than they were during the project.  The innovation or idea was the heart failure education with the relative advantage being that the education was convenient during work. The innovation was compatible with the population of the study.  Heart failure education was provided through a video that was straight forward and provided humor when appropriate to enhance learning.  The trialability of his theory consisted of this one time research project which showed to be beneficial to the heart failure knowledge of nurses.  Observability was obtained by providing the education in a group setting and then later the nurses observe each other putting the information to practice.  Some of clinical staff are medical assistants and observability possibly would have been great if they were included more in the educational opportunity not necessarily the research project.

The second component of Rogers' theory (1995) is communication of how an idea gets from one to another.  The focus was more on the interpersonal approach rather than the mass media approach however, when looking at the subject participation it might have been useful to use more of both communication types during the recruitment period.  Mass media could have been used more by sending out individual emails to all the nurses who met criteria for the study. Also, interpersonal communication could possibly have been more effective if the department chairs would have been more involved and communicated the importance of attending the educational session.

The time component has three parts however, this study focused on the innovation-decision process which is the concept of the idea (heart failure) from first exposure to adopting or rejecting the information.  Perhaps it might take some nurses longer than one month to accept the new knowledge seeing how test scores improved but did not significantly improve.   The last component of the theory is the social system.  In this study the social system consisted of the clinic managers and the nurse practitioner providing the education.  The social system could have been enlarged by also including the department chairs with the potential of increasing the buy in or acceptance of the innovation by the group.  Overall the theory and project were compatible with each other and the theory guided the project.

**Discussion**

Heart failure is an illness that is complex and patients need to know self-monitoring techniques for symptoms, weight gain, exercise, and adherence to medication (Yancy et al., 2013).  From several studies, it is seen that nurses' knowledge of heart failure, specifically self-monitoring/assessment is lacking (Albert et al., 2002; Delaney et al., 2011; Fowler, 2012; Goodlin et al., 2007; Hart et al., 2011; Kalogirou et al., 2012; Kalowes et al., 2011; Sterne et al., 2014; Washburn et al., 2005; Willette et al., 2007).  It is important that nurses be knowledgeable of heart failure.  By educating nurses about heart failure, they can appropriately educate and care for patients.  With an increase in heart failure education and knowledge, the nurse should be able to provide better care and less contradictory education to the patient.  With better education to the patient, there might be a decrease in heart failure cost, readmissions, time spent in the hospital and better quality of life for the patient.  Presenting evidence based education in a convenient location to nurses at Marshall Health; nurses' knowledge of heart failure did increase.

Even though the results of this study showed increased heart failure knowledge of nurses after viewing an educational video on heart failure the increase was not significant (p= 0.277).

Only 42% of all qualifying nurses from Marshall Health cardiology and internal medicine participated. Two sessions were conducted one for cardiology and one for internal medicine and each was told about the other meeting so, if unavailable for their department meeting. Also, other sessions were offered at the departments/nurses convenience however, no one took advantage of these sessions. There was no advertisement for the educational session other than the manager discussing the meeting agenda with the subjects. This was consistent with how meetings in the department are usually ran and it was believed that since department meetings are mandatory, there would be a good turn out and participation. However, the internal medicine department meeting was not mandatory. Perhaps advertising the event and opening it to all departments within Marshall Health might have improved the test base. Approval was only obtained from cardiology and internal medicine department managers and department chairs thus IRB approval consisted of only cardiology and internal medicine. Due to the topic it was felt that these two departments would be the only ones interested in heart failure education. In addition, each educational session was limited to one 60 minute evidence based heart failure video. Multiple sessions with different modes of education, prior to a posttest, may improve intended outcome (knowledge base).

After reviewing the pretest and posttest answers, much speculation can be made. However, not one classification of questions (diet, medication/treatment, weight, signs/symptoms, or heart failure classification) consistently improved or worsened. It is possible that online refreshers (chosen by the subject) might have differed from the heart failure content video shown at the educational session causing confusion during the posttest even though only

one nurse admitted to an online refresher.  The only question with significant improvement from pre to posttest was question 10.  This question might have been confusing on the pretest because the second most common answer for the "classic triad" of symptoms for heart failure included hypertension, fatigue, and pitting edema where the correct answer was dyspnea, fatigue, and edema. Pitting edema is a worsening sign of heart failure, however edema alone whether pitting or non-pitting is a sign of heart failure.

Those questions with improved correct answers on posttest but not a significant improvement were questions, 16, 18, 19, 21, 23, 24, 25 and 26.  Both questions 16 and 18 improved on posttest and pertained to diet.  Question 16 was a simple calculation of a sodium restriction and a serving size of French fries.  On posttest nurses may have paid more attention and actually calculated the answer rather than guessing at the correct answer.  When asked about intake in moderation of caffeinated tea, white wine, chewing tobacco or flavored seltzer in the heart failure patient the pretest answers were wide spread.  However, after reviewing the video it may be clearer that tobacco is a product in which moderation is not even acceptable due to the many toxins and cardiovascular effects.  All the other answers could be used in moderation. Question 19 pertained to exercise, 99% of nurses answered this question correctly on pretest and 100% on posttest.  It appears that most nurses understand that patients should be advised by their provider about exercise and the increase in posttest correct answers was not large enough to make a significant difference.  Questions 21 and 23 were related to medications.  One question (21) referred to medications used in acute heart failure since these nurses work in an outpatient facility they may not be as familiar with acute medications rather more familiar with chronic medications for heart disease thus showing why there might have been an increase in correct answers after viewing the video.  On the other had question 23 pertained to chronic medications

for heart failure and on pretest 99% of nurses answered correctly with 100% answering correctly

on posttest which they were most likely familiar with these medications prior to pretest.

Question 25 pertained to vital signs that become abnormal last in patients with acute heart failure

there was improvement after the educational video however, the answers might have been

confusing as oxygen saturation was the correct answer and dyspnea is one of the first signs of

acute heart failure.  Health literacy was the question for 26 the mean on prestest was.786 and 1

on posttest so there was little room for improvement especially significant improvement.

Questions with a higher pretest score were questions 12, 14, 15, 17, and 22.  Question 12

was symptom related choosing the least likely symptom and showed a slight decrease in correct

answers at posttest.  This question might not have been a good question because all of the

answers were correct however the correct answer was confusing about pitting edema especially

after looking at question 10 with a correct answer of edema and not pitting edema.  Both

questions 14 and 17 related to intake and output.  Question 14 nurses may have read into the

question because typically one does not estimate the amount of perspiration when measuring

intake and output but seems logical that the patient has an output of that fluid.  When questioning

about foods that should not count as a liquid on the posttest more individuals chose pudding than

did on the pretest. It is unclear of why unless they were looking a water content in the other

foods instead of a higher amount of fluid which would be seen in the pudding from the milk.

Question 15 questioning about the patient weighing themselves decreased to a mean of .857 at

posttest from a mean of .929 at pretest.  It is unclear why those answering correct would have

been higher at pretest however, weights of heart failure patients is a commonly missed question

in other studies (Albert et al., 2002, Washburn et al., 2005, Willette et al., 2007, Kalogirou et al.,

2012, Kalowes et al., 2011 & Mahramus et al., 2013).  Most common class of mediation for

chronic diastolic heart failure was missed by more on posttest.  A thought that the question might have been miss read at posttest possibly reading systolic heart failure thus making the next most answered medication beta-blockers make since for the answer.

Four questions did not see a change in correct answers from pre to posttest (11, 13, 20 & 27).  Question 11 was a question with all correct answers if not reading the question carefully. All of the answers would have been correct if one did not pay attention to the words common reasons.  A question asking about weight gain in pounds per week and per day (13) did not show a change from pretest.  This question was clearly covered in the education video so; nurses might have gotten confused about weekly weight gain seeing as how providers usually describe it as a 3-5 pound weight gain in a week.  New York Heart Association class of heart failure question (20) did not see a change from pre to posttest however; it was answered correctly by more RN's than LPN's.  This might have occurred because more RN's might have covered this topic in school and might have been more of a refresher where LPN's might focus more on the changing symptoms rather than classification. Even though there was education on discussing end of life care at an earlier point in life with patients there was no change in response to this question (27) from pre to posttest.   For the longest time the medical field thought of palliative care as the end and patients received palliative care typically weeks to days prior to death.  Also, playing a role might be the myth that Hospice care only accepts patients when they are estimated to have six months or less to live.  It is now being thought that palliative care should be discussed sooner in the chronic disease state and patients referred to palliative care for symptom management when there is no cure and medications have or are being prescribed at their max and not when it is time to discontinue all medications.

Since nurses have been seen to be the key providers of heart failure education to the patient and coordinators of care (Washburn et al., 2005), there might be other positive benefits seen after educating the nurses about heart failure. Readmission rates may possibly decrease and the heart failure patient may have a better quality of life. Washburn et al. (2005) stated that patients could not be expected to practice self-management if not given the correct information about self-management. By nurses having a better understand of heart failure including medications, weights, exercise, signs and symptoms, classifications and diet they could better guide their patient. Perhaps suggesting increasing diuretics under the direction of the provider, decreasing fluids or salt intake or bring the patient back into the office for reassessment instead of the patient getting to the point of needing hospitalized. A systematic review revealed that hospital readmissions decreased when patients understood self-management (Jovicic, Holroyd-Leduc, & Strauss, 2006). Thus it is important for nurses to have a good understanding of self-management in heart failure so this information can be passed onto the patient.

Recommendations

As a further study a chart review, to check hospital readmissions for number of heart failure admissions prior to the education opportunity, compared to after the education to see if readmissions were affected. A study by Sterne et al (2014) did show a decrease in hospitalizations 3 months after an education session and posttest for nurses. A patient survey would also provide valuable information for improving the program. Provider feedback would also be interesting to review to see if providers feel their nurse or nurses understood heart failure and communicated this to patients. Seeing as Marshall Health does not have live continuing education provided on a regular basis during work hours it would be interesting to evaluate if nurses, managers and providers feel this would be a worthwhile endeavor. With the results of

this study showing an increase in heart failure knowledge by nurses after one month it seems

reasonable that the department and patients would benefit from the increased knowledge.  Thus

in office education should be provided by the department not only for nurses but for other

clinical staff as well such as medical assistants or health coaches.

Recommendations for future studies would be to advertise the educational event more

than the usual staff meeting advertisement.  Advertisement could include emails, texts, or placing

signs around the common areas of the department.  Better by in may take place if it is

communicated to the nurses more that the department chairs and managers on on board with the

educational opportunity.  Since an improvement of scores was seen with just a 60 minute

educational video it would be interesting in future studies to provide several educational sessions

with different types of learning.  Individuals learn in different ways so nurses might benefit from

written materials such as guidelines or self care management techniques, a reference list of

where to find guidelines or educational information and role playing can also be of help when

learning.

**Limitations**

The most significant limitation was the small study size.  The subjects consisted of a

convenience sample at Marshall Health which could cause bias for the more ambitious or

knowledgeable nurse may be the ones to sign up for the study.  As stated before all subjects were

from Marshall Health an outpatient facility so generalizability to all nurses would be limited

since no inpatient facility was tested.  Also, the nurses with an advanced degree such as nurse

practitioners might have felt excluded or uncomfortable at the department staff meetings since

they fall into a category that is more consistent with the provider role.

The questionnaire used was developed to be used with the heart failure educational video. However, the validity and reliability of the questionnaire has not been studied. The questionnaire was supervised by the nurse practitioner conducting the study which is viewed as a strength but in another light could be viewed as a limitation. By allowing department clinical managers to supervise the questionnaire more nurses might have participated and might have been more convenient for the nurse to participate while still being supervised.

**Conclusion**

The results of this study did show that nurses have a knowledge gap related to heart failure which is consistent with previous studies. Nurses need to be better educated and have a better understanding of heart failure to adequately advise patients about heart failure especially heart failure self-monitoring techniques. Not only do nurses need educated but the entire health care team needs to have heart failure knowledge and consistency in educating patients to help decrease readmissions and improve patients' quality of life.

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Practice Guidelines. *Circulation*, *128*.

Appendix A: Letter of support

**MARSHALL UNIVERSITY**
Joan C. Edwards School of Medicine
w w w . m u s o m . m a r s h a l l . e d u

Department of Cardiovascular Services

August 20, 2015

RE:    Beth Ann White, NP-C

To Whom It May Concern,

Beth Ann White, NP-C is a DNP student at West Virginia University.  She has discussed her research project with me regarding the design of the study and the targeted population.  She has approval from Marshall Health in Huntington, WV to conduct her research within our patient population.

If you have any further questions please feel free to contact my office at (304) 691-6534.

Sincerely,

Mark Studeny, MD, FACC
Chairman and Professor, Marshall Cardiology

**WE ARE... MARSHALL.**
1249 15th Street • Suite 4000 • Huntington, West Virginia 25701 • Tel 304/691-8500 • Fax 304/691-8530
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Appendix B: Consent form

# Informed Consent to Participate in a Research Study

## *Nursing Knowledge of Heart Failure*
Mark Studeny MD, Principal Investigator

## *Introduction*

You are invited to be in a research study.  Research studies are designed to gain scientific knowledge that may help other people in the future.  You may or may not receive any benefit from being part of the study.  Your participation is voluntary.  Please take your time to make your decision, and ask your research investigator or research staff to explain any words or information that you do not understand.

## *Why Is This Study Being Done?*

The purpose of this study is to evaluate the level of heart failure knowledge among nurses/clinical staff at Marshall Health and to see if knowledge increases after an educational video.

## *How Many People Will Take Part In The Study?*

About 30 people will take part in this study.  There is no upper limit of how many may enter the study.

## *What Is Involved In This Research Study?*

The study will take approximately 2 hours of your time.  The study will be conducted in the conference room at Marshall Health either cardiology or internal medicine depending on your department.  The study will be divided into 2 days and will occur at your staff's regular scheduled monthly meeting.  The first day will consist of a pretest which will take approximately 20-30 minutes to complete and an educational video that is approximately 60 minutes.  The second day will consist of a posttest which should take approximately 20-30 minutes.

## *How Long Will You Be In The Study?*

You will be in the study for approximately one month.

You can decide to stop participating at any time.  If you decide to stop participating in the study we encourage you to talk to the study investigator or study staff as soon as possible.

The study investigator may stop you from taking part in this study at any time if he/she believes it is in your best interest; if you do not follow the study rules; or if the study is stopped.

## *What Are The Risks Of The Study?*

There are no known risks to those who take part in this study.

## *Are There Benefits To Taking Part In The Study?*

If you agree to take part in this study, there may or may not be direct benefit to you.  We hope the information learned from this study will benefit other people in the future.  The benefits of participating in this study may be: that you receive continuing education from Cabell Huntington Hospital depending on your board requirements for attending the evidence based heart failure education video and your knowledge of heart failure might increase.

## *What About Confidentiality?*

We will do our best to make sure that your personal information is kept confidential.  However, we cannot guarantee absolute confidentiality.  Federal law says we must keep your study records private.  Nevertheless, under unforeseen and rare circumstances, we may be required by law to allow certain agencies to view your records.  Those agencies would include the Marshall University IRB, Office of Research Integrity (ORI) and the federal Office of Human Research Protection (OHRP).  This is to make sure that we are protecting your rights and your safety.  If we publish the information we learn from this study, you will not be identified by name or in any other way.

## *What Are The Costs Of Taking Part In This Study?*

There are no costs to you for taking part in this study.  All the study costs, including any study tests, supplies and procedures related directly to the study, will be paid for by the study.

## *Will You Be Paid For Participating?*

You will not receive any monetary payment however, if your governing board such as the board of nursing requires continuing education you will be qualified to receive continuing education through Cabell Huntington Hospital for taking part in this study.

## *What Are Your Rights As A Research Study Participant?*

Taking part in this study is voluntary.  You may choose not to take part or you may leave the study at any time.  Refusing to participate or leaving the study will not result in any penalty or loss of benefits to which you are entitled.  If you decide to stop participating in the study we encourage you to talk to the investigators or study staff first.

## *Whom Do You Call If You Have Questions Or Problems?*

For questions about the study or in the event of a research-related injury, contact the study investigator, Mark Studeny MD at 304-691-8500 or Beth Ann White MSN, NP-C, AACC at 304-638-2911.  You should also call the investigator if you have a concern or complaint about the research.

For questions about your rights as a research participant, contact the Marshall University IRB#2 Chairman Dr. Stephen Cooper or ORI at (304) 696-4303.  You may also call this number if:
   o  You have concerns or complaints about the research.
   o  The research staff cannot be reached.
   o  You want to talk to someone other than the research staff.

You will be given a signed and dated copy of this consent form.

### SIGNATURES

You agree to take part in this study and confirm that you are 18 years of age or older.  You have had a chance to ask questions about being in this study and have had those questions answered.  By signing this consent form you are not giving up any legal rights to which you are entitled.

_____
    Subject Name (Printed)

_____        _____
    Subject Signature                                                                    Date

_____
    Person Obtaining Consent (Printed)

_____        _____
    Person Obtaining Consent Signature                                          Date

Appendix C: Pretest

**Heart Failure Video: Pre-Test**

**Preliminary Items:**
1. Name of your Organization/Department:
2. Have you reviewed the Heart Failure Video?
          __ No (pre-test)
          __ Yes (post-test)
3. What is your username or number: _____
4. Please select the highest degree that applies to you:
__ APRN (MSN)
__ APRN (DNP)
__ APRN (PhD)
__ RN (PhD)
__ RN (Diploma)
__ RN (ADN)
__ RN (BSN)
__ RN (MSN)
__ LPN
__ MA
__ CNA
__ RPh
__ PA
__ Pharm D
__ Other (please specify): _____

5.  What is your age:
__18-24
__25-34
__35-44
__45-54
__55-64
__65+

6. Years of experience as nurse/clinical staff:
__0-4
__5-9
__10-19
__20-29
__30-39
__Other_____

7.  Gender
__Female
__Male

8.  Race/Ethnicity
__White
__Black or African American
__Hispanic or Latino
__Asian or Asian American
__Other_____

9. Would you consider using an online refresher if available?
__ Yes
__No
__Maybe
__Other_____

**Once you begin, you will have 30 minutes to complete the test.**

**Directions:** Please choose the best answer to each item below.  We are asking these questions before and after the video to see if the video was helpful in improving your understanding of heart failure.  Your performance will determine areas of strength and areas for which additional educational activities may be helpful.

**Questions:**

10. Which set of symptoms represents the "classic triad" in heart failure?
A. Tachypnea, hypotension, and edema
B. Dyspnea, fatigue, and edema
C. Hypertension, fatigue, and pitting edema
D. Bradypnea, fatigue, and non-pitting edema

11. All of the following are common reasons for medication non-adherence in patients with heart failure *except* …
A. Trouble swallowing pills because of laryngeal edema
B. Medications are too expensive
C. Lack of transportation to pharmacy
D. Difficulty understanding prescription labels

12. Which symptom is *least* likely to be associated with heart failure?
A. Weight gain
B. Crackles at base of lungs
C. Non-pitting edema
D. Elevated jugular venous pressure

13. What is the rule of thumb for teaching patients when to report changes in weight for heart failure management?
A. Loss of 1 pound in one day or 3 pounds in one week
B. Loss of 3 pounds in one day or 5 pounds in one week
C. Gain of 1 pound in one day or 3 pounds in one week
D. Gain of 3 pounds in one day or 5 pounds in one week

14. What is true about I's and O's in monitoring heart failure?
A. Intake does not include fluids consumed in taking medications
B. Output includes only the first morning void
C. One must estimate perspiration as part of output
D. A positive I/O balance means the patient has taken in more than put out

15. Patients with well-controlled heart failure should do all of the following *except* …
A. Weigh themselves weekly
B. Keep taking their medicine
C. Eat a low salt diet
D. Report chest pain

16. If a person with heart failure is restricted to 2000 mg of sodium daily, what is the maximum number of *full servings* of french fries (230 mg of sodium per serving) the person can have if that is all they eat on a given day (however inadvisable)?
A. 6
B. 8
C. 10
D. 12

17. Which food item would *not* count as a liquid in calculating fluid intake in patients with heart failure?
A. Pudding
B. Strawberries
C. Orange
D. Jello

18. The intake of which of the following is *not* safe in patients with heart failure, even in moderation?
A. Caffeinated tea
B. White wine
C. Chewing tobacco
D. Flavored seltzer

19. What is *always* true about exercise in patients with heart failure?
A. Patients should check with their doctor first
B. Patients should not exercise at all
C. Patients should exercise until they feel tired
D. Patients should exercise only in the morning

20. Which option is consistent with the New York Heart Association diagnosis of Class 3 heart failure?
A. Symptoms at rest
B. Asymptomatic heart failure
C. Symptoms with significant exertion
D. Symptoms with minimal exertion

21. Acute diastolic heart failure may be treated with all of the following *except*:
A. Nitroglycerin
B. Lasix
C. Dobutamine
D. Ultrafiltration

22. What is the *most* common class of medications in the chronic treatment of diastolic heart failure?
A. Diuretics
B. ACE inhibitors
C. Beta blockers
D. Angiotensin receptor blockers

23. The mainstay of chronic treatment of patients with systolic heart failure may include …
A. Angiotensin receptor blockers
B. Implantable cardiac defibrillators
C. Diuretics
D. All of the above

24. Biventricular pacemakers in patients with systolic heart failure are useful when …
A. Walls are beating too slowly
B. Walls are beating too quickly
C. Walls are beating irregularly
D. Walls are beating out of sync

25. Which vital sign may become abnormal *last* in patients with acute heart failure?
A. Oxygen saturation
B. Heart rate
C. Respiratory rate
D. Blood pressure

26. Health literacy refers to one's ability to …
A. Read health information
B. Understand health information
C. Act on health information
D. All of the above

27. Palliative care is *best* described as …
A. Holistic care in the final six months of life
B. Complementary medicine that has the potential to cure
C. Symptom therapy not designed to cure
D. Alternative treatments not provided by doctors or nurses

Appendix D: Posttest

**Heart Failure Video: Post-Test**

**Preliminary Items:**
1. Name of your Organization/Department:
2. Have you reviewed the Heart Failure Video?
       __ No (pre-test)
       __ Yes (post-test)
3. What is your name (Last name, first name) or username: _____
4. Please select the highest degree that applies to you:
__ APRN (MSN)
__ APRN (DNP)
__ APRN (PhD)
__ RN (PhD)
__ RN (Diploma)
__ RN (ADN)
__ RN (BSN)
__ RN (MSN)
__ LPN
__ MA
__ CNA
__ RPh
__ PA
__ Pharm D
__ Other (please specify): _____

5.  What is your age:
__18-24
__25-34
__35-44
__45-54
__55-64
__65+

6. Years of experience as nurse/clinical staff:
__0-4
__5-9
__10-19
__20-29
__30-39
__Other_____

7.  Gender
__Female
__Male

8.  Race/Ethnicity
__White
__Black or African American
__Hispanic or Latino
__Asian or Asian American
__Other_____

9. Did you use an online refresher?
__ Yes, if so how many times and was it the same video._____
__No
__Maybe
__Other_____

**Once you begin, you will have 30 minutes to complete the test.**

**Directions:** Please choose the best answer to each item below.  We are asking these questions before and after the video to see if the video was helpful in improving your understanding of heart failure.  Your performance will determine areas of strength and areas for which additional educational activities may be helpful.

**Questions:**

10. Which set of symptoms represents the "classic triad" in heart failure?
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