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Assessment of Nursing Knowledge Before and After Implementation of Educational Intervention on Heart Failure

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Assessment of Nursing Knowledge Before and After Implementation of

Educational Intervention on Heart Failure

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By

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Purpose: The purpose of this study was to assess the knowledge of nursing staff on a cardiology unit before and after the implementation of heart failure specific education.

Methods: Forty staff nurses on a cardiology unit at a single institution were given The Nurses Knowledge of Heart Failure Education Principles Survey (NKHFEP), a validated tool to assess nursing knowledge of heart failure. A series of four educational sessions were given to the same forty nurses. They were then given the NKHFEP survey a second time to assess change in knowledge post educational intervention.

Results: The mean of Pre-education ($M = 16.77$) was significantly lower than the mean of post-education ($M = 19.77$). The result of the paired samples t-test was significant, $t(39) = -19.75$, $p < .001$, suggesting that the true difference in the means of pre- education and post-education was significantly different from zero. The results of the Wilcoxon signed rank test were significant, $V = 0.00$, $z = -5.66$, $p < .001$.

Conclusions: Continuing education specific to heart failure increased nursing knowledge which can be utilized to increase patient education. Improved patient education can help the heart failure patient with self-care and increase health literacy, an aim for improved outcomes outlined by the ACC/AHA Heart Failure guidelines. This project can provide a pathway to ongoing inquiry in nursing knowledge and the importance of continuing education for both the nurse and the patient.

Introduction

Heart failure (HF) is a chronic condition that affects 6.5 million Americans over the age of 20 (Benjamin et al., 2017). According to the American College of Cardiology guidelines, HF is defined as "a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill or eject blood" (Yancy et al, 2013, p.12). Diagnosis of HF is based upon a careful history and physical examination (Yancy et al, 2017). During examination, subjective data may include orthopnea, edema, fatigue, and breathlessness. Objective data includes evidence of congestion (right and left-heart) such as elevated jugular venous pressure, lower leg edema, pulmonary crackles, and ascites (Kataoka, 2013). HF can include patients with normal left ventricle (LV) size and near normal ejection fraction (EF) as well as patients with severe left ventricle dilation and significantly reduced EF (Yancy et al, 2013). HF with normal LV size and near normal EF is typically referred to as heart failure with preserved ejection fraction (HFpEF) or diastolic heart failure. HFpEF can occur when the EF is near normal to normal, but according to Dorhout Mees (2013) is characterized by a rigid LV which causes inadequate ability to withstand the blood supply from the lungs. Alternatively, heart failure with reduced ejection fraction (HFrEF) or systolic heart failure affects the contraction of the heart muscle. Thus, HFrEF is the inability for the myocardium to eject adequate blood volume during systole. HFrEF can be classified as ischemic (regional) or non-ischemic (global).

Heart failure is a major public health problem as evidenced by high health care expenditures and a significant number of hospitalizations (CDC, 2015). Each year 960,000 people are diagnosed with heart failure (HFSA, 2017). One in five of those diagnosed will die within the first year after diagnosis (Hart, Spiva, & Kimble, 2011).

Management of heart failure can be a significant challenge for health care professionals as well as patients themselves. Adherence and management of a prescribed medication regimen, dietary changes, symptom recognition education, and fluid restrictions are some of the lifestyle modifications included in the management of HF (Rasmusson, Flattery, & Bass, 2015). Additionally, the treatment of heart failure is costly. The total cost of heart failure was estimated at 20.9 billion dollars in 2012 with an expected increase to 53.1 billion dollars by 2030 (Heidenreich, et. al, 2013). A substantial portion of this cost is due to hospitalizations including readmissions (Heidenreich, et. al, 2013). According to Mahramus, Penoyer, Frewin, Chamberlain, & Sole (2014), 50% of patients that are hospitalized will be readmitted within 6 months for heart failure. The Centers for Medicare and Medicaid Services financially penalize hospitals for avoidable readmissions which emphasizes the importance of coordination of care with heart failure patients (Yancy et. al, 2013). Given the financial hardship of heart failure hospitalizations the need to decrease hospital readmission rates is evident.

Evidence suggests there are multiple efforts to reduce readmission rates for heart failure patients. Decreasing HF readmission rates is a national and local healthcare goal. According to McHugh & Ma (2013), improving nursing care may contribute to a reduction in hospital readmissions. Heart failure literacy in cardiac nurses is essential to assist patients in achieving improved outcomes. Nurses are at the bedside twenty-four hours a day and most often during decisive discussions with physicians. This allows nurses the opportunity to continually educate patients and families for discharge during the hospitalization (McHugh & Ma, 2013). Thus, the nurses' role as educator has become

fundamental in the care of heart failure patients (Kalogirou, Lambrinou, Middleton, &

Sourtzi, 2013).

Background

The Centers for Medicare and Medicaid Services (CMS) has targeted heart failure

readmissions through the Hospitals Readmissions Reduction Program (HRRP). CMS has

determined providers and systems will not be reimbursed for patients readmitted for heart

failure within 30 days of initial discharge (CMS, 2017). The Hospital Readmissions

Reduction Program through CMS was created to facilitate better coordination of care for

patients between providers and to improve discharge planning, education, and follow-up.

The Joint Commission (TJC) has set forth heart failure core measures and has addressed

key factors relative to the long-term management of heart failure (TJC, 2017). The Joint

Commission requires hospitals seeking advanced HF certifications to include the

following within heart failure discharge instructions: diet, exercise, weight monitoring,

worsening symptoms, medications, and follow up appointments (TJC, 2014).

Providing comprehensive education to heart failure patients through the nursing

staff is an important component in reducing readmissions as found in the Fowlers (2012)

study. Improved education for heart failure patients has been recognized by CMS as a

key component for hospitals to improve upon. Comprehensive patient education on heart

failure management should include medication adherence, weight monitoring, diet and

lifestyle modifications, and signs and symptoms of worsening condition (Mahramus,

Penoyer, Frewin, Chamberlain, & Sole, 2014). According to The American Nurses

Association (ANA) Scope and Standards of Cardiovascular Nursing, patient education is

a fundamental responsibility of the nurse (ANA, 2008).

Purpose

The aim of this study is to evaluate the effect of a comprehensive education intervention on nurse knowledge of basic information important to heart failure management. A secondary aim of this study is to describe the strength of nursing knowledge regarding medication adherence, weight monitoring, diet and lifestyle modifications, and signs and symptoms of worsening heart failure. Objectives will include testing of knowledge prior to the educational intervention, implementation of comprehensive heart failure education program for nursing staff, and testing of knowledge immediately after the educational intervention.

Search Strategy

A comprehensive literature search for relevant research studies was conducted. The purpose of the search was to systematically identify, analyze, and synthesize literature to support the EBP project on the utility of increasing heart failure specific education in an effort to reduce frequent readmissions. The review of the literature included a search of all full-text, published literature from 2011 to 2018 PubMed available from Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, and Cochrane Library. The search terms that were used included: heart failure, education, nurses, knowledge assessment, cardiac, readmission, medication compliance, and patient education. Exclusion criteria included non-English literature.

Review of the Literature

In review of the literature, there was a consistent concept of improving health literacy and self-care in the heart failure patient to help decrease readmission rates. Heart failure requires watchful care and treatment in order to improve quality of life and

outcomes. Improvement of these outcomes requires patients to have the knowledge and skill set to perform self-management techniques to prevent or reduce undesirable effects of heart failure including multiple hospitalizations. When patients are not adequately informed about heart failure self-management they may be at risk for inability to recognize the development of worsening heart failure symptoms which increases the danger of decompensation (Mahramus et al., 2013). Worsening HF symptoms will include dyspnea, fatigue, orthopnea, edema, nausea, and anorexia (Evans, 2016). According to Ivynian, DiGiacomo, and Newton (2015), more than half of patients that defer medical care for the aforementioned signs and symptoms will subsequently require emergency medical care. In an effort reduce morbidity and mortality due to delaying treatment, self-care management by the HF patient has been shown to lower hospitalization rates and emergency room visits (Sethares, Chin, & Jurgens, 2014). Self-care management encompasses a decision-making process for the patient. According to Sethares, Chin, and Jurgens (2014), those steps include, evaluation of the change in symptoms, deciding on a plan of care, implementation of the plan, and evaluation of plan of care efficacy.

Participation in a continuing education program on heart failure self-care principles increased nurses' knowledge on the subject matter shown in a study performed by Mahramus et al (2014). This study was small (n=150), however the study did demonstrate there is a nursing knowledge deficit in self-care concepts for heart failure patients. Additionally, a study (n=122) conducted by Hart, Spiva, and Kimble (2011) also showed knowledge gaps within the nursing staff that include signs of worsening HF. Patients should not be learning self-care decision making strategies through readmissions,

but through discussions with nursing staff. There is a need to improve health care

providers' HF knowledge thus, ongoing education should be held to improve HF

knowledge among nursing staff. A lack of information provided by health care providers

can create sub-optimal patient management of HF (Tsai et al, 2014). When there is

knowledge deficit in HF management and symptomology in HF patients, this creates

uncertainty for the patient in regards to when to seek medical attention (Ivynina,

DiGiacomo, & Newton, 2015).

There are many barriers to improving morbidity and mortality of patients with

heart failure. Interventions such as evidence based educational material and plans of care

that are more easily understood have been identified as possible solutions. Lack of family

support and failure to understand complex plans of care contribute to the high 30-day

readmission rate (Yancy et. al, 2013).

<center>**Theoretical Framework**</center>

Treatment of heart failure requires a certain level of health literacy in the patient

and the care providers. This involves nurses undergoing continuing education around

heart failure pathophysiology and treatment modalities. Maintaining change in current

continuing education practices can be difficult initially, but with a plan in place for a

process of change, it can be attainable. Lewin's Change Theory (1951) will be the

theoretical framework for the purpose of this project. Cummings, Bridgman, and Brown

(2016) state that Kurt Lewin is considered the founding father of change management.

Lewin's theory utilizes three steps: unfreezing, changing, and refreezing as an approach

to managing change. Lewin explains that an improvement in performance by a group is

often temporary. Lewin goes on to explain that change is often short lived due to lack of

appropriate goal setting. Lewin developed the concepts of force and field, which are the

underpinnings of this theory. Field is the system or entity that is changing. Force is

defined as the direction the entity or system is going (Lewin, 1947). In this project, the

system changing is a cardiology unit in a single institution.

In the unfreeze step of Lewin's theory the cardiology unit prepares for change by

first determining if the unit is open for change. During this step, the importance of the

problem is emphasized in addition to the ability for the unit to acknowledge that change

is needed. In this case, the cardiology unit should recognize the existing knowledge

deficit in the nursing staff that can potentially cause a lack of education to the patients, or

even worse, wrong information being disseminated. During this step, the force will either

work for or against the proposed change. When the idea of change has been accepted by

the field, the second step will start. During the change step, the nursing staff will be

educated in the pathophysiology and treatment of heart failure patients. In the final step,

freezing, the change becomes a permanent process on the cardiology unit (Lewin, 1947).

Project Methods

Setting and Participants

The study took place in an inpatient setting with cardiac nurses within an inner-

city hospital located in St. Louis, Missouri. The study was conducted on the cardiac unit

within the hospital which includes 40 nurses. The nursing staff varies with nursing years

of experience and education. The cardiac unit provides acute care to a wide range of

patients of different socioeconomic status. The unit is managed by two assistant nurse

managers, one nurse manager, and one director of cardiovascular services. The leadership

for this project consisted of the nurse manager for the unit. She was not a participant in

the study. All nurses that were invited to join were able to participate in the entire study.

Measuring Knowledge Outcome

The overall approach for this study was evidenced-based practice with change

implementation. The methodology of this project consisted of a pre-and post-knowledge

survey to nurses on a cardiology unit. The survey tests nursing knowledge about heart

failure. The survey was administered over the course of two-weeks to ensure all

participants, on each shift could participate. Once the surveys were completed the

education presentations started. The presentations were interactive. The post survey was

given once all sessions were completed by the nursing staff which assessed the impact of

the education intervention by comparison with the pre-test.

Data Collection

For this project, nursing knowledge of heart failure was assessed with The Nurses

Knowledge of Heart Failure Education Principles Survey (NKHFEP) (appendix A). The

survey consists of twenty true/false questions. The NKHFEP survey was given to the

nursing staff prior to the educational intervention and immediately following the

intervention (Appendix B). The education implementation was presented to the high-risk

cardiology nursing staff in a series of twenty minute sessions. The sessions were

conducted during the daily staff meeting. A log was kept to ensure all nursing staff

participating in testing were also included in each of the educational sessions. The

content was provided via PowerPoint (Appendix C) in a series of four, twenty-minute

sessions. The educational sessions included: pathophysiology of HF, lifestyle

modifications, medication education and importance of adherence, and signs and

symptoms of worsening HF.

Ethics and Human Subjects Protection

The process that took place to obtain approval was a face-to-face meeting with the

director of cardiovascular services at the institution as well as the nurse manager on the

unit the study took place.   Human subject approval was obtained through the

Washington University IRB and UMSL IRB. No risk to participants within this project

was identified. This project was education driven and did not involve patient contact.

The educational intervention was presented by the DNP student. The survey did not

include any participant demographics, but did require a numerical coding system so that

the pre-and post-test could be matched for the purpose of analysis. See Appendix D for

UMSL IRB approval.

Results

This education intervention met its goal of successfully providing evidence-based

heart failure education to nursing staff. The participants indicated improved knowledge

base of heart failure. The purpose of the following analysis was to determine if there was

an improvement in knowledge of heart failure.

The pre-test mean score was 16.77, and the post-test mean score was 19.77, which

is a mean gain of 3 (see table 1 and figure 2). The result of the paired samples *t*-test was

significant, $t(39) = -19.75$, $p < .001$, suggesting that the true difference in the means of

pre- education and post-education was significantly different from zero. The mean of Pre-

education ($M = 16.77$) was significantly lower than the mean of post-education ($M =$

19.77). Table 1 presents the results of the paired samples *t*-test. Figure 2 displays the

mean of pre-education and post-education.

Table 1

Paired Samples t-Test for the Difference between Pre_education and post_education

Pre_education		post_education				
M	SD	M	SD	t	p	d
16.77	0.92	19.77	0.42	-19.75	< .001	4.19

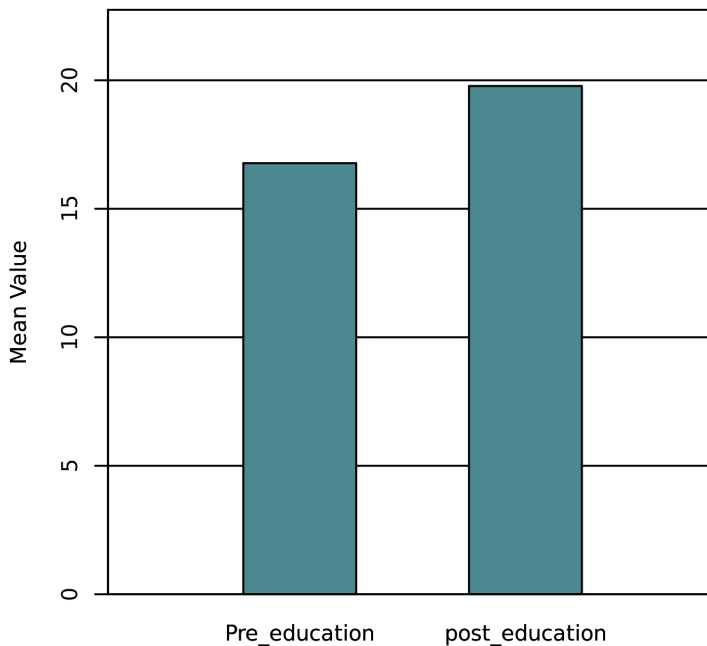*Note.* Degrees of Freedom for the *t*-statistic = 39. *d* represents Cohen's *d*.

Figure 2. The means of pre-education and post-education.

In addition to the paired samples *t*-test, a Wilcoxon signed rank test was

conducted to examine whether there was a significant difference between pre-education

and post-education. The results of the Wilcoxon signed rank test were significant, *V* =

0.00, $z = $ -5.66, $p < $ .001. This indicates that the differences between pre-education and post-education are not likely due to random variation. Figure 3 shows a boxplot of the ranked values of pre-education and post-education.
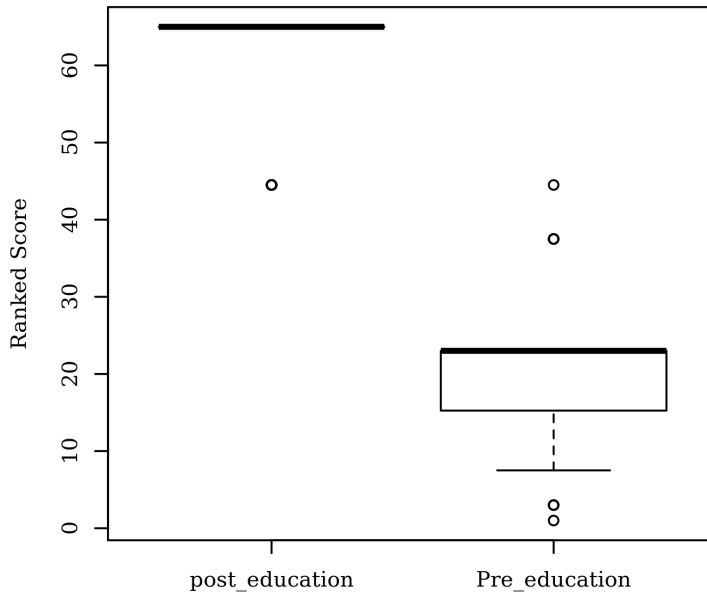

Figure 3. Ranked values of Pre_education and post_education.

Barriers

During this project, there were a couple of barriers. These barriers consisted of time constraints and staff resistance to change. Prior to implementing the project, there was groundwork to be laid in order to have full buy-in from the staff. The readmission rates of heart failure patients were shared with nurses in a staff meeting as well as through email. Additionally, a follow-up email with more information on the topic was sent to the entire staff. The education intervention included the importance of adherence to treatment plans for the patients. This was met with discussions surrounding the patient

population that is served on the unit. The issue that was raised by the nursing staff was

that patients often fail to follow the treatment plan despite efforts to engage and educate,

which is frustrating for the nursing staff. This resulted in resistance to change current

practice from the nurses. However, it was discussed that moving forward the nursing

staff will continue to provide the best care to their patients which includes providing HF

education to patients throughout their hospitalization.

A second barrier was the time constraints of the educational sessions. The cardiac

unit is a very busy unit with a large number of critically-ill patients. Managing to keep

the sessions succinct was difficult with a large amount of information and discussions

that would inherently result from certain topics. The educational sessions would be of

more benefit on non-work time, but would be difficult to persuade participation during

those time. Additionally, informational handouts to read when time allowed could have

been of benefit.

Discussion

In reviewing the analysis of whether or not the educational intervention was

successful, it can be concluded that heart failure specific education improved nursing

knowledge on heart failure. Nursing management should take this into consideration

when discussing education plans for staff members in the future. Improvement in nursing

knowledge of heart failure can help with the goal of increasing health literacy and self-

care in the heart failure patient.

In the future, a more detailed nursing knowledge survey can be utilized that would

assess heart failure knowledge more thoroughly. This would provide additional insight on

additional topics that can be addressed in educational sessions held with the nursing staff.

Although heart failure knowledge in the nurse has been studied in the past, additional studies may contribute positively in the goal of better outcomes for heart failure patients.

Limitations

This project had limitations. A small sample size (n=40) provided limited data. In the future, the sample size can be increased by including additional cardiology floors as well as medicine floors that treat heart failure patients. In addition to the small sample size, the survey used was limited and did not include level of experience or education level of the nurse taking the survey. The years of experience and level of education is useful information in an educational project. Nurses that participated in this evaluation indicated that some questions were difficult to interpret what the question was asking.

<div align="center">

Conclusion

</div>

The understanding of the importance of proper heart failure education to both the nurse and the patient is pivotal in reducing heart failure readmissions. Recognizing the gap in knowledge of nursing staff is the first step in working towards a solution. This project aimed to provide education to the nursing staff in order to better educate patients with heart failure. Nurses have a responsibility to provide accurate patient education to their patients and to help facilitate that is ongoing specific education. This project will be presented to the director of nursing services and the director of cardiovascular services at the institution where the study took place. The purpose will be to engage in discussion about increasing ongoing education provided to the nursing staff in order to improve better patient outcomes.

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Appendix A: The Nurses' Knowledge of Heart Failure Education Principles (NKHFEP)

Instrument.

Survey Questions

1. Patients with heart failure (HF) should drink plenty of fluids each day. (False)
2. As long as no salt is added to foods, there are no dietary restriction for patients with HF. (False)
3. Coughing and nausea/poor appetite are common symptoms of advanced HF. (True)
4. Patients with HF should decrease activity and most form of active exercise should be avoided. (False)
5. If the patient gains more than three pounds in 48 hours without other HF symptoms, they should not be concerned. (False)
6. Swelling of the abdomen may indicate retention of excess fluid due to worsening symptoms. (True)
7. If patients take their medications as directed and follow the suggested lifestyle modifications, their HF condition will not return. (False)
8. When patients have aches and pains, aspirin and nonsteroidal anti- inflammatory drugs should be recommended. (False)
9. It is ok to use potassium-based salt substitutes (like "no-Salt" or "Salt Sense") to season food. (False)
10. If the patient feels thirsty, it is ok to remove fluid limits and allow them to drink. (False)
11. If a patient adds extra pillows at night to relieve shortness of breath, this does not mean the HF condition has worsened. (False)
12. If a patient wakes up at night with difficulty breathing, and the breathing difficulty is relieved by getting out of bed and moving around, this does not mean that the HF condition has worsened. (False)
13. Lean deli meats are an acceptable food choice as part of the patient's diet. (False)
14. Once the patient's HF symptoms are gone, there is no need for obtaining daily weights. (False)
15. When assessing weight results, today's weight should be compared with the patient's weight from yesterday, not the patient's ideal or "dry" weight. (False)

The following 5 statements reflect signs or symptoms that patients may have. Mark "yes" (T) or "no" (F) to signify that a patient should notify their HF physician of these signs and symptom

1. Blood Pressure recordings of 80/56 without any HF symptoms. (No/F)
2. Weight gain of 3 pounds in 5 days without symptoms. (Yes/T)
3. Dizziness or lightheadedness with arising that disappears within 10 to 15 minutes. (No/F)
4. New onset or worsening of fatigue. (Yes/T)
5. New onset or worsening of leg weakness or decrease ability to exercise. (Yes/T).

Appendix B: The Nurses' Knowledge of Heart Failure Education Principles (NKHFEP) Instrument- Authorization for Use.

Appendix C: Heart Failure PowerPoint Education

Heart Failure
Sarah Scott

What is Heart Failure?

- Heart Failure (HF) is a complex clinical syndrome that can result from any functional or structural cardiac disorder that impairs the ventricle's ability to fill with or eject blood (Yancy et. Al, 2013)
- Different types of HF
  - HFrEF vs. HFpEF

HFrEF vs. HFpEF

Heart Failure with Reduced Ejection Fraction
- HFrEF is associated with eccentric hypertrophy, a dilation of the ventricles, which manifests itself in reduced pump function.
- Systolic performance: preload, afterload, contractility
- Frank-Starling curve

Heart Failure with Preserved Ejection Fraction
- HFpEF is associated with concentric hypertrophy, a thickening of the ventricular wall, which results in impaired filling. Characterized by EF ≥50 % in current guidelines.
- Abnormal relaxation and passive stiffness that manifests as prolonged relaxation, slow LV filling and increased diastolic stiffness

(Genet, Lee, Bailargeon, Guccione, Kuhl, 2016)

HF PATHOPHYSIOLOGY

Left Ventricle

- LV performance is dependent upon the ability of heart to cycle two states:
  - (a) a compliant left ventricle that allows the LV to fill during diastole from low left atrial pressures
  - b) a firm LV chamber in systole that ejects the stroke volume (volume of blood pumped from one ventricle of the heart with each beat) at arterial pressures.

HFpEF

- Treatment of HFpEF should include:
  - Guideline directed medical therapy
  - Treatment for cardiovascular and noncardiovascular coexisting conditions (CAD, obesity)
  - Aerobic exercise training to increase exercise tolerance
  - Education regarding self-care
  - Disease management programs for patients with refractory symptoms or frequent hospitalizations for heart failure
  - Difficult to treat
- The diagnosis of HFpEF requires:
  - (i) signs or symptoms of heart failure;
  - (ii) normal or mildly abnormal systolic LV function; EF >50%
  - (iii) evidence of diastolic LV dysfunction (Echocardiogram, Cardiac MRI)
- Infiltrative and Inflammatory Cardiomyopathies
  - Biopsy, Cardiac MRI, SPEP/UPEP studies

(Redman & Soloman, 2016)

HFrEF

- Treatment of HFrEF should include:
  - Guideline directed medical therapy
    - ACE-I, BB, aldosterone antagonist, nitrate/hydralazine
  - Treatment for cardiovascular and noncardiovascular coexisting conditions (CAD, obesity)
  - Aerobic exercise training/PT to increase exercise tolerance
  - Education regarding self-care
  - Disease management programs for patients with refractory symptoms or frequent hospitalizations for heart failure
- ICD placement if indicated (primary or secondary)
- CRT therapy if indicated

Hospitalized patient

- Per the ACC AHA guidelines
  - Patients with evidence of volume overload should be promptly treated with IV diuretics (bolus or continuous infusion). Early treatment (emergency department) can lower hospital mortality.
  - Careful monitoring:
    - Volume status
    - Evidence of congestion
    - Oxygenation
    - Daily weight
    - I&O
    - Electrolyte abnormalities, renal function

Sodium and Fluid Restriction

- Sodium restriction is commonly recommended for HF patients, although there is insufficient data to support this, the ACC/AHA guidelines recommend some degree of restriction
- Fluid restriction is thought to be helpful in patients with HF, especially with hyponatremia, as suggested by the ACC/AHA guidelines.

(ACC/AHA, 2017)

Advanced Heart Failure Therapies

- LVAD
- Home inotropes
- Heart Transplantation

- Careful evaluation for each of these options is done through diagnostic testing, social work evaluation, financial evaluation, etc.

Acute vs. Chronic

Clinical Manifestations of Heart Failure

- Weight gain
- Dyspnea
- Orthopnea
- Paroxysmal nocturnal dyspnea
- Peripheral edema
- JVD
- Tachycardia
- Hypotension

- Hepatosplenomegaly
- Ascites
- Fatigue
- Weakness
- Nausea
- Poor appetite
- Cachexia
- Renal hypoperfusion

HF Management

- Goals of therapy of heart failure:
  - Reduce morbidity and mortality
    - Management of associated conditions
    - Lifestyle modification
    - GDMT (Guideline Directed Medical Therapy)
    - Advanced therapy if indicated
    - Cardiac Rehabilitation
    - Preventative care
- Major Society guidelines

HF Management

- Hypertension
  - Reduce blood pressure
  - Reduce LV afterload
    - Decrease progression of pathologic remodeling
- Ischemic Heart Disease
  - CAD
    - Medical therapy
    - Revascularization
    - Diet modification

HF Management

- Valvular Heart Disease
  - Surgical correction
  - Ex: Mitral stenosis or regurgitation
- Arrhythmia-Induced CM
  - Suppression of arrhythmia with surgical procedure or medical therapy.
  - OSA screening and treatment

Lifestyle Modification

- Largely based on observational studies & physiologic rationale
- Few RCT's on the effects of lifestyle modification
  - Avoidance of obesity
  - Restriction or absence of alcohol consumption
  - Dietary sodium restriction
  - Fluid restriction
  - Daily weight monitoring

Pharmacologic Therapy

- Goals of pharmacologic therapy include
  - Improvement of symptoms
  - Slow or reverse deterioration in myocardial function
  - Reduce mortality

Pharmacologic Therapy

- Improvement in symptoms can be achieved with:
  - Diuretics
  - Beta-blockers
  - ACE inhibitors
  - ARBs (angiotensin II receptor blockers)
  - ARNi (angiotensin receptor-neprilysin inhibitors)
  - HCN Channel blocker
  - Hydralazine + Nitrate
  - Aldosterone antagonists

Interactions

- Education on drug interactions is important
- Avoidance of NSAIDS in HF patients
  - Can be used with caution, but should avoid.
  - Use of NSAIDS have been associated with occurrence of symptoms of HF

Drugs to avoid in HF patients

- Specific anti-arrhythmics
- Calcium-Chanel Blockers
- Thiazolidinediones (Tx for type II DM)

What is an example of food with hidden sodium?

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1. Pre-packaged foods :
   frozen foods
   boxed foods
   canned foods
   deli-meats

2. Fast food

3. Restaurants

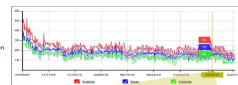4. Flavored drinks
   Soda
   Gatorade

CardioMems

- The CardioMEMS heart sensor monitors cardiac pressures with the goal of improving outcomes for heart failure patients.
  - NYHA Class III patients
  - Monitors pulmonary artery pressure
  - Placed in the cardiac catheterization lab
  - https://www.sjm.com/en/professionals/resources-and-reimbursement/video-and-media/hf-cardiomems-hf-system-implant
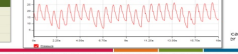
CardioMems

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Appendix D: UMSL IRB Approval Letter

Office of Research Administration

One University Boulevard
St. Louis, Missouri 63121-4499
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Fax: 314-516-6759
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DATE: May 3, 2018

TO: Sarah Scott
FROM: University of Missouri-St. Louis IRB

PROJECT TITLE: [1217441-1] Assessment of Nursing Knowledge Before and After
                         Implementation of Educational Intervention on Heart Failure
REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: May 3, 2018

REVIEW CATEGORY: Exemption category # 2

The chairperson of the University of Missouri-St. Louis IRB has APPROVED the above mentioned
protocol for research involving human subjects and determined that the project qualifies for exemption
from full committee review under Title 45 Code of Federal Regulations Part 46.101b. The time period
for this approval expires one year from the date listed above. You must notify the University of Missouri-
St. Louis IRB in advance of any proposed major changes in your approved protocol, e.g., addition of
research sites or research instruments.

You must file an annual report with the committee. This report must indicate the starting date of the
project and the number of subjects to date from start of project, or since last annual report, whichever is
more recent.

Any consent or assent forms must be signed in duplicate and a copy provided to the subject. The
principal investigator must retain the other copy of the signed consent form for at least three years
following the completion of the research activity and they must be available for inspection if there is an
official review of the UM-St. Louis human subjects research proceedings by the U.S. Department of
Health and Human Services Office for Protection from Research Risks.

This action is officially recorded in the minutes of the committee.

If you have any questions, please contact Carl Bassi at 314-516-6029 or bassi@umsl.edu. Please include
your project title and reference number in all correspondence with this committee.

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