2020

Nutritional Assessment of Patients in the Intensive Care Unit

Jennifer Maureen Brown
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Jennifer Brown

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Janice Long, Committee Chairperson, Nursing Faculty
Dr. Lynda Crawford, Committee Member, Nursing Faculty
Dr. Mary Catherine Garner, University Reviewer, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Nutritional Assessment of Patients in the Intensive Care Unit

by

Jennifer M Brown

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2020

Abstract

Impaired nutrition is associated with prolonged hospitalization, poor patient outcomes, high mortality, and increased health costs. Nutritional assessment in intensive care unit (ICU) patients is important in recognition of changes in the patient's nutritional status from admission to discharge and may promote early nutritional interventions by the health providers to prevent complications of poor nutrition. The purpose of this staff education doctoral project was to assess ICU nurses' knowledge of nutritional assessment for critically-ill patients and to provide education on an assessment tool for patient nutritional assessment- the malnutrition universal screening tool (MUST). The guidelines from the American Society for Parenteral and Enteral Nutrition were used to develop the education program and the advancing research through clinical practice and close collaboration model was used as a framework to inform the pretest, posttest designed project. The project took place in a local hospital medical ICU over 4 weeks with 72 nurse participants. Surveys were administered to determine nurses' knowledge of nutritional assessment, then the pretest, education and posttest were completed. Descriptive statistics were used to analyze the answers on the 5-point Likert scale pre- and posttests, and significance ($p<.05$) was determined using a paired t-test. Results indicated significant improvement on the posttest compared to the pretest for questions on screening protocol, nurses' responsibility, compliance, knowledge, and recognizing risk factors. Through increasing nursing knowledge on the use of the MUST screening tool, the risk of malnutrition in ICU patients may decrease and patient outcomes improve providing positive social change.

Nutritional Assessment of Patients in the Intensive Care Unit

by

Jennifer M. Brown

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2020

Dedication

"The heights by great men reached and kept were not attained in sudden flight but, they while their companions slept, they were toiling upwards in the night." ― Henry Wadsworth Longfellow.

Acknowledgments

I want to thank Dr. Janice Long, my Doctoral Committee Chair, for your unfailing support and motivation as I balance work, personal life, and Doctoral studies. Your expertise and leadership have been instrumental in getting me to this point, and I am so thankful. You truly were the right person to guide me through this process, and I cannot express how much that means to me. I want to thank Dr. Lynda Crawford, for your valuable feedback for both my oral and final defense and Dr. Garner as a committee member. I would also like to thank Dr. Donna Molyneaux for going above and beyond to provide me with experiences, insights, and opportunities that are invaluable to this process and my professional development. Your clinical expertise has been outstanding throughout my practicum experiences, as well as the planning, implementation, and dissemination of my project. I am eternally grateful. Special acknowledgment of the MICU leadership team at my project site, your support was amazing. To my daughter Danielle and son Ryan, you are the reason I go the extra mile. Your love has been my constant, and I hope that this achievement serves as an inspiration for you. To my mother, Ivel Farquharson, my hero, you make me believe the impossible. For the love, encouragement, and support from my husband Everton, my siblings and friends, your confidence in my abilities, and your help have sustained me so far, and I am blessed to have you all in my life. Nursing has been my passion, and I have found so much joy in giving, but the rewards have been unmatched.

Table of Contents

i

ii

List of Tables

List of Figures

Section 1: Overview of the Evidence-Based Project

Introduction

Failure to initiate a nutritional plan for patients in the Intensive Care Unit (ICU) within the first 24–48 hours of admission is widespread and common in clinical practice (Tappenden et al., 2013). Even knowing the negative impact of poor nutrition on patient outcomes, there continues to be a lack of interdisciplinary efforts to address malnutrition promptly. Malnutrition significantly affects the health of the intensive care unit (ICU) patient in a myriad of ways, including morbidity, mortality, ventilator dependence and increased complications, leading to extended ICU and hospital stay (Shapata et al., 2013). An estimated 1 in every 2 patients who enter the ICU are already malnourished, with the increased risk of further decline if left unfed (Avelino-Silva and Jaluul (2017). Focus on the patient's illness and injuries are of considerable importance; however, without nutrition being a priority, their recovery is compromised (Avelino-Silva and Juluul, 2017). Tappenden et al. (2013) studied the critical role of nutrition in improving quality of care and found that there was substantial documentation on improvements to clinical outcomes when effective and timely nutritional interventions were in place. The World Health Organization (WHO) (n.d.) defines nutrition as the amount of food consumed in relation to the body's dietary needs and outlines the distinction between good and bad nutrition. Good nutrition is a combination of a balanced diet and exercise, while poor nutrition is a catalyst for adverse health conditions including reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity (WHO, n.d.). Malnutrition is an imbalance of nutritional provision

to patients, regardless of whether they are underweight or overweight (Tappenden et al., 2013). Food is essential to patient outcomes, a key component in addressing the problem of malnutrition in hospital settings, and in improving quality of care.

The topic of nutrition management among ICU patients is vital to research, theory, and nursing in that it allows for the translation of evidence from research to be applied to clinical decision-making (Fitzpatrick, 2010). By utilizing knowledge gained from randomized controlled trials coupled with expert judgment by clinicians who are the specialists in their field, nurses can synthesize this knowledge through implementation efforts while monitoring effects for best results (Fitzpatrick, 2010). Gray, Grove, and Sutherland (2017) posited that evidence-based practice (EBP) is the concerted efforts of experts to utilize the best research available to improve patient outcomes while ensuring quality and affordable healthcare. EBP's relevance to nursing is evident in the utilization of an education tool that will allow nurses to identify patients at risk for nutritional imbalances.

The clinical dilemma faced by nurses in the ICU is when to initiate nutritional treatment while avoiding complications to the health and recovery of the patient (Gupta et al., 2012). This dilemma coupled with the uncertainty of knowing the appropriate nutritional therapy to initiate, magnifies the problem (Mooi, 2018). Not having a nutritional management protocol in place often leads to missed opportunities for initiating a nutritional plan well beyond the recommended 48 hours (Tappenden et al., 2013). This deficit in the delivery of care to the patient often results in complications to health and recovery that could otherwise be prevented (Tappenden et al., 2013). It is imperative that

there is increased awareness among nurses on the impact of nutrition on patient

outcomes, with the inclusion of nurses into interdisciplinary efforts to address the

problem (ESPN Guidelines, 2019).

Despite the healthcare providers' intentions for quality care and health outcomes

for hospitalized patients, ensuring that patients receive adequate nutrition may be more

complicated for the ICU patient (Merriweather et al., 2014). Merriweather et al. (2014)

clarified that deficiencies in nutrition can continue for an extensive time period without

any indication or symptom making identification of nutritional deficits difficult. Many

complications of nutrition such as pressure ulcers, poor wound healing, and infections are

preventable. ICU nurses can play a key role in prevention of the risk (Avelino-Silva and

Juluul, 2017). ICU nurses, therefore, need to utilize nutrition-screening tools and perform

early and frequent assessments to obtain crucial information necessary to develop

nutritional care plans (Avelino-Silva and Juluul, 2017).

At the local practice facility in Northeastern United States, which was the setting

for this project, per practice protocol, ICU nurses are not required to perform nutritional

screenings for all patients admitted to the ICU. With infrequent opportunities for

nutritional assessment, ICU nurses may not have the experience needed for assessment of

the patient's nutritional status. This gap in practice can result in a lack of knowledge

regarding the importance of nutrition. In this practice project, I assessed and provided

education to ICU nurses by introducing an evidence-based assessment tool to assist them

in recognizing patients at risk for imbalanced nutrition. My hope is that this will guide

early implementation of an individualized plan of care to improve nutritional management within this patient population.

This project aligned with the recent collaboration between the Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N., 2016), which recommended that early nutrient therapy can lead to an improvement in the clinical course of critically-ill patients. The joint committee proposed that early initiation of a nutritional treatment plan among ICU patients "may reduce disease severity, diminish complications, decrease the length of stay (LOS), and favorably impact patient outcomes" (McClave et al. 2016, pg. 174). Therefore, empowering nurses to improve current clinical practices while utilizing procedures and protocols that are evidence-based will facilitate clinical initiatives that will include new implementations into practice (Black, Balneaves, Garossino, Puyat, and Hong (2016).

Ultimately, the decision to initiate early nutrition therapy still resides with the provider. This will also require improved collaboration between the nurses and the providers as encouraged by the SCCM and A.S.P.E.N. committee (2016) through guidelines that outline early treatment protocols and benefits to the patient (McClave et al. 2016). This practice project also has extensive potential to bring about positive social change through use of the evidenced-based assessment tools, and the education of nurses who can identify patients at risk, so that identification of the immediate cause and related behaviors, will lead to interventions that will address ways to disrupt current habits and build new ones, thus ensuring better nutrition management and improved patient

outcomes. Section 1 of this project includes the problem statement, the purpose, the

nature of the doctoral project, significance, and a summary.

Problem Statement

In clinical practice today, there are several efforts by providers to make nutrition a

priority in the patient's care plan, by incorporating assessment through the use of

evidence-based practices (Yeh et al., 2016). Nurses' roles at the bedside inadvertently

contribute to the inconsistencies of lack of initiation of a nutritional plan for ICU patients

and intensify the problem that exists (Gupta et al., 2012). In this practice project, I

addressed the nutritional management of the critically-ill patients in the ICU with the

education of nurses on the use of an assessment tool to help in identifying patients at risk

for malnutrition. I used the ARCC model a framework to align the importance of EBP to

the implementation process.

Impaired nutrition is associated with prolonged hospitalization, poor patient

outcomes, higher mortality, and increased health costs (Stewart, 2014a). Patients with

age-related physiological changes, coupled with the inadequate caloric intake, are

susceptible to nutritional decline and will only worsen with hospitalization if left unfed

(Wells and Dumbrell, 2006). Patients often are more vulnerable to deterioration during

their admission when they are exhibiting symptoms of nausea, vomiting, medication side-

effects, or requiring nothing by mouth orders. Difficulty with vision and opening

containers, the placement of food out of patients' reach, limited access to snacks, and

ethnic or religious food preferences may all contribute to low nutritional intake in

hospital (Wells and Dumbrell, 2006). Aziz et al. (2011) also concurred that patients who

present with malnutrition on admission usually worsen with hospitalization. Patients

whose nutritional status is already compromised may further experience impaired

immunity, respiratory and muscle function, and delays in wound healing (Wells and

Dumbrell, 2006). Yalcin, Cihan, Gundogdu, and Ocakci (2013) blamed the cause of

ineffective nutritional practice on a lack of nutritional knowledge among RNs. In a

randomized questionnaire, including over 300 nurses and encompassing several hospitals

Yalcin et al. (2013) determined that nurses with high nutrition knowledge base were more

competent in nutritional assessments due to frequent use in clinical practice. They further

implore institutions of nursing education to structure a curriculum that emphasizes

ongoing nutritional education in clinical practice (Yalcin et al., 2013). Mitchell, Lucas,

Charlton, and McMahon (2018) believed that nurses are strategically positioned to

support nutritional management in patient care effectively but they lamented the lack of

training and ongoing nutritional education opportunities to make this a reality. In a

systematic review of case studies published between 2000 and 2016, to investigate the

results of nutrition education on improved knowledge and practice, Mitchell et al. (2018)

determined that face-to-face nutrition training and self-directed learning manuals were

among the most effective methods and lead to positive improvements in nutritional

knowledge among nurses (Mitchell et al., 2018). If nurses are to respond to the call for

increased involvement in assessment of the ICU patient, then support, through the use of

a comprehensive nutrition education program with reevaluation is required (Dobson &

Scott, 2007). With the existing gap between nurses' knowledge and repeated nutritional

assessments in practice (Mitchel et al., 2018), it is imperative that there is increased

awareness among nurses on the impact of nutrition on patient outcomes. Equipping

nurses with the ability to perform nutritional assessments will help to identify patients at

risk for malnutrition (Singer, 2019). With a 96% consensus, the ESPEN guidelines

recommend the assessment of every ICU patient hospitalized for greater than 48 hours,

using a nutrition assessment tool to identify any risk of malnutrition (Singer, 2019).

Providing education to nurses can result in improved knowledge-based nutritional

competency that would bridge the gap between practice and knowledge and empower

nurses to fulfill their responsibility to patient care.

The Level 1 trauma hospital, which was the setting for this project, has multiple

ICUs and has an interest in improving the issues with the timely implementation of a

nutritional plan. While the organization utilizes a nutritional assessment tool, the

continuity of nutritional assessment is often inconsistent as nutrition assessment is only

performed at the beginning of patient hospitalization. Nurses in the ICU may not have

been the ones to perform the required assessment and could lose this skill and its

importance to patient outcomes, over time. Without awareness of and continuing

education on the use of the nutritional assessment tool, the appropriate nutrient therapy

may also not be implemented, and neglecting to perform regular assessments may result

in nurses not identifying patients at risk (Racco, 2012; ICU leadership Meeting, 2019).

With the established practice by the facility to assess nutrition only on admission using

the assessment tool, it is evident that a lack of knowledge of the importance of nutrition

exists. In conjunction, limited nutritional assessment or lack of use of the assessment tool

at the local facility could result in a lack of knowledge regarding the competent

assessment of nutritional status. Bluestone et al. (2013) supported repeated intervention over single use. Incorporating continuing nutritional education will allow nurses to re-familiarize themselves with assessment practices and address the deficiencies outlined above, bridge the gap between nurses' knowledge and evidenced-based literature, as well as improve the facilities' current practices for improvements in optimal nutritional outcomes among patients who are critically ill. Changing the facility's practice protocol will require buy-in from leadership so that nutritional care among the patients who are critically-ill can be prioritized. Commitment from a needs-assessment and meeting with the leadership team has guaranteed support of educational training and recommendations that will be provided as part of this project (ICU Leadership Meeting, 2019).

Purpose

The purpose of this practice project was to address the gap in practice regarding the nutritional management of the critically-ill patients in the ICU with the education of nurses on the use of an assessment tool to help in identifying patients at risk for malnutrition. I designed the following practice-focused question to assess the areas of nurses' knowledge that were needed to refresh and to provide an educational strategy on the identification of patients at risk for impaired nutrition: Will the education of an EBP assessment tool improve nurses' knowledge of nutritional assessment and identify patients at risk for impaired nutrition? The adverse effects of nutritional deficits in the critically ill patient have been identified in the literature as impaired nutrition and is a severe problem impeding patient outcome (Stewart, 2014a). Nutrition is critical to the survival of the ICU patient (Hejazi et al., 2016). The nutritional assessment conducted

only at admission, as practiced at the local facility, necessitated this project, as efforts to improve nurses' knowledge of EBP assessment tool and organization awareness of the importance of nutrition, are needed. Even with the current nutrition protocol in place, failure to reassess nutritional status and incorporate changes could result in suboptimal nutritional support and delay improvement to patients' health (Racco, 2012).

Empowering nurses with nutritional assessment education will allow them to recognize areas of incompetence, effectively utilize the EBP assessment tool to identify patients at nutritional risk and reinforce nutritional care in practice (Mitchell et al., 2018). This project was essential to improve the nutritional practices at the site as well as increased the importance of nutritional management among care providers in the local organization.

I completed this program in collaboration with administration, the nursing management team, nursing staff in the ICU, and the information technology (IT) staff at the clinical site. I designed training to provide information on the method of assessment and enhance understanding of the assessment tool with different clinical scenarios to practice appropriate use of the instrument and to evaluate their performance of the identified skills. As soon as the lessons ended, I used a short quiz to evaluate nurses' knowledge. I used 80% as the score for a passing grade.

My hope is that improved education among nurses, as recommended by Wells and Dumbrell (2006) will increase interdisciplinary collaboration and lead to both the successful diagnosis and development of comprehensive treatment plans that with prompt implementation, and will ensure that the hospitalized patients at risk for malnutrition can

be aggressively treated. These efforts will also align with the recommendations of the SCCM and A.S.P.E.N. and confirms early nutrient therapy as the impetus for improvement in the clinical course of critical patients.

Nature of the Doctoral Project

The nature of this project was to research the topic of nutritional assessment for the ICU patient and provide an understanding of the risk factors involved in identifying nutrition problems among ICU patients and how this can adversely affect patient outcomes. Hejazi et al. (2016) posited that there is a marked difference in the patient nutritional status on entry to the ICU compared to that at discharge. This problem, even though identified, is repeated multiple times and among a significant number of patients. As a result, current nutritional assessment protocol results in failure of the nurses to assess patients at risk, and the interdisciplinary team to plan nutritional management in a timely fashion. Mauldlin and O'Leary-Kelly (2015) posited that patients' nutritional status deteriorates with hospitalization and recommends specific guideline that would ensure that the patient receives a thorough dietary assessment at admission.

A careful review of the literature showed that McClave et al. (2016) supported the A.S.P.E.N. assertion that identification of nutritional imbalance requires full nutritional screening of the ICU patient within 48 hours of admission, with a detailed assessment of those patients who have a higher risk of decline and adverse outcomes (McClave et al. 2016). Among the many assessment tools identified in the literature, the Malnutrition Universal Screening Tool (MUST) was one of the only tools that provides information on both the severity of the disease process, and the patient's nutritional status (McClave et

al. 2016), as well as a screening tool appropriate for use in the acute hospital setting (Isenring, Bauer, Banks, and Gaskill, 2009).

I provided the ICU leadership team and expert panel with the reliability and validity tool, along with where and when and by whom it was developed. I then invited the team to review the nutrition packet, comprising of the pre and posttest, and education, to evaluate for appropriateness of materials. I also sought buy-in and approval from the administration and department heads to obtain permission to proceed.

After obtaining all necessary permission, I invited the Registered Nurses from the ICU to complete the pre-survey. The survey was available for 4 weeks. Immediately after the pre-survey, the nurse participants completed education on the MUST, followed by the posttest questionnaire. The efforts were used to assess the Nurses knowledge, pre-and-post results, as well as the improvements from training on the evidenced-based nutritional screening tool.

While working as a RN in the ICU, I had seen the plethora of problems that resulted from inadequate nutritional health and knew firsthand that having adequate assessment information was essential to effective treatment plans. RNs would be required to use the MUST assessment tool to screen patients' for impaired nutritional status, and would also use it for continued monitoring, to ensure that nutritional decline in at-risk patients was identified early and interventions were implemented promptly (Mauldlin and O'Leary-Kelly (2015), as outlined in the training materials.

Significance

The significance of nutrition in the hospital setting, especially the ICU, cannot be overstated (McClave et al. 2016). According to Balakas, Sparks, Steurer and Bryant (2013), using EBP to question current practices and translate the findings into practice is one way to ensure that nurses are empowered and promoting best practices to prevent modifiable risk factors that could otherwise lead to adverse outcomes. Kalaldeh and Shahin (2014) stressed the importance of good assessment skills as the best indicator of identifying patients at risk for nutritional decline in order to minimize its impact. I used this DNP project to bridge the gap between knowledge and practice by providing education to nurses to better equip them in proving quality assessments to intervene in the nutritional care of patients in the ICU.

During the completion of my project Nurses were able to use the MUST EBP tool to assess patients' risks and implement care to improve nutritional management in critically-ill patients. The success of my project could significantly promote positive social change through an education strategy that would enhance knowledge among the nursing staff in the identification of patients at risk for impaired nutrition. Positive social change would be achieved as Nurses gain confidence from increased awareness, became more proactive in decision making and clinical skills, strengthened collaboration within the interdisciplinary team, resulting in higher quality care and improved patient outcomes. My project would also have lasting contributions that would continue to promote positive social change with the improved education of nutritional assessment and ongoing utilization of EBP assessment tool in practice.

The result of the education among Nurses would add to the body of knowledge available regarding assessment tools for nurses as well as provide a way to fill the gaps that existed in nurses' knowledge and practice. This would empower Nurses to assertively act as advocates for their patients in nutritional situations that warranted intervention so that patient outcomes could be improved (Mooi, 2018). This positive social change also could affect other stakeholders as well, including physicians who would benefit from increased interdisciplinary collaborations and partnership among Nurses and Dietitians alike, and the increased emphasis on prioritizing nutritional care. Both patients and the organization are poised to benefit from improved outcomes, with patients receiving more focused and enhanced attention, while the results may prove to be more cost effective for the organization through reduced adverse events. This project also had the potential to create social change in all other ICUs where the patient's nutritional status may benefit from more timely interventions. I will use the findings from my project to provide a basis for evidence-based practice in future training efforts and other clinical settings as appropriate.

Summary

Nutrition management continues to be a problem in the ICU, and therefore initiatives are necessary to improve nurses' education as well as patient outcomes (Hejazi et al., 2016). Incorporating education of the evidence-based MUST will empower nurses to identify and advocate for early interventions in critical patient care (McClave et al. 2016). The MUST tool will be used by Nurses to assess patients at risk for nutritional instability so that they can be easily identified and problem averted. Section 2 of this

paper will include the literature that supports the use of educating nurses to use assessment tools to identify patients at risk for impaired nutrition. I will also explore the details of the concepts, theories, and change model aligned with this initiative.

Section 2: Background and Context

Introduction

Nutritional management continues to be a significant problem in hospitalized patients resulting in poor health outcomes. About 30% of all patients in the ICU are malnourished with some patients presenting with the condition, while other statuses worsen due to neglect to initiate a treatment plan (Kruizenga et al., 2016). While other aspects of the patient's disease process are routinely evaluated, nutritional status continues to be ignored (Kruizenga et al., 2016). With many of these cases starting to impact reimbursement to hospital and even malpractice suits, it is important that organizations implement ICU nutritional management protocols to eliminate this problem (Kruizenga et al., 2016). In this evidence-based practice project, I addressed the nutritional management of critically-ill patients in ICU with the education of nurses on the use of an assessment tool to identify the patients at risk for impaired nutrition.

There have been searches of multiple strategies used to resolve the lack of intensive care nursing knowledge on the assessment of impaired nutrition among the critically-ill in their care. I conducted a thorough review of the literature to increase understanding of the magnitude of the problem, to evaluate strategies currently in practice, and to understand the effect on patient outcomes. I completed a search of several databases, including the Walden University Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases, Medline and Cochrane Library. The search included the following keywords: *impaired nutrition, malnutrition, clinical practice guidelines, policy for nutrition in the ICU, guidelines for nutrition in the ICU, nurses'*

role in preventing malnutrition, ICU nurses' knowledge of assessing nutrition, and

nutrition screening tools. I extended the search of peer-reviewed articles beyond 5 years

due the limited articles found, and included articles that ranged from 1999 to 2018 since

many protocols found on ICU were much earlier works that had been updated over time.

I used the Boolean "and" between keywords in locating additional studies. Information

on the model that was used to guide this scholarly project will be described in the

Concepts, Models, and Theories section of this project.

Concepts, Models, and Theories

Multiple models of EBP are available and can support an organized approach to

implementation, prevent incomplete application, improve the use of resources, and

facilitate the evaluation of outcomes (Schaffer, Sandau, and Diedrick, 2012). I used the

ARCC model to support the research efforts and projected results of this project. The

ARCC model (1999), has been identified by Camargo (2017) as a way to create an

awareness of the problem that exists in ICU and identifies stakeholders who can have a

lasting impact. I used the ARCC model as a conceptual framework to guide this project. I

was able to use the model as a way to create an awareness of EBP and facilitated

implementation while promoting sustainability throughout the organization (Schaffer et

al., 2013). The ARCC model is a five-step process with the basis being the cognitive

behavioral theory and was used to guide the perception of clinicians to adopting EBP. It

included a scale which I used to assess changes in the organizational culture for EBP as

well as a way to measure the sustainability of EBP in clinical practice (Schaffer, Sandau

and Diedrick, 2013). My project assessed nurses' knowledge of nutritional assessment

and related effects, and the ARCC model was a useful framework, due to its frequent use

in system-wide implementations and sustainability of EBP at the hospital level.
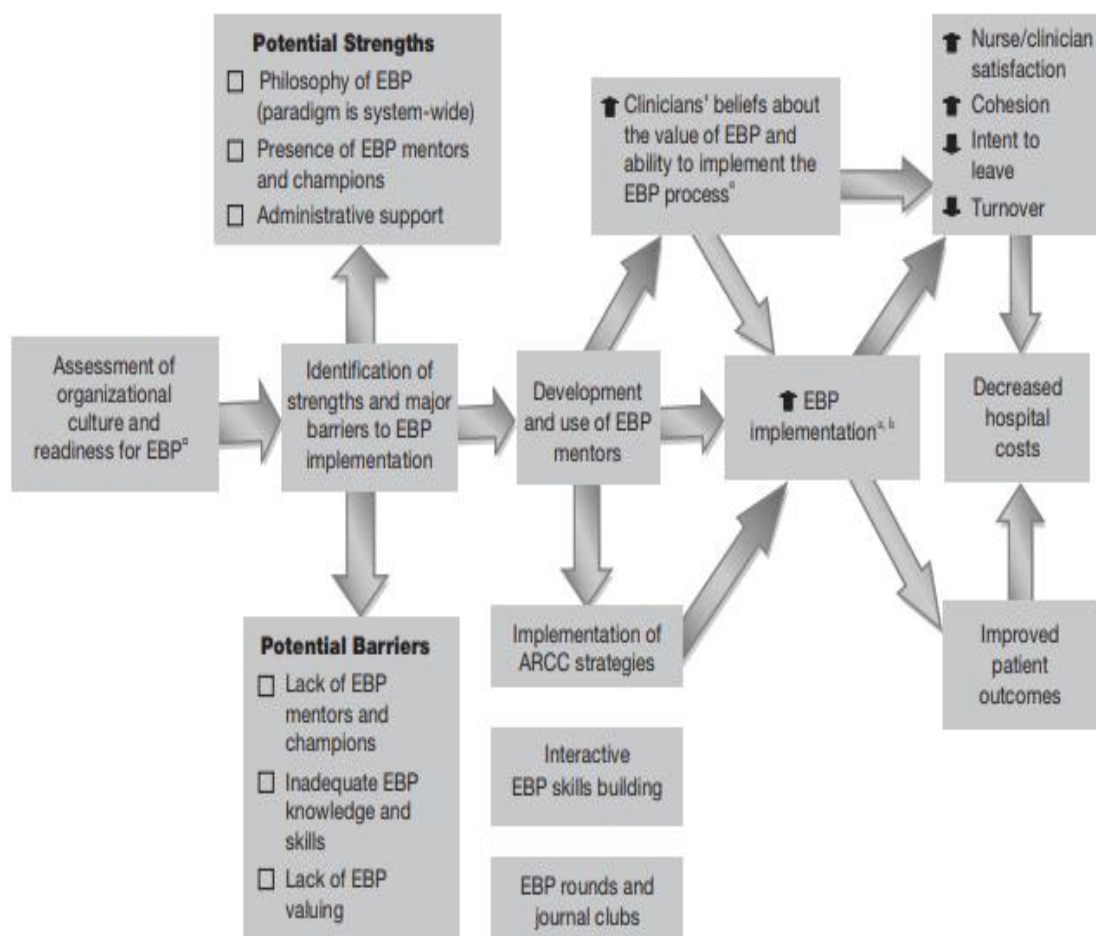
Figure 1. The ARCC model for System-wide Implementation and Sustainability of EBP.
ARCC = advancing research and clinical practice through close collaboration. EBP =
evidence-based practice. Adapted from "Sustaining Evidence-Based Practice through
Organizational Policies and an Innovative Model," by B. M. Melnyk, E. Fineout-
Overholt, L. Gallagher-Ford, and S. B. Stillwell, 2011, *AJN American Journal of
Nursing*, *111*(9), p. 57–60. Copyright 2005 by Melnyk and Fineout-Overholt.

The five steps of the ARCC model include: (a) assessment of organizational

culture and readiness for implementation in the health care system, (b) identification of

strengths as well as existing barriers to the implementation of EBP efforts within the

organization, (c) identification of the appropriate mentor for the EBP, (d) implementation of the evidence into current practice, and (e) Evaluation of patient outcomes and other associated organizational change (Schafer et al., 2013).

Melnyk, Fineout, Giggleman and Choy (2017) explored the impact of the ARCC model on the culture, EBP readiness, and implementation effects on patient outcomes at an acute care hospital in the western United States. Using a sample of 58 interprofessional professionals from a 341-acute bed hospital, Melnyk et al. (2017) implemented the ARCC over 12 months in a sequential format. Using pre- and posttests, the authors monitored the clinicians EBP readiness for implementation, while barriers to EBP and culture were measured. The results of the study indicated positive changes within the acute care hospital to EBP implementation, with significant improvements in all three areas previously outlined.

The ARCC model was an effective tool to use with large groups as well as more systemic structures. Facilitating change at a unit or organizational level requires consensus and collaboration, and the ARCC model consisted of various steps that were easy to be applied in the implementation process and during the monitored input of stakeholders at every level of the implementation process, in assessing culture and readiness for change. Implementation of the ARCC model in ICUs therefore was a way to improve best practice among nurses with appropriate assessments, encourage belief of nurses in EBP implementation and the education provided, and ultimately improve ICU culture and patient outcomes.

Relevance to Nursing Practice

Nutrition plays a pivotal role in a patient's life and illness (Rabito et al., 2017).

When ICU nurses lack nutritional knowledge, particularly about the complex nutritional

needs of the patient and how this impact their health condition, they will fail to identify

ongoing nutritional problems that could result in adverse results for the already critically

compromised patient. Deficient nutritional knowledge among ICU nurses, in the delivery

of care to the patient, often results in complications to health and recovery that could

otherwise be prevented.

> The WHO defined nutrition as, the intake of food, considered concerning the
>
> body's dietary needs. Good nutrition – an adequate, well-balanced diet combined
>
> with regular physical activity – is a cornerstone of good health. Poor nutrition can
>
> lead to reduced immunity, increased susceptibility to disease, impaired physical
>
> and mental development, and reduced productivity (WHO.org, n.d.).

Marshal et al. (2014) posited that nutrition problems among the elderly are commonplace

and is the same in both the community and institutions alike. He estimated the prevalence

of malnutrition in the community to be at 10% to 30 %, with the estimate significantly

higher among intensive care unit patients at 30% to 50% (Marshal et al., 2014).

In a study of cognitively intact patients in the emergency room**,** Marshal et al.

(2014) found that most ER patients were either malnourished or at risk for malnutrition.

ICU patients were found to be at risk due to depression, difficulty eating, and the ability

to get food for themselves (Pereira et al., 2014). While this may be their situation before

entering the hospital, patients admitted from the emergency department to the ICU may

already be at risk and therefore their nutritional status needs to be identified, and the appropriate actions taken to maintain their nutritional intake and prevent further deterioration while hospitalized.

Healthcare providers strive for continuity of care for all hospitalized or rehabilitated patients, however, Merriweather et al. (2014) believed that getting adequate nutrition may be trickier for the ICU patient. The authors clarified by stating that deficiencies in nutrition can continue for a long time without any indication or symptom and makes it even harder for the medical professional to identify. The article, however, pinpointed specific indicators that can be telltale signs among older adults. These include unexplained fatigue, brittle and dry hair, ridged or spoon-shaped nails, mouth problems, diarrhea, apathy or irritability, and lack of appetite (Merriweather et al., 2014).

Herzberg and Nathan (2015) attributed increased risk of poor nutrition in the older adult ICU patient to the physiology of aging and the metabolic rate and energy requirements as the reason for the decline in nutritional status. The authors postulated that changes in the body that occur at a different age, and especially after age 60, often result in the reduction of lean body mass (Herzberg and Nathan, 2015). They insisted that because basal metabolism and energy requirements diminish, leading to reduced caloric intake, the subsequent outcome is the inability to meet daily micronutrient requirements. This nutrition imbalance then has to be combated with the introduction of supplements. Already at risk, the situation can only worsen when ICU patients are left unfed.

Bales and Ritchie (2009) in support of the impact of poor nutrition on the ICU patients' health, presented statistics that showed that almost 55% of patients entering the

hospital have pre-existing evidence of malnutrition. Bales and Ritchie (2009) further

claimed that because of pre-existing malnutrition, these patients often are more

susceptible to developing further nutritional problems during their stay in the ICU. Bales

and Ritchie (2009) continued that incidence of nausea, vomiting, nothing by mouth

orders, medication side-effects, among others, contributed to low nutritional intake in the

ICU. Agarwalla et al. (2014) also concurred that malnutrition during ICU admission

leads to the following complications, such as increased, length of stay (LOS),

readmission, mortality, skin breakdown, infections, as well as links to impaired

immunity, respiratory and muscle function, and delayed wound healing.

      The benefits of oral nutritional supplementation (ONS) to the hospitalized elderly

patient have been established in several randomized controlled trials (Mullin, Fan, Sulo,

and Partridge, 2019). In a meta-analysis of 8,713 patients at risk for malnutrition on

admission, Mullin et al. (2019) analyzed the association between ONS, hospital LOS and

30-day readmission rate. Patients receiving oral nutritional supplements had a reduction

in relative risk of mortality over those who did not receive supplementation (Mullin et al.,

2019). Although only 3.1% of patients trialed were assessed at risk for malnutrition with

ONS initiated, the analysis showed that 38.8% of patients who received ONS had fewer

readmissions than the non-ONS patients (Mullin et al., 2019). LOS was significantly

shortened the earlier patients were assessed for nutritional risk, with reduction of 16.6%

among patients when ONS was provided, further demonstrating that nutritionally

supplemented critically-ill patients have a shorter overall length of stay in hospital and

reduced unplanned readmissions within 30-days (Mullin, et al., 2019).

Recognition of malnutrition among ICU patients include nutritional screening, followed by a prescribed nutritional plan and ongoing monitoring for identification of changes as necessary (Rasmussen, Holst, and Kondrup, 2010). Shikany et al. (2014) stated that multiple attempts might need to be made to ensure effective nutritional screening, with various ICU nutritional management protocols in place to address the more specific dietary needs of the patient. It is important that healthcare providers are educated about this need and given the tools so that they can successfully assess the elderly and incorporate nutritional plans appropriate to the setting and their condition. For the post-ICU patients, a diet including multivitamin supplements is highly recommended to increase caloric intake for those absorbing less than 1500 kcal/day (Hutt et al., 2013). Other steps to prevent malnutrition should include, plans to assess choices for nutrient-dense foods when appropriate, implement daily weights to assess for losses higher than 4%, and offer nutritional supplements to aid in bone healing along with calcium and vitamin D supplements, especially for patients with fractures. Patients need to be educated on the benefits of whole grains, fruits, and vegetables and provided snacks between meals.

For patients in the ICU, a registered dietician is needed to guide the nutritional process, to identify nutritional deficiencies that may exist and, incorporate consultation from other health professionals. Because these patients are also at risk for nutritional deficiencies even in the short term, supplemental nutrition should be an option. When older adults begin to show signs of unintentional weight loss, supplemental nutrition may provide a means of increasing intake (Avelino-Silva and Jaluul, 2018). Methven et al.

(2013) supports the use of nutritionally complete oral nutritional supplement drinks as a way to increase weight gain among patients at risk for malnutrition. Hand and tube administered supplements have been widely and effectively used to provide nutrition to the hospitalized and long-term care patients. Stratton and Elia (2007) alluded to the benefits of Oral nutritional supplements (ONS), which were consistent among patients with complications, such as pressure ulcers and infections, including declining mortality. Patients with COPD however, were not as likely to benefit from ONS as found in previous studies (Stratton and Elia, 2007). A more recent meta-analysis, however, showed that nutritional support, mainly in the form of ONS, did improve total intake, anthropometric measures, and grip strength in people with COPD (Collins et al., 2012). Tube feeding, when swallowing is impaired, is a logical step to increase nutrition. The decision can be a difficult one, as in many cases, the benefits have not been shown to outweigh the risks.

Enteral nutrition (EN) is a method of delivering nutrients and fluids directly to the digestive tract, and is suitable for ICU patients as it can be used temporarily, up to two weeks, to provide fluids and nutrients (Tanner, 2006). The process includes the insertion of a Gastric tube (G-tube) directly through the abdomen into the stomach and can be left in place for long-term feeding (Tanner, 2006). EN can be useful for instances in which the digestive system is intact, but swallowing is impaired, for example, due to stroke. Jejunostomy tube (J-tube) is similar to a G-tube but it is inserted into the jejunum, the second part of the small intestine (Tanner, 2006). Parenteral nutrition (PN) is an intravenous process of fluid and nutrient delivery that bypasses the digestive system

entirely, for use in the short term for patients whose digestive system is compromised (Tanner, 2006). Total parenteral nutrition (TPN) is the method referred to when all nutrition is delivered through the EN or PN routes as the only way of feeding (Tanner, 2006).

Nutrition is a significant contributing factor to the health and outcome of the ICU patient; however, there exists a need for nursing staff to be more involved in identifying this problem. It is essential that nurses are provided education of assessment tools, to help them in the early identification of risk factors, as well as awareness of care plans to be implemented to improve patient outcomes.

This doctoral project has the potential to change how nutritional care of the ICU patient population is addressed, starting with knowledge of the EBP assessment-screening tool, followed by the implementation of the nutrition assessment plan of care, and ongoing monitoring. My project also had the potential to improve nurses' confidence, gained from increased knowledge provided through refresher courses, which could help enhance nursing practice and overall patient health outcomes. Through my project there would also be increased ability for collaboration between the interdisciplinary team with the role of the nurse in screening and assessment, and that of the physician and dietician in ensuring that the prescribed plan of care is appropriate for the needs of the patient. ICU leadership at my project site agreed that improvement to the current nutritional assessment process, with more frequent nutritional assessments of patients in the ICU, would allow RNs to communicate assessment findings of nutritional decline to the physician or dietician more promptly.

Stakeholders who stood to benefit from my project included the nursing staff, from the acquisition of nutritional knowledge among the ICU patient population, the patients who would benefit from improved care, and, the organization through decreased costs associated with adverse events and increased length of stay. The problem of impaired nutrition is prevalent in many different ICU settings and hospitals, and as a result, the findings from my project would be transferrable to many other ICUs and facilities providing care to the critically-ill population.

Local Background and Context

To sufficiently address the problem of impaired nutrition, there needed to be an understanding of the risk factors involved in identifying nutrition problems among ICU patients and how this adversely affected patient outcomes. The Level 1 Trauma hospital, which was the setting for my project, has multiple intensive care units and has a practice approach which impacts the continuity of nutritional assessment throughout the patient hospitalization, affecting the timely implementation of a nutritional plan among the patient population. It was therefore essential to perform a needs assessment during program planning and evaluation that would help to identify areas that were inconsistent with the policy on nutrient therapy as well as readiness to change the culture and improve current practices (Laureate Ed., 2011). Getting stakeholder buy-in was essential to the success of the process, as it required resources and time to successfully incorporate education that would address the gap between nurses' knowledge and evidenced-based literature, as well as ongoing efforts to sustain best practice.

In planning a change in any healthcare process, it is vital that the existing need is clear. In my review of the literature McClave et al. (2016) reinforced that identification of nutritional imbalance requires full nutritional screening of the ICU patient within 48 hours of admission, with a detailed assessment of those patients who have a higher risk of decline. The practice at my project site stipulates nutritional screening only at admission. Therefore, having RNs with knowledge of, and repeated use of a reliable assessment tool, that can provide early identification of the patients' nutritional status and the severity of the disease process, was critical (Kyle and Coss-Bu, 2010).

Kettner, Moroney, and Martin (2017) postulates that for any healthcare project to be successful, thorough, and careful analysis of the problem specific to the population must be completed. Planning for my project was therefore, specific to the needs of the ICU population and the evaluation was based on interventions determined to address those needs. The results from my pre-survey assessment identified the educational requirements and helped to determine the best course of action for the program. My education presentation was used to teach RNs how to use the EBP assessment tool in screening and ongoing monitoring of the patient's nutritional status. The staff understanding of the teaching and use of the content was evaluated with the assistance of the ICU support team. Members of the expert panel, comprising of Unit Manager, Clinical Nurse Specialist, and Nurse Educator, reviewed the pre and posttests, and the education presentation for appropriateness of content. I provided the nurses with education of the MUST which was used to assess nutritional instability among the ICU patients and a way to bridge the gap between knowledge and practice. Stakeholders'

involvement ensured that all aspects of the program was addressed and aligned with the strategic vision of the organization.

Role of the DNP Student

Impaired nutrition among ICU patients can have immediate and long-term effects if not addressed (Tappenden et al., 2013). Higher rates of infections, pressure ulcers, impaired wound healing, and other adverse outcomes requiring more exceptional nursing care and more medications can become costly for both the patent and the facility (Mitchell and Porter, 2016). In the long term, these complications can result in readmission rates and higher hospital costs (Mitchell and Porter, 2016). I prepared a nutrition packet which included a pretest, a teaching presentation on the use of the MUST EBP tool, and a posttest. I developed the nutrition packet through continued collaboration with the expert panel, who are leaders in the ICU, for content validity and effectiveness of the implementation process. The expert panel further completed an evaluation of the materials of the nutrition packet and the training that I provided to the RNs. I also provided a copy of the nutrition packet to ICU leadership with a plan for future implementation, having ensured that the strategies provided were relevant for continued best outcomes.

Summary

Nutrition is a significant contributing factor to the health and outcome of the intensive care unit patient; however, there existed a need for the nursing staff to be more involved in identifying the problem. Improving the role of nurses by providing education of assessment tools that would allow for early identification of patients at risk and

improved knowledge on the plan of care that needed to be implemented, was critical to my project. I also believed that my project would be beneficial not just for nurses but the interdisciplinary team, as a whole. There was so much to be gained by nurses, patients and the ICU population from bridging the knowledge gap and providing continuing education to sustain the best practice, but even more important was the increased awareness of the impact of nutrition on health outcome.

The WHO defined conditions that predisposed patients to specific categorization to allow for awareness among healthcare professionals (WHO.org). However, much is needed to be done on the part of stakeholders to ensure that efforts are in place to provide education that will lead interventions to address health disparities. As healthcare providers, it is essential that we study the various evidence of nutritional instability among critically ill patients, but more efficiently, explore the evidence for opportunities to enhance the use of current assessment tools that are available in practice, to ensure that these are utilized appropriately to meet the needs of the patient. Our responsibility as providers is to implement changes in practice by incorporating more evidence into practice (Field and Lawrence, 2016) to prevent the continuation of adverse outcomes. As advance care providers, it is our responsibility to engage in collaborations to ensure that risk factors are addressed, especially during heightened health needs as evidenced among the hospitalized ICU patient population.

Section 3: Collection and Analysis of Evidence

Introduction

The focus of my project was the nutritional assessment of patients in the ICU by providing education to nurses on the utilization of an evidence-based assessment tool that would allow nurses to identify patients at risk for imbalanced nutritional status so that immediate interventions can be made toward nutritional management. Use of the health information system to facilitate the use of EBP can support an organized approach to implementation of EBP, prevent incomplete application, improve the use of resources, and facilitate the evaluation of outcomes (Schaffer, Sandau, and Diedrick, 2013). Having effective nutritional screening and assessment as a requirement of care for every patient in the ICU is essential (Alvelino-Silva and Juluul, 2017). This practice by the ICU leaders expedites development of nutrition assessment programs so that patients who have a negative nutrition screen are assessed in a timely fashion and receive appropriate nutrition interventions. Implementing the use of a new EBP tool for assessment of ICU patients at risk of nutritional instability would provide information to substantiate the need and perhaps guarantee support at the organization and department levels.

Impaired nutrition in ICU patients could have immediate and long-term effects if not addressed. Higher rates of infections, pressure ulcers, impaired wound healing, and other adverse outcomes requiring more exceptional nursing care and more medications could become costly for both the patent and the facility. In the long term, these complications could result in readmission rates, higher hospital costs, and as well as training needs among RNs (Mitchell and Porter, 2016). Reduction in impaired

malnutrition among patients would, therefore, result in cost savings for the patient and the organization, and improved nutritional assessment among nurses leading to increased knowledge and empowerment.

The purpose of this practice project was to ensure that nurses are knowledgeable of and could utilize an EBP tool in the identification of patients at risk for impaired nutrition and early interventions. Throughout the remainder of this chapter, I outlined the steps needed for the development of the project. I referenced the practice-focused question throughout the section, and presented a literature review of evidence that supported the problem identified as well as the outcome of the research completed. I ensured validity and transparency by addressing the ethical protection of participants and procedures, followed by analysis and synthesis of the complete process.

Practice-focused Question(s)

The local problem addressed in this project was the need to identify patients at risk for impaired nutrition, by educating nurses on the use of an evidence-based assessment tool, assessing their knowledge and learning, to better equip them in providing quality assessments leading to early interventions. The purpose of this practice project was to address the gap in practice regarding the nutritional management of the critically-ill patients in the ICU with the education of nurses on the use of an assessment tool to help in identifying patients at risk for malnutrition. The guiding practice-focused question was, will the education of an EBP assessment tool improve nurses' knowledge of nutritional assessment and identify patients at risk for impaired nutrition? In a review of the literature McClave et al. (2016) supported that identification of nutritional

imbalance required full nutritional screening of the ICU patient within 48 hours of admission, with a detailed assessment of those patients who have a higher risk of decline. Having RNs with knowledge of and use of a reliable assessment tool that can provide early identification of the patients' nutritional decline and its impact on the disease process is critical (Kyle and Coss-Bu, 2010). It is imperative to bridge the gap between knowledge and practice by empowering nurses through education of an assessment tool that will better equip them in providing quality assessments to improve the nutritional stability of patients in the ICU. The practice approach for my project was getting buy-in from stakeholders to prioritize the importance of nutritional management in improving patient outcomes through the implementation of a pre- and post-test methodology.

Impaired nutrition is associated with prolonged hospitalization, poor patient outcomes, high mortality, and increased health costs (Gillespie and van den Bold, 2015). Patients with age-related physiological changes, coupled with the inadequate caloric intake, are susceptible to nutritional decline and will only worsen with hospitalization if left unfed (Wells and Dumbrell, 2006). Patients whose nutritional status is already compromised may further experience impaired immunity, respiratory and muscle function, and delays in wound healing (Wells and Dumbrell, 2006). I, therefore incorporated education to address the gap between nurses' knowledge and evidenced-based literature, as well as, to highlight current practices in the ICU, where the timely implementation of nutrition need to be prioritized.

In planning a change to any healthcare process, it is vital that the existing need is clear. After I identified the need at my project site, I used my project to address the gaps

in practice. Wells and Dumbrell (2006) stated that identification of gaps in practice is crucial for recommendation of quality health care services to meet the required standardized criteria and lead to performance improvements. I communicated the need and educated stakeholders of the EBP approach to address the clinical issue and obtained their buy-in. I presented the information clearly and straightforwardly, and used evidence from the literature of best nutritional practices among critically-ill patients, in support of the need for the change, and created awareness and established trust. Prioritizing nutritional assessments was an essential factor for improved patient outcomes and required organizational leadership, ICU managers, and staff input, which led to the development of goals and objectives specific to the department needs.

For long-term successful alliances, building good relationships and credibility were essential for tackling problems related to my project, and creating change within the ICU. Kettner, Moroney, and Martin (2017) suggested that careful analysis of the problem specific to the population must be completed. Therefore, I created and used a survey as a pre- and posttest for information gathering on nurses' knowledge of nutritional problems. In initiating the approach I required ICU department leaders' involvement, time and resources. I expressed the necessity for the EBP tool to be available, especially to those who would be involved in the project. I further stressed that the successful implementation of my project would determine nurses' knowledge of nutritional assessment of patients in the ICU and provide them with education on how to identify those at risk, for timely interventions.

Sources of Evidence

I conducted review of the literature regarding the nutritional assessment of patients in the ICU. Evidence from a research by Kim and Chou (2009) supported early identification and management of the ICU patient to prevent adverse outcomes. McClave et al. (2016) supported the argument that identification of nutritional imbalance requires full nutritional screening of the ICU patient within 48 hours of admission, with a detailed assessment of those patients who have a higher risk of decline. McClave et al. (2016) further expounded that identifying the appropriate EBP tool and providing education that can deliver accurate information on both the severity of the disease process and the patient's nutrition status was critical to nutritional management.

I conducted an assessment to determine nurses' knowledge of nutritional assessment of the critically-ill patient in the ICU, using an existing instrument to measure nutritional impairment. Participants were asked to complete a survey related to their current understanding of nutritional assessment and assessment tools available in practice.

Published Outcomes and Research

I conducted a search of the literature using CINAHL, the nursing specific search engine, which yielded numerous studies on the nutritional assessment of critically-ill patients in the ICU. The search terms I utilized were *critically ill patients, nutrition, intensive care unit, nutritional status of ICU patients, and nutritional risk of ICU patients, nutritional status, nutritional screening, nutritional assessment tools,* and *nurses' knowledge of nutritional assessment tools*. I included only EBP and research

conducted between 2001 until 2019. The results of the search were numerous, with

multiple studies, literature reviews and articles central to the topic of assessing the

nutritional status of the ICU patient, and EBP tools, used to complete this type of

assessment. The sources I selected for inclusion were specific to the stated variables.

Additionally, I conducted online searches of nutritional organizations such as ESPEN,

National Association for Nutrition Professionals (NANP), American Nutrition

Association (ANA), and the Academy of Nutrition and Dietetics (AND). The A.S.P.E.N.,

American Council on Science and Health (ACSH), and the National Alliance for

Nutrition and Activity were also included in the search, which provided guidelines for the

nutritional management of the hospitalized patient. Of the thirty-five articles I

considered, twenty were focused on the assessment of the nutritional status of the ICU

patient; 5 provided guidelines and protocols on nutrition in the ICU; 5 discussed

education, knowledge, and attitudes of nurses caring for ICU patients; and 5 were reports

of interventions used to prevent nutritional impairment and enhanced nutritional

management, as well as barriers to implementation and management of a nutritional plan.

Archival and Operational Data

Nutritional assessment of the ICU patent is critical, with studies showing that

more than 40% of patients' nutritional status decline while hospitalized, increasing the

number of complications, increased length of stay, and readmissions (Kim & Chou,

2009). The purpose of this study was to improve nurses' knowledge of nutritional

assessment so that interventions can be put in place more promptly.

The Pennsylvania organization, at which my project was completed, currently assessed patients' nutritional status upon admission. There is an assessment tool now utilized in practice; however, patients are assessed once on the unit that they are initially admitted, which may not be the ICU. The Joint Commission mandated that patients receive nutritional screening within 24 hours of admission (Patel et at., 2014), which is routinely conducted at the site, but not repeated for nutritional planning. Implementing a process where nutritional assessment is continued throughout the ICU stay is, therefore, requiring nurses to identify patients at risk for the nutritional decline and allow for earlier interventions (Patel et al., 2014).

The organization currently uses a malnutrition screening tool, which is an EBP tool, that is accessible from the patient database. However, the data it provides is limited and is only collected by the nurse completing the initial assessment, and often only once during hospitalization. A repeat nutritional assessment may not be required, even with transfer of the patient to the ICU. The MUST (See Appendix A) includes repeated nutritional assessment of the ICU patient, at least weekly, based on nutrition risk and effect of disease severity. The limitations therefore, that exists in the validity of the information being used to create a plan of care for the ICU patient, is that the information may not represent the patient's current nutritional status or provide any information of a decline in status, which may have occurred since hospitalization.

The project site has its own IRB department; however, the director of nursing research and the MICU Manager were aware that IRB approval would be obtained from

Walden University. They acknowledged support of Walden University as the IRB of record and provided a letter to that extent.

Evidence Generated for the Doctoral Project

Carney and Meguid (2002) stated that recognition and treatment of a nutritional problem are of equal importance to the patient's primary diagnosis. McClave et al. (2016) also added that accurate information on both the severity of the disease process and the patient's nutrition status are essential. Therefore, by providing education on the use of the MUST tool after admission, as well recommendations for its use for continuous assessment throughout the patient's stay in the ICU, provided real time information of nutritional status. It is critical that nurses caring for this population are knowledgeable of the assessment tool, and can competently identify those at risk for impaired nutrition (Carney & Meguid, 2002). Munuo, Mugendi, Kisanga and Otieno (2016) indicated that knowledge deficits even when coupled with positive attitudes, would lead to inadequacies in practice, so I developed an instrument (Exhibit A) to assess nurses' knowledge of nutritional assessment among ICU patients. I created the questionnaire based on the current literature on nutritional assessment of the ICU patient.

Participants

I invited participants for my project from among nurses currently employed in the medical intensive care unit (MICU). The setting is a 27-bed unit, with more than 100 registered nurses. Participation was not mandatory; however, the use of the EBP tool was required for all patients assigned to RNs who volunteered for the project. I provided training to all nurses, offered classes on all shifts, and extended the invitation to all

interested RNs working in the unit, male and female, with the exclusion of any ICU RNs floating from another department for one shift only.

Procedures

I distributed the pre-test survey using a Likert scale to identify nurses' knowledge and perceptions of the nutritional assessment tool, and protocol within the facility, to RNs who attended the information meeting and volunteered for the DNP project. I distributed the survey and collected responses over a 4-week period. Following the pre-survey, I provided registered nurses with education through a PowerPoint presentation on the MUST. The MUST has been validated as a diagnostic and ongoing malnutrition-screening tool for use in the hospital (Avelino-Silva & Juluul, 2017). I educated the RNs on how to use the MUST tool to identify patients at risk of malnutrition, that could result in increased length of stays, and higher hospitalization costs, as outlined in the literature. The nurse participants completed a posttest (See Appendix B) after the education presentation was completed. I distributed the evaluation and collected the completed copies with the assistance of the ICU leadership team and expert panel.

I used the summative to assess improvements of nursing knowledge as well as changes to attitudes of continued nutritional assessment within the ICU. I selected experienced ICU nurse who provided information on the attitudes associated with knowledge of an assessment tool in the nutritional management of the ICU patient or lack thereof. I distributed the post-test survey to the participants with the help of the expert panel, who returned all copies to me on completion by the RNs (See Appendix B for detail of sample questions).

I ensured that my project aligned with the constructs of the doctoral project, through content validity which was established with content experts comprising of the Unit Manager, Nurse Educators, and Clinical Specialists, who evaluated the presentation for a Content Validity Index (CVI) greater than 0.80 agreement. My PowerPoint education contained information regarding the MUST and the importance of nutritional assessment of the ICU patient. The post-survey included the same questions as the pre-survey, except for two questions added to the Likert scale regarding the understanding of the content taught and changes to participant's attitudes and ability to apply it in practice to identify patients requiring additional nutritional support. I also studied the results of my project for indications of other barriers that could impact staff knowledge about the identification of impaired nutritional status among ICU patients.

Protections

I held a meeting with the nurse manager, clinical specialists, and clinical educator of the MICU as a precursor to the start of my project to establish a relationship for ongoing partnership and facility support for the duration of the process. I explained the problem-focused topic, and received approval and support from the leadership team. I also explained the process at staff meetings on both day and night shifts to ensure full opportunity and understanding, as soon as IRB approval was obtained. I facilitated discussion of the project procedures to ensure ethical protections throughout the process. Participants were informed of their right to privacy and assured confidentiality. I secured and maintained confidentiality of survey results by using a locked, password protected, and encrypted drive, and transported the files in a secured binder. No incentives were

offered for participation, however I explained that consent was voluntary with the option to withdraw at any time, without penalty. No identifiers were included on documents, but I asked participants to create a code, which they maintained, and which I used to identify their work on the pre and posttests evaluation.

Analysis and Synthesis

The data analysis I completed, utilized descriptive statistics to analyze and describe the participants. The pre and post surveys included demographic data including participants' age, gender, number of years as an RN, number of years as an RN in the ICU, and RN program completed. The expert panel evaluated content validity of the instrument and rated the relevance of each item using a 5-point scale ranging from strongly disagree, disagree, neutral, agree, to strongly agree. I used the SPSS software package to summarize the data, which provided ongoing analysis and tracking with no patient parameters included. I incorporated strict parameters to assure the integrity of the evidence, so that any survey having less than 10% of information missing, could identified and discarded. The responses were reviewed for emerging patterns and themes to better understand RNs attitudes toward nutritional assessment in the ICU. The survey content was used to demonstrate the validity of my project question and provide direction for education to nurses on the EBP assessment tool to improve the nutritional management of patients in the ICU.

Summary

My review of the literature suggested that an understanding of the risk factors involved in identifying nutrition problems among ICU patients is high and has led to

adverse patient outcomes. Hejazi et al. (2016) posited that there is a marked difference in the patient nutritional status on entry to the ICU compared to that at discharge. Therefore, understanding nurses' knowledge of nutritional assessments and its impact on early interventions to prevent nutritional decline and other adverse outcomes was essential. Result of my project could consequently have a significant effect on the initial assessment and management of nutritional status among ICU patients. Not only among the patient population at my practicum site but other ICUs and at-risk patients at other facilities.

Section 4: Findings and Recommendations

Introduction

Initiating a nutritional plan for patients in the ICU within the first 24-48 hours of admission is regarded as one of the best practice recommendations based on evidence and consensus among experts in the area of study (Siobal and Baltz, 2013). Although still controversial in clinical practice today (Reintam Blaser, A., and Berger, 2017), several guidelines, developed by the SCCM and A.S.P.E.N., the European Society for Clinical Nutrition and Metabolism (ESPEN), the AND, and the Canadian Clinical Practice Guidelines for Nutritional Support (CCPG) all support early assessment and feeding of the ICU patient (Siobal & Baltz, 2013). While malnutrition among ICU patients continues to affect millions of patients both nationally and globally, early nutrition, when initiated promptly with a gradual increase over 3-4 days, is considered the best routine protocol for feeding among ICU patients (Reintam Blaser, A., and Berger, 2017).

Nutrition plays a pivotal role in a patient's life and illness (Rabito et al., 2017). Lack of nutritional knowledge among nurses, particularly the impact on the health condition of ICU patients, has led to failures in identifying ongoing nutritional problems that could result in adverse results for the already critically compromised patient. To sufficiently address the local problem of identifying patients at risk for impaired nutrition, I am convinced that educating nurses on the use of an evidence-based assessment tool, assessing their knowledge and learning, to better equip them in providing quality assessments leading to early interventions, is imperative.

The purpose of my doctoral project was to bridge the gap between knowledge and practice by empowering nurses through education of an assessment tool that would better equip them in identifying patients at risk for malnutrition, by providing quality assessments to improve the nutritional stability of patients in the ICU. Guiding the doctoral project was the practice-focused question; will the education of an EBP assessment tool improve nurses' knowledge of nutritional assessment and identify patients at risk for impaired nutrition? I conducted an extensive search of the literature using databases such as CINAHL, PubMed, Medline, EBSCO, and Walden Library. In the review McClave et al. (2016) supported that identification of nutritional imbalance required full nutritional screening of the ICU patient within 48 hours of admission, with a detailed assessment of those patients who have a higher risk of decline. Having RNs with knowledge of and use of a reliable assessment tool that can provide early identification of the patients' nutritional decline and its impact on the disease process is crucial to improving the nutritional stability and outcomes of the patients in the ICU (Kyle & Coss-Bu, 2010).

Other results from the literature review revealed correlations between assessment of nutritional stability and early implementation of a feeding plan that often lead to a nutritional decline in patients. Most of these were associated with lack of organizational support due to existing culture, lack of time and resources, lack of knowledge and ease of using screening tool, and need for continuing education (Bonetti, Bagnasco, Aleo, & Sasso, 2013; Duerksen et al., 2016; & Eide et al., 2015). Following the education on the nutritional assessment tool, providers demonstrated an increase in knowledge of patient

care, including documentation, interventions, and care planning among interdisciplinary care members (Silver et al., 2018).

According to Aziz et al. (2011), patients who present with malnutrition on admission usually worsen with hospitalization. Wells and Dumbrell (2006) concurred that patients whose nutritional status is already compromised might further experience impaired immunity, impaired respiratory and muscle function, and delays in wound healing. Hejazi, Mazloom, Rezaianzadeh, and Amini (2016) conducted a study that provided a positive correlation with the length of stay in intensive care and malnutrition on discharge. Patients were further requiring supervised nutritional care and were discharged from the hospital to skilled nursing facilities or rehabilitation centers (Yeh et al., 2016). Unfortunate outcomes of impaired nutrition in the ICU have led to readmission rate of 17% and a mortality rate of 17.9 % within 30 days (Bendavid et al., 2017; Havens et al., 2015). Bendavid (2017) predicted mortality of greater than 30% in a study of 9,777 patients worldwide, with an additional 40% resulting from not receiving nutrition on Day 1, which was similar to findings of other studies.

Yalcin, Cihan, Gundogdu and Ocakci (2013) blamed the cause of ineffective nutritional practice on a lack of nutritional knowledge among RNs. In a randomized questionnaire, including over 300 nurses and encompassing several hospitals, the authors determined that nurses with a high nutrition-knowledge base were more competent in nutritional assessments due to frequent use in clinical practice (Yalcin et al., 2013). They further implored institutions of nursing education to structure a curriculum that emphasizes ongoing nutritional education in clinical practice (Yalcin et al., 2013).

Mitchell, Lucas, Charlton and McMahon (2018) believed that nurses are strategically

positioned to support nutritional management in patient care effectively, but lamented the

lack of training and ongoing nutritional education opportunities to make this a reality. In

a systematic review of case studies published between 2000 and 2016, to investigate the

results of nutrition education on improved knowledge and practice, Mitchell et al. (2018)

determined that face-to-face nutrition training and self-directed learning manuals were

among the most effective methods that led to positive improvements in nutritional

knowledge among nurses. Dobson and Scott (2007) postulated that if nurses are to

respond to the call for increased involvement in the assessment of the ICU patient, then

support through the use of a comprehensive nutrition education program with

reevaluation is required.

With the existing gap between nurses' knowledge and repeated nutritional

assessments in practice (Mitchel et al., 2018), it is imperative that there is proficient

knowledge of nutritional assessment skills and increased awareness among nurses on the

impact of nutrition on patient outcomes. Screening tools are recommended for use in the

ICU to identify patients at risk for impaired nutrition (Olivares et al., 2014). The MUST

has been reliably used in acute settings and measures both patients' risk of nutritional

decline as well as its effects on the severity of disease (Singer, 2019). Incorporating the

components of the MUST tool, Body mass index (BMI) score (Step 1), Weight loss score

(Step 2), Acute disease effect score (Step 3), Overall risk of malnutrition score (Step 4),

and management guidelines (Step 5), will provide assessment data as well as care plan

for timely interventions (Isenring, Bauer, Banks, and Gaskill, 2009; Alvelino-Silva

&Juluul, 2017). Equipping nurses with the ability to perform nutritional assessments will help to identify patients at risk for malnutrition (Singer, 2019). With a 96% consensus, the ASPEN and ESPEN guidelines recommended the assessment of every ICU patient hospitalized for greater than 48 hours, using a nutrition assessment tool to identify any risk of malnutrition (Singer, 2019).

After performing numerous exploration of the literature and evidence to support the correlation between the lack of nutritional assessment with nurses' knowledge and perception of malnutrition in the ICU patient, the absence of a definitive conclusion as to why this problem still exists, is questionable. Reintam Blaser and Berger (2017) posited that lack of knowledge and use of assessment tool, coupled with commitment and organization follow through, creates a significant gap in the culture within the ICU. This gap demonstrated in the literature requires more understanding of nurses' knowledge of assessment and awareness of the impact of nutrition on patient outcomes.

Findings and Implications

The potential of life-threatening complications of malnutrition among critically-ill patients in the ICU makes it necessary for nurses to be knowledgeable and competent in their assessment skills. Nurses should also be required to maintain proficiencies in their abilities to identify those patients at continued risk. This requires organizational support for continued education and interdisciplinary collaboration to ensure that interventions are prompt.

My project began with the identification of the MICU as the setting for my project due to the wide range of diagnoses among its patient population. The leadership team,

including the MICU manager, the nurse educator, the clinical nurse specialist, as well as

the director of nursing research (who is also a certified nurse educator and my practicum

preceptor), comprised the expert panel. The process of developing the pretest, education,

and posttest involved recommendations from project committee on drafts, involvement of

the priority audience (expert panel) to ensure that the drafted materials were

understandable, suitable for the target audience, and effective, before final documents

were produced. The pretest was a 16-question 5-point Likert scale survey, the education

was a PowerPoint presentation, and the posttest consisted of 19 questions. I presented the

nutrition packet, including the pretest, teaching presentation on the use of the EBP

nutritional assessment tool, and a posttest, to the expert panel for review. Paper copies

were distributed during this meeting, along with an email copy of the voice-over narrated

version of the PowerPoint presentation. Members of the team were allowed to review the

documents and provide feedback. There were questions regarding the length of the

questionnaires and potential nurses' error of not completing the other side of the sheet.

One question seemed more relevant to providers (physician and dietician) and was

recommended for removal to prevent misunderstanding. I resubmitted the final draft to

the team included changes to reflect the recommendations they provided.

The content experts reviewed the materials using a computation of an S-CVI for a

16-item with three Expert Raters (Appendix F). I provided a revised copy of the Nutrition

Packet, with recommended changes to the team, which was approved. I sent an initial

contact email to the MICU manager to be forwarded to the MICU staff. The email

contained an explanation regarding my project, consent form for anonymous

questionnaires and an anonymous link to the pre-survey (Appendix B), for distribution to participants who consented to complete the study. I used the email to further informed participants that the identity of those who completed the survey would remain anonymous. By clicking the embedded link in the survey, participants indicated their choice of participating in the project and were directed to the demographic questionnaire and pretest items to assess their knowledge of nutritional assessment of ICU patients.

Participants

I invited the participants who completed the online pretest, the revised 10-question 5-point Likert scale survey, which included three demographic questions, to education sessions scheduled on their shift and gave them a thorough description and purpose of the study. Seventy-two RNs, from across all shifts, and who met the inclusion criteria of being employed full-time to the MICU, completed the pretest and the education. I used the selected materials to evaluate nurses' knowledge and perception of nutritional assessment in the ICU, in order to provide direction on areas requiring improvement and reason for lack of assessment.

The nurse participants completed education on the MUST tool only after the pretest was finished. The education included identified risks from the literature that included length of stay in the ICU, higher costs, and increased readmission rates. I provided detailed information on each step of the MUST process with a demonstration of assessment and a case study to reinforce and evaluate content. Following the education, I administered the posttest which included a Likert scale with an additional three questions to evaluate post-education knowledge and perception of malnutrition. The summative

evaluation assessed improvements of nursing knowledge as well as changes to attitudes of continued nutritional assessment within the ICU. The selection of experienced ICU nurses was to provide information on the attitudes associated with knowledge of an assessment tool in the nutritional management of the ICU patient or lack thereof. Significance differences was found in questions 4,5,6,7,8,10 between the pretest and posttest results and results are explained in the following sections. The tables below show the results of both pretest and posttest.

Data Collection

Once Internal Review Board (IRB) approval was obtained (IRB Approval # 11-12-19-053502) I then collected data over 4 weeks. The pretest was distributed via email by the MICU manager and I accessed the results online and collected the hardcopies used. The expert panel further completed an evaluation of the Nutrition Packet (teaching materials) as well as the training that I provided (Appendix E).

I completed the data analysis using descriptive statistics. I assessed the demographic data, along with knowledge and attitude assessment responses from the 5-point Likert scale pre and posttest, ranging from strongly disagree to strongly agree and compared using aggregate analysis.

Results

Of the one hundred plus registered nurses that were emailed the survey link, 65% participated by completing the online version of the pretest survey. All 100% of those who completed the pretest survey attended the education sessions and completed the posttest. There were 7 participants who attended the training without completing the

online pretest and were provided hard copies of the survey before they were allowed to

attend the training. They also completed the posttest for a total of seventy two

participants. Of the respondents, 19.44 % were males, and 80.56% were females. As is

common in most Intensive Care Units, the findings showed that a significantly higher

number of females are employed as registered nurses, compared to males, a difference of

61% among the study group (Figure 2).

Figure 2. Gender
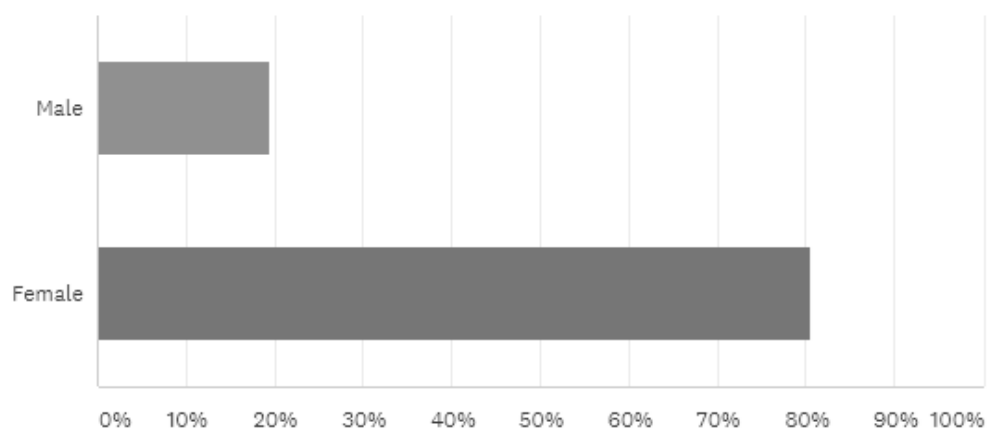
Gender	N (%)
Male	14 (19.44%)
Female	58 (80.56%)

Figure 3 shows that of the seventy two staff members employed in the MICU and

participated in the survey, close to half of them (41.67%) had an experience of greater

than ten years as a registered nurse compared to 27.78% with less than five years.

Figure 3. Number of Years as an RN
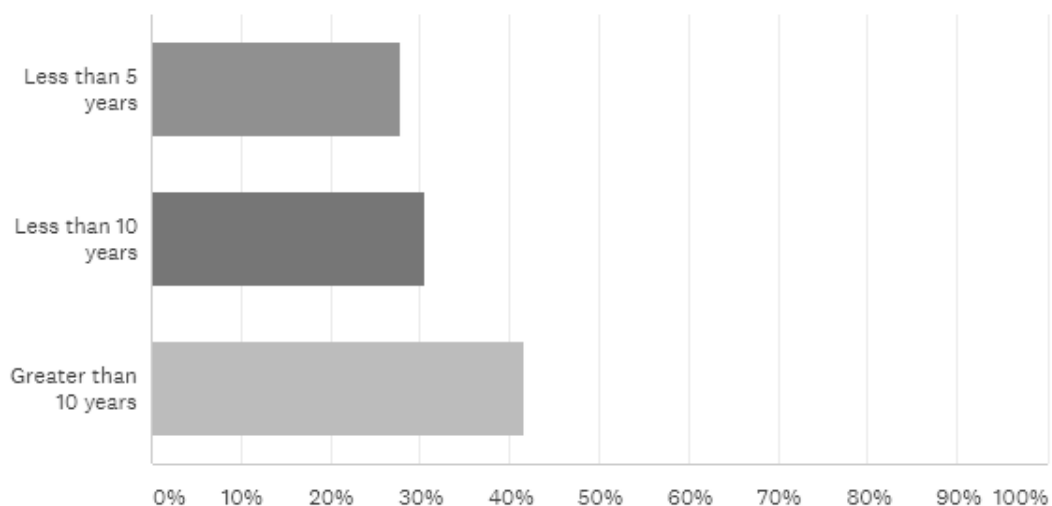
	N (%)
Less than 5 years	20 (27.78%)
Less than 10 years	22 (30.56%)
Greater than 10 years	30 (41.67%)

I categorized the years of experience among the participants in the Intensive Care Unit into three areas illustrated by Figure 4; those employed less than 5 years, less than 10 years, and greater than 10 years. 47% of the participants identified as working in the ICU of less than five years compared to 30.56% greater than five years. The results indicated that the length of practice as an RN was not significant to time worked in the ICU, which is atypical to ICU staffing in previous years but is becoming a common trend and is attributed to an increase in younger nurses' interest in ICU nursing as a prerequisite for advance practice nursing careers (Branthover, 2018).

Figure 4. Number of Years in the Intensive Care Unit
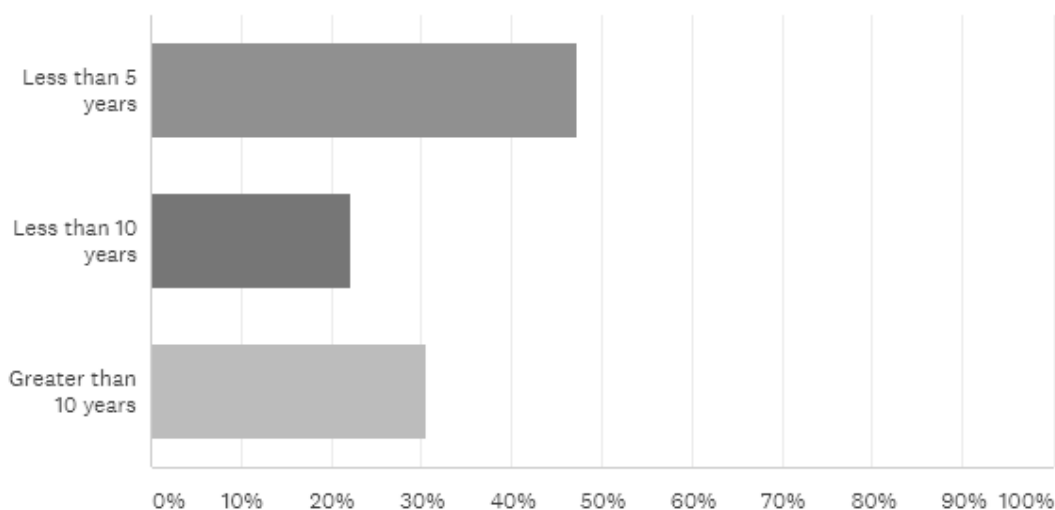
	N (%)
Less than 5 years	34 (47.22%)
Less than 10 years	16 (22.22%)
Greater than 10 years	22 (30.56%)

Participants in the ICU were asked to share their perception of the facility's

screening of malnutrition among ICU patients. Table 1 reflects their responses ranging

from strongly disagree to strongly agree. There were significant changes in perceptions

between the results on the pretest compared to the posttest among those who strongly

disagreed (2.78% to 86.11%) and those who strongly agreed (36.11% to 8.33%).

Table 1. Facility Screening of Malnutrition among ICU Patients

	N (Pretest %)	Posttest (%)
Strongly Disagree	2 (2.78%)	62 (86.11%)
Disagree	6 (8.33%)	2 (2.78%)
Neither agree nor disagree	16 (22.22%)	0 (0.00%)
Agree	26 (36.11%)	6 (8.33%)
Strongly agree	22 (30.56%)	2 (2.78%)

Participants were asked to share their agreement or disagreement with the
question, that it was the RNs responsibility to complete a nutritional assessment or
screening of the ICU patient for nutritional risks. RNs agreement to this responsibility
was significantly different on the pretest, especially among those who strongly agreed
(16%) to the posttest (66%). The 69% difference in opinions was credited to the
education provided to the RNs. The responses were as demonstrated in Table 2 below.

Table 2. RNs Responsibility of Nutritional Assessment of the ICU Patient

	N (Pretest %)	Posttest (%)
Strongly Disagree	4 (5.56%)	0 (0.00%)
Disagree	14 (19.44%)	0 (0.00%)
Neither agree nor disagree	6 (8.33%)	0 (0.00%)
Agree	32 (44.44%)	6 (8.33%)
Strongly agree	16 (22.22%)	66 (91.67%)

Table 3 shows the responses from participants on the completion of nutritional
assessment within 24-hours of admission to the ICU. The results indicated that the
facility's practice was not consistent with ASPEN recommendations. This resulted in a
significant change from agree on the pretest (55.6%) to strongly disagree on the posttest
(62.5%) following the education.

Table 3. Nutrition Assessment Completed Within 24-hours of Admission to the ICU

	N (Pretest %)	Posttest (%)
Strongly Disagree	2 (2.78%)	45 (62.5%)
Disagree	2 (2.78%)	12 (16.67%)
Neither agree or disagree	12 (16.67%)	3 (4.16%)
Agree	40 (55.56%)	10 (13.89%)
Strongly agree	16 (22.22%)	2 (2.78%)

The results of table 4 confirmed that many ICU RNs were not performing
nutritional assessment due to the facility's practice of completing assessments only an

admission, and as such did not strongly agree to be able to locate the nutrition-screening

tool in the EMR on the pretest. This significantly changed on the posttest after the

education. The results are reflected in the table below.

Table 4. Locating the Nutrition Screening Tool in the EMR

	N (Pretest %)	Posttest (%)
Strongly Disagree	4 (5.56%)	0 (0.00%)
Disagree	12 (16.67%)	0 (0.00%)
Neither agree or disagree	4 (5.56%)	0 (0.00%)
Agree	40 (55.56%)	40 (55.56%)
Strongly agree	12 (16.67%)	32 (44.44%)

Participants were asked about their competency in using nutritional assessment to

identify ICU patients experiencing malnutrition or those at risk of malnutrition. Their

responses were collected ranging from strongly disagree to agree. Their competence level

improved significantly as correlated to the increase in strongly agree responses on the

posttest, following the education (14% to 83%), a difference of 69%.

Table 5. RNs Competence in Identifying Patients Experiencing Malnutrition or at Risk.

	--	*N* (Pretest %)	Posttest (%)
Strongly Disagree		4 (5.56%)	0 (0.00%)
Disagree		6 (8.33%)	0 (0.00%)
Neither agree or disagree		12 (16.67%)	0 (0.00%)
Agree		40 (55.56%)	12 16.67%)
Strongly agree		10 (13.89%)	60 (83.33%)

RNs comfortability in consulting with providers about their patients' nutritional

status was unchanged on the survey results. Table 6 shows both pretest and posttest

responses, which suggested that even with increased knowledge of nutritional assessment

following the education, RNs did not feel comfortable addressing these concerns that
impacted patient care.

Table 6. RNs Comfortability in Consulting with Providers about Nutritional Status of the
ICU patient.

	N (Pretest %)	Posttest (%)
Strongly Disagree	2 (2.78%)	0 (0.00%)
Disagree	4 (5.56%)	0 (0.00%)
Neither agree or disagree	0 (0.00%)	1 (1.38%)
Agree	24 (33.33%)	36 (50.0%)
Strongly agree	42 (58.33%)	35 (48.6%)

Providing education to improve RNs ability to identify patients' at risk for
malnutrition was a critical component of the study. Table 7 illustrates the result of how
well this was achieved, and identified the significant changes from pretest to posttest in
response to the education provided.

Table 7. Factors that Contribute to Patient's Risk for Malnutrition

	N (Pretest %)	Posttest (%)
Strongly Disagree	2 (2.78%)	0 (0.00%)
Disagree	2 (2.78%)	0 (0.00%)
Neither agree or disagree	4 (5.56%)	0 (0.00%)
Agree	46 (63.89%)	25 (34.72%)
Strongly agree	18 (25.00%)	47 (65.28%)

The responses of the Intensive Care Unit staff to the Likert scale survey on
nurse's knowledge and attitude of malnutrition screening was calculated using
percentages of agreement and disagreement with items. I entered the data into a
Statistical Significance Calculator to help determine the value of the comparative error,
difference and the significance for any given sample size and percentage response. The

expert panel assessed the validity and reliability of the nutrition packet for a CVI of 94%.

As represented in various tables, there were areas of significant statistical differences

between the pretest and the posttest, after the education, in areas such as, locating the

nutrition screening tool in the EMR (Table 4), feeling competent in identifying patients

experiencing malnutrition (Table 5) and, increased confidence in identifying risk factors

of malnutrition (Table 7).

     There was a calculated difference of 27.77 % between nurses' ability to locate the

nutrition-screening tool in the EMR prior to the education and after. Only 16.67% of

responders strongly agreed to know where to locate the assessment tool in the EMR on

the pretest, compared to 44.44 % strongly agreeing on the posttest. This significantly

demonstrated a change from 72% of those indicating some form of agreement on the

pretest to 100% agree or strongly agree, on the posttest. The competence level among

RNs in identifying patients experiencing malnutrition or at risk for malnutrition increased

from 13.89% to 83.33% after the education. Knowledge about the factors that contributed

to patients risk for malnutrition also increased from 25% to 65.28%.

     There was a dramatic decline in results for the question regarding facility

practicing malnutrition screening among ICU patients, from the pretest (66.67 %) to the

posttest (11.11%). On the pretest, most responses typically agreed to some extent that

nutrition was assessed in the ICU and that it is the RNs responsibility to perform this

screening (66.66%). Most notably, only 2 responders strongly disagreed to a practice of

screening of malnutrition on the pretest, with sixty two strongly disagreed on the posttest,

showing a difference of 77.78% indicating a change in perception of practice after the

education. Subsequently, the results were similar for the question on the pretest regarding 24-hour nutrition assessment in the ICU, with a significant decline on the pretest from 77.78% agreement to 16.67%, and an increase from 5.56% disagreement on the pretest to 79.17%.

While changes were evident among responses after the education to many of the questions, the responses to the question of comfort level of participants in consulting with the provider about the patient nutrition status remained unchanged, and could be indicative of the culture that existed in the ICU. Overall, the results showed that participants felt more likely that it was their responsibility to complete nutritional assessment or screenings for nutritional risk, after the education, but may not feel comfortable enough to collaborate with the providers due to organization culture and practice.

I presented 3 additional questions on the post survey after the education, including; the participants' likelihood to assess nutrition among ICU patients after receiving the education, feelings to advocate for nutrition for patients, as well as increased understanding of the assessment tool because of the education. Responses to the 3 additional questions ranged from agree to strongly agree for all participants. When discussing the steps of the MUST tool and identifying impact to severity of disease process, most participants admitted to lack of knowledge and awareness, as key concerns of practice.

During the analysis of the data, I discovered that although a nutritional screening was completed on patients during admission, most ICU RNs were not aware that

nutritional assessment was only completed once, per facility practice, and that the patient was not reevaluated for nutritional decline while in the ICU. Therefore, risk factors for declining status, especially among patients that were unfed, were inadvertently missed.

With the culmination of the results of my project I have supported the research focus. The research question which asked the question, will the education of an EBP assessment tool improve nurses' knowledge of nutritional assessment and identify patients at risk for impaired nutrition have been answered. The results of my project showed that experience in nursing does not equate to knowledge of nutritional assessment of the ICU patients' and that most RNs in the ICU lose the knowledge of using an EBP tool to assess the patient for malnutrition overtime, due to infrequent use. The response rate of strongly agree to RNs responsibility in nutritional assessment increased from 22.22% on the pretest to 91.67% on the posttest and indicate a dramatic change in knowledge after the education. The improvement in strongly agree responses from 25% to 65% on identification of contributing risk factors for malnutrition also demonstrate that education plays a key role in nurses' knowledge and performance, which also correlates with 69.44% increase on competency in identifying patients with malnutrition.

Implications for Practice

Due to the inconsistencies in nutritional assessment practices, as well as the failure to follow the guidelines as recommended by the AND and ASPEN (Grammatikopoulou et al., 2018), patients are at increased risk for malnutrition. The early identification of risk factors, diagnosis, and treatment is critical among healthcare providers, including registered nurses. With the implications resulting from the findings

of my study, I was able to demonstrate a need to bridge the gap between knowledge and practice by providing education to nurses to better equip them in providing quality assessments to intervene in the nutritional care of patients in the ICU. Having the opportunity to improve RNs' knowledge will also help to empower and promote best practices in reinforcing the importance of proper assessment skills. Mooi (2018) stressed that education is the best indicator of identifying patients at risk for a nutritional decline and the best way to minimize its impact by identifying factors that could otherwise lead to adverse outcomes (Mooi, 2018).

Not only will individual registered nurses benefit from increased knowledge of nutritional risk factors and are prepared to facilitate timely interventions, but the critical care population in the intensive care unit will also be identified early for other adverse responses that are synonymous with impaired nutrition. With the ability of RNs to competently identify patients at risk for impaired nutrition, and to understand the impact on the disease process, nurses are more equipped to respond promptly. Patients, especially those whose conditions are further complicated by immunosuppressed states, rely on the knowledge and skills of healthcare professionals, including nurses, to ensure that they receive the best assessment and treatment for positive outcomes. Assessment skill is a crucial component of the nurses' role, regardless of the patient population, but extremely important for critically ill patients suffering from significant diseases complicated by impaired nutrition.

Implications from the study extend to institutions and systems, demonstrating a need to have collaboration among all members of the treatment team to ensure that the

plan of care aligns with patients' needs. When R.N.s are comfortable consulting with dietitians and physicians about the patients' nutritional status, interventions can be prompt. Having a culture where organizational leaders support continued education and interdisciplinary collaboration is essential (Reintam Blaser, A., and Berger, 2017), and ensures that healthcare professionals such as nurses, dietitians, and physicians, are proactive and equipped with early nutrition measures, and the best protocol for nutrition needs of the ICU

Implications for Social Change

Potential implications for positive social change include the use of evidence-based assessment tools and the education of nurses who can identify patients at risk. Increased assessment skills among nurses will ensure the identification of the immediate cause and related behaviors of impaired nutrition, and will lead to interventions that will address ways to disrupt current cultures within the ICU and create new processes that guarantee better nutrition management and improved patient outcomes. The use of Electronic medical records to document patient assessment results, will be beneficial and accessible to all members of the interdisciplinary team in the creation of care plans and prompt interventions. The use of patient information in the identification of trends to assess protocols and create reports that could be shared with other units and institutions, for like populations, resulting in buy-in from stakeholders through experience with the EBP tool. Training on the use of the MUST tool can also be shared among departments with sufficient data to support its use. These results will also benefit both the patients and the organization through improved outcomes, with patients receiving focused and enhanced

attention. Similarity, the results may prove to be cost-effective for the organization through reduced adverse events.

Other implications for social change include the identification of barriers and solutions to the plan of care. The identification of behaviors among providers, that are not conducive to interdisciplinary collaboration, and which negatively affects multidisciplinary approach to patient care, could be addressed to ensure best results. With increased comfortability among RNs to consult with all members of the interdisciplinary team, consistency and follow-though will be easier to accomplish. The findings from this project support the continuing education of RNs on nutritional assessment. It is my hope that the findings from my project will provide a basis for evidence-based practice to be utilized in future training efforts and other clinical settings, as appropriate.

Recommendations

Nutritional assessment among critically ill patients in the ICU was intended to identify patients at risk, reduce adverse effects and improve patient outcomes. Educating nurses on the use of an evidenced-base practice tool to provide nutritional assessments and identify patients at risk for impaired nutrition was the focus of the study. The results have led to the following recommendations to enhance the care of the patient in the critical care unit studied.

The first recommendation requires critically ill patients in all ICUs to be assessed for malnutrition and associated risk factors using an EBP tool within 24 hours of admission (Tappenden et al., 2013). As a condition that Reber et al. (2019) states is preventable and mostly reversible through early and adequate nutritional therapy, without

adequate awareness, knowledge and appropriate clinical protocols, for identification and treatment, the problem often remains undetected within hospitals. The MUST is a validated screening tool that is used to measure both the patients' risk of malnutrition as well as effects on their disease process (Reder et al., 2019). Assessment results from the screening completed by nurses must be documented in the electronic medical record and be accessible to all members of the interdisciplinary team (Tappenden et al., 2013). The recommendation for assessment within 24 hours of admission to the ICU, will address the finding among 86% of participants who strongly disagree that the facility routinely screens for malnutrition of all patients in the ICU. The site currently only utilizes the assessment tool on admission and my project findings demonstrates that nurses are uncertain of when to perform additional nutritional assessments on their patients. The facility therefore needs to implement a nutrition protocol to ensure that all departments are flagged for immediate screening (Tappenden et al., 2013) and rapid implementation of nutrition unless contraindicated.

There was no significant change indicated by nurses' responses to the question of comfortability among RNs to consult with physicians and dieticians about the nutritional status of patients in the ICU. Therefore, the results led to my second recommendation, to create an organizational culture where nutritional assessment of the patient is valued and supported by stakeholders, knowledgeable to the impact of malnutrition on patient outcomes (Tappenden et al., 2013), and ensuring that nurses and dieticians are included in the interdisciplinary care of the patient.

The third recommendation builds on the previous finding and supports Tappenden et al. (2013) claim that multidisciplinary approach will ensure that the nutrition status of the ICU patient is addressed promptly. With improved knowledge nurses will empowered competently consult with the interdisciplinary team to initiate appropriate interventions. This collaboration will also lead to the identification of barriers and solutions to the plan of care.

The fourth recommendation is in response to the 83% increase in competency among RNs in identifying patients at risk for malnutrition following education. The increase in nurses' response following the education indicates the improved knowledge gained through training, and shows that the facility should provide ongoing nutritional education for nurses to ensure that patients are assessed as outlined by the MUST tool and reevaluated as appropriate. With ongoing education, nurses should be required to demonstrate knowledge of nutritional assessment by successfully completing refresher trainings, as established by the organization's leadership.

Implementing these recommendations will also result in providers following the ASPEN guidelines and ensure that nutrition practices, as specified by the organization, will lead to a change in culture that ultimately leads to a reduction of malnutrition rates in the ICU.

Contribution of the Doctoral Project Team

For the successful implementation and evaluation of any project, the need must be evident and commitment and support of the process, necessary. Getting buy-in from organization leaders and other stakeholders is exceptionally crucial. Not only did the

support team at my project site provided me access to organization leaders for the

presentation of my project, but they were also instrumental in facilitating meetings with

nursing staff, to allow for increased awareness of the project and to generate interest

among participants. They were also involved in the review of the nutrition packet I

created, assisted me in scheduling education sessions, and making themselves available

for answering questions on facility-specific practices and protocols. The process of

developing the pretest, education, and posttest involved recommendations from my

project committee on drafts, involvement of the expert panel to ensure that the drafted

materials were understandable, suitable for the target audience, and effective, before final

documents were produced.

Throughout the project process, I collaborated with several individuals at the

project site as well as with my project committee. Recommendations from members of

the DNP Project committee happened at all aspects of the process. They consisted of

direction and feedback to ensure the reliability and validity of materials, as well as the

accuracy of content and representation of the latest evidence in understanding the

practice-focused question. The development of a CVI tool, a student evaluation, as well

as weekly meetings to address issues pertinent to the project, kept me focused and

provided guidance for meeting desired results. The activities throughout the process

resulted in the development of a Nutrition Packet that contained the data results that

determined the required changes in practice, as outlined in the final recommendations.

The ICU support team at my project site, including members of the expert panel which

comprised of, the unit manager, nurse educator, clinical nurse specialist, and the director

of research, continuously provided support on the needs of RNs, as well as feedback on the surveys, screening tool, education materials and evaluation of my performance. The team also recommended a shortened version of the surveys, which led to revisions and approval of the final product. The MICU leadership team accepted the project, supported staff participation, and provided direction to ensure that all aspects of the program aligned with the strategic vision of the organization. They even offered unit coverage during the education of RNs. Recommendations from the support team included the suggestion of having a dietician in every ICU department as a way to develop consistent nutritional education and protocols, as well as consistency and collaboration.

Plans for Project Dissemination

One of the most critical steps of the DNP project is the dissemination of the final study and professional responsibility, as outlined in the DNP essentials. I have planned for a presentation at the project site, with a question and answer session to discuss the results and recommendations for practice. Another goal of disseminating the project will be through publication in a peer-reviewed journal, which will allow for rapid distribution to a broad audience of colleagues. Other targeted audiences will include poster presentations at professional and community organizations, as well as attendance to conferences as podium speaker. The focus of dissemination is to improve practice and patient outcomes resulting from nutritional instability by utilizing the developed DNP project.

Strengths and Limitations of the Project

The willingness of the leadership team and the participant response of 100% completion rate of both pre and posttest was a considerable strength of the study. The participation rate provided a significant representation of the population studied (72%). Other strengths included having the leadership team setting up a buddy system as well as covering for participants so that they could rotate through the education sessions. Providing safe and appropriate care is extremely important due to the critical state of patients in the ICU, and having leadership assistance through the process allowed data to be collected in a cost and time efficient manner.

One limitation of the study was gender inequality due to the high number of females, which is typical for nursing. An unanticipated limitation was that not all ICU departments have dieticians dedicated to the unit or available for consults, which can further delay identification of risk factors among this population, limit the RNs ability to advocate for patients experiencing malnutrition, and further prevent findings to be generalized to all critical care units.

Section 5: Dissemination Plan

I designed my project as an educational program targeted toward identifying and improving nurses' knowledge and perception of nutritional assessment in the ICU using an evidenced-based assessment tool. The aim of my project was to bridge the gap between knowledge and practice by providing education to nurses to better equip them in proving quality assessments to intervene in the nutritional care of patients in the ICU. I plan to disseminate the data by sharing the results along with a copy of the nutrition packet including pre and posttest surveys and the PowerPoint education. The information will include no identifiable information and will contain recommendations for improvements, with the ultimate goal of the dissemination to facilitate education, leading to improving nurses' knowledge of nutritional assessment of patients in the ICU.

My plans for future projects include incorporating nutritional assessment in all critical care units within the facility, using the MUST tool to perform nutrition assessment of all patients within 24 hours of admission. Commitment to this practice will ensure prompt interventions among the critically ill population and reduce associated adverse patient outcomes. Nutritional assessment is critical to the outcome of patients in the ICUs. The ongoing evaluation of ICU patients will provide valuable information on changes to the nutritional status from admission to discharge (Hejazi, Mazloom, Zand, Rezaianzadeh, and Amini, 2016). Many complications of nutrition, such as pressure ulcers, poor wound healing, and infections are preventable, and ICU nurses play a vital role in this process (Avelino-Silva and Juluul, 2017). Early and frequent screenings of ICU patients will provide crucial information necessary to develop nutritional care plans,

facilitate multidisciplinary efforts, and improve patient outcomes (Avelino-Silva and Juluul, 2017).

Analysis of Self

The completion of my DNP project has allowed me to achieve both personal and professional growth. Reflecting on my experiences, both didactic and practicum, throughout my DNP study, has been poignant. Progressing from one course to the next, remaining committed to the timeline while encountering personal and professional challenges along the way, has increased my resilience and commitment to succeed.

As I continue to evolve throughout this process, the impacts from each practicum experience and culminating in my capstone project, have increased my leadership skills, improved my level of knowledge in so many areas, allowed me to develop professionally, and overall increased my awareness of my responsibility on obtaining a doctor of nursing practice degree. While each course has been invaluable in the experiences that have influenced my progress throughout the program, many opportunities have ensured my growth and development in the areas of leadership. As a leader, being cognizant of my responsibility in creating a culture of safety in practice, being a change agent in improving processes and practices leading to improved functionality and sustained results. I have learned through the completion of my DNP study that to prevent failure, a good leader will employ the best strategies to identify problems and apply maintenance tools that define the required changes over time. I have participated in meetings with my preceptors and shared my knowledge in the development of policies and procedures to address organizational and system issues to prevent future adverse events. I have gained

much insight into the development of policies. While I would not consider myself an

expert at this, but I have developed increased awareness and knowledge in the

development of health policy with reasonable understanding to participate in efforts to

advocate for issues of concern. Through the DNP capstone process, I have been able to

assess different leadership styles. I know that I have the tools to be an effective leader,

having received buy-in, support, and feedback from the different professional groups I

have worked with, through the acceptance of my ideas to change practice.

Practitioner

As a practitioner, I have the dual role of being a provider and an educator. My

responsibilities as a practitioner as outlined by Rolfe and Davies (2009) involved playing

an integral part in clinical practice through patient care, as well as narrowing the

knowledge gap through efforts to improve outcomes rather than its contribution to

generalizable knowledge. Fulfilling the DNP Essentials VII (AACN, 2006) by

demonstrating leadership skills through an understanding of the role of an advanced

prepared nurse in expanding knowledge through research to apply effectiveness-based

programs that successfully address healthcare problems. As a DNP prepared nurse, my

practicums and capstone project have allowed me to focus on the translation of EBP into

practice (DePalma and McGuire, 2005) through its application, implementation, and

evaluation, by achieving and maintaining high-quality care through practice to guide

improvements and outcomes. I feel prepared through my involvement in the different

practicums I have completed to fulfill these roles competently. The ability to do so has

improved with each rotation, and I feel prepared to guide improvements in practice and

outcomes because of the experiences I have gained through this process.

Scholar

The DNP journey has allowed me to evolve and gain new insights into different

areas of nursing care. Understanding the role of the student to maintain a work-life

balance while utilizing the constructs of the adult learning theory to initiate structures to

sustain adult learning. The experiences afforded through my doctoral training have

allowed me to objectively view the impact of access to healthcare as well as the

importance of affordable coverage. They have increased my commitment to advocating

for allocations that ensure patient safety and reduction in the overall cost of healthcare.

The practicum experience has provided many opportunities for me to develop the

advanced practice foundational competencies specified by the DNP essentials. As a

scholar I have fulfilled DNP Essentials II (AACN, 2006) by observing the process of

organizational and systems leadership in prioritizing decisions that improve the quality of

care within the clinical practice. I plan to build on the knowledge base gained in all the

areas appropriate to my responsibility in practice or where my future goals in healthcare

may take me.

Project Manager

The capstone project serve as an excellent opportunity to develop and guide

implementation to improve nursing practice and improve outcomes in healthcare.

Through the leadership of the DNP practicum preceptor, committee chair, and leadership

at the project site, I have been able to gain insight and confidence as I collaborate in

initiatives that increase my understanding and created mutual commitment and respect. I have learned to complete a needs assessment while gaining an understanding of present cultures that shape practice. Learning how to utilize the best strategy while ensuring that all stakeholders are represented and buy-in to projects that ultimately enhance the delivery of care. During the completion of my project, I have gained an understanding of the federally mandated responsibilities of a research investigator in conducting a clinical protocol, by completing and benefitting from training opportunities. Meetings with the leadership team and ensuring that I am professional and ethical in practice and conduct in m my representation of Walden University, my profession, and my future aspiration as a DNP.

Summary

The role of nurses in the nutritional care of patients in the ICU cannot be overstated. It is imperative that nurses possess the highest level of skills to perform quality assessment, as required by this critically-ill population. In clinical practice today, there are several efforts to make nutrition a priority in the patient's care plan, which incorporates assessment with evidence-based practices (Yeh et al., 2016). Nurses' roles at the bedside contribute to the inconsistencies of lack of initiation of a nutritional plan for intensive care unit patients and intensify the problem that exists (Gupta et al., 2012). The results of my DNP project demonstrated that the nutritional management of the critically-ill patients in the intensive care unit will be improved with the education of nurses on the use of an EBP assessment tool to aid in identifying patients at risk for malnutrition. The findings from my project, adding to the body of other published evidence, will help to

promote evidence-based practice in the clinical ICU setting. The project also

demonstrates that experience, as an ICU nurse does not equate to nutritional assessment

skills. Using EBP to question current practices and translate the findings into practice, is

one way to ensure that nurses are empowered and promoting best practices to prevent

modifiable risk factors that could otherwise lead to adverse outcomes. Other similar

works are needed across all ICU populations to enhance nurses' knowledge of nutritional

assessment and bridge the gap between knowledge and practice.

References

Al Kalaldeh, M., & Shahin, M. (2014). Nurses' knowledge and responsibility toward
  nutritional assessment for patients in intensive care units. *Journal of Health
  Sciences, 4*(2), 90–96. https://doi.org/10.17532/jhsci.2014.168

Avelino-Silva, T. & Jaluul, O. (2017). Malnutrition in hospitalized older patients:
  Management strategies to improve patient care and clinical outcomes.
  International Journal of Gerontology, 11, 56–71.
  https://doi.org/10.1016/j.ijge.2016.11.002

Aziz, E. F., Javed, F., Pratap, B., Musat, D., Nader, A., Pulimi, S., & ... Kukin, M. L.
  (2011). Malnutrition as assessed by nutritional risk index is associated with worse
  outcome in patients admitted with acute decompensated heart failure: an ACAP-
  HF data analysis. *Heart International*, *6*(1), 3–8. doi:10.4081/hi.2011.e2

American Association of Colleges of Nursing. (2006). The essentials of doctoral
  education for advanced nursing practice. Retrieved from
  http://www.aacn.nche.edu/dnp/Essentials.pdf

American Nursing Credentialing Center. (2016). A new model for ancc's magnet
  recognition program. Retrieved from
  http://www.va.gov/nursing/docs/ANCC_NewMagnetModel.pdf

Barker, M., Dombrowski, S. U., Colbourn, T., Fall, C. D., Kriznik, N. M., Lawrence, W.
  T., & ... Stephenson, J. (2018). Series: Intervention strategies to improve nutrition
  and health behaviors before conception. *The Lancet*, 3911853-1864.
  doi:10.1016/S0140-6736(18)30313-1

Balakas, K., Sparks, L., Steurer, L. & Bryant, T. (2013). An outcome of evidence-based
practiced education: Sustained clinical decision-making among bedside nurses. *Journal
of Pediatric Nursing*, 28, 479–485. doi: 10.1016/j.pedn.2012.08.007

Black, A. T., Balneaves, L. G., Garossino, C., Puyat, J. H., & Hong, Q. (2016).
Promoting evidence-based practice through a research training program for point-
of-care clinicians. *Journal of Nursing Administration*, S36–S42.
doi:10.1097/NNA.0000000000000151

Bluestone, J., Johnson, P., Fullerton, J., Carr, C., Alderman, J., & BonTempo, J. (2013).
Effective in-service training design and delivery: evidence from an integrative
literature review. *Human Resource Health*. doi: 10.1186/1478-4491-11-51.

Branthover, Jean. (2018). An exodus of bedside nurses. *The American Journal of
Nursing, 111*(4). doi: 10.1097/01.NAJ.0000532046.13169.cb

Camargo, F., Iwamoto, H., Galvão, C., Monteiro, D., Goulart, M., & Garcia, L. (2017).
Models for the implementation of evidenced-based practice in hospital based
nursing: A narrative review. *Texto & Contexto - Enfermagem*, *26*(4), e2070017.
doi.org/10.1590/0104-07072017002070017

Carney, D.E., & Meguid, M.M. (2002). Current concepts in nutritional assessment.
Archives of surgery, 137(1), 42-5. DOI: 10.1001/archsurg.137.1.42

Chao, P. C., Chuang, H. J., Tsao, L. Y., Chen, P. Y., Hsu, C. F., Lin, H. C., … Lin, C. F.
(2015). The Malnutrition Universal Screening Tool (MUST) and a nutrition
education program for high risk cancer patients: strategies to improve dietary
intake in cancer patients. *BioMedicine, 5*(3), 17. doi:10.7603/s40681-015-0017-6

Dobson, K., & Scott, A. (2007). Review of ICU nutrition support practices: Implementing the nurse-led enteral feeding algorithm. *Nursing in Critical Care, 12*(3), 114–123. https://doi.org/10.1111/j.1478-5153.2007.00222.x

Fitzpatrick, J. (2010). Connecting or disconnecting the dots between research and Evidence-based practice. *Applied Nursing Research, 23*(1), 1. doi:10.1016/j.apnr.2009.10.001

Gaskins, A. J., Toth, T. L., & Chavarro, J. E. (2015). Prepregnancy nutrition and early pregnancy outcomes. Current Nutrition Reports, 4(3), 265–272. http://doi.org/10.1007/s13668-015-0127-5.

Gillespie, S. & van den Bold, M. (2015). Stories of change in nutrition: A tool pool. IFPRI Discussion Paper 1494. Washington, D.C.: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130077

Goodman, L., Khemani, E., Cacao, F., Yoon, J., Burkoski, V., Jarrett, S., … Hall, T. (2018). A comparison of hospital-acquired pressure injuries in intensive care and non-intensive care units: a multifaceted quality improvement initiative. *BMJ Open Quality, 7*(4), e000425. doi:10.1136/bmjoq-2018-000425.

Grammatikopoulou. M., Theodoridis. X., Gkiouras.K., Stamouli.E., Mavrantoni. M., Dardavessis. T., & Bogdanos. D., (2018). Agreeing on guidelines for nutrition management of adult severe burn patients. *Journal of Parenteral and Enteral Nutrition, 43*(4), (490–496). doi: 10.1002/jpen.1452

Gray, J.R., Grove, S.K., & Sutherland, S. (2017). *Burns and Grove's the practice of*

nursing research: Appraisal, synthesis, and generation of evidence (8th ed.). St. Louis, MO: Saunders Elsevier.

Gupta, B., Agrawal, P., Soni, K. D., Yadav, V., Dhakal, R., Khurana, S., & Misra, M. (2012). Enteral nutrition practices in the intensive care unit: Understanding of nursing practices and perspectives. *Journal of anesthesiology*, *clinical pharmacology, 28*(1), 41–44. https://doi.org/10.4103/0970-9185.92433

Hejazi, N., Mazloom, Z., Zand, F., Rezaianzadeh, A., & Amini, A. (2016). Nutritional assessment in critically ill patients. *Iranian Journal of Medical Sciences*, (3), 171. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/27217600

Huth, P., Fulgoni III, V., Keast, D., Park, K. & Auestad, N. (2013). Major food sources of calories, added sugars, and saturated fat and their contribution to essential nutrient intakes in the U.S. diet: data from the national health and nutrition examination survey (2003–2006). *Nutrition Journal*, 12, 1–10. https://doi.org/10.1186/1475-2891-12-116

Isenring EA, Bauer JD, Banks M, & Gaskill D. (2009). The Malnutrition Screening Tool is a useful tool for identifying malnutrition risk in residential aged care. *Journal of Human Nutrition & Dietetics, 22*(6), 545–550. https://doi.org/10.1111/j.1365-277X.2009.01008.x

Joint Commission on Accreditation of Healthcare Organizations. (2016). Retrieved from https://www.jointcommission.org/accreditation/hospitals.aspx

Kettner, P. M., Moroney, R. M., & Martin, L. L. (2017). *Designing and managing programs: An effectiveness-based approach* (5th ed.). Thousand Oaks, CA:

Sage.

Kruizenga, H., Keeken, S. v., Weijs, P., Bastiaanse, L., Beijer, S., Waal, G. H., & ...
Thijs, A. (2016). Undernutrition screening survey in 564,063 patients: patients
with a positive undernutrition screening score stay in hospital 1.4 d longer.
American Journal of Clinical Nutrition, 103(4), 1026.
doi:10.3945/ajcn.115.126615

Kyle, U. G., & Coss-Bu, J. A. (2010). Nutritional assessment and length of hospital
stay. CMAJ: *Canadian Medical Association journal = journal de l'Association
medicale canadienne, 182*(17), 1831–1832. doi:10.1503/cmaj.101256

Mauldin, K., & O'Leary-Kelley, C. (2015). New Guidelines for Assessment of
Malnutrition in Adults: Obese Critically Ill Patients. *Critical Care Nurse*, *35*(4),
doi: 10.4037/ccn2015886.

McClave, S. A., Taylor, B. E., Martindale, R. G., Warren, M. M., Johnson, D. R.,
aunschweig, C., & ... Compher, C. (2016). Guidelines for the Provision and
Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient:
Society of Critical Care Medicine (SCCM) and American Society for Parenteral
and Enteral Nutrition (A.S.P.E.N.). *JPEN Journal of Parenteral & Enteral
Nutrition, 40*(2), 159–211. doi:10.1177/014860711562186324–31.
doi:10.4037/ccn2015886

Melnyk, B. M., Fineout, O. E., Giggleman, M., & Choy, K. (2017). A Test of the
ARCC© Model Improves Implementation of Evidence-Based Practice,
Healthcare Culture, and Patient Outcomes. *Worldviews on Evidence-Based*

Nursing, 14(1), 5–9. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/28002651

Melnyk, B. M., Fineout-Overholt, E., Gallagher-Ford, L., & Stillwell, S. B. (2011).

Sustaining Evidence-Based Practice through Organizational Policies and an

Innovative Model. *AJN American Journal of Nursing*, *111*(9), 57–60.

https://doi.org/10.1097/01.NAJ.0000405063.97774.0e

Merriweather, J., Smith, P., & Walsh, T. (2014). Nutritional rehabilitation after ICU -

does it happen: a qualitative interview and observational study. *Journal of*

Clinical Nursing, *23*(5/6), 654–662 9p. Progress for children: A report card on

nutrition / *The United Nations Children's Fund*. (2006). New York/N.Y:

UNICEF. doi: 10.1111/jocn.12241

Mitchell, H., Lucas, C., Charlton, K. & McMahon, A. (2018). Models of nutrition-

focused continuing education programs for nurses: a systematic review of the

evidence. *Australian Journal of Primary Health, 24*(2):101–108. doi:

10.1071/PY17088.

Mooi, N. M. (2018). Knowledge of intensive care nurses regarding the monitoring of

early enteral nutrition. *Africa Journal of Nursing & Midwifery, 20*(2), 1–14.

https://doi.org/10.25159/2520–5293/3901

Morphet, J., Clarke, A. B., & Bloomer, M. J. (2016). Intensive care nurses' knowledge of

enteral nutrition: A descriptive questionnaire. *Intensive & Critical Care Nursing*,

37, 68–74. https://doi.org/10.1016/j.iccn.2016.07.001

Moser, J. (2010). Early enteral nutrition reduces mortality in the critically ill. *The*

American Journal of Nursing, 110(1), 19. doi:

10.1097/01.NAJ.0000366040.81948.86

Mullin, G. E., Fan, L., Sulo, S., & Partridge, J. (2019). The Association between oral

nutritional supplements and 30-day hospital readmissions of malnourished

patients at a US academic medical center. *Journal of the Academy of Nutrition*

and Dietetics, (7). doi10.1016/j.jand.2019.01.014.

Munuo, A., Mugendi, B., Kisanga, O., & Otieno, G. (2016). Nutrition knowledge,

attitudes and practices among healthcare workers in management of chronic

kidney diseases in selected hospitals in Dar es Salaam, Tanzania; a cross-sectional

study. *BMC Nutrition, 2*(1), 1. Retrieved from

https://bmcnutr.biomedcentral.com/articles/10.1186/s40795-016-0045-y

Patel, V., Romano, M., Corkins, M. R., DiMaria-Ghalili, R. A., Earthman, C., Malone,

A., … Guenter, P. (2014). Nutrition Screening and Assessment in Hospitalized

Patients: A Survey of Current Practice in the United States. *Nutrition in Clinical*

Practice, 29(4), 483–490. https://doi.org/10.1177/0884533614535446

Rabito, E. I., Marcadenti, A., da Silva Fink, J., Figueira, L., & Silva, F. M. (2017).

Nutritional Risk Screening 2002, Short Nutritional Assessment Questionnaire,

Malnutrition Screening Tool, and Malnutrition Universal Screening Tool Are

Good Predictors of Nutrition Risk in an Emergency Service. *Nutrition in Clinical*

Practice, 32(4), 526–532.

https://libproxy.gmercyu.edu:2308/10.1177/0884533617692527

Racco, M. (2012). An enteral nutrition protocol to improve efficiency in achieving

nutritional goals. *Critical Care Nurse, 32*(4), 72–75. doi: 10.4037/ccn2012625

Rasmussen, H. H., Holst, M., & Kondrup, J. (2010). Measuring nutritional risk in

hospitals. Clinical epidemiology, 2, 209–216.

https://doi.org/10.2147/CLEP.S11265

Reber, E., Gomes, F., Vasiloglou, M. F., Schuetz, P., & Stanga, Z. (2019). Nutritional

Risk Screening and Assessment. *Journal of clinical medicine, 8*(7), 1065.

https://doi.org/10.3390/jcm8071065

Reintam Blaser, A., & Berger, M. M. (2017). Early or late feeding after ICU admission?

Nutrients, 9(12), 1278. doi:10.3390/nu9121278

Roberta Flores Marquezini, F. & Maria Conceição de, O. (2016). Risk factors associated

with malnutrition in hospitalized patients / Fatores de risco associados à

desnutrição em pacientes hospitalizados. *Revista De Nutrição*, (3), 329.

doi:10.1590/1678-98652016000300003

Shpata, V., Kreka, M., Mjekaj, E., Naço, M., Gjyzari, A. & Soxhuku, A. (2013).

Malnutrition affects negatively the outcome of intensive care unit (ICU) patients.

European Journal of Anaesthesiology (EJA), *30*(1), p 189–189. Retrieved from

https://journals.lww.com/ejanaesthesiology/fulltext/2013/06001/malnutrition_affe

cts_negatively_the_outcome_of.589.aspx

Singer, P., Blaser, A., Berger, M., Alhazzani, W., Calder, P., Casaer, M., Hiesmayr, M.,

Mayer, K., Montejo, J., Pichard, C., Preiser, J., van Zanten, A., Oczkowski, S.,

Szczeklik, W., Bischoff, S. (2019). ESPEN guideline on clinical nutrition in the

intensive care unit. *Clinical Nutrition, 38*(1), 48–79. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/30348463

Siobal, M. & Baltz, J. (2013). A Guide to the Nutritional Assessment and Treatment of

the Critically Ill Patient. Retrieved from

https://c.aarc.org/education/nutrition_guide/nutrition_guide.pdf

Stewart, M.L. (2014a). Interruptions in Enteral nutrition delivery, in critically ill patients

and recommendations for clinical practice. *Critical Care Nurse, 34*(4), 14–21.

doi:http://dx.org/10.4037/ccm2014243

Tappenden, K., Quatrara, B., Parkhurst, M., Malone, A., Fanjiang, G., Ziegler, T. (2013)

Critical role of nutrition in improving quality of care: an interdisciplinary call to

action to address adult hospital malnutrition. *Journal of the Academy of Nutrition

and Dietetics,113*(9). 1219-1237. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/23736864

Wells, J. L., & Dumbrell, A. C. (2006). Nutrition and aging: Assessment and treatment of

compromised nutritional status in frail elderly patients. *Clinical Interventions in

Aging, 1*(1):67–79. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmed/18047259

Yalcin N, Cihan A, Gundogdu H, Ocakci A. (2013). Nutrition knowledge level of nurses.

Health Science Journal. 7(1):99–108. Retrieved from

https://pdfs.semanticscholar.org/be8c/fcf31dfe6779e580d814dab074acc11b430b.

pdf

Yeh, D. D., Peev, M. P., Quraishi, S. A., Osler, P., Yuchiao Chang, Gillis Rando, E., …

Velmahos, G. C. (2016). Clinical outcomes of inadequate calorie delivery and

protein deficit in surgical intensive care patients. *American Journal of Critical Care, 25*(4), 318–326. https://doi.org/10.4037/ajcc2016584

Malnutrition Universal Screening Tool ('MUST')

What is the Malnutrition Universal Screening Tool ('MUST')?

'MUST' is a five step nationally recognized and validated screening tool to identify **ADULTS** who are malnourished or at risk of malnutrition. It is the most commonly used screening tool and is suitable for use in hospitals, community and other care settings. This tool can be completed electronically using the on line 'MUST' calculator or manually as outlined below:

'Malnutrition Universal Screening Tool'

BAPEN
www.bapen.org.uk

MAG
Malnutrition Advisory Group
A Standing Committee of BAPEN

'MUST'

'MUST' is a five-step screening tool to identify **adults,** who are malnourished, at risk of malnutrition (undernutrition), or obese. It also includes management guidelines which can be used to develop a care plan.

It is for use in hospitals, community and other care settings and can be used by all care workers.

This guide contains:

- A flow chart showing the 5 steps to use for screening and management
- BMI chart
- Weight loss tables
- Alternative measurements when BMI cannot be obtained by measuring weight and height.

The 5 'MUST' Steps

Step 1
Measure height and weight to get a BMI score using chart provided. *If unable to obtain height and weight, use the alternative procedures shown in this guide.*

Step 2
Note percentage unplanned weight loss and score using tables provided.

Step 3
Establish acute disease effect and score.

Step 4
Add scores from steps 1, 2 and 3 together to obtain overall risk of malnutrition.

Step 5
Use management guidelines and/or local policy to develop care plan.

Please refer to *The 'MUST' Explanatory Booklet* for more information when weight and height cannot be measured, and when screening patient groups in which extra care in interpretation is needed (e.g. those with fluid disturbances, plaster casts, amputations, critical illness and pregnant or lactating women). The booklet can also be used for training. See *The 'MUST' Report* for supporting evidence. Please note that 'MUST' has not been designed to detect deficiencies or excessive intakes of vitamins and minerals and is of **use only in adults.**

84

Step 1 – BMI score (& BMI)

BAPEN
www.bapen.org.uk

Height (feet and inches)

Weight (kg)

Weight (stones and pounds)

1.46 1.48 1.50 1.52 1.54 1.56 1.58 1.60 1.62 1.64 1.66 1.68 1.70 1.72 1.74 1.76 1.78 1.80 1.82 1.84 1.86 1.88 1.90 1.92 1.94

Height (m)

© BAPEN

Note : The black lines denote the exact cut off points (30, 20 and 18.5 kg/m²), figures on the chart have been rounded to the nearest whole number.

Step 1 + **Step 2** + **Step 3**

BAPEN
www.bapen.org.uk

BMI score   **Weight loss score**   **Acute disease effect score**

BMI kg/m²	Score
>20 (>30 Obese)	= 0
18.5-20	= 1
<18.5	= 2

Unplanned weight loss in past 3-6 months

%	Score
<5	= 0
5-10	= 1
>10	= 2

If patient is acutely ill **and** there has been or is likely to be no nutritional intake for >5 days

Score 2

If unable to obtain height and weight, see reverse for alternative measurements and use of subjective criteria

Acute disease effect is unlikely to apply outside hospital. See 'MUST' Explanatory Booklet for further information

Step 4

Overall risk of malnutrition

Add Scores together to calculate overall risk of malnutrition
Score 0 Low Risk   Score 1 Medium Risk   Score 2 or more High Risk

Step 5

Management guidelines

0
Low Risk
Routine clinical care

- Repeat screening
  Hospital – weekly
  Care Homes – monthly
  Community – annually
  for special groups
  e.g. those >75 yrs

1
Medium Risk
Observe

- Document dietary intake for 3 days

- If adequate – little concern and repeat screening
  - Hospital – weekly
  - Care Home – at least monthly
  - Community – at least every 2-3 months

- If inadequate – clinical concern – follow local policy, set goals, improve and increase overall nutritional intake, monitor and review care plan regularly

2 or more
High Risk
Treat*

- Refer to dietitian, Nutritional Support Team or implement local policy

- Set goals, improve and increase overall nutritional intake

- Monitor and review care plan
  Hospital – weekly
  Care Home – monthly Community – monthly

* Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.

All risk categories:
- Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

Obesity:
- Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.

Re-assess subjects identified at risk as they move through care settings

See The 'MUST' Explanatory Booklet for further details and The 'MUST' Report for supporting evidence.

© BAPEN

Step 2 – Weight loss score

BAPEN
www.bapen.org.uk

	Score 0 Wt loss < 5%	Score 1 Wt loss 5 - 10%	Score 2 Wt loss > 10%
	Weight loss in last 3 to 6 months		
kg	**Less than (kg)**	**Between (kg)**	**More than (kg)**
30	1.6	1.6 - 3.3	3.3
31	1.6	1.6 - 3.4	3.4
32	1.7	1.7 - 3.6	3.6
33	1.7	1.7 - 3.7	3.7
34	1.8	1.8 - 3.8	3.8
35	1.8	1.8 - 3.9	3.9
36	1.9	1.9 - 4.0	4.0
37	1.9	1.9 - 4.1	4.1
38	2.0	2.0 - 4.2	4.2
39	2.1	2.1 - 4.3	4.3
40	2.1	2.1 - 4.4	4.4
41	2.2	2.2 - 4.6	4.6
42	2.2	2.2 - 4.7	4.7
43	2.3	2.3 - 4.8	4.8
44	2.3	2.3 - 4.9	4.9
45	2.4	2.4 - 5.0	5.0
46	2.4	2.4 - 5.1	5.1
47	2.5	2.5 - 5.2	5.2
48	2.5	2.5 - 5.3	5.3
49	2.6	2.6 - 5.4	5.4
50	2.6	2.6 - 5.6	5.6
51	2.7	2.7 - 5.7	5.7
52	2.7	2.7 - 5.8	5.8
53	2.8	2.8 - 5.9	5.9
54	2.8	2.8 - 6.0	6.0
55	2.9	2.9 - 6.1	6.1
56	2.9	2.9 - 6.2	6.2
57	3.0	3.0 - 6.3	6.3
58	3.1	3.1 - 6.4	6.4
59	3.1	3.1 - 6.6	6.6
60	3.2	3.2 - 6.7	6.7
61	3.2	3.2 - 6.8	6.8
62	3.3	3.3 - 6.9	6.9
63	3.3	3.3 - 7.0	7.0
64	3.4	3.4 - 7.1	7.1

	Score 0 Wt loss < 5%	Score 1 Wt loss 5 - 10%	Score 2 Wt loss > 10%
	Weight loss in last 3 to 6 months		
kg	**Less than (kg)**	**Between (kg)**	**More than (kg)**
65	3.4	3.4 - 7.2	7.2
66	3.5	3.5 - 7.3	7.3
67	3.5	3.5 - 7.4	7.4
68	3.6	3.6 - 7.6	7.6
69	3.6	3.6 - 7.7	7.7
70	3.7	3.7 - 7.8	7.8
71	3.7	3.7 - 7.9	7.9
72	3.8	3.8 - 8.0	8.0
73	3.8	3.8 - 8.1	8.1
74	3.9	3.9 - 8.2	8.2
75	3.9	3.9 - 8.3	8.3
76	4.0	4.0 - 8.4	8.4
77	4.1	4.1 - 8.6	8.6
78	4.1	4.1 - 8.6	8.7
79	4.2	4.2 - 8.7	8.8
80	4.2	4.2 - 8.9	8.9
81	4.3	4.3 - 9.0	9.0
82	4.3	4.3 - 9.1	9.1
83	4.4	4.4 - 9.2	9.2
84	4.4	4.4 - 9.3	9.3
85	4.5	4.5 - 9.4	9.4
86	4.5	4.5 - 9.6	9.6
87	4.6	4.6 - 9.7	9.7
88	4.6	4.6 - 9.8	9.8
89	4.7	4.7 - 9.9	9.9
90	4.7	4.7 - 10.0	10.0
91	4.8	4.8 - 10.1	10.1
92	4.8	4.8 - 10.2	10.2
93	4.9	4.9 - 10.3	10.3
94	4.9	4.9 - 10.4	10.4
95	5.0	5.0 - 10.6	10.6
96	5.1	5.1 - 10.7	10.7
97	5.1	5.1 - 10.8	10.8
98	5.2	5.2 - 10.9	10.9
99	5.2	5.2 - 11.0	11.0

Current weight

© BAPEN

Alternative measurements and considerations

BAPEN
www.bapen.org.uk

Step 1: BMI (body mass index)

If height cannot be measured

- Use recently documented or self-reported height (if reliable and realistic).
- If the subject does not know or is unable to report their height, use one of the alternative measurements to estimate height (ulna, knee height or demispan).

Step 2: Recent unplanned weight loss

If recent weight loss cannot be calculated, use self-reported weight loss (if reliable and realistic).

Subjective criteria

If height, weight or BMI cannot be obtained, the following criteria which relate to them can assist your professional judgement of the subject's nutritional risk category. Please note, these criteria should be used collectively not separately as alternatives to steps 1 and 2 of 'MUST' and are not designed to assign a score. Mid upper arm circumference (MUAC) may be used to estimate BMI category in order to support your overall impression of the subject's nutritional risk.

1. BMI

- Clinical impression – thin, acceptable weight, overweight. Obvious wasting (very thin) and obesity (very overweight) can also be noted.

2. Unplanned weight loss

- Clothes and/or jewellery have become loose fitting (weight loss).
- History of decreased food intake, reduced appetite or swallowing problems over 3-6 months and underlying disease or psycho-social/physical disabilities likely to cause weight loss.

3. Acute disease effect

- Acutely ill and no nutritional intake or likelihood of no intake for more than 5 days.

Further details on taking alternative measurements, special circumstances and subjective criteria can be found in *The 'MUST' Explanatory Booklet*. A copy can be downloaded at www.bapen.org.uk or purchased from the BAPEN office. The full evidence-base for 'MUST' is contained in *The 'MUST' Report* and is also available for purchase from the BAPEN office.

Royal College of Nursing   THE BRITISH DIETETIC ASSOCIATION

Alternative measurements: instructions and tables

If height cannot be obtained, use length of forearm (ulna) to calculate height using tables below.
(See The 'MUST' Explanatory Booklet for details of other alternative measurements (knee height and demispan) that can also be used to estimate height).

Estimating height from ulna length

Measure between the point of the elbow (olecranon process) and the midpoint of the prominent bone of the wrist (styloid process) (left side if possible).

HEIGHT (m) Men (<65 years)	1.94	1.93	1.91	1.89	1.87	1.85	1.84	1.82	1.80	1.78	1.76	1.75	1.73	1.71
Men (>65 years)	1.87	1.86	1.84	1.82	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.67
Ulna length (cm)	32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.5	28.0	27.5	27.0	26.5	26.0	25.5
HEIGHT (m) Women (<65 years)	1.84	1.83	1.81	1.80	1.79	1.77	1.76	1.75	1.73	1.72	1.70	1.69	1.68	1.66
Women (>65 years)	1.84	1.83	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.63
HEIGHT (m) Men (<65 years)	1.69	1.67	1.66	1.64	1.62	1.60	1.58	1.57	1.55	1.53	1.51	1.49	1.48	1.46
Men (>65 years)	1.65	1.63	1.62	1.60	1.59	1.57	1.56	1.54	1.52	1.51	1.49	1.48	1.46	1.45
Ulna length (cm)	25.0	24.5	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.5	20.0	19.5	19.0	18.5
HEIGHT (m) Women (<65 years)	1.65	1.63	1.62	1.61	1.59	1.58	1.56	1.55	1.54	1.52	1.51	1.50	1.48	1.47
Women (>65 years)	1.61	1.60	1.58	1.56	1.55	1.53	1.52	1.50	1.48	1.47	1.45	1.44	1.42	1.40

Estimating BMI category from mid upper arm circumference (MUAC)
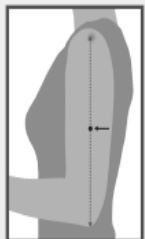
The subject's left arm should be bent at the elbow at a 90 degree angle, with the upper arm held parallel to the side of the body. Measure the distance between the bony protrusion on the shoulder (acromion) and the point of the elbow (olecranon process). Mark the mid-point.

Ask the subject to let arm hang loose and measure around the upper arm at the mid-point, making sure that the tape measure is snug but not tight.
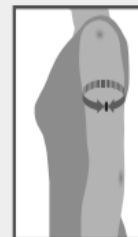
If MUAC is < 23.5 cm, BMI is likely to be <20 kg/m².
If MUAC is > 32.0 cm, BMI is likely to be >30 kg/m².

The use of MUAC provides a general indication of BMI and is not designed to generate an actual score for use with 'MUST'. For further information on use of MUAC please refer to *The 'MUST' Explanatory Booklet.*

Appendix B: Pretest Survey

Assessing Nurses' Knowledge and Attitude of Malnutrition Screening

Number: _____ **Date:** _____

Gender: Male_____ **Female**_____

No. of years as an RN: Less than 5 years_____; Less than 10 years; _____Greater than 10 years_____

No. of years in the Intensive Care Unit: Less than 5 years _____ Less than10 years; _____ Greater than 10 years_____

Please read the following and check one response for each statement

Check one response for each question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The facility routinely screens for malnutrition of all patients in the ICU.					
2. It is my responsibility to complete a nutritional assessment or screening for nutritional risks.					
3. The nutrition assessment is completed within 24-hours of admission to the ICU					
4. I know where to locate the nutrition assessment tool in the EMR system.					
5. I feel competent in identifying patients who are experiencing malnutrition or those at risk for malnutrition.					
6. I feel comfortable consulting with the dietician or physician about my patient's nutritional status.					
7. I know what factors contribute to patients risk for malnutrition.					

Appendix C: Posttest Survey

Assessing Nurses' Knowledge and Attitude of Malnutrition Screening

Number: _____ Date: _____

Gender: Male_____   Female_____

No. of years as an RN: Less than 5 years: _____ Less than 10 years: _____ Greater than 10 years_____

No. of years in the Intensive Care Unit: Less than 5 years; _____ Less than 10 years; _____Greater than 10 years_____

Please read the following and check one response for each statement

Check one response for each question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The facility routinely screens for malnutrition of all patients in the ICU.					
2. It is my responsibility to complete a nutritional assessment or screening for nutritional risks.					
3. The nutrition assessment is completed within 24-hours of admission					
4. I know where to locate the nutrition assessment tool in the EMR system.					
5. I feel competent in identifying patients who are experiencing malnutrition or those at risk for malnutrition.					
6. I feel comfortable consulting with the dietician about my patient's nutritional status.					
7. I know what factors contribute to patients risk for malnutrition.					
8. I feel more likely to assess nutrition in patients following the education.					
9. I feel more likely to advocate for nutrition for my patients after the education.					
10. The education increased my understanding of the nutritional assessment tool.					

Appendix D: Education PowerPoint Presentation

Figure 1. Advancing Research through Clinical Practice and Close Collaboration (ARCC) Model
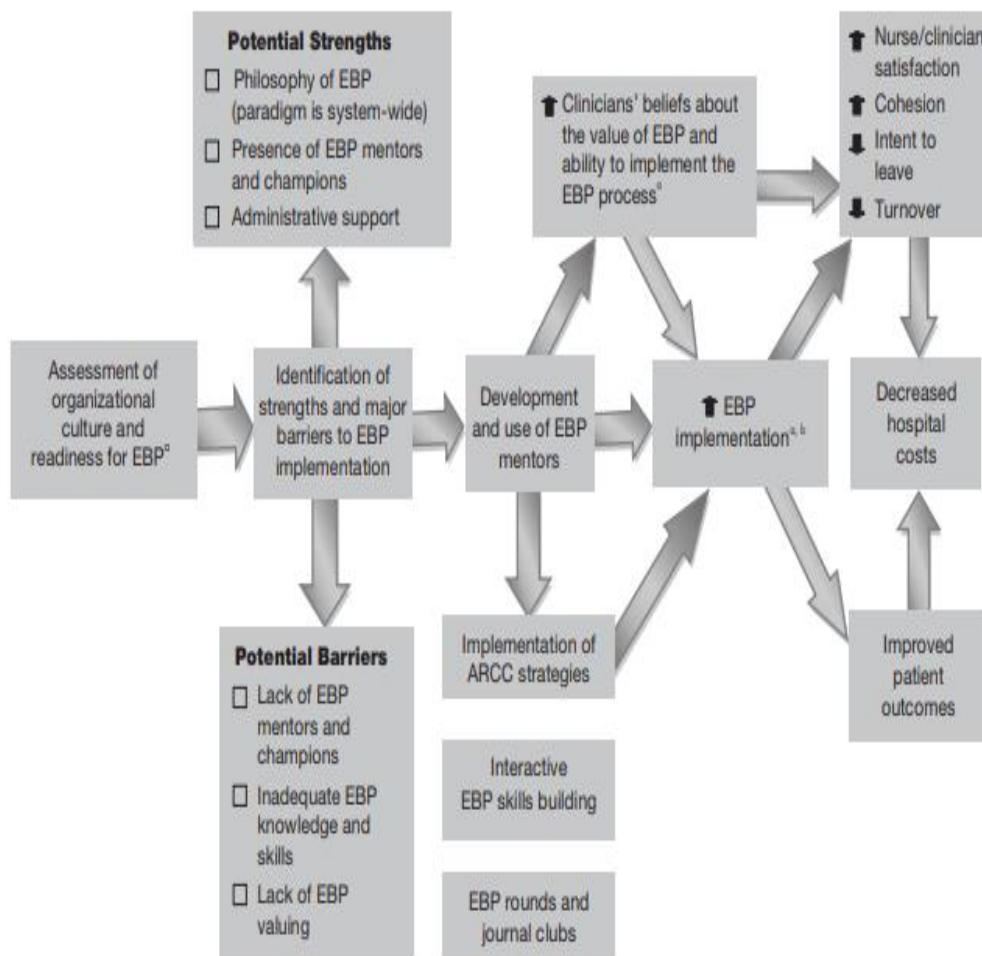
The ARCC Model for System-Wide Implementation and Sustainability of EBP   © 2005, Melnyk and Fineout-Overholt

Figure 1. The ARCC Model for System-Wide Implementation and Sustainability of EBP ARCC = Advancing Research and Clinical Practice through Close Collaboration

Appendix E: Evaluation Form

Please evaluate the DNP student using the following categories.

A = Excellent, B = Good, C = Fair, D = Poor, E = N/A

A	**B**	**C**	**D**	**E**	**How were the following objectives met?**
□	□	□	□	□	**1.** Packet included all required materials
□	□	□	□	□	**2.** Content accurate and represents the latest evidence.
□	□	□	□	□	3. Knowledge of Subject
□	□	□	□	□	4. Presentation orderly and understandable
□	□	□	□	□	5. Overall, I found the learning experience informative.
□	□	□	□	□	6. Jennifer Brown provided opportunities for questions.
□	□	□	□	□	7. Jennifer Brown provided ongoing support.

Appendix F: A Computation of a CVI for a 16-Item Scale with Three Expert Raters

Item	Expert Rater 1	Expert Rater 2	Expert Rater 3	Experts in Agreement	Item CVI (I-CVI)
1	√	√	√	3	1.00
2	-	-	-	3	0.0
3	√	√	√	3	1.0
4	√	√	√	3	1.0
5	√	√	√	3	1.0
6	√	√	√	3	1.0
7	√	√	√	3	1.0
8	√	√	√	3	1.0
9	√	√	√	3	1.0
10	√	√	√	3	1.0
11	√	√	√	3	1.0
12	√	√	√	3	1.0
13	√	√	√	3	1.0
14	√	√	√	3	1.0
15	√	√	√	3	1.0
16	√	√	√	3	1.0
Proportion relevant	.93	.93	1.00	Average I-CVI =	.93
S-CVI 15/16 = .93					

Ratings of item relevance in the final version of 3 experts: Relevant (ratings ≥ 3) Not relevant (ratings ≤ 2)
I-CVI item level content validity index, S-CVI, scale level content validity index method:
    a.   Items with I-CVI ≥ 0.78 are considered excellent according to Polit and Beck

    b.   S-CVI/Ave ≥ 0.90 is considered excellent according to Polit and Beck.