

**“THE IMPACT OF NUTRITIONAL INTERVENTIONS ON THE
OUTCOMES OF MALNOURISHED OLDER PATIENTS IN
ACUTE HOSPITAL SETTINGS”**

ABSTRACT

Background: Hospitalized seniors are malnourished. Hospital malnutrition causes infections, functional decline, muscle loss, poor wound healing, longer stays, pressure ulcers, and greater morbidity and mortality. Nutritional therapy reduce malnutrition-related consequences, morbidity, and hospitalization. To improve outcomes, hospitalized malnourished patients need nutritional therapy..

Aim: To seek and aggregate research on the effects of nutritional therapies on malnourished older people in acute hospital settings.

Methods: Secondary data analysis of 2014–2019 nursing literature from PubMed, Medline, The Lancet, CINAHL, Web of science, Wiley library, and ERIC databases found relevant papers. The unlimited search yielded 13,457 English-language research studies. 7 research publications fulfilled inclusion requirements after a thorough quality review.

Results: Patient education, dietary modification, oral nutrition supplement, enteral feeding, and parenteral feeding improved body weight, nutritional and functional status, muscle strength, health outcomes, complications, and mortality in malnourished older hospital patients. Oral nutritional supplements and diet adjustments caused weight growth and weight reduction. Dietary adjustments, enteral feeding, and oral nutritional supplements reduce hospitalization, death, and clinical outcomes.

Conclusion: Oral nutritional supplements, screening, and instruction helped malnourished older hospital patients. Thus, hospital management, nurses, and other health professionals should collaborate to adopt nutritional interventions to combat malnutrition..

Keywords: Malnutrition, hospital setting, nutritional interventions, elderly patients, oral nutritional supplements, nutrition screening, enteral feeding, parenteral feeding,

الخلاصة:

الخلفية: كبار السن في المستشفى يعانون من سوء التغذية. يتسبب سوء التغذية في المستشفيات في حدوث عدوى وتدهور وظيفي وفقدان عضلي وضعف التئام الجروح وإقامة أطول وتقرحات ضغط وزيادة معدلات الاعتلال والوفيات. يقلل العلاج الغذائي من العواقب المرتبطة بسوء التغذية والمرضاة والاستشفاء. لتحسين النتائج، يحتاج مرضى سوء التغذية المقيمين في المستشفى إلى علاج غذائي.

الهدف: البحث عن البحوث وتجميعها حول تأثيرات العلاجات الغذائية على كبار السن الذين يعانون من سوء التغذية في ظروف المستشفى الحادة.

الطرق: تحليل البيانات الثانوية لأدب التمريض 2014-2019 من PubMed و Medline و The Lancet و CINAHL و Web of science ومكتبة Wiley وقواعد بيانات ERIC وجدت الأوراق ذات الصلة. أسفر البحث غير المحدود عن 13457 دراسة بحثية باللغة الإنجليزية. استوفت 7 منشورات بحثية متطلبات التضمين بعد مراجعة شاملة للجودة.

النتائج: تثقيف المريض، وتعديل النظام الغذائي، ومكملات التغذية عن طريق الفم، والتغذية المعوية، والتغذية بالحقن أدت إلى تحسين وزن الجسم، والحالة التغذوية والوظيفية، وقوة العضلات، والنتائج الصحية، والمضاعفات، والوفيات لدى مرضى المستشفى الأكبر سناً الذين يعانون من سوء التغذية. تسببت المكملات الغذائية الفموية وتعديلات النظام الغذائي في نمو الوزن وخفضه. تقلل التعديلات الغذائية والتغذية المعوية والمكملات الغذائية الفموية الاستشفاء والوفاة والنتائج السريرية.

الخلاصة: ساعدت المكملات الغذائية عن طريق الفم، والفحص، والتعليمات المرضى كبار السن الذين يعانون من سوء التغذية في المستشفيات. وبالتالي، يجب أن تتعاون إدارة المستشفى والممرضات وغيرهم من المهنيين الصحيين لتبني التدخلات التغذوية لمكافحة سوء التغذية..

الكلمات المفتاحية: سوء التغذية، إعدادات المستشفى، التدخلات الغذائية، المرضى المسنين، المكملات الغذائية عن طريق الفم، فحص التغذية، التغذية المعوية، التغذية الوريدية،

CHAPTER ONE

INTRODUCTION:

Chapter Overview:

This chapter will present detailed information on malnutrition in a hospital setting, the impact of nutritional interventions on inpatients with malnutrition, and the justification of the systematic appraisal. The chapter will further present the research questions and objectives of the study.

Background of the Study:

Malnutrition refers to any nutrition imbalance ranging from under-nutrition to over-nutrition. Malnutrition can occur due to lack of adequate dietary intake, increased nutritional needs allied to the disease state, form disease complications like poor nutrient absorption to excess loss of nutrients (Barker et al, 2011). Malnutrition is a common problem in the geriatric population where evidence from 12 countries indicated that prevalence of malnutrition among the elderly was 23% with the malnutrition rate being 38.7% in a hospital setting (Alzahrani & Sultan, 2017). This is in line with Alvelino & Jaluul (2017) who state that high rates of malnutrition have been reported among the older hospitalized patient population. Malnutrition is mostly a multifactorial condition in geriatric population and possible causes include reduced appetite, depression, cognitive impairment, among other problems associated with old age (Alvelino & Jaluul, 2017).

According to Lee et al (2013) malnutrition in a hospital setting is associated with poor health outcomes for patients such as increased complications and infections, functional decline, muscle loss, poor wound healing, and increased the length of hospital stay, pressure ulcers, as well as higher morbidity and mortality rate. Evidence shows that malnutrition in hospital setting affects about 20-50 percent of patients (Alvelino & Jaluul, 2017). Another study indicated that 40 percent of the patients were under-nourished during admission, and approximately 75 percent of them lost more weight during hospitalization. Evidence further indicates that malnutrition is associated with increased healthcare costs, mostly because of the increased utilization of healthcare resources (Holyday et al, 2013).

Identification of malnutrition or malnutrition risk is the first step towards treatment of malnutrition. Therefore, nutrition risk screening and nutrition assessment present a viable intervention toward accurate diagnosis, and referral, as well as treatment of patients with malnutrition or patients at risk of malnutrition. Nutrition risk screening is referred to as the procedure of identifying patients manifesting characteristics normally allied to nutritional problems who may need comprehensive nutrition assessment (Verghese et al, 2018). Therefore, nutrition risk screening involves a set of validated questions that can predict malnutrition risk. Patients who are identified “at risk” during screening are then referred for additional nutritional assessment, normally conducted by a nutritionist/dietitian (Lee et al, 2013). A trained health practitioner can perform nutrition screening and it is commonly performed by a nursing or nutrition assistant staff.

Use of nutrition interventions in a hospital setting has been shown to reduce morbidity, mortality, rate of complication, and also reduces the length of hospital stay in patients with malnutrition (Verghese et al, 2017). Therefore, this justifies the systematic appraisal to identify nutritional interventions that can improve outcomes of malnourished patients in a hospital setting.

According to Alvelino T & Jaluul O. (2017), nutritional assessment is an effective diagnostic tool in identifying malnourished patients. Nonetheless, in spite of nutritional screening tools help to identify individuals at risk of malnutrition, studies show that other interventions such as enteral feeding and oral nutritional supplements are effective in addressing malnutrition in malnourished patients in a hospital setting. This is supported by Tanvir & Nadim (2010) who explain that many interventions focus on identifying malnutrition and providing treatment using nutritional provisions such as modified diet, enteral feeding, as well as oral nutritional supplements.

Key Supporting Literature

Good nutrition is an essential aspect of patient care and involves nutrition screening, nutrition assessment, and nutrition interventions. Nutrition interventions include numerous strategies such as dietary modifications, oral nutritional supplements and parenteral nutrition (Tanvir & Nadim, 2010).

The nutritional assessment has also been shown to be an effective intervention towards identified patients with malnutrition in order to implement suitable interventions. Nutrition assessment is defined as an all-inclusive strategy for defining nutritional status by utilizing medical, nutritional, treatment histories, lab data, anthropometric measurements, and physical examination (Tanvir & Nadim, 2010).

Dietary modification is an important intervention in treatment of malnutrition. According to Gibson (2014) dietary modification involves modification of the food during preparation, processing and eating in order to increase the bioavailability of micronutrients and at the same time decrease micronutrient deficiencies. An example of dietary modification is the concurrent consumption of iron-rich foods with vitamin C in order to improve iron absorption by the body. The aim of dietary modification is to optimize nutrients to the body. The dietary modification includes adjusting energy value, consistency, nutrient content, as well as the number of meals for the patients (Gibson, 2014). Oral supplements can be utilized as an important intervention that is used in treating malnutrition. Oral nutritional supplements refer to the nutritionally complete liquid supplements that normally contain a variety of macro and micronutrients (Alvelino & Jaluul, 2017). According to Alvelino & Jaluul (2017) oral nutrition supplements are effective nutritional because there is increased absorption of energy, micronutrients, and proteins when it comes to oral nutrition supplements. According to Löser (2015), oral nutrition supplements have demonstrated clinical, nutritional and functional benefits in hospital and community setting for individuals with malnutrition. Evidence indicates that oral nutrition supplements elevate energy and protein in patients with malnutrition without decreasing meal/food intake. In addition, oral nutrition supplements have been shown to assist in stimulating appetite and improving outcomes when it comes to nutritional status, treatment tolerance, weight, as well as the quality of life. Verghese et al (2018) further show that oral nutrition supplements can improve nutrition condition for patients at risk of malnutrition. Oral nutrition supplements have been shown to improve health outcomes and lower healthcare costs. Löser (2015) also provides that giving oral nutritional supplements to patients with malnutrition can assist in reducing morbidity and mortality, reducing readmission rates, reducing the length of hospital stay, improving the quality of life, as well as in lowering healthcare costs. Evidence recommends nutrient supplements administered to malnourished patients in a hospital setting to constitute of high energy protein formulas. Holyday et al (2013) supports this and provides that proteins should represent a bigger percentage of total energy intake. This is because disease-associated malnutrition is associated with increased protein loss, increased catabolism, insufficient protein intake, and protein deficiency. Oral nutritional supplements should be administered between meals. If the patient's ability to eat is very low, such patients may be given high-calorie nutritional drinks that have been enriched with the calorie content of 1.5 to 2.7 kcal/mL (Verghese et al, 2018).

Enteral nutrition involves feeding using the gastrointestinal tract to deliver a portion or all individual's caloric needs using a feeding tube (Alvelino & Jaluul, 2017). Enteral nutrition can encompass a normal oral diet or use of liquid supplements. According to Alvelino & Jaluul (2017), enteral nutrition should be administered to patients with a functional GIT but lack the ability to consume the required daily necessary calories. Enteral feeding is preferred to parenteral feeding because it is more physiologic and has better outcomes such as decreased inflammatory status, reduced risk of hospital-acquired infections, lower healthcare costs, and low mortality rate. Evidence supports the continuous infusion of feedings at the start, and by bolus 4–6 times daily after establishing tolerance (Verghese et al, 2018). Patients who are adequately nourished using enteral feeding are expected to meet 50 percent of their caloric needs within the first seven days of admission, whereas patients with malnutrition are supposed to meet 50% of their caloric goal within 3-5 days of hospitalization (Tanvir & Nadim, 2010).

Parenteral nutrition is also another intervention that has been widely used to address malnutrition. When the caloric needs of patients are not met within the 7 days of enteral feeding, it is recommended to consider parenteral nutrition (Lee et al, 2013). Parenteral nutrition involves intravenous administration of nutrients to patients who are unable to eat or absorb adequate food through tube feeding (Lee et al, 2013). Moreover, patients requiring nutrition support yet enteral nutrition is contraindicated such as patients with intestinal obstruction or malabsorption problems can greatly benefit from parenteral infusion (Lee et al, 2013). Patients with acute illnesses and being administered with parenteral nutrition get infusions continuously; however, abrupt discontinuation of parenteral nutrition can be done if the enteral or oral nutrition can account for at least 60 percent of the patient's caloric needs (Verghese et al, 2018).

Justification of the Study

Hospital-based malnutrition is a persistent challenge to the quality of patient care and safety. Even though malnutrition affects patients from all age groups, the older population is particularly susceptible (Verghese et al, 2018). Evidence shows that a high number of patients are malnourished during admission and many other patients develop malnutrition during hospitalization (Holyday et al, 2013). In acute hospital settings, malnutrition is associated with poor health outcomes that include increased infections, muscle loss, poor wound healing, pressure ulcers, health complication, and increased mortality rate. In spite of the severity of malnutrition, the issue remains under-diagnosed and untreated (Orlandoni et al, 2017). In addition, there is no reliable data about the prevalence of malnutrition among older patients and the appropriate interventions (Orlandoni et al, 2017). This important gap in knowledge therefore justifies this systematic review in order to identify interventions that can impact outcomes of malnourished older patients in an acute hospital setting.

Research Aim

The aim of this systemic review to identify and synthesize the available evidence on the impact of nutritional interventions on the outcomes of malnourished older patients in acute hospital settings

Research Question

What are the impacts of nutritional interventions on the outcomes of malnourished older patients in an acute hospital setting?

Research Objectives

1. To identify the impacts of nutritional interventions in the treatment of malnourishment in acute hospital settings
2. To assess the varying impacts of nutritional interventions in the treatment of malnourishment in acute hospital settings in relation to patient need / conditions
3. To assess the varying outcomes associated with nutritional interventions in the treatment of malnourishment in acute hospital settings

CHAPTER TWO

LITERATURE REVIEW:

Chapter overview

This chapter will define malnutrition, and nutritional interventions (nutritional screening/assessment, dietary modification, oral nutritional supplements, parenteral nutrition, and enteral nutrition). The chapter will also explain the relationship between nutritional interventions and the outcomes of malnourished older patients in hospital settings.

Search strategy; overview

The first step of literature review involved searching various databases such as PubMed, Medline, The Lancet, CINAHL, Web of science, Wiley library and ERIC. A PICO question was formulated in order to locate and retrieve the appropriate journal articles for this systematic review.

PICO Question

In malnourished older patients (P) in a hospital setting, do nutritional interventions (I) when compared to no nutritional interventions (C) improve outcomes of malnourished older patients (O).

During the search, the reference lists of the located published journal articles were also searched in order to identify other relevant quality research articles. Titles and abstracts of the located articles were further screened to assess their relevance. In addition, hand search for the relevant websites, thesis, and books was also done to further locate more information. The search was restricted to articles whose publication language was English.

Additionally, the search was restricted to articles published within the last 5 years, which means only articles published before 2014 were included in the review in order to ensure that the only the latest evidence on the study topic was retrieved. However, for the studies used to frame the theoretical framework, the time limit of five years was not applied. Research articles for the study were selected based on how relevant they were to the study topic by screening the titles and abstracts of the identified studies. In some case, the authors were contacted using the available email in order to seek clarification, and request for full-text version, in cases where the full articles could not be retrieved from the database.

At the end of the search, critical appraisal for the quality of the retrieved journal articles was performed utilizing the recommended Critical Appraisal Checklist for Qualitative Research Studies critical appraisal tool. Journal articles published using any other language than English or articles published before 2014 were excluded. Details of search strategies used to locate evidence for this systematic review will be explained further in the methodology chapter.

Definitions

Malnutrition

According to Alzahrani & Sultan (2017), malnutrition is a broad term that describes imbalances in nutrition, ranging from over-nutrition to under-nutrition. Malnutrition can occur as a result of a deficiency in dietary intake, elevated nutritional needs allied to a disease state, and complications due to an underlying disease condition such as excessive nutrient loss, or poor nutrient absorption. Malnutrition is allied to poor patient outcomes that include increased infections and complications, muscle loss, poor wound healing, lengthened the period of hospital stay, as well as an increased rate of morbidity and mortality (Volkert et al, 2019). Recently, the European Society of Parenteral and Enteral Nutrition (ESPEN) defined malnutrition to point out the differences between malnutrition and cachexia, sarcopenia (loss of muscle mass and function). Cachexia refers to the multifactorial syndrome typified by significant body weight, fat, and muscle loss, as well as elevated protein catabolism because of an underlying illness(es). Accordingly, malnutrition occurring among hospitalized patients is normally a combination of malnutrition (inadequate consumption of nutrients) and cachexia (disease-related), and not malnutrition alone (Gibson, 2014). Therefore, this systematic review will define malnutrition as a complex interaction between an underlying illness, illness-related metabolic changes and the decreased nutrient availability (due to low nutrition intake, impaired absorption, as well as elevated nutrient loss or a combination of these) which is a combination of malnutrition and cachexia.

Nutritional interventions

Volkert et al (2019) define nutritional interventions as the clinical trial of diets or dietary supplements modified to one or more specific target risk groups such as malnourished patients, pregnant women or cancer patients. Gibson (2014) on the other hand, defines nutritional interventions as interventions used in resolving or improving the diagnosis of malnutrition by providing education or delivering food components of specific diet modified in accordance with the

patient's needs. The rationale for nutritional interventions is that diet is among the most essential and modifiable lifestyle determinants of health in individuals. Additionally, malnutrition plays a significant role in the mortality and morbidity of people and particularly hospitalized patients and hence nutritional interventions are necessary to prevent nutritional morbidity and mortality associated with malnutrition (Volkert et al, 2019). Therefore, some of common interventions such as malnutrition screening, dietary modifications, oral nutritional supplements, enteral feeding, among other are used in treatment of malnutrition.

Malnutrition screening and assessment

Alvelino & Jaluul (2017) state that nutrition screening aims to identify patients who are at high risk of malnutrition. On the other hand, nutritional assessment aims to define the nutritional status of the patient as well as define the patient's clinically pertinent malnutrition and monitor the patient's changes in nutritional status. On this note, Aziz et al (2017) define nutritional assessment as the clarification of the anthropometric, laboratory, clinical and nutritional data to establish if the individual is malnourished or well-nourished. Verghese et al (2018) supports this and explains that nutrition assessment is an all-inclusive strategy to define the nutritional status of an individual by utilizing medical, nutritional, treatment histories, lab data, anthropometric measurements, and physical examination. According to Verghese et al (2018), there are various tools used to conduct the nutritional assessment. The Subjective Global Assessment (SGA) is among the most commonly used nutritional assessment tools and categorizes patients as well-nourished, mildly/moderately malnourished, and severely malnourished. The tool utilizes data on changes in weight, dietary intake changes, GIT symptoms, changes in functional status, muscle wasting, ascites, subcutaneous fat, and edema. The tool has been demonstrated to have a high level of inter-rater reproducibility. Verghese et al (2018) further add that SGA tool is subjective in nature and therefore highlights the significance of clinical judgment during the assessment of nutritional status. However, Olivares et al (2014) explains that MUST is the most valid tool to assess malnutrition among the hospitalized geriatric population. The Malnutrition Universal Screening Tool (MUST) is also used to diagnose malnutrition among patients in a hospital setting and nursing homes. Sauer et al (2018) clarify that the tool assesses the patient's BMI, weight loss, as well as disease presence. There are various studies that have been conducted to compare utilization of screening tools to envisage malnutrition among the geriatric population. Verghese et al (2018) conducted a cohort study of 248 in-hospitalised patients found out that MUST was the best performing nutrition screening tool.

Another important nutritional assessment tool is the Mini Nutrition Assessment (MNA) that assess 18 items to determine if the patient is at risk of has malnutrition. The tool assesses aspects such as food intake, loss of weight, acute illness, mobility, neuropsychological issues, as well as other anthropometrical measures. The MNA tool was designed for use among the geriatric population in hospital and community setting as well as older people in nursing homes (Verghese et al, 2018). Sauer et al (2018) suggest other nutritional assessment tools such as the Short Assessment Questionnaire that was developed to identify malnutrition among hospitalized patients and hence it is commonly used to indicate the need for nutritional referrals and development of initial nutritional treatments plans. The malnutrition screening tool can be used by a nurse who is not nutritionally trained to detect patients at high risk for malnutrition.

Dietary modifications

According to Eide et al (2016) dietary modifications aim to optimize the availability of vital nutrients to the body. Dietary modifications include adjusting the consistency and presentation of nutrients, as well as adjusting the energy value, nutrient content and number of meals for individuals diagnosed with malnutrition or those at risk of malnutrition. On the other hand, Roberts et al (2019) define dietary modification as modifying the food when preparing, processing and eating with an aim of increasing bioavailability of micronutrients in the body and also in order to reduce micronutrient deficiencies. Gibson (2014) provides an example of dietary modification as avoiding calcium foods such as milk after eating iron-rich foods or taking iron-rich foods together with vitamin C products in order to increase absorption of iron in the body. However, dietary modification as a malnutrition intervention can only be used in patients with the ability to eat. For example, patients with difficulty swallowing and impaired GIT cannot have their malnutrition treated using dietary modifications.

Oral nutritional supplements

Alvelino & Jaluul, (2017) define oral nutritional supplements as the nutritionally complete liquid supplements containing various macro and micronutrients. According to Alvelino & Jaluul (2017), oral nutrition supplements are effective nutritional interventions due to their ability to increase absorption of energy, micronutrients, and proteins. This is supported by Verghese et al (2018) who provide that oral nutritional supplements are useful for increasing protein, energy and micronutrients intake for patients at risk of malnourishment or already malnourished patients. A

meta-analysis conducted by Volkert et al (2019) reported weight gain and reduced mortality after oral nutritional supplementation (energy and protein) among older adults with under-nutrition. (Alvelino & Jaluul, 2017) opines that oral nutrition supplements are effective in appetite stimulation and in improving outcomes when it comes to nutritional status, treatment tolerance, weight, in addition to the quality of life. Guidelines recommend supplements prescriptions within the acute care setting to consist of high energy high protein formulas. As Verghese et al (2018) explain, proteins are supposed to represent a bigger percentage of total energy intake when compared to the protein intake in a community setting. The reason behind this recommendation includes protein deficiency and inadequate intake of proteins as well as protein loss and catabolism in malnutrition allied to diseases. On the contrary, previous research studies have not established any benefits associated with glucose-based supplementation among the geriatric population in hospital settings. In addition, oral nutritional supplements can be utilized in complementing the daily intake of dietary requirements, but should not be used as a substitution for meals and also should not be used to address specific nutritional deficiencies (Roberts et al, 2019). Evidence indicates that oral nutrition supplements are effective in managing malnutrition, improving weight, and reducing complications such as infections, poor wound healing, mortality, and hospital readmissions (Zhong et al, 2017). However, oral nutrition supplements are costly especially when overused or used unsuitably. In addition, in not monitored properly, patients normally have poor compliance to oral nutrition supplements while some complain of bad taste (Zhong et al, 2017).

Enteral nutrition

According to Verghese et al (2018), enteral nutrition is the use of gastrointestinal tract to provide a portion or all caloric needs of an individual using a feeding tube. Verghese et al (2018) explain that enteral nutrition is suitable for patients whose GIT system is well but the patient is not able to eat or drink the recommended number of calories. The aim of enteral nutrition is to improve nutritional intake and thus improve or maintain nutritional status of the patient. According to Roberts et al (2019) malnutrition is an extremely common problem among the older adults. Therefore, enteral nutrition is used as an indication for nutritional support. Alvelino & Jaluul, 2017) provides that percutaneous endoscopic gastrostomy (PEG) is often used over nasogastric tube because it is associated with a lower risk for tube displacement and it is readily accepted by patients. Normally, the rate of complication is normally very low during enteral nutrition as long as the guidelines for enteral tube feeding are followed. According to Verghese et al, (2018) patients acquire adequate nourishment using enteral feeding are able to meet 50 percent of their caloric needs within the first seven days after being hospitalized. However, enteral nutrition is associated with side effects such as vomiting and nausea. A study carried out by Padilla et al (2016) indicated that about 20 percent of patients who receive enteral tube feedings have serious vomiting and nausea. Delayed gastric emptying has been associated with these side effects.

Parenteral nutrition

Verghese et al (2018) define parenteral nutrition as an intravenous administration of nutrients and it might consist of protein, fat, electrolytes, vitamins, carbohydrate, minerals, other essential trace elements for patients without the ability to eat or absorb adequate food through mouth or tube feeding to ensure good nutritional status. As per Roberts et al (2019) parenteral nutrition should be provided when the patient's caloric needs are not met after the patient undergoes enteral feeding for seven days.

Relationship between nutritional interventions and the outcomes of malnourished older patients in hospital settings

According to Deutz et al (2016) malnutrition among the geriatric population in hospital settings is a source of concern because it contributes to declining health, lower functionality, and increased mortality rate. Eide et al (2016) however, explains that healthcare providers do not adequately address the multifactorial aspects that contribute to malnutrition among the elderly. Malnutrition is a common problem among the elderly because of the changes that occur within the GIT due to aging. This is supported by Alzahrani & Sultan (2017) who conducted a study in 12 countries and found that the incidence of malnutrition among the elderly was 23% with the malnutrition rate being 38.7% in a hospital setting. Orlandoni et al (2017) further add older adults aged over 65 years who are hospitalized are at high risk of suffering from malnutrition. This is because older adults are at risk of many factors that hinder proper feeding such as physiological changes, acute or chronic illness, loss of appetite, dental problems, and poor mental health. This negatively impacts the ensuing health and economic outcomes, consisting of a higher risk of mortality rate and increased rate of nonelective hospital readmission. According to Deutz et al (2016), malnutrition during admission is a predictor of ensuing hospital readmission is allied to increased mortality rate after being discharged. Roberts et al (2019) supports this and explains that even short periods of hospitalization among older adults can lead to significant loss of lean body mass with increased functional decline. The loss of lean body mass is a dysfunction of numerous physiologic and cellular processes and can be worsened by malnutrition. This is because during sickness many

patients are not able to feed well because of factors such as loss of appetite and also other physical impairment that may hinder proper feeding.

As a result, Sauer et al (2019) suggest that nutritional assessment and treatment is supposed to be a routine component of care for all hospitalized geriatric patients. As per Roberts et al (2019) interventions that can address malnutrition among the elderly include dietary modifications, providing oral supplements, enteral nutrition, among other interventions. Therefore, the hospital nursing staff should assess the ability of the patient to eat food and implement the appropriate nutritional interventions.

Increasing evidence indicates that oral nutritional supplements may improve outcomes of hospitalized older patients and also reduce the length of hospital stay, healthcare costs, and readmission rate. Löser (2015) carried out a study on the impact of oral nutritional supplements in older adults in a hospital setting and established that the intervention was effective in improving the nutritional status of the older patients and also reduced their readmission rate after a 6-month follow-up period. This was confirmed by Ruiz et al (2018) who found out that oral nutritional supplements reduced the length of hospital stay, reduced health care costs and also improved health status among hospitalized patients above 65 years with chronic pulmonary obstructive disease. Studies have demonstrated that utilization of oral nutritional supplements among malnourished patients in hospital settings can lower complications, mortality, and also reduce readmission rates (Deutz et al, 2016).

Theoretical framework

Ecological model

The ecological model is an all-inclusive multilevel approach that integrates concepts from several theoretical perspectives that are important in identifying conditions that need to change to facilitate desired health actions. In the ecological model, the levels of influence that impact behavior consist of the individual (knowledge, attitudes, and beliefs), interpersonal (group influence and support), institutional (norms or structures), community and public policy factors (Locher et al, 2011, p.376). Therefore, the ecological model will be an essential model especially when it comes to nutritional screening and dietary modification. This is because eating behaviors are influenced by numerous diverse factors such as illness and ageing that contribute to negative or low eating behaviors.

Social Cognitive Theory

The individual level of influence that affects behavior within the ecological model consists of knowledge, attitudes, and beliefs: they are key to the ability of a person to change and are fundamental tenets of social cognitive theory. The theory of social cognitive theory stipulates that reciprocal determinism for example behavior results from interactions occurring between a person and the environment. According to Esmayel et al (2013), people have significant inconsistency in their food preferences, obstacles to healthy eating, as well as psychosocial support that affects health behavior change. The willingness and the ability to eat is affected by many internal and external factors. Therefore, influencing people to make changes regarding healthy behavior places the clinician in the expert role and the patient in the role of being the recipient of the information and making changes ((Locher et al, 2011). Therefore, in this systematic review, the social cognitive theory will be used as the theoretical framework to support formulation of interventions aimed to treat malnutrition in patients with malnutrition within hospital settings.

Chapter summary

This chapter defined malnutrition and described various nutritional interventions that are used in treatment of malnutrition. The chapter further explained the relationship between nutritional interventions and the outcomes of malnourished older patients in hospital settings, and the theories used to develop the framework for this systematic review.

CHAPTER THREE

METHODOLOGY:

Chapter overview

This chapter provides the study methodology. This chapter will start by discussing aspects such as evidence-based practice, systematic review, secondary data analysis, and systematic appraisal. The chapter will then discuss the search strategy used in this systematic review, search process, data analysis and the inclusion and exclusion criteria used to identify the relevant studies. In addition, the appraisal tools used to appraise the studies will be discussed.

Evidence-based practice

Reid et al (2017, p.1) define evidence-based practice (EBP) as “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research”. This is supported by Hsieh et al (2016) who explain that EBP is the process of collection, procession, and implementation of research findings, with an aim of improving clinical practice, patient outcomes, and the work setting as well. Nursing interventions are supposed to be practical, and systematic decisions whose basis is on EBP research studies. Using the EBP approach in nursing practice ensures the provision of highest quality care to patients, and as efficiently as possible (Hsieh et al, 2016).

This is why EBP is very significant as it enables provision of the most effective available care in order to improve patient outcomes. Patients expect to be provided with the most effective care in accordance with the best available evidence.

Secondary data analysis

Secondary data analysis refers to the analysis of data that was collected by another researcher (Dunn et al, 2015). This is in line with Cheng & Phillips (2014) who define secondary data analysis as analyzing existing data where the data is evaluated to answer a research question and the primary research questions for which the data was primarily collected. Secondary data analysis, therefore, includes systematic steps that include formulating the research question, identifying the relevant data, and finally evaluating the data to answer the research question (Cheng & Phillips, 2014). This indicates the significance of secondary data in research.

Systematic review

A systematic review refers to synthesis and appraisal of primary research studies utilizing a rigorous and clearly define methodology ion search strategy and selection of studies as well (Pollock& Berge, 2018). According to Misra & Vikas (2018), a systematic review is a form of literature review that makes use of systematic methods in collection of secondary data, critically appraises research studies, and finally synthesizes the combined findings from the appraised research studies. In systematic reviews, research questions are formulated and studies directly related to the systematic research questions are identified. Misra & Vikas (2018) provide that systematic reviews involve a detailed and exhaustive summary of the latest research evidence pertinent to the research question. Cooper et al (2018) describe high-quality and well-conducted systematic reviews as the most reliable and rigorous sources of evidence for guiding clinical practice. Systematic reviews are aimed to provide a comprehensive summary of all available primary search pertinent to the research question. Therefore, a systematic review utilizes all the existing research to provide answers to the research question. As Cooper et al (2018) provide, systematic reviews aim to identify, retrieve, appraise, as well as synthesize all the empirical evidence that fulfills pre-set eligibility criteria to answer definite research questions. Accordingly, when performing systematic reviews systematic and explicit methods are used in order to reduce bias, and generate more reliable and valid results to inform decision-making (Misra & Vikas, 2018). Reducing bias and having a good understanding of bias and its effects on the study findings is importance for the practice of evidence-based medicine. For example, it is easier to generalized study findings without bias in practice.

Systematic appraisal

According to Pollock& Berge (2018), a systematic appraisal refers to the process of systematic and careful examination of research to judge the trustworthiness, value, as well as relevant of the research within a specific context. Dhammi & Haq (2018) further add that systematic appraisal is an important skill in evidence-based health since it enables healthcare providers to identify, retrieve and use research evidence efficiently and reliably. Systematic appraisal evaluates the way research is performed and evaluates factors such as validity, relevance, and generalizability

of the research findings. The first assessment of research studies should be based on the clinical relevance, the rigor, and robustness of the methodology, the reproducibility of the findings, and if there is any bias or conflict of interest (Dhammi & Haq, 2018). There are various tools used to perform critical appraisal of evidence. since this systematic review was based on qualitative studies, the selected critical appraisal tool was Critical Appraisal Checklist for Qualitative Research Studies.

The advantages/disadvantages of doing systematic appraisals and secondary data analysis

Use of systematic appraisals and secondary data analysis to answer research questions has numerous advantages. According to Cooper et al (2018), systematic reviews take less time and are cost-effective because study design and data collection are already completed. In addition, secondary data analysis enables researchers to access large data sets as well as longitudinal data. Cooper et al (2018) further add that systematic reviews involve a comprehensive literature review, peer-review at different stages, and critical appraisal of the data and therefore the findings are normally more reliable and with minimal bias. Pollock & Berge (2018) emphasizes that secondary data analysis is an effective and efficient strategy of performing nursing research. Nonetheless, Pollock & Berge (2018) explains that there are limitations associated with systematic reviews such as the challenge of combining results from different studies, sometimes only the abstracts of the primary research articles are available and also comparison of findings from studies having different study subjects and different study methodologies and settings may be a challenge.

Research aim

The aim of this systemic review to identify and synthesize the available evidence on the impacts of nutritional interventions on the outcomes of malnourished older patients in acute hospital settings

Research question

What are the impacts of nutritional interventions on the outcomes of malnourished older patients in an acute hospital setting?

Research objectives

1. To identify the impacts of nutritional interventions in the treatment of malnourishment in acute hospital settings
2. To assess the varying impacts of nutritional interventions in the treatment of malnourishment in acute hospital settings in relation to patient need/conditions
3. To assess the varying outcomes associated with nutritional interventions in the treatment of malnourishment in acute hospital settings

Inclusion & exclusion criteria

A pre-determined inclusion and exclusion criteria were established to narrow down literature search. For the inclusion criteria, only peer-reviewed qualitative studies performed and published between 2014-2019 were included in this systematic review. In addition, only studies whose language of publication is English were included in the study. Finally, all qualitative primary studies included had to focus on investigating the impact of nutritional interventions on the outcomes of malnourished patients within hospital settings.

Exclusion criteria

All studies that conducted and published before 2014 were excluded and also any study published in any other language than English was also excluded. The reason why studies published before 2014 were excluded is to allow only inclusion of the latest available evidence. All studies using mixed-method and quantitative research methods were also excluded. Finally, studies whose focus was not the impact of nutritional interventions on the outcomes of malnourished patients within hospital settings were excluded.

Search strategy

A detailed systematic search for evidence was performed. Four databases that included PubMed, CINAHL, Web of science, and ERIC were used in order to locate adequate articles to provide answers to the research question. The reference lists of all retrieved studies were searched and scrutinized to establish if the articles met the inclusion criteria. Additionally, in case the full-text was unavailable, the authors were contacted to provide the full-text format of the research articles.

PICO Question

PICO framework is a prompt used in evidence-based practice to develop literature search strategies, for example in systematic reviews. PICOI will therefore enable a well-focused question to be framed and avoid consuming so much time in identifying suitable resources and searching for the relevant evidence. PICO stands for P (Population); I (Intervention); C (Comparison); and O (Outcome). The following PICO question was formulated for this systematic review:

In malnourished older patients (P) in a hospital setting, do nutritional interventions (I) when compared to no nutritional interventions (C) improve outcomes of malnourished older patients (O)?

The search and key terms used during the search were malnourished older patients, nutritional interventions, nutritional screening/assessment, dietary modification, oral nutritional supplements, parenteral nutrition, and enteral nutrition.

Hits from the databases

Database	Number of hits
PubMed	4,455
CINAHL	3,232
Web of science	3,205
Wiley library	2,565
Total	13,457

Search breakdown

The unlimited search in this systematic review produced a total of 13,457. After scrutinizing the articles as per the inclusion and exclusion criteria, 13,422 were excluded because they did not meet the inclusion criteria. The articles that did not meet the inclusion criteria were too old and published before 2014, language of publication was not English, while some other study's had topic unrelated to the study topic. As a result, only 45 full-text articles were assessed for eligibility and for these articles critical analysis was done using Critical Appraisal Checklist for Qualitative Research Studies and finally, only six journal articles were selected because they fulfilled the inclusion criteria. The six (6) articles were considered to be appropriate to answer the primary research question.

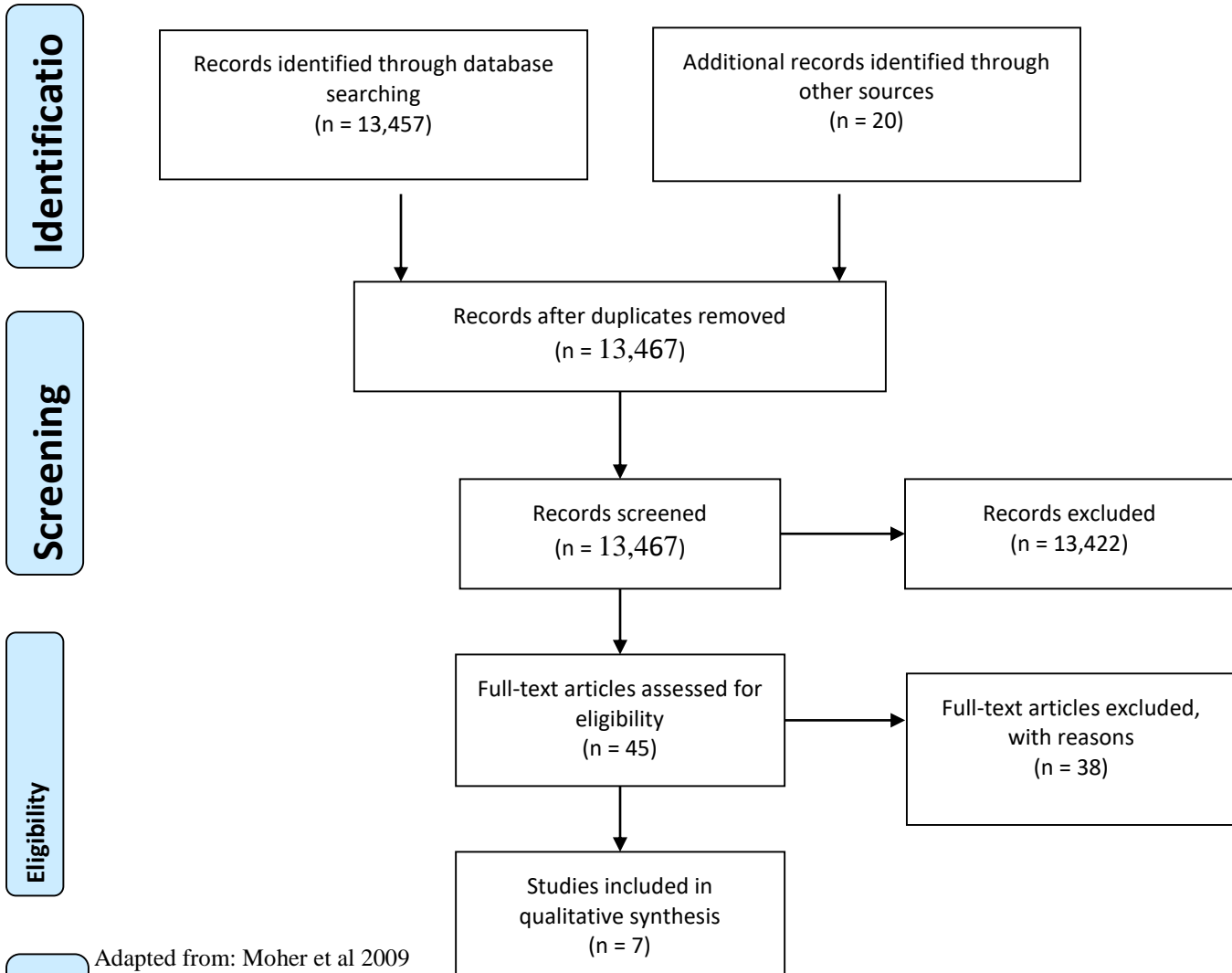
Search findings

The search identified six articles that were selected since they fulfilled the set inclusion criteria. The list below provides the selected articles for use in this systematic review:

1. Andraesen et al, 2018, Factors affecting patient and nursing staff adherence to an integrated physical activity and nutritional intervention targeting functional decline on an acute medical ward: a qualitative study
2. Alzahrani S & Sultan A, 2017, Prevalence of malnutrition and associated factors among hospitalized elderly patients in King Abdulaziz University Hospital, Jeddah, Saudi Arabia
3. Eide et al, 2016, Are Nutritional Care Adequate for Elderly Hospitalized Patients? A Cross-Sectional Study,
4. Eglseer et al, 2019, Nutritional management of older hospitalised patients with pressure injuries,
5. Lin Y-M, Wang M, Sun N-X, Liu Y-Y, Yin T-F & Chen C, 2019, Screening and application of nutritional support in elderly hospitalized patients of a tertiary care hospital in China,
6. Roberts S, Marshall A & Chabover W, 2017, Hospital staffs' perceptions of an electronic program to engage patients in nutrition care at the bedside: a qualitative study,

PRISMA

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to evaluate and critically appraise the eligibility of the selected six (6) studies for this systematic review.

PRISMA 2009 Flow Diagram

Adapted from: Moher et al 2009

The reason for excluding full-text articles included in the studies were low-quality Randomize Clinical Trial (RCT) while the content of some studies was not relevant to the main topic.

Quality assessment

Quality assessment involved systematically assessment of the retrieved and selected studies as per the pre-determined inclusion criteria. The Critical Appraisal Checklist for Qualitative Research Studies critical appraisal tool was used appraise the selected articles. According to Treloar et (2000), critical appraisal of qualitative studies in a systematic review is very important to ensure the reliability of the findings.

Explanation of data extraction and synthesis

For data to be extracted from the retrieved articles, The Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Qualitative Research was utilized to extract the data. The extracted data form contained the following components: study (year), study (year), country, research design (data collection techniques), sample (recruitment and participants), and main findings (Munn et al, 2018). For the data analysis, the JBI meta-aggregation was used. JBI meta-aggregation is used with an aim of generating synthesized findings that are relevant for clinical application (Munn et al, 2018).

Ethical consideration

The study is a systematic review and therefore ethical approval was not sought because there were no human study participants. However, it was ensured that information extracted from sources was cited appropriately and that all studies included had adhered to the required ethical requirements.

Chapter summary

The chapter provided the study's methodology by comprehensively detailing the search criteria, search processes, and inclusion and exclusion criteria for the study. In addition, evidence-based practice, secondary data analysis, systematic review, and critical appraisal with their relevance to the study topic. In addition, the chapter provided a list of the selected studies for the systematic review.

CHAPTER FOUR

Findings:

Chapter overview

The chapter provides a summary of all selected studies for this systematic review by considering methodological limitations, sampling methods, approaches to analysis, outcomes/findings, quality assurance issues such as the validity and reliability of the studies. This chapter will also give a justification why the selected articles were included and the quality assessment and appraisal were performed during the selection of the articles.

Characteristics and quality of the primary studies included

A total of six primary research articles were selected for this systematic review in accordance with specific inclusion criteria and exclusion criteria. Out of the six studies, 5 were cross-sectional, and one Randomized feasibility trial. In six studies (2, 3, 4 & 5) data was collected using questionnaires while in two studies study (1 & 6), the data was collected using interviews. Additionally, the included studies had different publication years that ranged from 2016 (3), 2017 (2), 2018 (1, 5, & 6), to 2019 (4). The study locations of the included studies represented a global distribution with one study from Denmark, one Saudi Arabia; one Norway; one China; and two Australia. The healthcare organizations in the included public and teaching hospitals, located in rural and urban areas. All the included research articles were peer-reviewed and published in English language and after 2014.

Methodological limitations

The main limitations in this systematic review were related to the search strategy, the small number of the included studies, and limitations of the primary studies. In addition, all the selected articles had varied objectives and study design and were conducted in different countries; this could interfere with the generalization of the study findings. In addition, only 6 research article that fully met the inclusion criteria which is a relatively small number of studies. Regarding the search strategy, it was only limited to research articles published in English language and this could have contributed to bias. Moreover, only one researcher (me) participated in the screening process of the selected studies and thus this could have contributed to some bias because there were no independent researchers. Lastly, data collection in most selected articles was primarily based on self-reports of the study subjects regarding the various nutritional interventions and their impact.

Sampling limitations

Some studies used purposive sampling technique and this could have contributed to bias because there was no random selection of study participants which could have given each participant an equal chance to take part in the study. This study limitation can reduce the validity and reliability of the study's findings and hence limit the generalization of this systematic review's findings (Palinkas et al, 2015). In addition, this systematic review targeted only qualitative studies which limited other high-quality studies conducted using quantitative or mixed method research designs.

Approach to analysis

In the study by Roberts et al (2017) data analysis was done utilizing inductive approach to thematic analysis. The key quotes were identified and codes developed according to the verbatims from the study participants. Grouping of the codes was done in accordance with the similarity and grouped into themes and sub-themes. For the study by Lin et al (2019), data was analyzed using SPSS20.0 and the expression of the qualitative data was done as mean \pm standard deviation. Analysis of variance and chi-square tests or Fisher's tests were used to do comparisons. Logistic multiple regression analysis was used to analyze factors impacting the clinical outcomes. Similarly, data analysis in Eglseer et al (2019) was performed using SPSS 23.0. For the study by Eide et al, 2016, data was analyzed using SPSS statistics Version 22.0 and patient features grouped as means and standard deviations (SDs), as appropriate. Similarly, data analysis in Alzahrani & Sultan (2017) was done using SPSS version 23.0 was for the management and analysis of the data. Finally, in Andreasen et al (2018) data analysis was done using six-step data-driven thematic analysis, as per Braun & Clark (2006).

Theoretical issues

Some selected studies used various theories to develop the hypothesis of the study and inform the conceptual framework. For example, the study conducted by Andreasen et al (2018) used theory-based taxonomy of methods as the theoretical model for the study. Other studies such as Sjögren et al (2018) were informed by grounded theory

study. Grounded theory is a research technique that generates a theory based on the data that was systematically collected and analyzed. Majority of the selected studies in this systematic review were informed by the grounded theory where the collected and analyzed data produced the studies' theories.

Findings

Overview of the included studies

Among the six included studies, one was conducted in Denmark, one Saudi Arabia; one Norway; one China; and two Australia. Of the six selected studies, 5 were cross-sectional, and one Randomized feasibility trial. Identified settings in the selected articles included 6 hospital settings. The study samples were nursing staff, dieticians, doctors and older adult patients. The key outcomes of interest were improved health and nutritional outcomes. Nutritional impact on the older adults was examined in regard to their impact on nutritional status and the overall health and according to the perception of healthcare providers and older adults as well.

Tabular presentation of all included studies

Author et al. (year)	Main Study Characteristics	Aim of the Study	Nutritional interventions	Main Findings
S1. Andreasen et al, (2018)	Denmark; Cross-sectional study; Danish University Hospital; 7 patients (senior adults) & 5 nursing staff	To identify positive and negative factors affecting the adherence of patients and staff to an integrated physical activity and nutritional intervention on a medical ward	Protein-rich drink	The nutrition intervention had a positive impact on the health of the patients
S2. Alzahrani & Sultan (2017)	Saudi Arabia; Cross-sectional study; King Abdulaziz University Hospital' 248 hospitalized patients	To estimate the prevalence of malnutrition among hospitalized elderly patients and its associated factors and outcomes in terms of length of stay and mortality in King Abdulaziz University Hospital, Jeddah, Saudi Arabia.	Mini Nutritional Assessment (MNA-SF)	Malnutrition was highly prevalent among hospitalized elderly and was associated with increased length of stay and mortality
S.3 Eide et al, (2016)	Norway; Cross-sectional study; University hospital; 173 nursing students conducted nutritional screening; 508 patients aged 70 years and above	To estimate the prevalence of nutritional risk among elderly patients in a large university hospital	Nutritional screening	Nutritional screening indicated that majority of older patients were malnourished due to lack of the internationally and nationally recommended nutritional care in the hospital
S4. Eglseer et al, (2019)	Australia; Cross-sectional study; 33 hospitals with a total of 208 wards; 1412 hospitalised adults aged 70 years or older	To describe the nutritional interventions conducted in Austrian hospitalised patients, who were 70 years of age or older and had (a risk of developing) pressure injuries	Food specifically desired by the patient; Malnutrition screening; Support at mealtimes; Adjustment of meal consistency; Dietitian referral; Energy/protein-enriched diet; Energy and/or protein-enriched snacks; oral nutritional supplements; Enteral	Nutritional care in older patients with (a risk of developing) pressure injuries was suboptimal

			nutrition and Parenteral nutrition	
S5. Lin et al (2019)	China; Prospective observational study; Geriatric department, Qilu hospital, Shandong University 745 elderly patients, aged 65 years and above	To evaluate the nutritional condition of the elderly patients and utilization of nutritional support at the target hospital and the impact of the nutritional support and nutritional status on the clinical outcomes	The Nutrition Risk Screening (NRS 2002) & Mini Nutritional Assessment-short forms (MNA-SF) for nutritional screening during admission Recording of anthropometric measurements, nutritional support, lab tests and clinical outcomes	Older patients at hospital manifest high rate of malnutrition or risk to malnutrition when compared to other patients. Nutritional support was effective in reducing the length of hospital stay and the rate of infectious complications among the elderly patients with malnutrition or at risk of malnutrition
S.6 Roberts et al, (2019)	Australia; qualitative descriptive study; 5 medical and surgical wards at a tertiary metropolitan teaching hospital in Australia; semi-structured interviews with hospital staff	To explore the perception of the hospital staff regarding the use of nutritional care technology to engage patients in their care	Electronic foodservice system (EFS)	Electronic foodservice system (EFS) can effectively engage patients in their nutritional care and thus play a role in improving patients' nutritional status

The impact of nutritional interventions on the outcomes of malnourished older patients in hospital settings

The findings from all selected studies suggested that various nutritional interventions had an impact on the outcomes of the malnourished older patients.

Impact of nutritional interventions on health outcomes and length of stay in hospital

The study by Alzahrani & Sultan (2017) indicated that malnutrition was highly predominant among the elderly patients in a hospital setting and was allied with an elevated length of hospital stay and the mortality rate. Similarly, findings by Lin et al (2019) also shows that nutritional support significantly decreases the length of hospital stay and also the prevalence of infectious complications in older patients with malnutrition. Andreasen et al, (2018) also shows that nutritional interventions such as oral nutritional supplements improved the health outcomes of the patients and hence reduced the hospital length of stay. Roberts et al (2019) further indicate that nutritional interventions such as dietary modifications, for instance mealtime assistance can significantly improve nutritional intake in hospitalized. In addition, Eide et al, 2016; Eglseer et al, 2019; & Lin et al 2019 show that nutritional interventions such as oral nutritional supplements, enteral feeding, dietary modifications and parenteral feeding positively improved health outcomes of the patients by improving aspects such as functional status, reducing health complications, preventing weight loss, and reducing patient's mortality rate.

Impact of nutritional interventions on health outcomes, nutritional and functional status

Findings from Andreasen et al (2018) indicate that nutritional interventions from dieticians impacted on their behavior and hence improved their health and nutritional status. A cross-sectional study performed by Eide et al (2016) showed that the hospital did not implement the required nutritional interventions for the hospitalized older patients and this put the older patient at nutritional risk. Nutritional interventions such as routine nutritional screening and other nutritional care practices can identify older patients at nutritional risk and implement the required nutritional interventions. Findings from Eglseer et al (2019) indicated that nutritional care in older patients was not adequate and this negatively impacted their health outcomes. Similarly, Lin et al (2019) reported that screening of malnutrition using validated assessment tools should be performed in order to determine the malnutrition status or the nutrition risk of the patients. Nutritional screening of the hospitalized elderly patients facilitates implementation of the appropriate nutritional interventions and hence improve the health outcome and also reduce the devastating effects associated with malnutrition (Lin et al 2019; Alzahrani & Sultan 2017 & Eglseer et al 2019).

Quality assurance

Validity

All the articles that were selected in the systematic review addressed the main elements of quality assurance and essential types of validity such as convergent validity, face validity and more importantly content validity (Leung, 2015).

Reliability

In the selected research articles, reliability was ensured through **confirmability and transferability of the findings of all the selected articles. Moreover, in the selected articles some authors developed data collection tools while authors who used data collected tools designed by other authors ensured that their reliability and validity had been tested before.**

Rigor

A detailed and wide literature review was conducted to ensure that all relevant research articles and any other information were located (Leung, 2015). In addition, Critical Appraisal Checklist for Qualitative Research Studies was selected as the critical appraisal tool for appraising all studies that were included in this systematic review (Heydari et al, 2017).

Ethical considerations

It was ensured that all the selected articles met the appropriate ethical requirements. The main ethical requirements in research studies include seeking informed consent from study participants, voluntary participation of the study subjects, and respecting privacy and confidentiality of the study participants (Yip et al, 2016). Obtaining informed consent from the participants ensures that the participants understand all the details of the research including the associated risks and therefore they participate in the study with the full information. Secondly, participation in the study should be voluntary where the participants should take part voluntarily without any coercion or forcefully. Lastly, confidentiality and privacy of all study participants should be maintained (Yip et al, 2016). Accordingly, all the selected articles adhered to the required ethical requirements by obtaining informed consent from the study participants, ensuring voluntary participation, and maintaining the confidentiality of the study participants.

Chapter summary

This chapter provided the characteristics and quality of the primary studies, methodological limitations of the selected studies, findings, summary table of the selected articles, approach to analysis, and quality assurance of all the selected studies. The next chapter will provide a detailed analysis and discussion of the study findings.

CHAPTER FIVE

Discussion of Findings:

Chapter overview

This chapter provides a detailed discussion of the findings from the selected research studies. The discussion of the findings will be presented in themes. Additionally, the chapter will discuss data collection process, knowledge gaps, study limitations, and interpretation of the selected studies. The chapter will conclude by discussing the implication to nursing practice, education, and management.

How the study addressed the systematic appraisal aims, objectives and research questions

Discussion of the appraisal process

Malnutrition within hospital setting, especially among the elderly patients is a common and a serious issue that deserves attention. As a result, while in practice the researcher gained keen interest in the topic because malnutrition had numerous adverse health outcomes on the patients. Some of the most common adverse effects included increased mortality rate, longer hospital stay, functional impairment, fatigue, reduced quality of life, among other effects. Therefore, the researcher decided to examine the relevant available literature regarding the impact of nutritional interventions on the outcomes of malnourished older patient in hospital settings in order to gain a better understanding on the topic, and design a research question, and as a result conduct a critical appraisal from published qualitative studies.

While performing this systematic review, a number of challenges were experienced; these challenges posed limitations to this study. According to McGrath et al (2017), a well-conducted systematic review should be performed by more than one independent researcher and also the critical appraisal of the studies to be used in the systematic review should be done by more than one researcher. However, in this systematic review, only one researcher (student) was involved; however, in order to ensure credibility, the supervisor was always consulted in all stages of the study in order to provide input.

In addition, it is also recommended that standard and reliable quality assessment tools should be used to critically appraise the studies in order to ensure quality and reliability of the study findings. As a result, the researcher used Critical Appraisal Checklist for Qualitative Research Studies to critically appraise the quality of the selected research studies; this was achieved by assigning scores to various criteria on the appraisal tool to establish if they were quality and reliable studies. Therefore, even though there was a limitation regarding the student appraising the articles alone, use of Critical Appraisal Checklist for Qualitative Research Studies to critically appraise each and every selected study may have reduced any bias.

Another limitation is that the inclusion criteria only allowed research articles published in English language. Restricting the search only to studies published in English may have limited selection and use of other high-quality studies published using another language. The last limitation was lack of enough time to formulate research question, perform comprehensive literature review, select the appropriate study design, and to critically appraise the studies and perform data analysis. This led to inclusion of only six research articles but a pragmatic focus in including only six studies felt this number would still provide enough evidence to address the research objectives.

Discussion of emerged appraisal themes

1. The relationship between nutritional interventions on the outcomes of malnourished older patients in hospital settings

Nutritional interventions from all the selected articles had a significant positive impact on aspects such as the body weight, nutritional and functional status, muscle strength (S1 & S3) better health outcomes, reduced health complications (S4 & S5), and reduced mortality rate among malnourished older patients in hospital settings (S5). These findings indicate the significance of nutritional interventions in positively impacting outcomes in hospital settings. The study by S1 indicated that nutritional intervention in hospitalized patients aged 65 years and above improved functional status and muscle strength as well. Similarly, a study by S4 indicated that administration of high-energy/high-protein oral nutritional supplements in older patients improved healing rate of pressure ulcers. This is per the NPUAP guideline that supports provision of fortified food and high-protein and high-calorie oral nutritional supplements when the nutritional requirements of hospitalized patients cannot be met using the dietary intake. These findings are supported by Gail (2015) who provided that providing malnourished hospitalized patients with foods

enriched with proteins and energy and also provision of oral nutritional supplements was effective in improving their functionality and overall general health. The findings of this study also indicated that screening interventions such as malnutrition screening for the hospitalized patients improved the health and the length of stay at the hospital for the malnourished patients (Gail, 2015). The findings of this systematic review S2 show that nutritional screening facilitates early identification of malnutrition and as a result help to delay and prevent poor health outcomes associated with malnutrition. Use of nutritional screening tools such as the Mini Nutritional Assessment (MNA) are effective in assessment of the nutritional status of the hospitalized older patients which leads to the implementation of the necessary interventions and treatments S2. As Thiago & Jaluul (2017) nutritional screening provide the vital information essential to formulate nutrition care plans. These developed nutritional plans are then used to determine the required dietary modifications, parenteral nutrition or enteral nutritional interventions, and even help to develop strategies to monitor nutritional adverse events. Similarly, findings by S5 indicated that nutritional support significantly decreased the length of hospital stay and also reduced the prevalence of infectious complications in older patients with malnutrition. The nutritional support provided to these patients included parenteral nutrition supplies and enteral nutrition supplies that included oral nutritional supplements and enteral tube feeding. Generally, findings from the selected articles indicate that nutritional interventions such as dietary modifications, oral nutritional supplements, enteral feeding and parenteral feeding positively impact the outcomes of malnourished older patients in hospital settings. On the other hand, nutritional screening allows early identification of malnutrition or patients at risk of malnutrition and hence allows the appropriate treatment intervention to be started promptly.

2. Impact of nutritional interventions on anthropometrics, nutritional and functional status

Regarding the impact of the nutritional interventions on the anthropometric measures such as body weight for the hospitalized older patients, a study by S5 found out that the group that received oral nutritional supplements had significant improvement on anthropometric measures, especially weight gain and decreased the rate of weight loss. These findings are consistent with the findings of this systematic review (S5 & S6) who opine that nutritional interventions such as oral nutritional supplements improved nutritional status and prevented weight loss among the hospitalized frail older patients. Findings from S6 further indicates that nutritional interventions such as dietary modifications, for instance mealtime assistance can significantly improve nutritional intake in hospitalized older patients and thus improve parameters such as weight gain. This study further indicates that oral nutritional supplement in form of energy and protein rich feeds significantly improved nutritional intake for malnourished older people (S6). Weight gain and prevention of muscle was a common benefit seen in older patients who received oral nutritional supplements. These findings agree with a Cochrane review by Baldwin & Weekes (2011) that indicated that oral nutritional supplements can improve anthropometric measures such as grip strength, body weight, as well as body composition. However, in this study, oral nutritional supplements did not indicate benefit associated with improved survival. Saur et al (2018) highlights that nutritional interventions positively impact the anthropometrics (body weight), and hence supports findings from S5 & S6.

Some of the studies in this review also investigated the impact of nutritional interventions on nutritional status and functionality. S2 & S5 found notable improvement in nutritional status and functionality after the hospitalized patients were administered with nutritional interventions. These findings are congruent the study conducted by Thiago & Jaluul (2017) whose findings demonstrated improved nutritional condition in hospitalized malnourished older patients who were receiving nutritional interventions. This systematic review S6 also shows that nutritional interventions improved functional status or reduced functional limitations in malnourished older people who were administered with nutrition intervention. The use of nutritional interventions such as malnutrition screening tools is allied to improved monitoring of food intake, with procedures for addition oral nutritional supplements and referring patients to dieticians for personalized nutritional support was shown to improve clinical outcomes and functionality as well (S6). S5 reported that screening of malnutrition using validated assessment tools should be performed in order to determine the malnutrition status or the nutrition risk of the patients. This can help in improving the patient outcomes such as improved nutritional status and improved body weight.

3. Impact of nutritional interventions on health outcomes and length of stay in hospital

Evidence suggests that malnutrition and nutritional risk among the older hospitalized patients is a common occurrence (Thiago & Jaluul, 2017). Malnourished and patients at increased risk of malnutrition have a higher likelihood of having a longer hospital stay and poor health outcomes. Findings from this systematic review indicate that nutritional support such as dietary modifications, enteral feeding and oral nutritional supplements reduces the length of hospital stay and also improves clinical outcomes (S3 & S5). The impact of nutritional interventions on the length of hospital

stay in inpatient population has also been supported in previous studies. A study of inpatients with malnutrition indicated that complete nutrition care and interventions including an electronic medical record-cued malnutrition screening tool (S1), oral nutrition supplements, along with nutrition support during hospitalization significantly reduced the length of hospital stay and 30-day readmissions (S4). These findings are supported by previous evidence that suggests that oral nutrition supplementation can improved the outcomes of hospitalized older patients, including reducing the length of stay and reducing the risk of readmissions (Thiago & Jaluul, 2017).

Nutritional interventions in this systematic review were also shown to significantly prevent complications and morbidity in hospitalized patients. The study by S4 indicated that hospitalized patients with pressure ulcers who were given support during mealtimes, dietary modifications, malnutrition screening and were referred to dietitians had optimal recovery rates. Similarly, other studies indicate that nutritional interventions for hospitalized patients had significant beneficial outcomes on morbidity and other health complications (Deutz et al, 2016). This study further indicated that oral nutritional support and nutrition counselling in hospitalized patients were associated with fewer complications (Deutz et al, 2016).

Nutritional interventions have been shown to reduce mortality rate in patients with malnutrition. According to S2 serum protein are important marker of nutritional status, where serum albumin is widely used to predict mortality and other health outcome in older adults. S2 reported that malnourished older adults in hospital setting had a considerably lower albumin levels (28.2 ± 7.7), which could predict mortality. These findings are supported by a previous study by Deutz et al (2016) that established that implementation of the appropriate nutritional interventions such as nutrient-dense oral nutritional support among patients aged 65 years and above was shown to significantly reduce the 90-day mortality rate.

4. Overall impact of nutritional interventions

Overall, the findings of this critical appraisal build on the existing body of evidence indicating that nutrition interventions can result to improved health outcomes for the older patients within hospital settings. A study conducted by Thiago & Jaluul (2017) on nutritional interventions in hospitalized malnourished elderly patients indicated that nutritional supplements such as oral nutritional supplements, nutrition screening and nutrition education positively impacted the health of malnourished older patients in a hospital setting. Similarly, in this systematic review, majority of the selected studies that used various nutritional interventions reported considerable and positive outcomes on malnourished elderly patients within hospital settings (S5; S6; S4; & S3).

When treating malnutrition in patients within hospital settings, oral feeding using oral nutritional supplements or diet enrichment is used as the first line of treatment. Oral nutritional supplements have been used consistently and have been shown to provide clinical, nutritional, functional, as well as economic benefits to patients with malnutrition (Hamilton C & Boyce V, 2013). These findings agree with the findings of this systematic review since S6; & S4 indicate that oral nutritional supplements significantly improve nutrition status, functionality, reduce mortality rate and also improve the general outcome of malnourished patients within hospital settings. However, oral nutritional supplements can only be used in patients with the ability to feed and therefore for patients who cannot achieve sufficient oral intake from oral nutritional supplements and food and are not able to eat and drink safely; enteral feeding or parenteral feeding are recommended (Elke et al, 2016). These findings highpoint the necessity of developing, implementing, and examining comprehensive nutritional interventions to improve the outcomes of malnourished elderly patients within hospital setting, as well as individuals with malnutrition or at risk of malnutrition across continuum of care.

Implication for nursing practice, education and management

Nursing practice

According to the findings of this systematic review, monitoring patients and using nutritional interventions such as nutritional screening, dietary modifications, oral nutritional supplements and enteral feeding have been shown to improve the nutritional status and other health outcomes; yet this aspect is given lower priority when compared to other components of patient care (Roberts et al, 2017). The impact of not addressing the nutritional status of patients in hospital is associated with higher morbidity rate, high mortality rate, increased length of stay, as well as high rate of complications and infections, especially among the older adults (Snider et al, 2015). Therefore, it is important for nurses to ensure provision of adequate nutritional care to the hospitalised patients, in order to prevent the needless patient suffering and other complications associated with malnutrition (Eide et al, 2016). In addition, nurses should improve their skills and ability to monitor the nutritional intake of their patients using the appropriate nutrition screening tools and also competently implement the appropriate nutritional interventions.

Education

It is important to integrate comprehensive nutritional units within the curriculum of nursing academic studies to prepare graduate nurses for the realities of practice. In addition, healthcare organisations should provide opportunities for continuous education for nurses and also organise educational activities touching nutrition aspects, for the nursing staff (Backlund et al, 2018). This will equip nurses with the appropriate skills and knowledge to handle patients with malnutrition or those at risk of malnutrition.

Management

The management has the responsibility to implement policies to guide organisational practices. Therefore, from the abundant research evidence, the management should implement policies requiring mandatory nutritional screening of all patients during admission. Patients with malnutrition or those at risk of malnutrition should then be administered with the appropriate nutritional interventions (Snider et al, 2015). Findings from this systematic review indicate that there is a need for the healthcare organisations to mandate nutritional screening of patients during admission because nutritional screening and other nutritional support for the older patients within hospital settings significantly improves many health aspects of this population (Roberts et al, 2019 & Alzahrani & Sultan, 2017).

Future research

Most of the studies have evaluated the impact of oral nutritional supplements in malnourished older patients. Generally, there is lack of scientific evidence regarding the impacts of nutritional interventions on the clinical outcomes and functionality in older adults who are malnourished. A future study, using a higher number of studies, along with a prospective study design is required for the generalisation of findings. In addition, few studies focusing on the impact of nutritional interventions on the outcomes of malnourished older patients within hospital settings, were located and retrieved. Majority of the studies focus on the general population. Therefore, future research should focus on the impact of nutritional interventions on outcomes of hospitalised geriatric population. In addition, research of malnutrition within hospital setting should look beyond identifying patients who are malnourished or patients at risk of malnutrition, and explore approaches that can improve nutritional intake of the hospitalised patients. Finally, research regarding nutrition should adopt a multidisciplinary approach.

Gaps in research

Demographics of the study participants, such as the level of education years of work experience, the design of the selected studies, and the settings might have affected the evidence and quality of this systematic review. Additionally, some of the challenges experienced when performing this systematic review may have had an impact on the quality of this study's findings. Moreover, the selected studies used different nutritional interventions to address malnutrition which may have affected the combination and generalization of the findings of this study.

Problematic nature of evidence and its collection, collation and interpretation

The findings from the selected research studies has various challenges in regard to the collection, collation, as well as the findings' interpretation. One, the inclusion criteria only allowed inclusion of articles published in English language and this eliminated any other relevant high-quality study published using other languages. Secondly, the study topic focused on the impact of nutritional interventions within hospital settings and this may have narrowed down the studies and thus this limited the amount of research studies and evidence to be used in this systematic review. In addition, some of the included studies used questionnaires as the data collection instruments and this may have limited the ability of the study participants to provide their perspectives on other relevant aspects that were indicated within the questionnaire. Therefore, this may have limited information and data in these studies.

Chapter summary

This chapter comprehensively discussed the findings from all the selected studies on the impact of nutritional interventions on the outcomes of malnourished older patients in hospital settings which was tackled in themes in order to answer the research question for this systematic review lastly, the chapter discussed the data collection process, knowledge gaps, study limitations, and interpretation of the selected studies as well as the implication to nursing practice, education, and management.

CHAPTER SIX

Summary/Conclusion:

Chapter overview

This chapter will summarise the findings of the systematic review and summarise other relevant points from previous chapters. In addition, the chapter will provide a summary of the study's limitations and strengths, implications for practice, and recommendation for future research.

Strengths and limitations of the study

There were some noteworthy strengths to this systematic review and they included the search strategy and critical appraisal of the selected research articles. A wide scoping search strategy was used across various databases, and this ensured that all research studies across the study topic were included. Hand searching of the reference lists of the retrieved relevant research articles and screening of abstracts and titles, as well as quality assessment and critical appraisal of the selected studies further increased confidence that the identification and interpretation of the relevant research studies was accurate. This helped in improving the reliability and validity of the findings of this systematic review and hence supporting the generalization of this study's findings. In addition, majority of the study participants in the included research studies had similar demographics and similar settings since only studies addressing older patients in hospital settings were included. This simplified the process of collation and findings interpretation.

Nonetheless, there were various limitations that were encountered when conducting this systematic review. First, there were no independent researchers involved in this review since it was only performed by the student which may have led to bias. This could have affected the quality of this study. In there were restrictions by language and date which could have limited other quality studies that may have been conducted in different years and published using a different language. Therefore, the interpretation and generalization of this study's findings should be done cautiously because of the above-mentioned limitations.

Summary of the Points

Findings of this systematic review indicate that nutritional interventions positively impact on health aspects such as the body weight, nutritional and functional status, muscle strength, better health outcomes, reduced health complications, and reduced mortality rate among malnourished older patients in hospital settings. Nutritional support such as dietary modifications, enteral feeding and oral nutritional supplements also reduces the length of hospital stay and improves clinical outcomes. Therefore, the themes in the discussion section can be summarized in the following main points:

- Nutritional interventions positively impact the outcomes of malnourished older patients in hospital settings
- Nutritional interventions reduce the length of hospital stay and also improves clinical outcomes
- Nutritional interventions positively impact anthropometric measures such as body weight for the hospitalized older patients
- Nutritional interventions improve nutritional status and functionality of inpatients with malnutrition
- Nutritional screening can identify malnutrition in patients as well as patients at risk of malnutrition
- Nutritional interventions prevent health complications and morbidity in hospitalized patients
- Oral nutritional support and nutrition counselling in hospitalized patients is associated with fewer complications
- When treating malnutrition in patients within hospital settings, oral feeding using oral nutritional supplements or diet enrichment is used as the first line of treatment
- It is important to develop, implement, and examine comprehensive nutritional interventions to improve the outcomes of malnourished patients in hospital setting or those at risk of malnutrition across continuum of care

Problematic Nature of Evidence; its Collection, Collation, and Interpretation

This systematic review had a number of challenges during the collection, collation and the interpretation of the data. For example, exclusion of studies published using other languages than English and studies published earlier than 2014, may have omitted other high-quality and relevant research studies. Additionally, the search was restricted to only nursing and health databases, and this might have further limited the number of retrieved studies. It was also noted that most of the research articles that were selected used questionnaires as the main data collection methods and this might have restricted collection of comprehensive data because it was not possible to explore views of the study

participants, which is essential when generalizing the findings of a study.

Gaps in research evidence

Some of the challenges present in this systematic review may have impacted the quality of this study's findings. In addition, only a relatively number of studies were included and therefore there is a need for a higher number of high-quality research studies including multidisciplinary nutritional support to authenticate findings of this systematic review. In addition, the included studies utilized varying nutritional interventions in the treatment of malnutrition in patients within varying hospital settings, and this might have had an impact on the combination and generalization of the findings of this systematic review.

Implication for Practice

Nursing Practice

It is important to ensure effective monitoring of the nutritional status of the patients through nutritional screening and application of the relevant nutritional interventions such as dietary modifications, oral nutritional supplements and enteral feeding for patients found to be malnourished or at risk of malnutrition. Malnutrition of hospitalized patients should be prioritized, just like other aspects of patient care and ensure that nutritional care is integrated into the nursing care. nurses also need to improve their skills and ability to provide nutritional care and collaborate with other health practitioners such as dieticians and nutritionists during care provision.

Education

Comprehensive nutritional courses should be integrated into the curriculum of nursing academic studies to prepare graduate nurses for the realities of practice. Healthcare organisations need to provide opportunities for continuous education for nurses and also organise educational activities touching nutrition aspects, for the nursing staff. This will equip nurses with the appropriate skills and knowledge to handle patients with malnutrition or those at risk of malnutrition.

Management

The management in hospitals should implement policies requiring mandatory nutritional screening of all patients during admission. Patients with malnutrition or those at risk of malnutrition should then be administered with the appropriate nutritional interventions.

Recommendations for Future Research

A similar future study needs to be conducted on a larger scale and use more research studies with different care settings using a prospective study design; this will facilitate generalization of the study findings. In addition, there is a need to have more studies that focus on the impact of nutritional interventions on outcomes of hospitalized geriatric population. Lastly, research of malnutrition within hospital setting should look beyond identifying patients who are malnourished or patients at risk of malnutrition, and explore approaches that can improve nutritional intake of the hospitalized patients. Research regarding nutrition should adopt a multidisciplinary approach because treatment and management of malnutrition involves different inter-professionals. Finally, future research should consider using more using more rigorous study designs that include examination of the clinical and cost-efficacy outcomes, allowing full-text papers to be published in the future.

Conclusion

Findings from this systematic review indicate that nutritional interventions positively impact on aspects such as the body weight, nutritional and functional status, muscle strength, better health outcomes, reduced health complications, and reduced mortality rate among malnourished older patients in hospital settings. This review found out that there is limited research on malnutrition in hospitalized older adults and the appropriate nutrition interventions. Significant findings were found in favor of various nutritional interventions in treatment and management of malnutrition. There was clear evidence for the beneficial impact of oral nutritional supplement, where supplementing usual nutritional intake significantly improves nutritional intake. Nutritional screening was also shown to help in detecting malnutrition and patients at risk of malnutrition in order to implement the appropriate nutritional interventions. However, this systematic review does not recommend generalization of the findings due the small number of research studies used and the presence of various limitations that may have affected the quality of evidence. This systematic review encourages researchers implementing nutritional interventions for older adults in hospital settings to consider using more rigorous study designs.

Chapter summary

This chapter summarised the key findings of this systematic review briefly discussed the relevant points in the previous chapters. Additionally, this chapter provided limitations in this systematic review, implication for practice, recommendations for future research, as well as the general conclusion of the study.

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APPENDIX

1. JBI Critical Appraisal Checklist for Qualitative Research

Reviewer _____ Date _____

Author _____	Year _____	Record Number _____			
		Yes	No	Unclear	Not applicable
1. Is there congruity between the stated philosophical perspective and the research methodology?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there congruity between the research methodology and the research question or objectives?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there congruity between the research methodology and the methods used to collect data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there congruity between the research methodology and the representation and analysis of data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there congruity between the research methodology and the interpretation of results?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a statement locating the researcher culturally or theoretically?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the influence of the researcher on the research, and vice-versa, addressed?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are participants, and their voices, adequately represented?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

 Overall appraisal: Include Exclude Seek further info
 Comments (Including reason for exclusion)

2. SUBJECTIVE GLOBAL ASSESSMENT (SGA): Nutritional Support Products

Member Name: _____

 Does member have feeding tube? Yes No

Member ID #: _____

Member Diagnoses: _____

1. Weight change:

*Please document weight loss:

Current weight: _____ kg/lb

Base weight: _____ kg/lb

Ideal Body Weight (IBW): _____ kg/lb

Weight loss in the past 6 months:

 0-5%

 5-10%

 >10%

If the member is a child, has he/she crossed 2

or

Weight change in past two weeks:
 Yes No
 Increase _____ kg/lb
 Decrease _____ kg/lb
 Stable _____ kg/lb

more growth curves in the last 6 months?

2. Diet intake:

- No change or suboptimal intake
 Liquid diet
 Hypocaloric fluids or starvation

3. Gastrointestinal symptoms for >2 weeks:

- None
 Anorexia and nausea
 Vomiting
 Diarrhea

4. Functional capacity:

- Normal
 Work capacity diminished by 50%
 Ambulatory (i.e. capable of only activities of daily living)
 Bedridden

5. Physiologic stress:

- None
 Minimal
 High

6. Physical signs:

Loss of subcutaneous fat over:

- Triceps
 Chest

Fluid retention:

- Edema
 Ascites

Muscle wasting:

- Deltoids
 Temporal
 Quadriceps

Mucosal lesions:

- Glossitis
 Skin rash suggestive deficiency

*Note: If there is recent weight gain, previous loss is not considered in the assessment.

Provider's Signature: _____

Date of Assessment: _____

Failure to complete this assessment will result in denial of prior authorization for specified nutritional support products.

The 'Malnutrition Universal Screening Tool' ('MUST')

Surname: <Patient Name> First Name: <Patient Name> Hospital Number: <Patient hospital number> NHS Number: <NHS number>	Malnutrition Universal Screening Tool ('MUST') and Action Plan
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Complete the nutrition screening tool at first appointment or within 24 hours of admission/transfer.

Date	Height - Ulna length (cm):	Height (m)	Weight 3-6 months ago (kg)	If unable to obtain weight and height use clinical judgement for each step based on subjective measurement e.g. MUAC, visual impression, loose fitting clothing/jewellery/dentures to estimate risk category (LOW, MEDIUM or HIGH)					
<Today's date>		<Numerics>	<Numerics>						
Abbreviations: < less than > more than ≥ more than or equal to Scales: S=standing, C=chair, H=hoist ONS: oral nutritional supplements		Date:							
		Scales used:	S C H	S C H	S C H	S C H	S C H	S C H	
		Weight (kg) or MUAC (cm):							
Step 1	BMI >20 (acceptable – overweight) Score = 0 BMI 18.5 – 20 (Thin) Score = 1 BMI < 18.5 (Very Thin) Score = 2 Refer to BMI reckoner								
Step 2	Unplanned weight loss in the past 3-6 months < 5 % loss Score = 0 5 – 10% loss Score = 1 >10% loss Score = 2 Refer to weight loss reckoner								
Step 3	If patient is acutely ill and there has been or is likely to be no nutritional intake for > 5 days Score = 2 (NB This unlikely to apply in the community)								
Step 4 'MUST'	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: Ensure appropriate actions are ticked and signed once completed									
Score 0 LOW RISK	Care Home Residents: re-screen monthly Community Patients: re-screen as part of routine clinical care or upon concern								
	Document nutritional aims and action taken								

Score 1 MEDIUM RISK	Provide and discuss 'Eat Better, Feel Better' leaflet with patient/carer							
	Weigh and re-screen monthly							
	Document nutritional aims and action taken							
Score 2 HIGH RISK	Consider underlying cause of malnutrition and treat/refer as appropriate							
	Provide and discuss 'Eat Better, Feel Better' leaflet with patient/carer							
	Consider over-the-counter supplement drink							
	Document nutritional aims and action taken							
	Weigh and re-screen monthly If no improvement consider treating as per score ≥ 3							
Score ≥ 3 HIGH RISK	Care plan as per score 2 AND							
	Consider one month trial of ONS in line with ONS formulary – discuss with GP							
	Weigh and re-screen at least monthly							
	If no improvement after one month, consider referral to Dietitian via GP							
Electronic MUST score: <Numerics>	Completed by:	<Sender Name>						
	Designation:							
This is a malnutrition screening tool. Some patients will need referring to the dietitian due to clinical and nutritional problems even if they have a MUST score of less than 2.								
This screening tool should be used in conjunction with clinical judgement. Patients may require dietitian referral even if they are not at high risk of malnutrition e.g. disease-specific diet, dysphagia, tube feeding.								
For further information and supporting resources, please contact Western Sussex Hospitals Dietitians:								
St Richard's Hospital:			Tel: 01243 831498			Email: wshnt.chichesterdietitians@nhs.net		
Worthing & Southlands Hospital:			Tel: 01903 286779			Email: worthing.dietitians@wsht.nhs.uk		
http://www.westernsussexhospitals.nhs.uk/services/dietitians/								

The 'Malnutrition Universal Screening Tool' ('MUST') is adapted and reproduced here with the kind permission of BAPEN (British Association for Parenteral and Enteral Nutrition). For further information on 'MUST' see www.bapen.org.uk