12-1-2017

A RETROSPECTIVE CHART REVIEW COMPARING NUTRITIONAL SCREENING TOOLS (MNA-SF AND MUST) IN IDENTIFYING MALNUTRITION IN OLDER ADULTS ADMITTED TO A HOSPITAL IN 2016

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by

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Presented to the Faculty of the Honors College of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

HONORS BACHELOR OF SCIENCE IN NURSING

THE UNIVERSITY OF TEXAS AT ARLINGTON

December 2017

ACKNOWLEDGMENTS

I would first like to thank my friends and family for their continuous support that has been provided to me throughout this journey. I thank my parents for their unconditional love throughout my undergraduate college career; I would not be the person I am today without them. I would also like to thank my nursing instructors for shaping me into the compassionate and caring nurse I have become. Last, but certainly not least, I owe a huge thanks to Dr. Kathy Baldwin and Dr. Deborah Behan for their endless hours helping me conduct research and compose this thesis.

November 17, 2017

ABSTRACT

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There are many factors that contribute toward negative outcomes in the healthcare setting for hospitalized older adults (Tappenden, Quatrara, Parkhurst, Malone, Fanjiang, & Ziegler, 2013). One of these factors includes meeting nutritional requirements. Unfortunately, many cases of malnutrition in patients 65 years and older, who are admitted to the hospital, go unnoticed due to the lack of nutritional screening tool implementation (Tappenden et al., 2013). Therefore, this study looks at two of the most popular nutritional screening tools, the MNA-SF and MUST, to identify malnutrition in older adults with a preexisting diagnosis of either malnutrition or failure to thrive and to determine their effectiveness.

Charts from fifteen older adults with the diagnosis of malnutrition, and fifteen older adults with the diagnosis of failure to thrive were analyzed using the MNA-SF and MUST nutrition screening tools at a south-central USA hospital. Data collected included anthropometric data, diagnoses, hospital problems, age, food intake, loss of appetite history, digestive problems, chewing or swallowing difficulties, previous weight loss, mobility status, psychological stress, acute disease, neuropsychological problems, and body mass index.

The results indicated that the MNA-SF screening tool consistently identified 100% of patients with either risk-for malnutrition or current malnourishment, while the MUST screening tool only identified 60% of patients from the same sample size.

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CHAPTER 1

INTRODUCTION

Over the past few decades, there have been increased efforts to improve the quality in hospital-based patient care (Tappenden, Quatrara, Parkhurst, Malone, Fanjiang, & Ziegler, 2013). Despite the advancements that have been made, one huge challenge remains nutritional imbalance. This condition can occur in both underweight and overweight individuals and is correlated with the manifestation of two or more of the following features: deficient energy intake; weight loss; muscle mass loss; subcutaneous fat loss; fluid accumulation that can be localized or generalized; or a decrease in functional status (Alliance to Advance Patient Nutrition, 2014). Unfortunately, malnutrition is not recognized or treated as often as it should be, even though inadequate nutrition has been shown to be associated with increased complication rates, longer hospital stays, higher readmission rates, and increased mortality (Alliance to Advance Patient Nutrition, 2014). Higher healthcare costs can also be indirectly contributed to malnutrition (Alliance to Advance Patient Nutrition, 2014). With all this being said, malnutrition has been referred to time and time again as the "skeleton in the hospital closet" (Alliance to Advance Patient Nutrition, 2014, p. 1).

Among those most at risk for poor nutrition in a clinical setting are older adults, surgical patients, and long stay patients. This is mainly due to the metabolic responses from trauma, specific pathology to certain diseases, combination of poor-health and ability to care for one's self, and meal planning that is insignificant (Langley-Evans & King, 2014).

Any patient, regardless of their body mass index, can experience malnutrition due to illness-induced poor appetite, gastrointestinal problems, decreased ability to chew or swallow, or being placed on NPO (nothing by mouth) status because of certain diagnostic or therapeutic procedures that need to be conducted (Tappenden et al., 2013).

As the standard of living increases and more medical technology develops, the elderly population continues to grow at a steady pace (Baek & Heo, 2015). As stated earlier, older adults are more vulnerable to suffer from nutritional deficiencies because aging can be connected with physiological impairment, psychological issues, and economic hardships (Baek & Heo, 2015). Since undernourishment can be a critical predictor of morbidity, as well as mortality, it is important that hospitals screen patients for malnutrition upon admission and regularly throughout hospital stays (Baek & Heo, 2015). In particular, those at a higher risk, such as those older than 65 years of age, should be flagged upon admission and dietary interventions should be started immediately (Baek & Heo, 2015). Although there is not a gold standard set for a specific nutritional screening tool, some examples that can be used in the hospital setting are the Mini Nutritional Assessment- Short Form (MNA-SF) and the Malnutrition Universal Screening Tool (MUST). Because there is no suggested tool to identify those at risk for malnutrition in an acute care facility, this study will look at these two different tools to determine the best screening tool to use for patients in a south-central USA hospital system.

1.1 Literature Review

1.1.1 Implications and Statistics of Malnutrition

As healthcare moves toward a new age of delivery, it is imperative that a comprehensive care model is developed so that standards of nutrition is improved for

patient outcomes. After looking at several data sources and studies, it has been concluded that malnutrition is connected to adverse outcomes such as an increased incidence of pressure sores, prolonged wound healing, suppression of the immune system, and a higher rate of infection (Tappenden et al., 2013). It was found in a research study by Fry, Pine, Jones, and Meimbem in 2010, who analyzed close to one million surgical patients at 1,368 different hospitals, that patients who had existing malnutrition or weight loss at admission experienced a two to three-fold increased risk of developing nosocomial infections. Infections such as Clostridium difficile, enterocolitis, a post-operative surgical-site infection, or pneumonia after surgery were some of the adverse findings in the study (Fry et. al, 2010). Additionally, it was found that if a patient with malnutrition underwent coronary artery bypass graft surgery, they would have a five-fold increased risk of mediastinitis post-operatively. Urinary tract infections, due to catheters, also have occurred more often in malnourished patients than those who are not malnourished (Tappenden et al., 2013). Therefore, it is determined by these studies that malnutrition can be considered an independent risk factor for patients in the development of nosocomial infections (Tappenden et al., 2013).

During bed rest, many hospitalized patients experience an accelerated loss of lean body mass leading into an immune suppression response (Tappenden et al., 2013). As discussed by Tappenden et al. (2013), a 10% decrease in lean body mass increases infection susceptibility, a 15% to 20% decrease creates delayed wound healing, and a 30% decrease or more can contribute to the development of pressure ulcers, an increased pneumonia risk, and incomplete wound recovery. In another study, a sample size of 2,425 older adults (age $\geq$ 65) at risk for the development of pressure ulcers revealed that 76% of those patients

were considered malnourished (Lyder, Preston, Grady, Scinto, Allman, Bergstrom, & Rodeheaver, 2001).

It also has become apparent that malnutrition can contribute to hospital readmission rates (Allaudeen, Vidyarthi, Maselli, & Auerbach, 2011; Kassin, Owen, Perez, Leeds, Cox, Schneir, & Sweeny, 2012). The study conducted by Allaudeen et al. (2011) was a retrospective observational analysis that evaluated various contributing factors leading to hospital readmission in over 10,000 consecutive admissions. It was discovered that co-morbidities significantly raised the risk of patient readmission. Moreover, weight loss alone had a 26% increased chance of readmission. It is important to note that 17% of their sample had been previously admitted within the previous 30 days. In the study by Kassin et al., (2011) 1,442 general surgery patients were looked at; out of that group, the 30-day readmission rate was 11 percent. Some of the most usual causes for readmission included gastrointestinal problems (28%), infections from surgery (22%), and a diagnosis of failure to thrive or simple malnutrition (10%). Failure to thrive can be defined in elderly patients as a state of decline caused by chronic concurrent diseases and/or functional impairments. Failure to thrive is manifested by weight loss, decreased appetite, poor nutritional intake, and inactivity (Robertson & Montagnini, 2004). These findings from both studies illustrate the hypothesis that poor nutrition and weight loss contribute to a post-hospital syndrome that drastically increases the risk for readmission within 30 days.

While malnutrition in hospitalized patients leads to poor clinical outcomes, these same outcomes contribute to increased healthcare costs (Alliance to Advance Patient Nutrition, 2014). As discussed earlier, patients who are undernourished or who become malnourished during hospitalization have increased infection rates, pressure ulcers, and

impaired wound healing rates; therefore, these patients require more intensive nursing care and medications which subsequently leads to increased expenses (Alliance to Advance Patient Nutrition, 2014). As a result, these patients typically require longer hospital stays and as noted in the previous paragraph, contribute to higher readmission rates, which in turn create amplified costs for hospitals (Alliance to Advance Patient Nutrition, 2014). In a recent study which examined data from the 2010 Healthcare Cost and Utilization Project, a nationally-representative data that depicts United States' hospital discharges reported that patients who suffer from malnutrition spend about 12.6 days on average in the hospital compared to only 4.4 days for other patients (Alliance to Advance Patient Nutrition, 2014). As a result, these malnourished patients incidentally cause a three-fold increase in the cost of healthcare ($26,944 versus $9,485) (Alliance to Advance Patient Nutrition, 2014).

1.1.2 Reasons Leading to Poor Nutrition Intake

It has been reported that the prevalence of malnutrition in elderly patients who have been hospitalized is between 32.9%-76%, which is substantially higher than their younger counterparts (Baek & Heo, 2014). The reasons for older adults acquiring malnutrition is varied, but it has been determined that some groups are more at risk (Langley-Evans & King, 2014). Some of those at higher risk are elderly patients with gastrointestinal and head and neck cancers (Langley-Evans & King, 2014). While in the hospital, older adults who experience poor nutrition may attribute the cause to a response elicited by surgical trauma or the pathology of a certain disease (Langley-Evans & King, 2014). However, it is more common to associate malnutrition to lower physical activity, a lack of appetite, and chronic diseases in the older adult population. Many older adults who experience chronic diseases tend to be sedentary and ingest less food with less protein and other nutrients leading to

nutritional deficiencies (Cawood & Streatton, 2011). Additionally, other prevalent factors that can be associated with malnutrition in adults older than 65 years of age include depression, bereavement, and living alone contributing to a decreased drive to eat. Further, economic hardships can be another reason for malnutrition in the older adult because of the inability to afford high-nutritive foods (Alliance to Advance Patient Nutrition, 2014).

1.1.3 Malnutrition Screening Tools

It is strongly recommended that malnutrition screening is the first step implemented when patients are admitted into a hospital (Young, Kidston, Banks, Mudge, & Isenring, 2011). The reason for this is to allow early identification and treatment of any malnourishment present. Many validated nutritional screening tools exist today to triage patients, but there is still much debate regarding which tool should be used in health practice (Young, et al., 2011). However, the nurses in one hospital located in the south-central USA has decided that whichever tool is used, it should be simple and quick enough to accurately identify patients who may have poor nutritional status in order to efficiently allocate resources for further nutritional assessment (K. Baldwin, personal communication, fall, 2017).

Some of the most common nutritional screening tools include the Mini Nutritional Assessment (MNA), Mini Nutritional Assessment-Short Form (MNA-SF), Geriatric Nutritional Risk Index (GNRI), Malnutrition Universal Screening tool (MUST), and Nutritional Risk screening-2002 (NRS-2002). Both the MNA and MNA-SF detect malnutrition in the elderly patient, while the GNRI detects malnutrition in the elderly while also detecting its associations to complications. Both the MUST and NRS-2002 detect poor nutrition status in adult populations, but the NRS-2002 also identifies patients who need

closer monitoring. All the tools listed here assess various anthropometrics and most assess nutrition related problems such as stress of acute diseases. The GNRI is the only one that assesses the biochemistry with albumin (Baek & Heo, 2014). For any screening tool, a high sensitivity will ensure that patients who are at risk of malnutrition will not have a misdiagnosis, but a low specificity will result in too many patients being diagnosed with malnutrition (Tripathy & Mishra. 2015).

In a prospective cohort study by Young et al. (2011), 134 patients, 65 years or older, were screened using several different malnutrition screening tools- the MNA-SF, MUST and NRS-2002 because of their use in evidence-based practice guidelines. It was discovered through this research study that the MNA-SF was the most sensitive (95.6%) in detecting malnutrition in those screened, while the MUST was the least sensitive (67.8%). Therefore, it was concluded that the MNA-SF was the best at discriminating between patients who actually had malnutrition, those at risk, and those who were not a risk. However, although the MNA-SF was outstanding at identifying at risk patients, it identified a larger number of at-risk patients than the other screening tools. Because of this, it is important to choose the tool that works best at hospitals that have sufficient resources to provide nutritional assessments and interventions to all at-risk patients (Young et al., 2011).

Another study by Baek and Heo (2014) was carried out to determine which nutritional screening tool had the greatest efficacy in predicting malnutrition in the elderly population. Five nutrition screening tools were used: the MNA, MNA-SF, MUST, GNRI, and MUST. One hundred forty-one elderly patients were screened using each tool. Baek and Heo (2014) discovered that the MUST identified 36.2% of patients to be at risk for

malnutrition, while the MNA-SF identified 72.3%. The NRS-2002 identified 56.0% to be at risk and the GNRI identified 60.3%. The MUST had a higher sensitivity (80.6%) and specificity (98.7%) compared to the MNA-SF (100% and 49.4% respectively). They concluded that the higher the sensitivity of the tool is, the less likely a malnourished patient will be missed. However, it can easily raise the false positive rate by detecting elderly patients who are indeed not malnourished. The MNA-SF has been reported to have higher sensitivity and lower specificity than other tools. Additionally, Baek and Heo (2014) concluded that if the MNA-SF was used to assess nutritional status at admission and throughout hospital stay, it would be too time consuming and troublesome for nursing staff because too many patients would be at risk.

As of right now, the most commonly used and effective tool for assessing nutritional status quickly in older adults is the MNA or MNA-SF (Donini, Poggiogalle, Molfino, Rosano, Lenzi, Fanelli, and Muscaritoli, 2016). However, a major limitation to using the MNA is that it takes 10-15 minutes to administer, which consumes up too much time in an admission assessment (Donini et al., 2016). Recently, more tools have been created to relieve this problem such as the related MNA-SF, which is easier to use, allowing more valid and time-sparing nutritional risk assessments to be completed (Donini et al., 2016).

Velasco, Garcia, Rodrigues, Frias, Garriga, Alvarez, Garcia-Peris, and Leon (2016) evaluated the NRS-2002, MUST, and MNA with a sample size of 400 patients. Again, a relationship was found between the MNA having a high sensitivity rate catching 58.5% of the patients screened with a nutritional risk, while the MUST caught 31.5%, and NRS-2002 caught 34.5%. The sensitivity for the MNA in this study was 95% and its specificity was

61.3%. These results correlated with the high prevalence of malnutrition that is found in hospitalized patients discovered in other performed research studies. The MNA can be considered a complex test that assesses many factors that can lead to malnutrition, which in the end can cloud the true rate of malnutrition. Therefore, this tool should only be used with suitable age groups such as the elderly. It was also concluded that at admission, the NRS-2002 and MUST should be used when screening for nutritional status (Velasco et al., 2016).

Generally, all tools perform well when considering the validity of the tools. All the tools discussed in this paper identify patients that are indeed at risk for malnutrition or are currently malnourished (Holst, Yifter-Lindgren, Surowiak, Nielson, Mowe, Carlsson, Jacobsen, Cederholm, Fenger-Groen & Rasmussen, 2012). Part of nutritional assessment in the elderly includes identifying the risk factors that lead to a confirmed diagnosis of malnutrition or failure to thrive. This assessment can be defined as a thorough investigation of a patient's nutritional risk, which looks at functional and psychological status in addition to physiological conditions. It also is important not to use BMI as a sole parameter to estimate nutritional risk even though it is a general indicator of poor nutritional status (Holst et al., 2012).

1.1.4 Benefits of Dietary Intervention

Unfortunately, as statistics have shown, one-third of patients are malnourished upon arrival to the hospital, and if their malnourishment is left untreated, two-thirds of patients will experience further deterioration of their nutritional status (Alliance to Advance Patient Nutrition, 2014). Even 38% of patients who are not malnourished upon admission, will experience nutritional regression during hospitalization. With this being

said, the role of nutrition in patient care should be elevated to a priority status, especially for the older population. Identifying patients at risk, and treating nutritional needs is a low-cost and effective treatment for hospitals to act on to improve the previously discussed outcomes of their patients. According to multiple studies regarding nutrition intervention, patients who receive dietary interventions have a 25% reduction in the frequency of pressure sore development, 14% less complications, a reduction in the average hospital stay of approximately two days, a 28% drop in readmissions, an overall decreased mortality rate, and a reported enhanced quality of living (Alliance to Advance Patient Nutrition, 2014).

It is recommended by the Joint Commission that all at-risk patients are screened within 24 hours of being admitted to the hospital and at regular intervals during hospitalization (Alliance to Advance Patient Nutrition, 2014). Unfortunately, patients are ineffectively screened and their diagnosis of malnutrition continues to go unrecognized. This can be contributed to institutions and hospitals not having enough registered dietitians and/or nutritionists to address all patients' dietary needs accordingly. Additionally, contributing factors can include nurses not being consistently included in the nutritional care of their patients and delayed nutrition interventions due to the time it takes to obtain a nutrition consultant. In a research study conducted at the John Hopkins School of Medicine, it was found that the time from admission to nutrition consultation was an average of 5 days (Alliance to Advance Patient Nutrition, 2014). Additionally, there is a lack of protocols that focus on nutrition, lack of physician sign-off required for nurses to carry out nutritional care, and the inadequate consumption of food by hospitalized patients due to

not having any assistance to eat during meals (Alliance to Advance Patient Nutrition, 2014).

While many studies discuss the effectiveness of identifying malnourished patients on admission using select nutritional screening tools, the purpose of this study is to compare two screening tools retrospectively. The Malnutrition Universal Screening Tool and the Mini Nutritional Assessment Short-Form will be compared to evaluate the efficiency in detecting malnutrition in hospitalized adults older than 65 years of age already assigned a diagnosis of either malnutrition or failure to thrive when admitted.

CHAPTER 2

METHODOLOGY

The study was conducted as a retrospective chart review in order to determine the incidence of malnutrition in previously admitted older adults (sixty-five years or older) with either the admitting diagnosis of malnutrition or failure to thrive using both the Mini Nutritional Assessment Short-Form and Malnutrition Universal Screening Tool (see tables 2.1, 2.2, 2.4 and 2.4). After obtaining IRB approval from a hospital in the south-central USA, up to five-hundred medical records of patients with the two previously stated diagnoses admitted between January 01, 2016 and January 01, 2017 were pulled from the electronic medical record system, CareConnect. Out of the five-hundred charts pulled, fifteen patients with the diagnosis of malnutrition and fifteen patients with the diagnosis of failure to thrive were randomly selected using an online random integer generator.

Information collected from the thirty medical records included general, anthropometric, and biological data such as diagnosis, hospital problems, age, food intake, loss of appetite history, digestive problems, chewing or swallowing difficulties, previous or current weight loss, mobility status, psychological stress, acute diseases, neuropsychological problems, and body mass index (BMI). No protected health information was collected or recorded; specifically, none of the 18 HIPAA identifiers were collected. The information for each patient was entered into data collection tables for each specific screening tool, which aligned with a total score when added up in order to

determine the risk for or presence of malnutrition. The total scores were then analyzed to determine the incidence of malnutrition per each tool and diagnosis. Each screening tool (MNA-SF and MUST) was analyzed using the IBM SPSS Statistics software for Windows in order to determine the effectiveness and which tool is more proficient in identifying a malnutrition risk using sensitivity and specificity.

Standard descriptive statistical methods were conducted to determine the prevalence/percentage of risk categories for each diagnosis and tool. Cross-tabulations were also used in order to conduct sensitivity and specificity. Sensitivity being defined as the correct proportion of patients being identified with malnutrition by a screening tool, and specificity being defined as the correct proportion of patients being diagnosed as not-malnourished. Both tools were classified into three categories: not at risk for malnutrition, at risk for malnutrition, and malnourished. The k-statistic was calculated to determine the agreement between the two screening tools, and the Shrout classification was referenced for value interpretation (0.0-0.1 = virtually no agreement, 0.11-0.40 = slight agreement, 0.41-0.60 = fair agreement, 0.61-0.80 = moderate agreement, and 0.81-1.0 = substantial agreement).

Table 2.1: Presentation of Nutritional Screening Tools

Screening Tool	Initial Purpose	Total Number of Parameters	Check Category
Malnutrition Universal Screening Tool (MUST)	Detect malnutrition in adult population	3	-Anthropometrics: BMI, weight loss (%) Nutrition related problems or feeding; Acute illness or no nutritional intake for >5 days
Mini Nutritional Assessment Short-Form (MNA-SF)	Detect malnutrition in elderly	6	Anthropometrics: BMI, weight loss Nutrition related problems Psychological stress Acute disease Mobility Neuropsychological problems Declining food intake

Table 2.2: Scores of Malnutrition and Assessment of Nutritional Status

Screening Tool	Score Allocation	Assessment of Nutritional Status
MUST	Score range: 0-6	
	0: Low risk of malnutrition	Normal
	1: Medium risk of malnutrition	Malnutrition
	≥2: High risk of malnutrition	Malnutrition
MNA-SF	Score range: 0-14	
	≥12: Normal nutrition status	Normal
	8-11: At nutritional risk	Malnutrition
	0-7: Malnourished	Malnutrition

Table 2.3: MNA-SF Criteria and Screening Score Categories

Criterion A- Has food intakes declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?	0 = Severe decrease in food intake 1 = Moderate decrease in food intake 2 = No decrease in food intake
Criterion B- Weight loss during the last 3 months	0 = Weight loss greater than 3 kg (6.6 lbs.) 1 = Does not know 2 = Weight loss between 1 and 3 kg (2.2 and 6.6 lbs.) 3 = No weight loss
Criterion C- Mobility	0 = Bed or chair bound 1 = Able to get out of bed/chair but does not go out 2 = Goes out
Criterion D- Has suffered psychological stress or acute disease in the past 3 months?	0 = Yes 2 = No
Criterion E- Neuropsychological problems	0 = Severe dementia or depression 1 = Mild dementia 2 = No psychological problems
Criterion F- Body Mass Index (BMI)	0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater
Screening Score	12-14 = Well-Nourished/Low Risk 8-11 = At-risk for Malnutrition/Medium Risk 0-7 = Malnourished/High Risk

Table 2.4: MUST Criteria and Screening Score Categories

Criterion A- Body Mass Index (BMI)	0 = BMI >20.0 1 = BMI 18.5-20.0 2 = BMI <18.5
Criterion B- Unplanned weight loss in past 3-6 months	0 = <5% 1 = 5-10% 2 = >10%
Criterion C- If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days	2 = Acutely ill and there has been or is likely to be no nutritional intake for >5 days
Screening Score	0 = Well-Nourished/Low Risk 1 = At-Risk for Malnutrition/Medium Risk 2 = Malnourished/High Risk

CHAPTER 3

RESULTS

Thirty charts were analyzed to determine which tool was the best to identify malnutrition in older adults. Out of the thirty charts analyzed, fifteen with the diagnosis of malnutrition and fifteen with failure to thrive for adults older than 65 years of age with a total 500 charts selected initially. There was slight agreement (0.11-0.40) between the MUST and the MNA-SF using the k statistic (k = 0.136). The data for both the MUST and MNA-SF was 100% complete. The percentages for each screening tool and diagnosis are presented in table 3.1 and 3.2. It was determined that 46.7% and 63.3% of patients were considered already malnourished, and 13.3% and 36.7% of patients were considered at risk for malnutrition by the MUST and MNA-SF, respectively.

3.1 MUST Results

According to the MUST, 16.7% of patients who were diagnosed with malnutrition upon admission were screened at a low risk level/well-nourished while 23.3% of patients diagnosed with failure to thrive were categorized as low risk/well-nourished as well. This contributed to a total of 40.0% not being identified as malnourished for the MUST screening tool. On the other hand, more failure to thrive patients were identified as malnourished than at-risk for malnutrition, 26.7% and 0.0% respectively. For the admitting diagnosis of malnutrition, 20.0% of patients were identified as malnourished and 13.3% as at-risk for malnutrition. Therefore, for both diagnoses, the MUST recognized 60% of patients as at risk or malnourished (13.3% at risk and 46.7% malnourished).

3.2 MNA-SF Results

On the other hand, the MNA-SF screening tool identified all 30 patient medical records as either at-risk for malnutrition or malnourished (100%). This tool identified more patients with the diagnosis of malnutrition as malnourished than the MUST did- 36.7%, but it identified the same percentage of failure to thrive patients as malnourished- 26.7%. More failure to thrive charts were identified as at-risk than actual malnutrition diagnosed patients- 23.3% compared to 13.3% respectively. Overall, the MNA-SF screening tool identified 63.3% of the 30 patients to be malnourished, and 36.7% to be at-risk for poor nutrition.

3.3 Combined Results

Sensitivity was calculated for each diagnosis in order to determine how likely the two screening tools would be in correctly identifying malnutrition with a confidence interval of 95%. These results can be seen in table 3.3. The MNA-SF had a sensitivity of 100% for both diagnoses-malnutrition and failure to thrive with a confidence interval of 75.7-100. The MUST, had a lower sensitivity for failure to thrive patient charts (53.3% with a confidence interval of 30.2-75.1) and a sensitivity of 66.7% (confidence interval of 41.5-84.8) for the malnutrition diagnosis. Unfortunately, specificity, which is the ability of a screening tool to correctly detect those without the disease, could not be calculated because the patient charts used for this study already had a diagnosis of malnutrition or failure to thrive. Therefore, only the effectiveness of identifying true malnutrition, also known as sensitivity, could be calculated.

Table 3.1: MUST Risk Diagnosis Crosstabulation

Screening Tool			Diagnosis		
			Malnutrition	Failure to Thrive	Total
MUST Risk	Not at Risk for Malnutrition	Count	5	7	12
		% of Total	16.7%	23.3%	40.0%
	At Risk for Malnutrition	Count	4	0	4
		% of Total	13.3%	0.0%	13.3%
	Malnourished	Count	6	8	14
		% of Total	20.0%	26.7%	46.7%
Total		Count	15	15	30
		% of Total	50.0%	50.0%	100%

Table 3.2: MNA-SF Risk Diagnosis Crosstabulation

Screening Tool			Diagnosis		
			Malnutrition	Failure to Thrive	Total
MNA-SF	Not at Risk for Malnutrition	Count	0	0	0
		% of Total	0.0%	0.0%	0.0%
	At Risk for Malnutrition	Count	4	7	11
		% of Total	13.3%	23.3%	36.7%
	Malnourished	Count	11	8	19
		% of Total	36.7%	26.7%	63.3%
Total		Count	15	15	30
		% of Total	50.0%	50.0%	100%

Table 3.3: Accuracy of Screening Tools at Identifying Malnutrition

Screening Tool	Diagnosis	95% CI (%) Sensitivity	Specificity
MUST	Malnutrition	66.7% (41.5-84.8)	Cannot be calculated
MUST	Failure to Thrive	53.3% (30.2-75.1)	Cannot be calculated
MUST	Both Diagnoses	60.0% (42.3-75.4)	Cannot be calculated
MNA-SF	Malnutrition	100% (75.7-100)	Cannot be calculated
MNA-SF	Failure to Thrive	100% (75.7-100)	Cannot be calculated
MNA-SF	Both Diagnoses	100% (75.7-100)	Cannot be calculated

CHAPTER 4

DISCUSSION

Throughout the last few decades, many nutritional screening tools have been created in order to better patient outcomes in identifying malnutrition to provide nutritional and medical interventions before decompensation from hospitalization occurs (Tappenden, et al., 2013). In order to assess the effectiveness of which screening tool performs the best in detecting patients for the risk of malnutrition or current malnourishment, this study retrospectively evaluated both the MUST and MNA-SF in screening already diagnosed patients. Many of the studies discussed above have already compared several nutrition screening tools that have analyzed different populations, settings, and various diagnoses. Therefore, this study evaluated which screening tools would work best for screening older adults for malnutrition in a south-central USA hospital.

It was found that the prevalence of malnutrition in elderly patients varied greatly between the two nutritional screening tools, ranging from 46.7% (MUST) to 63.3% (MNA-SF). It is possible that the differences can be attributed to the different criteria assessed in each tool. The MNA-SF was more effective in identifying malnutrition in this patient population because there were no patients screened that fell into the score category of well-nourished unlike the MUST, which identified 40% of the thirty patients as not malnourished despite their admitting diagnosis of malnutrition or failure to thrive. This is likely due to the MNA-SF having six screening parameters that are more specific compared to the MUST only having three. This clearly illustrates that in a clinical setting, the

screening tool selected may have a crucial impact on whether or not patients with malnutrition are missed or nutritional risk is overestimated. Additionally, these results are supported by the study conducted by Baek and Heo (2014), which found that the MNA-SF performed significantly better identifying patients at risk for malnutrition (72.3%) while the MUST only identified 36.2% of the same patients.

The MUST and MNA-SF both identified the same percentage of malnutrition patients with the diagnosis of failure to thrive, but the MNA-SF significantly performed better in detecting at-risk patients diagnosed with failure to thrive for malnutrition. The MNA-SF screening tool also had a higher prevalence of patients diagnosed with malnutrition with the screening result of malnourished when compared with the MUST.

Unfortunately, these two tools only had slight agreement ($k = 0.136$) because of their differences of criteria and the percentage of malnutrition identified from the same sample of patient charts. Additionally, the specificity for the MNA-SF was 100% suggesting that any patient at a true risk for malnutrition will not be undiagnosed, while the specificity for the MUST was only 60% suggesting that some patients who are indeed at risk for malnutrition might miss a diagnosis for it. These results are supported by the study done by Young et al. (2011), which found the MNA-SF to also have the highest sensitivity (95.6%) compared to the MUST at (67.8%). Although the MNA-SF was accurate in identifying the malnutrition in the already diagnosed malnourished patients, it classified a huge number of patients at-risk for malnutrition meaning that if healthcare providers choose to use this screening tool, they must ensure they have sufficient and proper resources to provide other deeper nutritional assessments and interventions.

4.1 Strengths and Limitations

Overall, this research study has some strengths and limitations. First, selection bias was alleviated by randomly choosing patient charts that fit the admitting diagnoses selected for this study. The data was complete for each chart analyzed using the screening tool. However, one of the limitations that existed for this study included the fact that only patients with an admitting diagnosis of malnutrition or failure to thrive were considered. Realistically, nutritional screening should be done for every patient that is admitted to the hospital whether or not malnutrition is known. More than thirty charts could also be analyzed to further increase accuracy of the tools. Additionally, another limitation included the fact that only two screening tools were studied because according to the literature, they aligned better with the age-group of the subjects in the study even though there are many more nutritional screening tools available for use.

4.2 Implications for Nurses

As for nurses, there are many actions that can be taken to combat malnutrition in an acute hospital setting. First, nurses can incorporate nutrition into their routine care checklists and include nutrition intake during team huddles (Tappenden et al., 2013). Nurses should also screen every hospitalized patient for the presence of malnutrition as a regular procedure and communicate the results in a timely manner into the patient's chart and to appropriate personnel. Rescreening is also another important task for the bedside nurse to consider when providing care. During nursing school, future nurses should be taught the importance of nutrition in patient care and how nutrition plays a role in preventing the negative outcomes discussed earlier. (Tappenden et al., 2013).

From the information found in this study, it has become apparent that more research needs to be conducted regarding the many other nutritional screening tools and their effectiveness in identifying malnutrition. Targeted nutritional therapy for nutritional at risk patients who have been screened, should also be considered as a future study to understand relevant outcome measurements for various populations (Holst et al., 2012). More importantly however, this study has shown that the MNA-SF could be an excellent choice for bedside nurses to use in their practice when evaluating for the presence of malnutrition.

4.3 Conclusion

For a long time, malnutrition has been recognized as a huge factor for poor outcomes for both patients with acute and/or chronic illnesses. Despite the number of screening tools available, a lot of patients remain undiagnosed. Therefore, new protocols must be set in place for the screening of potentially at-risk patients, and nutritional screening should be simple and easy for healthcare providers to administer. From the findings of this study, it appears that the use of the MNA-SF can consistently identify numerous patients that other screening tools may end up missing.

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BIOGRAPHICAL INFORMATION

Elizabeth Schneider graduated *Magna Cum Laude* with an Honors Bachelor of Science in Nursing in December 2017. She started at The University of Texas at Arlington in August 2014 after graduating from Lawrence D. Bell High School with an International Baccalaureate diploma. Elizabeth is a member of the National women's sorority, Alpha Chi Omega, which has allowed her to find a passion for supporting domestic violence awareness and helping those affected by it. Elizabeth starts her new career as a cardiac nurse at Texas Health Harris Methodist Hospital Fort Worth in February 2018. From there, she hopes to someday further her education to become a nurse anesthetist.