2024

Improving Nutrition Screening Practice in the Hospitalized Heart Failure Patient Population

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Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing Practice at the University of Kentucky

By

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Lexington, KY

2024

Abstract

Background: Heart Failure is a disease known to affect nearly 6.5 million adults in the United States. Characterized by recurrent hospitalizations, heart failure significantly contributes to morbidity, mortality, and healthcare costs in the United States and worldwide. Because malnutrition is prevalent in the heart failure population, healthcare providers must perform nutritional assessments on admission to intervene in the case of malnutrition, prevent deterioration, and improve patient prognosis. Without intervention and early identification of malnutrition, heart failure hospitalizations will remain a significant problem.

Purpose: The purpose of this study is to evaluate the effect of an evidence-based educational program for cardiac nurses designed to improve nutritional screening practice for hospitalized heart failure patients.

Methods: This project followed a quasi-experimental one-group time series pre-posttest design. A retrospective EPIC electronic medical records review was also completed, including data from thirty days pre-educational intervention and thirty days post-educational intervention for comparison of completeness of the nutrition screening tool, malnutrition screening tool, and number of nutrition consults ordered.

Results: There was a significant increase in cardiac nurse knowledge ($p < .001$) after implementing the virtual educational intervention. Mean baseline knowledge increased by 57% from pre- to post. The electronic medical record review found no statistically significant changes in scores post-educational intervention regarding completion of the nutrition screening tool, malnutrition screening tool, or nutrition consults ordered.

Conclusion: Educational interventions may not be enough to overcome barriers that impact nutrition

screening practice in the hospital setting. Future research efforts are needed to translate increased clinician knowledge into standard practice to decrease the burden of heart failure hospitalizations and improve patient outcomes.

Acknowledgement

I want to express my sincere gratitude to my DNP Advisory Committee members, whose support and contributions have been instrumental in completing this project. Special thanks to Dr. Karen Butler, my dedicated Advisor and Committee Chair, for her unwavering guidance, insightful feedback, and continuous encouragement throughout the entire process. Her expertise and commitment to academic excellence have been instrumental in shaping the trajectory of this study. I am grateful for the valuable contributions of my committee members, Dr. Karen Stefaniak and Dr. Linda Clements, for their constructive criticism and thoughtful insights that significantly enhanced the depth and quality of this project.

Additionally, I extend my appreciation to Dr. Amanda Thaxton-Wiggins for her patience and invaluable expertise in this project's statistical analysis. I also thank Whitney Kurtz-Ogilvie for her insightful comments and careful editing of my manuscript. Furthermore, I want to acknowledge those who provided me with clinical opportunities and experiences throughout this journey, including Dr. Kim Blanton, Dr. DeeDee McCallie, Dr. Kathy Isaacs, and Dr. Jessica Sass. Your encouragement, inspiration, and challenges have not only improved this project but have also profoundly impacted my personal and professional growth. I will never forget the positive influence you have had on my life.

Dedication

To my parents:

Thank you for making it possible to pursue my dreams. Everything I am is because of you! I hope I make you as proud as you make me.

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Background and Significance

Problem Statement

Heart failure is a complex chronic disease with high morbidity and mortality rates. One in four heart failure patients is readmitted to a hospital within thirty days of discharge and nearly half are readmitted within six months (Riegel et al., 2018). This frequency is due to symptom exacerbation, lack of treatment adherence, and poor self-care behavior (Matsuoka et al., 2016). Nutritional status is a key factor for hospital readmittance in this population; therefore, early identification of malnutrition in heart failure patients is essential to improving patient outcomes.

Context, Scope, and Consequences of the Problem

Heart failure is a prevalent and progressive condition associated with significant clinical and financial burden. Characterized by recurrent hospitalizations, heart failure is a major contributor to morbidity, mortality, and healthcare costs in the United States and worldwide (Garcia et al., 2019). Approximately 6.5 million American adults aged 18 or older live with heart failure (Mehta et al., 2019), with prevalence projected to increase by 46% by 2030 (Jacobson et al., 2018). Worldwide, cases of heart failure exceed 64 million (Liu et al., 2022). In the United States, one million new cases of heart failure are diagnosed annually, most among adults 55 years and older (Arslanian-Engoren et al., 2020). Heart failure is also currently the costliest illness in the United States, estimated to cost more than $70 billion annually (Lin et al., 2017); 80% of this total is attributed to hospitalizations (Wu et al., 2019).

Heart failure is a chronic public health threat as the mortality rate remains high, with 50% of heart failure patients dying within five years of diagnosis (Wu et al., 2019). In addition, the rate of hospitalizations in this patient population remains elevated. For example, 50% of heart failure patients are re-hospitalized within six months of hospital discharge (Kruse et al., 2017), and 67% are readmitted

within one year due to worsening disease or symptom exacerbation (Wu et al., 2019). Accounting for approximately 900,000 patient hospitalizations annually, 25% of those patients are readmitted within 30 days of a heart failure-related hospitalization, and 36% seek medical attention through an emergency department within 90 days of a heart failure related hospitalization (Arslanian-Engoren et al., 2020). Thus, without intervention, heart failure hospitalizations will remain a significant problem for the foreseeable future.

Practice guidelines from the American College of Cardiology/American Heart Association (ACC/AHA) recommend assessing the nutritional status of heart failure patients; however, no single nutritional tool is considered the gold standard for nutritional assessment in this population (Bonilla-Palomas et al., 2016; Liu et al., 2022; van der Meer et al., 2019). Furthermore, without a universally accepted definition for malnutrition in this patient population, there is concern that patients are being underdiagnosed and under-treated. Malnutrition affects up to 25% of patients hospitalized with heart failure (Bonilla-Palomas et al., 2016), and 20-50% are at risk for malnutrition or are malnourished upon hospital admission (Reber et al., 2019). The underlying disease may directly impair nutritional intake and can be exacerbated by other factors while the patient is hospitalized, such as procedures, examinations, fasting before and after treatments or interventions, inappropriate meal services, or insufficient staff assistance with meals. Thus, healthcare providers must perform nutritional assessments on admission to intervene in the case of malnutrition, prevent deterioration, and improve patient prognosis (Liu et al., 2022). Given the limited studies comparing nutrition screening tools and interventions, there is no optimum standard regarding nutritional support for patients hospitalized with heart failure. Therefore, there is a need for reliable and standardized screening tools to assess the nutritional status of this patient population.

Current Evidence-based Interventions/Strategies Targeting the Problem

Current evidence suggests that early nutritional screening and intervention is essential in patients with heart failure. Liu et al. (2022) examined the impact of nutritional status on readmission in heart failure patients using seven known malnutrition screening tools. Their findings suggest that the prevalence of malnutrition is high in patients hospitalized with heart failure (5.7 – 78.1%, depending on the screening tool), and those with malnutrition have a doubled risk of hospital readmission (Liu et al., 2022). Chen et al. (2022) explored the association between Nutritional Risk Screening 2002 (NRS-2002) and hospital length of stay in heart failure patients. The results of this study indicated that a high NRS-2002 score had a strong and independent association with rehospitalization and hospital length of stay (Chen et al., 2022).

In a third study, the multicenter randomized controlled clinical PICNIC (Nutritional Intervention Program in Hospitalized Patients with Heart Failure who are Malnourished), malnutrition was established using the Mini-Nutritional Assessment (MNA) score (Bonilla-Palomas et al., 2016). This study classified patients as well-nourished, at risk for malnutrition, or malnourished upon hospital admission. The nutritional intervention for the study was based on diet optimization, specific diet recommendations, and nutritional supplements tailored to patient-specific needs. The results of this study demonstrate that individualized nutritional intervention reduces the risk of readmission and mortality in the heart failure patient population (Bonilla-Palomas et al., 2016). Findings from these studies indicate early identification of malnutrition in heart failure patients is essential to improving patient outcomes.

Purpose/Objectives

The purpose of this study is to evaluate the effect of an evidence-based educational program for cardiac nurses designed to improve nutritional screening practice in the hospitalized heart failure patient population. With the implementation of this program, the objectives of this study are:

- By October 10th, 2023, evaluate for the completion of nutrition and malnutrition screening tools in UK HealthCare's electronic medical record, EPIC, in addition to the number of nutrition consults ordered by nursing staff before implementation of the educational program.
- By October 24th, 2023, all nursing staff on units 6 North and 6 West will have completed the educational intervention for the study, along with pre- and post-tests. Compare pre- and post-test data results.
- By November 24th, 2023, evaluate for the completion of nutrition and malnutrition screening tools in EPIC in addition to the number of nutrition consults ordered by nursing staff in the thirty days after implementation of the educational intervention. Compare to pre-intervention data.

Theoretical Framework

Lewin's change theory guided the theoretical framework of this project. Developed by Kurt Lewin, the change theory of nursing is a model used to understand the planned change process at the organizational level (Butts & Rich, 2018). The change theory is comprised of three stages: unfreezing, change, and refreezing (Butts & Rich, 2018). Unfreezing creates an awareness of how the status quo is hindering the organization (Butts & Rich, 2018). It is then necessary to overcome individual resistance and group conformity. In the change stage, people learn new behavior, processes, and thinking methods (Butts & Rich, 2018). Lastly, refreezing involves cementing new behaviors into the organization's culture and maintaining them as the accepted norms (Butts & Rich, 2018). This project aims to bring awareness

of the need to assess heart failure patients' nutrition status accurately, establish steps to create new behaviors, and adapt the steps to move towards organizational change.

Review of the Literature

PICOT Question and Search Strategies

A literature review was conducted to determine the effectiveness of a nutritional education program designed for staff and its effect on nutrition screening practice in the hospitalized heart failure patient population. Using the PICOT format, the guiding question for this review was: Does an evidence-based educational program improve nutritional screening practice for hospitalized heart failure patient patients among cardiac nurses?

This literature search was conducted using CINAHL and PubMed and included articles published between January 1, 2018, and February 15, 2023. Search terms were generated from the words in the PICOT question and synonyms. Keywords were combined using the Boolean connectors "AND" and "OR" to link the PICOT question's different components. The list of search terms used in this literature search included: "heart failure," "hospital*," "education OR staff education," "nutri* OR nutri* screen* OR nutri* tool," "malnutri*," and "readmission." Inclusion criteria involved peer-reviewed primary studies published in English and available in free full-text and electronic format. This review excluded articles not published between January 1, 2018, and February 15, 2023, studies including heart failure patients under age 18, studies written in a language other than English, and articles that were not both in free full-text and available in a digital format. Twenty-seven articles met the inclusion criteria, and nine were chosen to be analyzed based on quality of evidence and themes.

Synthesis of the Literature

The overall strength of the evidence is mixed and of moderate to high quality. Heart failure patients who were identified with subpar nutritional status were found to have significantly more

hospital readmissions than patients who were not (Chen et al.,2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021; Uemura et al., 2022). The evidence shows that poor nutritional status in the heart failure patient population is a predictor of mortality (Chen et al., 2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021). Moreover, nutritional evaluation and screening can provide guidance and secondary prevention (Chen et al., 2022; Hersberger et al., 2021; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Sundel & Emerson, 2018; Takikawa et al., 2021; Uemura et al., 2022). Therefore, exploring the best available tools to evaluate nutritional status is essential. However, there is currently no gold standard nutritional screening tool that is widely accepted for use in this patient population (Chen et al., 2022; Hersberger et al., 2021; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021; Uemura et al., 2022).

Because heart failure patients present unique screening challenges, a universal screening tool will not work. Therefore, it is essential to find one that is tailored to this specific population. Patients with heart failure often have the presence of edema and varying levels of inflammation or comorbidities, which may affect the accuracy and stability of nutritional evaluation when using a universal nutrition tool (Hu et al., 2022). This suggests that nutrition screening tools should be selected according to individualized patient characteristics, clinical setting, and the purpose of the screening or assessment (Chen et al., 2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021). In addition, studies have shown that regardless of the nutritional tool utilized, malnutrition in the heart failure patient population predicts mortality (Chen et al., 2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019).

Gaps in Practice

Evidence supports the need for nutrition screening and assessment in the hospitalized heart failure patient population; however, there is no gold standard nutritional tool recommended for these patients, and there appears to be a dearth of nutritional education programs designed for nurses. Nevertheless, available research supports using nutrition screening tools to identify malnourished patients to prevent deterioration and improve prognosis (Joaquín et al., 2020). In one study, a nurse-focused educational intervention on heart failure self-care principles significantly improved nurses' knowledge post intervention (Sundel & Emerson, 2018). Potential barriers to nutrition screening within the clinical setting may include increased acuity of patients, increased volume of patients, unknown availability of screening tools, lack of time to complete assessment, and lack of staff awareness that they can place orders for nutrition consultations. This project's educational intervention is expected to increase nutritional screening knowledge, improve nurses' ability to order nutrition consults, and close gaps related to inadequate nutritional status screening on 6 North and 6 West.

Methods

Design

This study was a quasi-experimental one-group time series pre-posttest created to evaluate the effectiveness of an educational intervention designed for staff on nutrition screening practice in the hospitalized heart failure patient population.

Setting

Agency Description

The study took place at the University of Kentucky Chandler Medical Center located in Lexington, Kentucky. The setting is a 1,029 licensed bed academic medical, Level One trauma center

located the southeast region of the United States. This Magnet-designated facility offers a comprehensive and multidisciplinary approach to treating heart failure.

Agency Mission Statement

The mission of UK HealthCare is exhibited through its five DIReCT core values. These values stand for Diversity, Innovation, Respect, Compassion, and Teamwork, and act as a decision-making guide for staff to foster a culture focused on patient-centered care committed to creating a healthier Kentucky. Initiating an intervention to address the nutritional needs of a population of patients with a known and unmet need ties in well with the mission statement of this healthcare organization. This project seeks to recognize the importance of nutrition screening for each patient, every time, and to identify malnourished patients to prevent deterioration and improve prognosis.

Stakeholders

Project stakeholders included the DNP project committee consisting of Dr. Karen Butler, committee chair, Dr. Karen Stefaniak, committee member, and Dr. Linda Clements, clinical mentor. Dr. Amanda Thaxton-Wiggins represented the statistician. In addition, the Chief Nursing Officer and Operations Director for the cardiothoracic service line, Dr. Kimberly Blanton and Colleen Hurst, agreed to support this project and its implementation. Key stakeholders for this project included heart failure patients admitted to an inpatient room on 6 North or 6 West, staff nurses on 6 North and 6 West, as well as the patient care manager and assistant patient care manager for both hospital units.

Facilitators and Barriers to Implementation

Project facilitators included support from hospital administration and unit management at UK HealthCare and the readiness of nursing staff to complete the educational intervention. Barriers to implementation included the availability of staff, time constraints of staff, high turnover rate of staff participants, and potential hesitancy of the staff to buy into the training.

Sample

Target Population

The target audience included nursing staff on 6 North and 6 West at Chandler Hospital at UK HealthCare. Inclusion criteria were any regular full-time, part-time, PRN, or agency staff who consistently work in direct patient care on units 6 North and 6 West. The project focused on nursing staff, and participants were not excluded based on gender, race/ethnicity, or health status, as these would not influence the outcome of interest. Exclusion criteria included pool staff or other nursing staff that do not regularly work in direct patient care on 6 North or 6 West. A convenience sample of 30 staff nurses was projected for this project.

Procedure

IRB Submission Process

This DNP project was approved by the University of Kentucky's Medical Institutional Review Board (IRB) on September 18, 2023, to ensure the protection of human subjects (see Appendix A). Before implementing this DNP project, approval in the form of a letter of support was also obtained from the Nursing Operations Director of Cardiovascular Services, demonstrating organizational and leadership support for the project.

Evidence-based Intervention

After IRB approval, eligible participants were contacted once via their @uky.edu email with the IRB-approved cover letter, pre-test, educational intervention, and post-test explaining the voluntary nature of the study and consent to participate. This study had a pre- and post-test comprising ten questions each, with the first question requiring the participant to create an identifier to allow for anonymity with results. The virtual educational intervention consisted of a PowerPoint slide show presentation lasting less than ten minutes (See Appendix B). The educational intervention included

information regarding heart failure prevalence and cost burden, the importance of nutrition screening in heart failure patients, where to chart nutrition-related data, and how to order a nutrition consult in UK HealthCare's electronic medical record (EMR), EPIC. The educational intervention was made available to all 6 North and 6 West staff nurses regardless of study participation, and the period to opt into participation remained open for two weeks.

Measures and Instruments

The primary investigator (PI) developed the pre- and post-educational intervention tests based on content from the virtual educational intervention. Both pre- and post-intervention tests consisted of ten questions, with the first requiring the participant to create an anonymous identifier to allow for anonymity with results. Qualtrics was utilized to generate the pre-test and post-test to administer to nursing staff via their work @uky.edu email. The email generated to 6 North and 6 West nursing staff included the IRB approval cover letter that addressed the purpose, methodology, risks, benefits, project process, and the PI's contact information. After reading the cover letter, completing the pre- and post-tests demonstrated participant consent. The pre- and post-test links remained open for two weeks before expiring.

Data Collection

The nursing educational intervention data were collected anonymously for both pre- and post-tests via Qualtrics. The Qualtrics software platform was accessible through the University of Kentucky's license and is a secure online survey tool. Participants on 6 North and 6 West were provided a unique link by email to access pre- and post-tests, to participate in the study, and to preserve participant anonymity. In addition, the first question on the pre- and post-tests contained an anonymous one-question identifier limited to a color and a set of four-digit numbers, such as PINK1234. This identifier

allowed for comparing pre- and post-test data results while keeping participant information unidentifiable.

Thirty days after the close of the survey opt-in, a retrospective medical record review of EPIC took place. EPIC was queried for all patients admitted with a heart failure diagnosis or related complication (see Table 1) on 6 North and 6 West, thirty days before the start of the educational intervention study, and thirty days post-educational intervention for comparison. A sample size of thirty-nine patient charts was chosen per simple random sample from all charts that met eligibility requirements, both pre- and post-intervention. Data extraction also included nutrition consults ordered and completion of nutrition and malnutrition screening tools pre- and post-intervention for comparison. The Center for Clinical and Translational Science (CCTS) performed data extraction, and the unidentifiable patient and participant data were then transferred into data analysis software (IBM SPSS) for analysis.

Data Analysis

The paired samples t-test was used to compare nursing knowledge pre- and post-educational intervention. From the chart review, patient demographics were summarized using means and standard deviation and frequency distributions and were compared using the two-sample t-test and chi-square test of association. Rates of completion of nutrition and malnutrition screening tools between pre- and post-intervention samples were compared using the chi-square test of association. All analysis was conducted using the Statistical Package for the Social Sciences (SPSS), version 29 with an alpha level of .05 to denote statistical significance.

Results

Thirty-two nurses from units 6 North and 6 West completed the educational intervention pre-survey, and 22 completed the educational intervention post-survey. Both surveys were sent to the 41

nurses that comprise units 6 North and 6 West, resulting in a 78% pre-survey completion rate and a 54% post-survey completion rate. Overall, there was a significant increase in mean knowledge scores post-intervention compared to pre-intervention ($p < .001$, see Table 2). The pre-intervention survey had a mean score of 38.6 (SD = 16.6), with mean scores increasing to 95.5 (SD = 10.5) post-intervention.

The EPIC electronic medical records review included 39 of 77 patient charts in the pre-intervention data and 39 of 85 patient charts in the post-intervention data (see Table 3). There was no significant difference in the demographic profiles between groups. The average age of the pre-intervention group had a mean age of 66.8 years (SD = 13.5) and 61.8 years (SD = 11.9) in the post-intervention group. In both samples, the majority of the patient population was male, 61.5% and 56.4%, respectively. The distribution of the diagnoses amongst both groups was similar between the two sample populations. The most frequent diagnosis was left ventricular dysfunction (pre = 66.7%; post = 64.1%), followed by other heart failure categories (69.2%; 59.0%), respiratory failure (48.7%; 53.8%), edema (17.9%; 12.8%), biventricular dysfunction (2.6%; 0.0%), and right heart dysfunction (0.0%; 7.7%). Because both sample groups reflected consistent patient populations on 6 North and 6 West, the groups were comparable.

Results showed no significant difference between the two sample populations among these categories; however, results decreased from pre to post in each category. In the pre-intervention group, 87.2% of patients were screened for completion of the nutrition screening tool, and 82.1% were screened in the post-intervention group (see Table 4). Nutrition consults ordered pre-intervention were 35.9% and 30.8% post-intervention, respectively (see Table 5). Lastly, completion of malnutrition screening tools pre-intervention was 87.2%, versus 82.1% post-intervention (see Table 6).

Discussion

The purpose of this study was to evaluate the effect of an evidence-based educational program for cardiac nurses designed to improve nutritional screening practice in the hospitalized heart failure patient population. Through a virtual education module, nurses were educated about heart failure prevalence and cost burden, the importance of nutrition screening in heart failure patients, how to document nutrition-related data in a patient's EMR, and how to order a nutrition consult in EPIC. The results from this project found that the evidence-based educational intervention did significantly increase cardiac nurse knowledge but did not significantly increase nutritional screening practice in the hospitalized heart failure patient population as expected.

Heart failure is rising in prevalence, yet no specific nutritional recommendations exist for this patient population (Bonilla-Palomas et al., 2016; Liu et al., 2022; van der Meer et al., 2019). Participants in this study had an increase in knowledge regarding the prevalence of heart failure from 31.8% in the pre-test to 100% in the post-test (see Figure 6). Study participants also increased their knowledge concerning the percentage of heart failure patients who die within five years of diagnosis from 36.4% in the pre-test to 95.5% in the post-test. Additionally, participants increased their knowledge of the number of heart failure cases diagnosed annually in the United States from 13.6% in the pre-test to 86.4% in the post-test. This study showed increased knowledge, demonstrating that educational interventions with nursing staff can be effective at improving clinician knowledge.

Staff were also asked if they had heard of or had utilized the MST, their frequency of screening for malnutrition over the past two weeks, and their level of comfort assessing patient nutritional status. Participants revealed that 57.6% had heard of or utilized the MST in the pre-test, and 63.6% indicated they had heard of or used it in the post-test (see Table 7). Consequently, when asked about their frequency of screening for malnutrition over the past two weeks, the most prevalent answer in the pre-

test was “occasionally,” with a 34.4% response, and “never” in the post-test with a 31.8% response (see Table 8). Furthermore, when participants were asked about their comfort level with assessing patient nutritional status, the majority in both pre-and post-tests resulted in “somewhat comfortable,” with 43.8% and 45.5%, respectively (see Table 9). Although these results were not statistically significant, they are clinically significant. Regardless of screening tool type, the burden of completion falls on nursing staff during patient admission. Thus, the tool utilized should be appropriate for the patient population, be simple to use, and consider the time constraints of nurses (House & Gwaltney, 2022). Additionally, the MST asks subjective questions, which becomes problematic when a patient cannot effectively communicate (House & Gwaltney, 2022).

Although nurse knowledge increased post-intervention, the education did not translate into practice, with increased nutrition screenings completed or nutrition consults ordered. As Lewin's change theory guided the theoretical framework of this project, this three-staged model entails creating a perception that change is needed, then moving towards the new desired level of behavior while solidifying the new behavior as the norm. Based on this theory, the educational intervention represented the first stage of change, called unfreezing, which created an awareness of how the status quo was hindering the organization (Butts & Rich, 2018). Barriers to completely progressing though the change and refreezing stages could include the short timeframe of the study, the small sample size of nurses and patients, patient acuity, staffing levels, and an assumption that admission screenings and documentation were completed on a preceding unit or by the admitting nurse.

Participant responses about their comfort level when assessing patient nutritional status indicate the need for more training and education (see Table 9). Various educational methods would be appropriate to account for different learning styles, such as more in-depth virtual and in-person training, posters, visual reminders, and role-play exercises. As the literature indicates, nursing education has

improved completion and compliance with nutrition screening; however, an ongoing, multifaceted approach is optimal for long-term compliance (House & Gwaltney, 2022). A multidisciplinary team approach to care could also be implemented, including dieticians designated explicitly to this patient population in the inpatient setting. With dieticians at the forefront of nutritional care, appropriate nutrition screening tools can be tailored to each patient, allowing for earlier intervention. This could also indicate the need for nutrition consults to automatically drop in EPIC when a patient is admitted with heart failure or a related diagnosis. Dieticians would also serve as patient advocates to reduce the amount of time patients spend fasting for potential and planned procedures to improve patient outcomes and reduce readmission risk (Joshi et al., 2023). Nutrition is crucial for heart failure patients, not only in prevention but also with regard to management and prognosis.

Implications for Practice, Education, Policy, and Research

Nutrition plays a crucial role in health promotion and disease prevention. Nutrition intake and its various controlling mechanisms, such as sensory cues and appetite, are complex physiological processes that influence a person's nutritional status. Patients with a chronic illness such as heart failure may struggle to meet their nutritional and hydration needs.

Nutritional risk screening is a rapid first-line tool that should be completed systematically in patients upon hospital admission to detect patients who are nutritionally at risk or malnourished (Osorio et al., 2023). Nutrition screening tools identify patients at nutritional risk early, thus raising awareness of the need for timely and adequate nutritional support. Patients identified as malnourished should have a nutrition consult or other standardized approach to further assess and tailor an appropriate dietary intervention to the individual patient's needs. Utilizing nutrition screening tools and managing malnutrition may contribute to improved patient outcomes and an overall reduction in health costs (Osorio et al., 2023; Reber et al., 2019). As the electronic health record EPIC at UK HealthCare already

comprises both the nutrition screening tool and the MST, there are no additional costs to utilize the tools other than provider time. Not screening patients for nutritional risk eliminates consultation opportunities, resulting in losses from potential reimbursements, which may also unintentionally decrease the quality of life of overlooked patients and lead to health complications or future rehospitalization (House & Gwaltney, 2022).

The increase in mean knowledge scores amongst nursing staff pre- and post-educational intervention was statistically significant. Nevertheless, the retrospective EPIC electronic medical records review did not result in a statistically significant difference between the pre- and post-nursing intervention data. Notably, there was not an increase in nutrition consults ordered or patients screened for nutritional risk, with consults ordered and screenings similar in amount both pre- and post-intervention. Although nurse knowledge increased, the education did not translate into more screenings completed or nutrition consults ordered post-intervention. With the results and implications of this study, it is crucial for further research to assess the impact of improving nutrition screening practice in the hospitalized heart failure patient population with a larger sample of nursing staff. Further study is warranted since the research findings from the medical records review were not statistically significant.

Future initiatives could also involve studies with more frequent nurse education and reminders to complete nutrition screenings using different delivery methods, such as technological reminders through the EMR or leadership reminders via staff meetings or other forms of communication. Furthermore, this pilot study can be a foundation for further research studies, as gaps and limitations can be addressed in future studies.

Limitations

This DNP study has several limitations regarding sample size, design, and data collection. The nursing sample size was small and taken from a convenience sample from two cardiac units.

Additionally, the post-survey received fewer responses than the pre-survey, which could be due to the lack of survey completion reminders, or may indicate the presence of survey fatigue, or staff time constraints. Despite efforts to make the educational intervention concise, some participants answered only some of the ten survey questions or completed the post-survey. The study was voluntary, and participation and participants could have completed pre- and post-surveys without participating in the educational intervention, limiting the strength of the results. This study was conducted on 6 North, where the primary investigator works, which may have also biased participation.

Additionally, data were analyzed in aggregate, which could conceal differences between and among subgroups. The study's electronic medical records chart review section was a retrospective design, so extrapolation or generalizability is limited. Another limitation of this study was the two 1-month periods; the time periods were selected out of necessity and convenience for completion. This study would benefit from an increased time frame for data collection and the inclusion of more patient units to ensure less variability and verify the effects of the implementation model.

Conclusion

There is increasing awareness of the role of diet in both health and disease management; however, there is limited information on the role of nutrition screening in the management of heart failure. Because of the lack of standardized definitions and agreement on assessment tools to quantify nutritional status, malnutrition is often missed in patients with heart failure. Early assessment of nutritional risk can help determine more appropriate nutritional therapy in the hospital setting and decrease all-cause mortality in this patient population. The results of this study demonstrated increased knowledge among nursing staff, indicating that educational interventions can effectively improve clinician knowledge. More research is needed to determine ways to translate increased knowledge into practice to decrease the burden of heart failure hospitalizations and improve patient outcomes.

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Tables

Table 1: ICD-10 Diagnosis Codes

Code #	Description
150	Heart failure
150.1	Left ventricular failure, unspecified
150.2	Systolic (congestive) heart failure
150.20	Unspecified systolic (congestive) heart failure
150.21	Acute systolic (congestive) heart failure
150.22	Chronic systolic (congestive) heart failure
150.23	Acute on chronic systolic (congestive) heart failure
150.3	Diastolic (congestive) heart failure
150.30	Unspecified diastolic (congestive) heart failure
150.31	Acute diastolic (congestive) heart failure
150.32	Chronic diastolic (congestive) heart failure
150.33	Acute on chronic diastolic (congestive) heart failure
150.4	Combined systolic (congestive) and diastolic (congestive) heart failure
150.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
150.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure
150.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure
150.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
150.8	Other heart failure
150.81	Right heart failure
150.810	Right heart failure unspecified
150.811	Acute right heart failure
150.812	Chronic right heart failure
150.813	Acute on chronic right heart failure
150.814	Acute on chronic right heart failure due to left heart failure
150.82	Biventricular heart failure
150.83	High output heart failure
150.84	End stage heart failure
150.89	Other heart failure
150.9	Heart failure, unspecified
I11.0	Hypertensive heart disease with heart failure
R06.0	Dyspnea, unspecified
J96	Respiratory failure, unspecified
R60.9	Edema, unspecified
J81.0	Acute pulmonary edema
E87.7	Fluid volume overload, unspecified

(WHO, 2023)

Table 2: Comparison of Heart Failure Knowledge Before and After Educational Intervention (n = 22)

	Pre-education *mean* (SD)	Post-education *mean* (SD)	*p*
Knowledge score	38.6 (16.6)	95.5 (10.5)	<.001

Table 3: Patient Demographics

	Pre (n = 39) mean (SD) or n (%)	Post (n = 39) mean (SD) or n (%)	*p*
Age	66.8 (13.5)	61.8 (11.9)	0.08
Sex			
Male	24 (61.5%)	22 (56.4%)	0.65
Female	15 (38.5%)	17 (43.6%)	
Diagnosis*			
Left Ventricular Dysfunction	26 (66.7%)	25 (64.1%)	>.99
Right Heart Dysfunction	0 (0.0%)	3 (7.7%)	0.24
Biventricular Dysfunction	1 (2.6%)	0 (0.0%)	>.99
Other Heart Failure Categories	27 (69.2%)	23 (59.0%)	0.48
Respiratory Failure	19 (48.7%)	21 (53.8%)	0.82
Edema	7 (17.9%)	5 (12.8%)	0.76

**Some patients were admitted with more than one primary diagnosis*

Table 4: Patients Screened with Nutrition Screening Tools

	Pre (n = 39) n (%)	Post (n = 39) n (%)	*p*
Screened	34 (87.2%)	32 (82.1%)	0.53
Not Screened	5 (12.8%)	7 (17.9%)	

Table 5: Nutrition Consults Ordered Amongst Patients Screened with Nutrition Screening Tools

	Pre (n = 39) n (%)	Post (n = 39) n (%)	*p*
Consult Ordered	14 (35.9%)	12 (30.8%)	0.63
Consult Not Ordered	25 (64.1%)	27 (69.2%)	

Table 6: Malnutrition Screening Tool (MST) Results

MST Score	Pre (n = 39) n (%)	Post (n = 39) n (%)
Not Screened	5 (12.8%)	7 (17.9%)
0	28 (82.4%)	22 (68.8%)
1	2 (5.9%)	3 (9.4%)
2	2 (5.9%)	2 (6.3%)
3	1 (2.9%)	3 (9.4%)
4	0 (0.0%)	2 (6.3%)
5	1 (2.9%)	0 (0.0%)

Table 7: Heard of/Utilized the Malnutrition Screening Tool (MST)

Answer	Pre-test Results (n = 33) n (%)	Post-test Results (n = 22) n (%)
Yes	19 (57.6%)	14 (63.6%)
No	14 (42.4%)	8 (36.4%)

Table 8: Frequency of Malnutrition Screening Over the Past Two Weeks

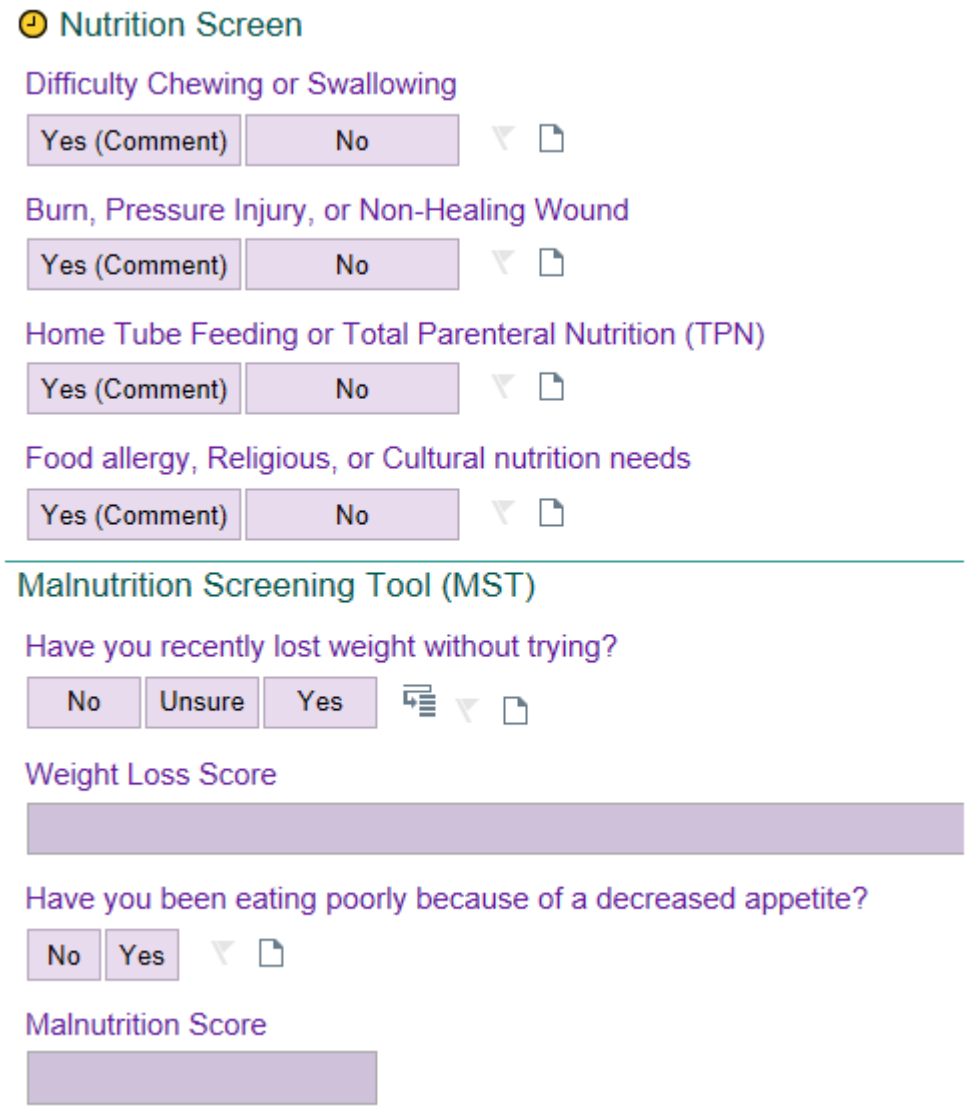
Frequency	Pre-test Results (n = 33) n (%)	Post-test Results (n = 22) n (%)
Never	9 (28.1%)	7 (31.8%)
Seldom	4 (12.5%)	4 (18.25)
Occasionally	11 (34.4%)	6 (27.3%)
Often	8 (25%)	4 (18.2%)

Table 9: Level of Comfort Assessing Patient Nutritional Status

Level	Pre-test Results (n = 33) n (%)	Post-test Results (n = 22) n (%)
Not comfortable	4 (12.5%)	3 (13.6%)
Somewhat comfortable	14 (43.8%)	10 (45.5%)
Comfortable	8 (25.0%)	6 (27.3%)
Very Comfortable	6 (18.8%)	2 (9.1%)

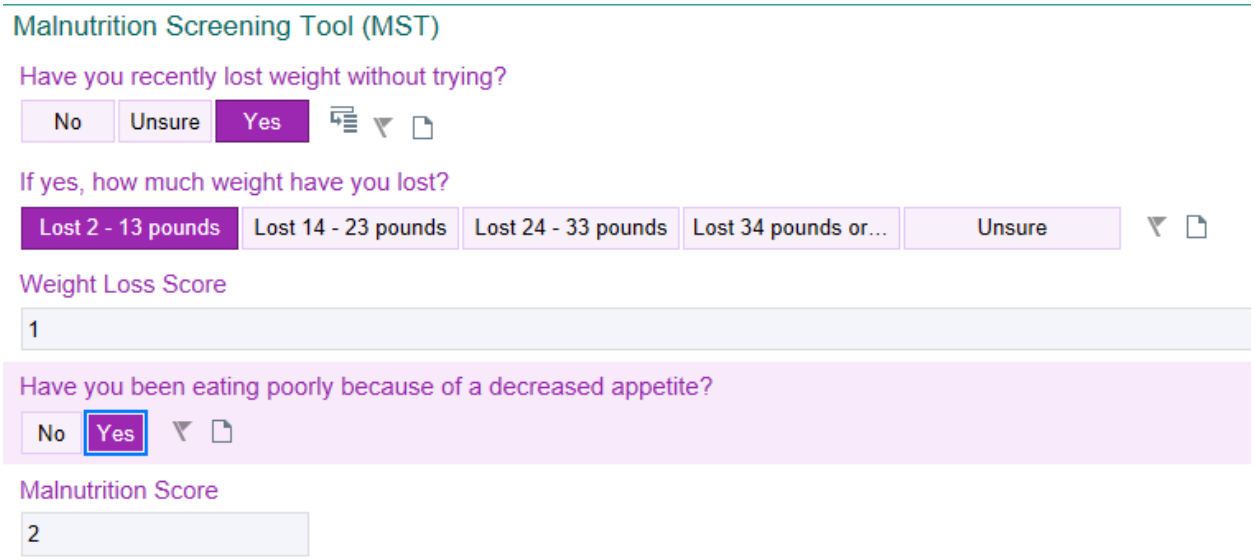
Figures

Figure 1: Nutrition Screen and Malnutrition Screening Tool (MST)



(EPIC, personal communication, April 1, 2023)

Figure 2: Example of Malnutrition Screening Tool (MST) in Practice



(EPIC, personal communication, April 1, 2023)

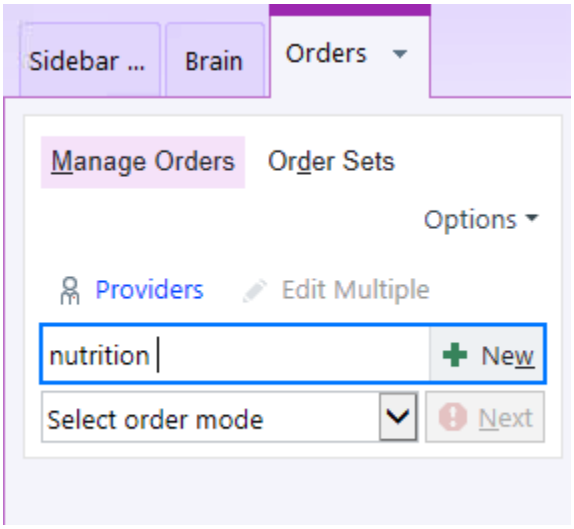
Figure 3: Malnutrition Screening Tool (MST) Scoring

Malnutrition Screening Tool (MST).

Have you lost weight recently without trying?	
No	0
Unsure	2
If yes, how much weight (kilograms) have you lost?	
1–5	1
6–10	2
11–15	3
>15	4
Unsure	2
Have you been eating poorly because of a decreased appetite?	
No	0
Yes	1
Total	
Score of 2 or more = patient at risk of malnutrition.	

(Serón-Arbeloa et al., 2022)

Figure 4: Ordering a Nutrition Consult Part 1

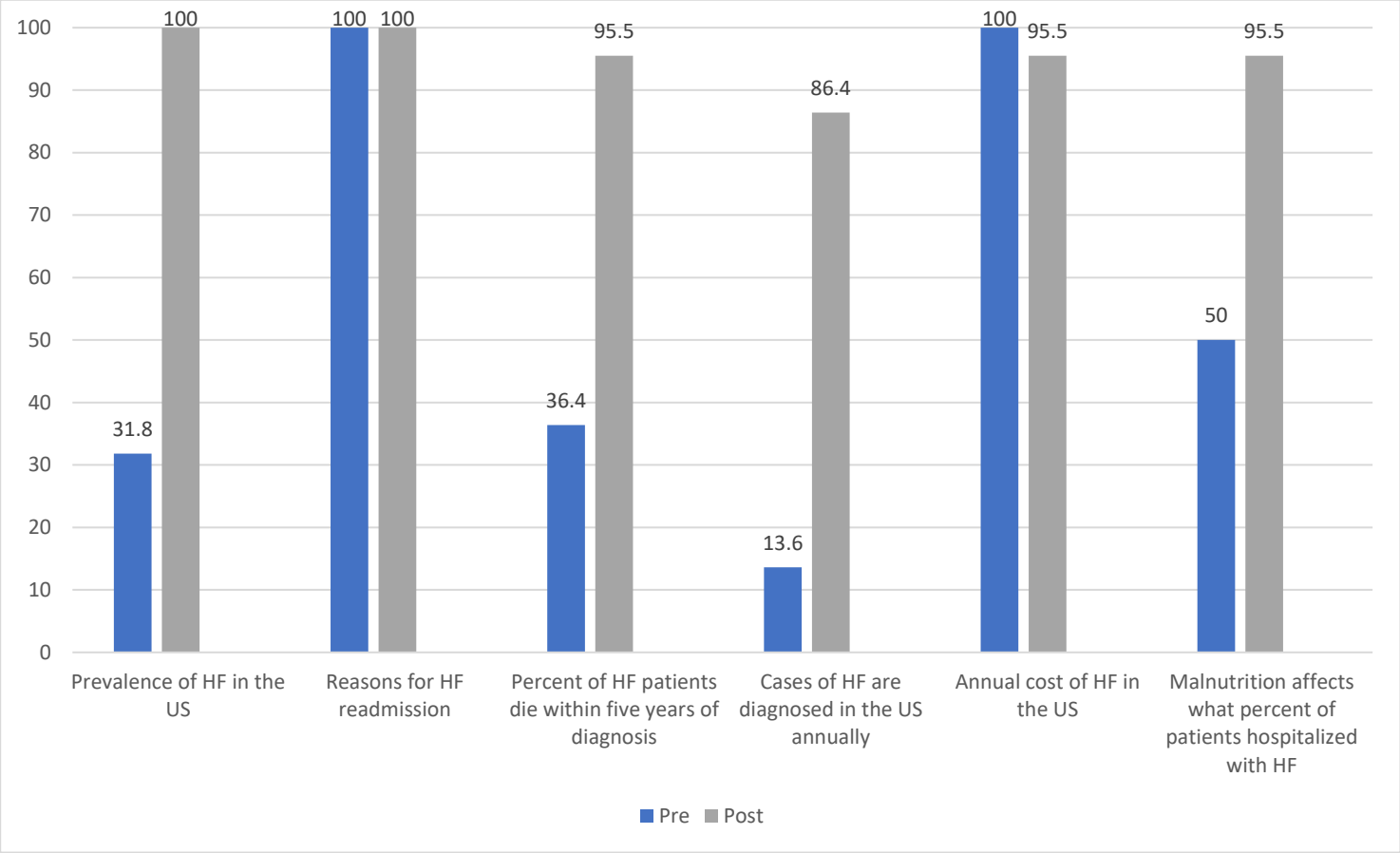


(EPIC, personal communication, April 5, 2023)

Figure 5: Ordering a Nutrition Consult Part 2

(EPIC, personal communication, April 5, 2023)

Figure 6: Descriptive Summary of Knowledge Items from Qualtrics Surveys (n = 22)



Appendices

Appendix A: Cover Letter

University of Kentucky | Office of Research Integrity
IRB, RDRC

XP Initial Review

Approval Ends:	IRB Number:
9/17/2024	89489

TO:	Amanda Bourgeois, BSN College of Nursing PI phone #: 8593126769 PI email: amanda.bourgeois1@uky.edu
FROM:	Chairperson/Vice Chairperson Medical Institutional Review Board (IRB)
SUBJECT:	Approval of Protocol
DATE:	9/18/2023

On 9/18/2023, the Medical Institutional Review Board approved your protocol entitled:

Improving Nutrition Screening Practice in the Hospitalized Heart Failure Patient Population

Approval is effective from 9/18/2023 until 9/17/2024 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, the IRB approved consent/assent document(s) to be used when enrolling subjects can be found on the approved application's landing page in E-IRB. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.] Prior to the end of this period, you will be sent a Continuation Review (CR)/Annual Administrative Review (AAR) request which must be completed and submitted to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions and requirements. The research procedures should be implemented as approved in the IRB protocol. It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online Office of Research Integrity's IRB Survival Handbook. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

seeblue.

405 Kinkead Hall | Lexington, KY 40506-0057 | P: 859-257-9428 | F: 859-257-8995 | www.research.uky.edu/ori/

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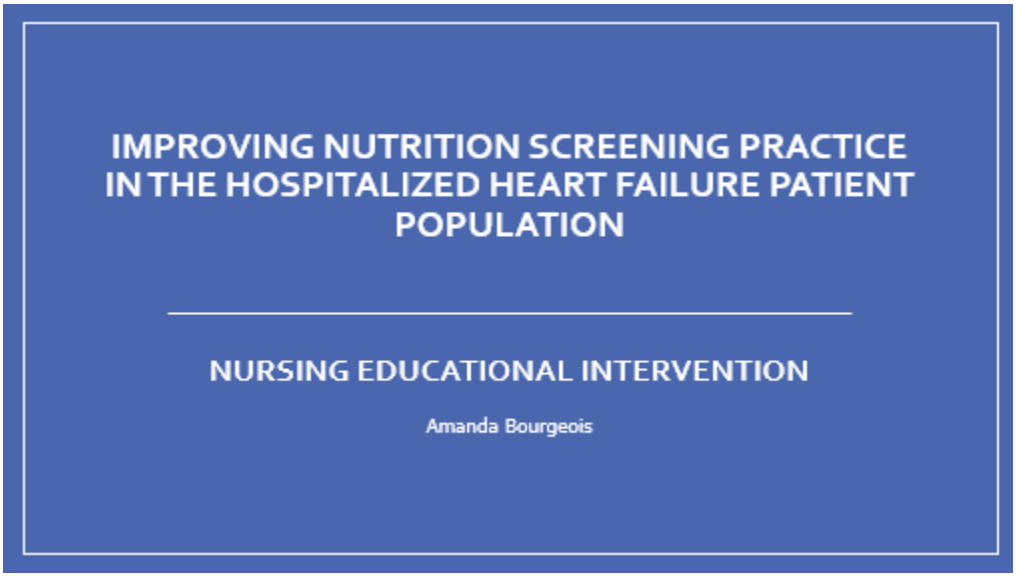
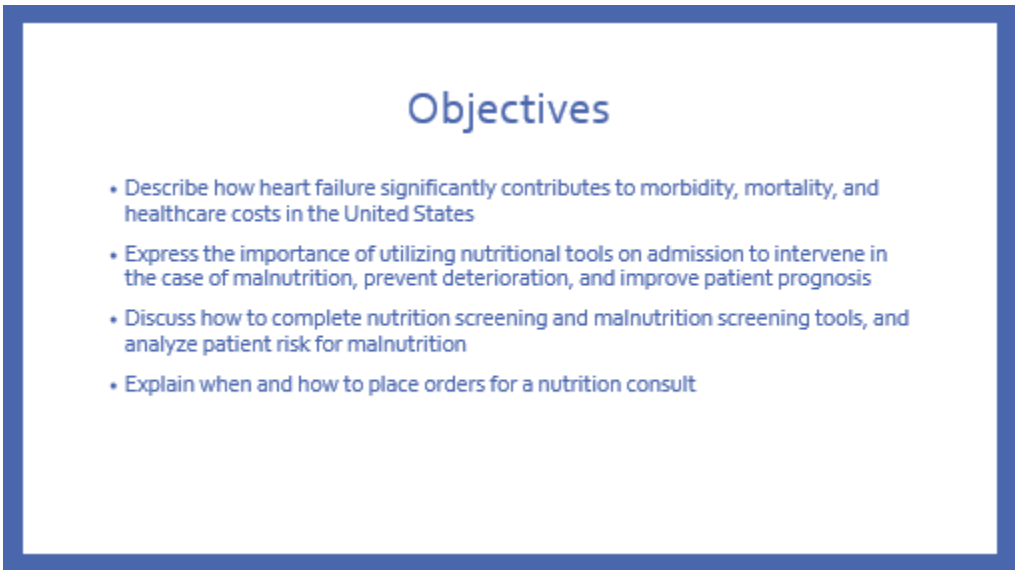
Appendix B: Educational Module Presentation





Problem

- Heart failure is a complex chronic disease with high morbidity and mortality rates. As the incidence of heart failure increases, one in four heart failure patients is readmitted to a hospital within thirty days of discharge and nearly half within six months (Riegel et al., 2018).
- Heart failure patients are frequently readmitted to the hospital due to symptom exacerbation, lack of treatment adherence, and self-care behavior (Matsuoka et al., 2016).
- The high incidence of hospitalizations may be attributed to the nutritional status of patients; therefore, early identification of malnutrition in heart failure patients is essential to improving outcomes and the overall nutrition status of this patient population.

Context and Scope

- Approximately 6.5 million American adults aged 18 or older live with heart failure (Mehta et al., 2019).
- Heart failure is also currently the costliest illness in the United States, estimated to be more than 70 billion dollars annually (Lin et al., 2017), of which 80% of this total cost is attributed to hospitalizations (Wu et al., 2019).
- Heart failure is a chronic and public health threat as the death rate remains high, with 50% of heart failure patients dying within five years of diagnosis (Wu et al., 2019).
- In the United States, one million new cases of heart failure are diagnosed annually, most among adults in the 55 years and older population (Arslanian-Engoren et al., 2020).

Synthesis of the Literature

- The evidence shows that poor nutritional status in the heart failure patient population is a predictor of mortality (Chen et al., 2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021)
- The nutritional status of heart failure patients impacts the long-term survival of this patient population, and nutritional evaluation and screening can provide guidance and secondary prevention (Chen et al., 2022; Hensberger et al., 2021; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Sundel & Emerson, 2018; Takikawa et al., 2021; Uemura et al., 2022).
- Heart failure patients across the spectrum identified with subpar nutritional status were significantly related to increased hospital readmissions (Chen et al.,2022; Hu et al., 2022; Joaquín et al., 2020; Liu et al., 2022; Qian et al., 2022; Ruiz et al., 2019; Takikawa et al., 2021; Uemura et al., 2022).
- Available research supports using nutrition screening tools to identify malnourished patients to prevent deterioration and improve prognosis (Joaquín et al., 2020).

Study Design and Timeline

- This study is a quasi-experimental one-group time series pre-posttest created to evaluate the effectiveness of an educational intervention designed for staff and its effect on nutrition screening practice in the hospitalized heart failure patient population.

Prevalence of Malnutrition

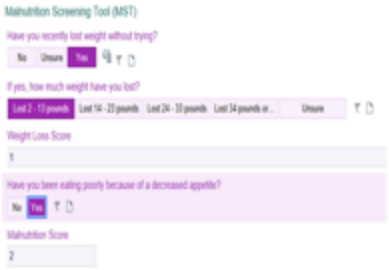
- No single nutritional tool is considered the gold standard for nutritional assessment in the heart failure population (Liu et al., 2022; van der Meer et al., 2019).
- Without a universally accepted definition for malnutrition in this patient population, there is concern that patients are being underdiagnosed and under-treated.
- The prevalence of malnutrition affects up to 25% of patients hospitalized with heart failure (Bonilla-Palomas et al., 2016).

Nutrition Screening Tools

Nutrition Screen

Malnutrition Screening Tool (MST)

Completing Nutrition Screening Tools



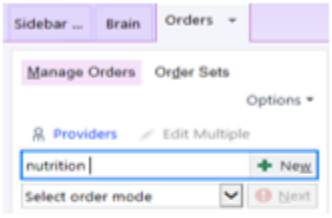
Malnutrition Screening Tool (MST).

Have you lost weight recently without trying?	
No	0
Unsure	2
If yes, how much weight (kilograms) have you lost?	
1–5	1
6–10	2
11–15	3
>15	4
Unsure	2
Have you been eating poorly because of a decreased appetite?	
No	0
Yes	1
Total	

Score of 2 or more = patient at risk of malnutrition.

Nutrition Consult Orders

- Click on patient name
- Find "Orders" tab
- Type "nutrition"
- Click on "Inpatient Consult to Nutrition Services"
- Place consult for patients with MST score of 2 or above



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Appendix C: Pretest

1) Please create a unique identifier that contains a color followed by a set of 4-digit numbers. Ex. PINK1234. This is to compare your pre- and posttest answers while keeping your identity anonymous. Note: Do not forget your unique identifier as it will be asked of you again on the posttest.

_____

2) How prevalent is heart failure in the United States?

A. 1 million adults

B. 3.2 million adults

C. 6.5 million adults

D. 8 million adults

3) Heart failure patients are frequently readmitted to the hospital due to symptom exacerbation, lack of treatment adherence, and self-care behavior.

A. True

B. False

4) Select the correct statement:

A. 30% of heart failure patients die within five years of diagnosis

B. 50% of heart failure patients die within five years of diagnosis

C. 70% heart failure patients die within five years of diagnosis

D. 85% of heart failure patients die within five years of diagnosis

5) How many cases of heart failure are diagnosed in the US annually?

A. 1,000,000

B. 750,000

C. 350,000

D. 50,000

6) What is the annual cost of heart failure in the US?

A. $75 Million

B. $570 Million

C. $25 Billion

D. $70 Billion

7) The prevalence of malnutrition affects what percent of patients hospitalized with heart failure?

A. 5%

B. 15%

C. 25%

D. 35%

8) Have you heard of/utilized the Malnutrition Screening Tool (MST)?

A. Yes

B. No

9) How frequently in the past two weeks did you screen for malnutrition among your patients?

0=Never 1=Seldom 2=Occasionally 3=Often

10) How comfortable do you feel assessing patient nutritional status?

0= Not comfortable 1=Somewhat comfortable 2=Comfortable 3=Very comfortable

Appendix D: Posttest

1) Please enter your unique identifier that contains a color followed by a set of 4-digit numbers. Ex. PINK1234. This will be the same unique identifier you entered on the pretest. This is to compare your pre- and posttest answers while keeping your identity anonymous.

_____

2) How prevalent is heart failure in the United States?

A. 1 million adults

B. 3.2 million adults

C. 6.5 million adults

D. 8 million adults

3) Heart failure patients are frequently readmitted to the hospital due to symptom exacerbation, lack of treatment adherence, and self-care behavior.

A. True

B. False

4) Select the correct statement:

A. 30% of heart failure patients die within five years of diagnosis

B. 50% of heart failure patients die within five years of diagnosis

C. 70% heart failure patients die within five years of diagnosis

D. 85% of heart failure patients die within five years of diagnosis

5) How many cases of heart failure are diagnosed in the US annually?

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9) How frequently in the past two weeks did you screen for malnutrition among your patients?

0=Never 1=Seldom 2=Occasionally 3=Often

10) How comfortable do you feel assessing patient nutritional status?

0= Not comfortable 1=Somewhat comfortable 2=Comfortable 3=Very comfortable