

**NURSING INTERVENTIONS TO PREVENT AND TREAT
MALNUTRITION IN OLDER ADULTS**

A literature review

**OMVÅRDNADSÅTGÄRDER FÖR ATT FÖREBYGGA OCH
BEHANDLA UNDERNÄRING HOS ÄLDRE PERSONER**

En litteraturöversikt

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ABSTRACT

Background

World Health Organization reports that there are no exact statistics of how many older adults worldwide suffer from malnutrition, but available data suggest that about 15–60 percent of older adults cared for in hospitals, nursing homes and home-care programmes are suffering from malnutrition. It is important that the registered nurse is aware of different interventions and how they can be implemented in order to improve the nutritional status of the older adult.

Aim

The aim of this study was to examine nursing interventions used to treat and prevent malnutrition in older adults at hospitals and nursing homes.

Method

The study design was a literature review with 15 scientific articles included. The data collection was done in the databases PubMed and CINAHL. The result articles were a mix of both qualitative- and quantitative studies. Intergraded data analysis was used to compile the 15 articles.

Results

The interventions had an overall positive effect on the nutritional status of the older adults. Oral nutritional supplements were the most common intervention. Both environmental and social factors had effect on the mealtime experience. The older adult was not often involved in the nutritional care and the evaluation of the outcome of the interventions was scarce. The teamwork between health professionals, relatives and the older adult was inadequate.

Conclusions

Malnutrition in older adults is a prevalent problem and is often de-prioritized in nursing care. The most common intervention used was oral nutritional supplements but there are other interventions that also provide positive results and provide more individual care and are often disregarded by the RN's. The older adults' involvement in the nutritional care can be increased and improved as well as involvement of relatives. The importance of treating and preventing malnutrition is a topic that could be emphasized more within the geriatric care.

Keywords: Malnutrition, Aged, Nursing care, Prevention & control [subheading]

SAMMANFATTNING

Bakgrund

Världshälsoorganisationen rapporterar att det inte finns någon exakt statistik över hur många äldre personer över hela världen som lider av undernäring, men tillgängliga data tyder på att cirka 15–60 procent av de äldre personer som vårdas på sjukhus, särskilt boende och inom hemsjukvården lider av undernäring. Det är viktigt att den legitimerade sjuksköterskan är medveten om olika omvårdnadsåtgärder och hur de kan genomföras för att förbättra den äldre personens näringsstatus.

Syfte

Syftet med denna studie var att undersöka tillämpade omvårdnadsåtgärder för att förebygga och behandla undernäring hos äldre personer på sjukhus och särskilt boende.

Metod

Studiedesignen var en litteraturöversikt med 15 vetenskapliga artiklar inkluderade. Databasinsamlingen gjordes i databaserna PubMed och CINAHL. Resultatartiklarna var en blandning av både kvalitativa och kvantitativa artiklar. En integrerad analys utfördes för att sammanställa de 15 artiklarna.

Resultat

Omvårdnadsåtgärderna hade en övergripande positiv effekt på de äldre personernas näringsstatus. Näringsdrycker var den vanligaste åtgärden. Både miljömässiga och sociala faktorer påverkade matupplevelsen. Den äldre personen var sällan involverad i sin nutritionsvård och utvärdering av omvårdnadsåtgärderna var sällsynt. Samarbetet mellan vårdpersonal, anhöriga och den äldre personen var otillräckligt.

Slutsats

Undernäring hos äldre personer är ett vanligt förekommande problem som ofta bortprioriteras inom vården. Den vanligaste åtgärden var insättande av näringsdryck men det finns andra åtgärder som ger goda resultat och är mer individanpassade som ofta förbises av sjuksköterskan. Den äldre personens medverkan i sin vård gällande nutrition kan ökas och förbättras, såväl som medverkan av anhöriga. Vikten av att behandla och förebygga undernäring är ett ämne som skulle kunna betonas mer inom geriatrisk vård.

Nyckelord: Undernäring, Äldre, Omvårdnad, Förebyggande åtgärder [aspektord]

TABEL OF CONTENTS

INTRODUCTION	1
BACKGROUND	1
Nutrition	1
Malnutrition.....	1
Older Adults	2
Malnutrition in older adults.....	2
Risk factors for malnutrition in older adults	3
Nursing care of older adults	4
Theoretical framework – Person-centred care	5
Rationale.....	6
AIM	6
RESEARCH QUESTIONS	6
METHOD	6
Design.....	6
Sample	7
Data collection.....	8
Quality review	11
Data analysis	11
Ethical considerations	11
RESULTS	12
Teamwork.....	12
Scales and assessments.....	13
Supplements	14
Personalized care and customized diets	14
Environment	15
Social factors	15
DISCUSSION	15
Results discussion	15
Method discussion.....	18
Conclusion.....	20
REFERENCES	23

APPENDIX A-B

INTRODUCTION

The world population is growing and due to higher living standards and modern medicine, the average life expectancy is increasing. Aging and diseases in general are well known risk factors for malnutrition. World Health Organization [WHO] reports that there are no exact statistics of how many older adults worldwide suffer from malnutrition, but available data suggest that 15-60 percent of older adults cared for in hospitals, nursing homes and home-care programmes are suffering from malnutrition (WHO, 2015).

Treating and preventing malnutrition among older adults is based on a collaboration between several professions such as nurses, doctors, dieticians, care assistants and needless to say the older adult himself, in correlation with the person's ability to self-care. This study will examine the effects of different interventions used to prevent and treat malnutrition in older adults within the health care system, with focus on interventions which can be implemented, delegated and evaluated by a registered nurse. The interest for the subject was aroused by the authors experiences of caring for older adults in nursing homes as care assistants and after nurse internships in various hospital wards, which created a desire to explore how registered nurses implements interventions and how well they can practice and evaluate them.

BACKGROUND

Nutrition

According to Dunne (2012) is good nutrition a fundamental element of good health. Nutrition can be divided into macro- and micronutrients. Macronutrients are those made up of carbohydrates, fats, and proteins. Carbohydrates in its simplest form, glucose, is the primarily energy source used by the brain and other tissues of the body. With the help of insulin, glucose can also be stored in fat cells in order to function as an energy storage. The brain is mostly made of fat and the connections between braincells need access to fat in order to function properly. Fat is also necessary for the uptake and use of fat- soluble vitamins A, D, E and K. Proteins are built by amino acids. When taken in as food, the digestive system will break down the proteins into free amino acids which the body then transforms into new structures used as building stones to its own structures, such as muscles or neurotransmitters (Dunne, 2012). Micronutrients are the essential vitamins and minerals the body needs to properly develop and function in its various systems. Some examples of needed minerals are calcium, potassium, selenium, iodine, sodium and iron (Nordic Council of Ministers, 2012).

Malnutrition

The Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition claims that a worldwide accepted diagnosis criteria for malnutrition does not exist and have therefore suggested some criteria which could be used as standard to diagnose malnutrition in adults. These criteria are insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localized or generalized fluid accumulation and diminished functional status as measured by handgrip strength. The presence of at least two of these criteria would confirm the diagnosis of malnutrition (White et al., 2012).

Several different screening tools are used in various healthcare systems to detect risk of malnutrition. Some of these are Nutritional Risk Screening 2002 [NRS-2002], Mini Nutritional Assessment [MNA] and Malnutrition Universal Screening Tool [MUST] (Cederholm et al., 2015). Some of the questions in these screening tools are about weight loss in previous months, mobility, chewing abilities, number of main meal-intake each day and the daily intake of dairy, legumes and meats (Nestlé nutrition institute, 2009). Other measures taken when screening for risk of malnutrition is anthropometry, where circumference of various body parts is measured, such as overarm or calf along with a calculation of BMI (Body mass index). An established risk factor indicating malnutrition is a BMI less than 18.5 kg/m². European society for clinical nutrition and metabolism highlights in their study that the use of BMI as an indicator should be evaluated. Since the world population in general becomes more overweight and obese, it is possible for a person to unintentionally lose 10 percent of their body weight in a couple of months and still be in the BMI-range of normal- or overweight and therefore “lose scores” in a screening test. A lack of macronutrients will lead to weight loss and can contribute to diseases like cachexia, sarcopenia and frailty (Cederholm et al., 2015).

A lack of micronutrients can cause a wide range of deficiency diseases, depending on which one of the nutrients that are missing, some well-known examples are scurvy, osteoporosis, pellagra, anaemia and rickets. Not only is a lack of appetite a common risk factor for malnutrition in older adults, as the human ages physiological obstacles can occur which can contribute to risk of not obtaining the right amount of energy and nutrients, such as impaired chewing abilities, decreased salivation and digestion problems (Christenson & Sundling, 2010).

Older Adults

Older adults are in general defined as people over the age of 65. They are a very diverse group, some 70 year-olds are extremely fragile and need a lot of help while others at the same age live in very good health and need little to non-help at all (WHO, 2018). The biology behind the aging process is a result of a build-up of different molecular and cellular damage that happens over time. This damage increases the risk of diseases and has a negative effect on the physical and mental capacity but interestingly it is not possible to link these changes only to the age in years, because there are several other factors that have a great impact on how we age. There are many health conditions that are associated with ageing like dementia, chronic obstructive pulmonary disease, osteoarthritis etcetera, but older adults are also more likely to deal with several conditions simultaneously. As a result, older adults are encountered in all areas of the health care system whether it is at the hospital, health care centers or in nursing homes (WHO, 2018).

Malnutrition in older adults

The human nutritional requirements are consistent throughout the adult life, what primarily changes as people age is the number of calories the body needs for its daily metabolism (Christenson & Sundling, 2010). Older adults are especially vulnerable to micronutrient deficiencies since the daily food intake among older adults generally is reduced. A decreased food intake in combination with an unbalanced diet causes obstacles for obtaining a sufficient ingestion of all the essential micronutrients (WHO, 2020). The natural process of aging causes the condition sarcopenia, where the total muscle mass in the body decreases, the strength of the muscles is lowered and the endurance of physical activity is reduced. Common chronic diseases in older adults, like cancer or heart failure,

increases the protein metabolism and will lead to further muscle mass loss and weakness. Older adults have a greater need for a protein-rich diet to compensate for the losses due to sarcopenia and metabolic diseases. Recommendations for older adults suggest a daily intake of at least 1 gram protein per kg body weight (Deutz et al., 2014).

Risk factors for malnutrition in older adults

Cognitive impairment

Studies have shown that risk for malnutrition can be associated to older adults with moderate or severe cognitive impairment (Fagerström et al., 2011; Lee et al., 2009). With cognitive impairment, varieties of feeding difficulties often follows such as physiological and functional impairments. Apraxia and agnosia are common in severe cognitive cases which means that the person might lack coordinations, making it difficult to use eating utensils as well as the person might lack the sensory of knowing what to do with the food. There are other factors that contribute to the eating difficulties with persons suffering from cognitive impairment that are just as important to address, like psychological and social issues as well as environmental factors (Chia-Chi et al., 2011)

Dysphagia

The digestive system is a long and complex part of the human body. The first process in this system is chewing and swallowing the food to pass it down to the stomach. Dysphagia is a condition where one or several steps in the chew and swallow-process is dysfunctional. This can occur in form of trouble with chewing, transportation of the chewed food back to the pharynx or as an impaired or prolonged swallowing response with risk of aspiration and aspiration pneumonia. Difficulty in swallowing can be caused by solid food, liquids and saliva (National Institute on Deafness and Other Communication Disorders, 2017). Dysphagia is often caused by common neurological diseases in older adults, for example Parkinson's disease, ALS and MS, and is also a common complication after a stroke. Occurrence of dysphagia is an indicator that the older adult might be in need of a texture modified diet (Akademiska Sjukhuset, n.d). Studies show a correlation between dysphagia and malnutrition. Dysphagia increases the risk for malnutrition and inversely, malnutrition increases the risk for dysphagia, which can become a vicious circle (Popman et al., 2018; Tagliaferri et al., 2019).

Oral health

Good oral health plays an important role in promoting and maintaining a sufficient nutritional status. Chewing abilities due to the condition of the mucous membrane, the number of teeth or a use of dentures and possible toothache will influence the ability to taste and grind different kinds of textured food. Not only will mechanical obstacles such as lack of teeth affect the ability to chew and swallow food, as we age, various chemical processes in the oral cavity changes as well. Mojet et al. (2001) describes that as we age our sense of taste decreases and we have less ability to sense the five basic tastes which are sweet, sour, salty, bitter and umami. That can lead to that food often feels more tasteless and less appetizing for an older adult compared to a younger one and can reduce motivation to eat and obtain a sufficient nutrient content (Mojet et al., 2001).

Persons with moderate or severe oral health issues are more often represented as being malnourished or being at risk to become so compared to those who doesn't have poor oral health. Further more, the importance of the nurse to in an early stage, to identify and

introduce nursing interventions for good oral health as a preventative work for malnutrition, is highlighted (Lindmark et al., 2018).

Medication

Medication can also affect the sensitivity of the taste buds. Some commonly used drugs in the older population such as drugs to lower cholesterol, antibiotics, drugs for hypertension, antidepressants and vasodilators can have side effects in form of altering taste and smell of foods and drinks, which can lead to a lack of appetite (Schiffman & Graham, 2000).

Other drug side effects that can conduce to malnutrition are nausea, xerostomia, diarrhea and an altered intestinal function and nutrient uptake (Region Gävleborg, 2013).

Nursing care of older adults

The International Council of Nurses (ICN, 2002) has defined Nursing as a care for all individuals, groups, families and communities both healthy and sick of all ages, in all contexts. It has its focus on prevention of illness and promotion of health as well as caring for the ill, disabled and dying.

Good nursing care means that the patient should always be in the centre and the focus should not be on the illness but on the person as a whole. It is important that the older adult can be as independent for as long as possible. The older adult should always feel like they are involved in their care and have a say (Svensk sjuksköterskeförening, 2014a). To increase the quality of a person-centred care it needs to be approached in a systematic and multi-level organisational way in order for the health professional to work person-centred in the whole care process and not only in specific moments (Nilsson et al., 2020).

The health care services can be seen as very complex, especially when a person is dealing with a variety of health problems. It is often difficult to assess the specific needs of an individual in healthcare system but if there is a consistency in the care process, the level of health care becomes more accurate to the patient's needs. This requires that the health care professional encourages the older adults to participate in decisions made regarding their own care (Kumlin et al., 2020). Studies have shown that health care systems also need to do a better work in improving the transitional care when discharging older adults from hospital to their home (Mesteig et al., 2010).

Registered nurses

The registered nurses' fundamental obligations are to prevent diseases, restore health and relieve suffering. The care shall always be given in respect for the individual's human rights and with consent from the patient. The consent should solely be given after sufficient and appropriate information from the nurse to the patient, about the risks and benefits of the nursing care (Svensk sjuksköterskeförening, 2014b). If a person for various reasons is unable to express one's own will it is the health care staff's duty to investigate if the person in the past have expressed wishes about health care decisions, by for example asking relatives or previous caregivers. If a person is unable to give consent due to communication difficulties can an usage of body language or showing pictures be helpful (Socialstyrelsen, 2015).

The registered nurses core competences includes person-centred care, collaboration in teams, evidence-based care, improving knowledge and quality, safe care and information as well as leadership and educational activities (Svensk sjuksköterskeförening, 2017).

Registered nurses working with older adults are responsible to further develop more specific competences within the area. Registered nurses are responsible for their own professional practice and therefore need to continuously analyse own strengths and weaknesses to be able to care for patients with complex needs and problems (Svensk sjuksköterskeförening, 2017). However, studies have shown that there is lack of competence in the ability to provide care that supports well-being of older adults in a holistic way (Bing-Jonsson et al., 2016; Kiljunen et al., 2019).

Nursing interventions

Before planning the nursing interventions to prevent or treat malnutrition in older adults, they need to be based on a nutritional nursing diagnosis (Socialstyrelsen, 2020). The assessment, diagnosis, planning, implementation and evaluation for the nursing care is done by the registered nurse and in collaboration with the health team and in partnership with the patient, and their relatives, if applicable. It is therefore important that the nurse can see a holistic perspective on the patient's situation (Svensk sjuksköterskeförening, 2017). The nursing interventions need to always have a person-centred approach. That means that adjustments need to be made on the personal preferences of the older adult and combined with the individual's needs (Socialstyrelsen, 2020). It is important that the risk assessments for malnutrition as well as the implementation of the nursing intervention is documented to ensure good and safe care for the patient (Socialstyrelsen, 2020).

Theoretical framework – Person-centred care

Person-centred care is based on a holistic view on the human being. The theory is said to have originated and developed over the past two decades, which has led to a consensus of some key concepts. These are to see the person as a subject rather than an object with symptoms, disabilities or sickness, striving to confirm the person's own experience of illness and to perform care based on the person's priorities, needs and wishes, as well as always including the person in decision makings of their own care (Edvardsson, 2020).

The nurse builds a partnership with the older adult through conversation, where the nurse listens genuinely and the older adult is encouraged to tell the narrative of their life. The life history and experiences, thoughts and values, the view on the current life situation and what is needed to be able to live the desired life, all this enables a deeper understanding of the older adult as an individual. The nurse strengthens the partnership by sharing knowledge and skills with a person-to-person approach, rather than as a superior professional to a patient. Shared information enables a joint deliberation which is the basis for decision making about the older adult's care (Ekman et al., 2011; Lood, 2020).

According to McCormack (2003) it is important to respect the person's daily routines and to design the daily care to suit with them, as the older adult depends on the nurse to prevent limitations in the autonomy. The nurse should take the time to provide good quality information about available nursing interventions and encourage the person himself to propose solutions and interventions and discuss the risks and benefits of these. The nurse should always have in mind that even though the person wants to be a part of designing their own care, it is not certain that the older adult wants to be the one to make the last decision and would rather leave that to the professional (McCormack, 2003).

A person-centred approach strives to minimize the use of terms such as "elderly" or "aged", as this categorizes a large group of individuals with diverse abilities and

restrictions. Such terms are often associated with illness, frailty and negative stereotypes and can even be considered as a form of ageism. A more suitable approach is the use of the terms “older person” or “older adult”, as this centers attention to the person rather than the age (Avers, 2011; Lundebjerg, 2017). This theoretical framework was chosen as it highlights the importance of involving the person in his or her own care and because it is based on a holistic view of the person it increases the chances of a more individualized care being provided. The person-centred care theory will be used as support in the discussion of the results in this literature review.

Rationale

The risk for malnutrition in older adults is a prevalent problem in modern society. WHO, among others, addresses that malnutrition among older adults is a noted fact and that qualified statistics about the subject is underrepresented in nursing care studies. In relation to an aging population, the number of individuals suffering from secondary diseases caused by malnutrition will increase. It is important that the care is person-centred based so that the older adult can be as involved in his or her own care as possible. In order for an appropriate preventative and treating work to be done, there is a need to examine how registered nurses use their competences when working with older adults, in order to detect signs of malnutrition and implement available nursing interventions to prevent or treat malnutrition among older adults.

AIM

The aim of this study was to examine nursing interventions used to treat and prevent malnutrition in older adults at hospitals and nursing homes.

RESEARCH QUESTIONS

What kinds of interventions have been used to treat and prevent malnutrition in older adults? And how effective have they been on outcomes related to malnutrition?

How is the older adult involved in the intervention?

How well does the registered nurse manage to monitor the nutritional status of the older adult before, during and after the implementation of the interventions?

How does the registered nurse work in a team with other professions with preventing and treating malnutrition?

METHOD

Design

The study design chosen was a literature review. A literature review is itself secondary source but is based on other primary source research reports on the subject. The review needs to have a clearly designed purpose or aim, which is then answered by a structured identification, evaluation and analyze of relevant studies. This literature review is a non-

systematic literature review where the data collection is done in a systematic way but do not include all published articles in the area. In order to get a more fruitful perspective it is important to examine and analyze a number of different research findings. This method circumvents the steps of recruiting new research participants and new interventions but gives a valuable overview of the research knowledge as well as the knowledge gaps within the field, and is therefore useful for researchers to know how to best make a contribution to existing evidence (Polit & Beck, 2021; Rosén, 2017).

Sample

Criteria specifications

It is important that the inclusion and exclusion criteria is pronouncedly defined to ensure higher quality of the systematic search as well as making the research easily reproducible. The purpose when setting the criteria is to avoid articles that are irrelevant in connection with the aim (Polit & Beck, 2021). Only Peer-reviewed articles were used which means that they have been reviewed by other researchers before publication, which can ensure quality (Karlsson, 2017). The articles languages had to be in either in English or Swedish to reduce the risk of misinterpretations and mistranslations, but there were no restrictions made on what country the articles came from since the goal was to examine the research state worldwide as well as in order to avoid cultural bias that could occur. In accordance with Polit & Beck (2021), to prevent that the chosen articles did not contain obsolete information, only articles published from January 2010 to September 2020 were included in the study. Review articles were excluded since it does not substitute the detailed information you get from primary sources (Polit & Beck, 2021).

Inclusion criteria

In relation to the aim of this study only studies that had focus on nursing interventions for treating and preventing malnutrition in older adults was included, where the registered nurse is responsible for the implementation and the follow-up of the interventions. With that said the articles could also include information from other health care workers since the actual intervention might only been implemented under a supervision from the registered nurse. Studies that examined interventions with a perspective of the patient's involvement in the care were also included since it is important to look at their experience of the nursing interventions. The age range in this literature review intended to be ≥ 65 years for the older adult participating patients but did also include articles with mean age range ≥ 65 years in order to not exclude studies with different age criteria, yet still relevant to the aim. The interventions needed to have taken place in nursing homes or in hospitals. The decision to only include interventions in nursing homes or in hospitals was made because these older adults have less influence of their nutrient intake, compare to when living at home with more abilities to choose when and what they can eat. In relation to the aim of this study it is appropriate to use both statistical results as well as results based on subjective experiences and phenomena and hence were both quantitative and qualitative studies included in this literature review (Polit & Beck, 2021). In accordance with Helgesson (2015) all articles needed to have ethical considerations to be included so that the participants confidentiality, privacy and anonymity was ensured.

Exclusion criteria

Articles that focused only on other professions like the dietician's work and mention nothing about the registered nurses work were excluded, since the focus of the study was intended to be on the registered nurses work in maintaining and improving nutrition status

among the older adults. Articles which were missing abstract were excluded as well as articles that required payment for access and which the library at Sophiahemmet Högskola did not have access to.

Data collection

The databases used in this non-systematic literature review were Public Medicine (PubMed) and Cumulative Index to Nursing and Allied Health Literature (CINAHL). PubMed have studies focusing on medicine and nursing care, while CINAHL primarily focus on nursing care studies. The data collection in this literature review was done with a help and guidance from the librarian to increase the quality of the search strategy. According to Rosén (2017), the optimal search strategy goal is to capture as many relevant studies as possible without including too many irrelevant studies. With the help of search terms, it was easier to find articles that were within the subject area.

A list of search terms was made based on the aim of the study that could be used to search in the databases. The terms included a lot of synonyms to capture more articles within the subject area (Polit & Beck, 2021). In PubMed the searches were done with help from Medical Subject Heading (MeSH) terms as well as terms that were searched in title/abstract. In CINAHL the search was done with help from Subject Heading List (CINAHL headings) as well as terms searched in titles and in abstracts. The reason why the search for terms in titles and abstracts was also sought was because some words such as “interventions“ do not exist as MeSH terms or as Subject Headings but were considered important because they are descriptive of the research topic. In both databases a Boolean operator was used to expand or delimit the search, those operators are AND and OR. The operator OR was used between the synonym terms like “Malnutrition“ OR “Undernutrition” to expand the search. The operator AND was then used to delimit the search like “Malnutrition” AND ”Interventions” and to combine block searches (Polit & Beck, 2021). All search terms used as well as the results of the data collection can be found in table 1. The articles then needed to fulfill the inclusion and exclusion criteria. In accordance to Polit & Beck (2021) the first screen for relevance is the title of the articles. The title can indicate whether the article can answer the aim of the study. After the first initial screening the next step was to examine the abstracts of the remaining articles. The authors sorted out irrelevant articles together, based on the title and abstract. The last step was to retrieve full text from all the articles left, according to their abstract, that could possibly have value for this review. Even though it is useful to exclude irrelevant articles based on the abstract it is necessary to screen the full article before inclusion. All the articles were read by the authors separately and then discussed were a joint decision was made on which articles would be included. A total of 15 scientific articles were then selected to obtain an analyzable material (Polit & Beck, 2021).

Table 1. Presentation of data collection

Database Date	Keywords	Number of Search Results	Number of abstracts read	Number of articles read	Number of included articles

PubMed 7 September 2020	"nursing"[Title/Abstract] AND "interventions"[Title/Abstract] AND ("aged"[MeSH Terms] OR "aged"[Title/Abstract] OR "elderly"[Title/Abstract] OR "older"[Title/Abstract]) AND ("malnutrition"[MeSH Terms] OR "malnutrition"[Title/Abstract] OR "undernutrition"[Title/Abstract])	76	35	18	6
CINAHL Complete 7 September 2020	"MH malnutrition OR TI malnutrition OR AB malnutrition OR AB undernutrition" AND "MH aged OR TI elderly OR AB elderly OR AB older" AND "MH nursing OR AB nursing" AND "TI intervention OR AB intervention" Limiters - Published Date: 20100101-20200931; Peer Reviewed; Language: English	75	8	4	1
PubMed 8 September 2020	((((malnutrition[MeSH Terms]) OR (nutrition disorders[MeSH Terms])) OR (malnutrition[Title/Abstract])) OR (undernutrition[Title/Abstract])) AND (((geriatric nursing[Title/Abstract]) OR (geriatric nursing[MeSH Terms])) OR (geriatric nursings[MeSH Terms]))	36	6	3	1
PubMed 9 September 2020	(((((malnutrition[MeSH Terms]) OR (nutrition therapy[MeSH Terms])) OR (nutrition support[MeSH Terms])) AND	82	15	10	5

	(((intervention[Title/Abstract]) OR (interventions[Title/Abstract])) OR (implement[Title/Abstract])) OR (implementation[Title/Abstract])) AND (((aged[MeSH Terms]) OR (aged, 80 and over[MeSH Terms])) OR (aged[Title/Abstract])) OR (elderly[Title/Abstract])) OR (older[Title/Abstract])) AND ((nursing home[MeSH Terms]) OR (nursing homes[MeSH Terms]))				
PubMed 10 September 2020	(((nursing homes[MeSH Terms]) OR (nursing home[MeSH Terms])) OR (hospitalization[MeSH Terms])) OR (hospitals[MeSH Terms])) AND (((((Health Facility Environment[MeSH Terms]) OR (Environment Design[MeSH Terms])) OR (environment[Title/Abstract])) OR (meal environment)) AND (((nutrition) OR (malnutrition)) OR (food intake))) AND (((aged[MeSH Terms]) OR (aged, 80 and over[MeSH Terms])) OR (elderly[Title/Abstract]))	140	12	4	1
Manual search *			5	5	1
TOTALT		409	81	44	15

Manual search *

To identify more articles responding to the study aim a manual search was performed by looking at articles used in results of other literature reviews as well as by clicking on “similar articles” in PubMed. This method is less precise compared to searches done by self-constructed samplings but is a helpful complement in order to find relevant articles

that did not appear in the search results (Östlundh, 2017). The manual search led to that one study (Miles et al., 2020) was selected to be included in this literature review.

Quality review

In a literature review, the quality of the studies is crucial for including or excluding a specific study in the review. The quality of the study method can also be evaluated, regardless of beneficial or non-beneficial results, by thoroughly evaluating the method used and described in the study and if it's repeatable (Friberg, 2017). The quality of the all included articles were therefore evaluated through an assessment basis made by Sophiahemmet Högskola (Appendix A). The assessment basis is a modification of already existing assessment basis created by Berg et al. (1999) and Willman et al. (2016). The basis classifies the articles in a three-point scale where I = high quality, II = medium quality and III = low quality. See Appendix A for criteria and more information about the assessments basis. The authors separately evaluated the quality of the articles using the assessment basis. If an article was assessed differently by the authors, then the article was reread and discussed to set a joint decision on the quality of the article. All articles included shall be first and foremost of the highest quality. Some medium quality articles were included as they were considered important for the purpose of answering the aim of the study (Polit & Beck, 2021). The quality review of the included articles can be found in appendix B.

Data analysis

The goal of the data analysis stages is to get an unbiased interpretation of the primary sources. In accordance with Kristensson (2014) the integrated analysis process can be divided into 3 stages. In the first stage the authors read through all 15 articles separately to get a better overall view of the context in the studies corresponding to the present study aim and to see whether there were overall similarities or differences in the result. During the reading, the authors wrote down notes to use to compare and discuss thoughts after the reading (Kristensson, 2014).

In the second stage the text was coded where the study findings from the articles were divided into categories that had similar results and could answer the aim of the literature review. Codes were used as labels to describe the content of each category. In this stage the authors coded separately in order to avoid the influence from each other on how they interpreted the results (Kristensson, 2014). To facilitate this part and make it more organized each code had a representative color that was used to highlight the text (Polit & Beck, 2021).

In the last step the results were summarized and compiled into different categories. When the authors presented these categories to each other it emerged that the same categories had been brought to the attention by both authors. These categories were then used as basis in the writing of the results (Kristensson, 2014).

Ethical considerations

In order for a study to be called ethical some criteria must be fulfilled. There should be an essential framing of questions, a high scientific quality and the study should be executed in an ethical way. The purpose of the study should be to fill knowledge gaps and benefit

individuals, the profession or society in general. To avoid future ethical abuses, several ethical codes have emerged, of which the Declaration of Helsinki is the best known (Kjellström, 2017). The World Medical Associations' [WMA] declaration of Helsinki claims that all medical research involving human beings must be executed with an informed consent. The participants must be informed of the purpose of the study, how it will be executed, potential risks or benefits etcetera. The participants must give their consent and be informed that they at any point can withdraw the consent and participation (WMA, 2013). Therefore, the articles used have been reviewed by both authors in the greatest possible extent to ensure that the studies have been executed in an ethical approved manner.

Good research practice condemns research executed with deficient documentation, which poses a great risk for fabrication. Fabrication simply means that one or several researchers account falsified data in the result, which were not found in the research process and then presents the data as if they were real findings. Distortion or misrepresentation is another ethical error. Examples of misrepresent is when the researcher tampers with the collected data or chooses to exclude data in order to obtain a result more beneficial for the researchers established hypotheses, or when only studies that validates the hypothesis are published (Helgesson, 2015). Though this literature study has not involved any contact with research participants, it still has been executed with an ethical approach. No conscious plagiarism, fabrication or misrepresent has been made by the authors of the literature review.

The authors have different mother tongues but are both based in Sweden, so in order to reduce the risk of misinterpretations and mistranslations, articles solely written in English or Swedish have been read. Independent acquaintances have proofread the work to detect any eventual personal opinions or condescending language.

RESULTS

A total of 15 scientific articles were compiled to form the results in this literature Review. Of these, three were qualitative studies and 12 were quantitative studies. The data analysis led to the identification of six categories. These categories are Teamwork, Scales and assessments, Supplements, Personalized care and customized diets, Environment and Social factors, which are presented below.

Teamwork

Four studies highlighted that even though the registered nurse (RN) plans and implement the interventions, most of the practical work with the interventions is performed by the assistant nurses (Lannering et al., 2017; Sjögren Forss et al., 2018; Tsai et al., 2020; Young et al., 2013). The assistant nurses mutually experienced that they were given to many tasks and were too busy to provide individual nutritional care, for example feeding assistance and oral care after meals (Allen et al., 2013; Lannering et al., 2017; Tsai et al., 2020). One study found that employment of an additional assistant nurse dedicated to nutritional care such as feeding assistance, assistance with menu orders with encouragement of high energy- and protein choices and food intake documentation, had a positive effect on calorie take (Young et al., 2013).

One study found that RN's experience that physicians do not take medical actions to deal with malnutrition, and therefore the RN seldom contact the physician, but rather contact a dietician instead (Sjögren Forss et al., 2018). On the other hand, one study found that a pharmaceutical review is a common planned intervention to treat and prevent malnutrition, an intervention which requires collaboration with the physician (Backlund et al., 2020).

One study found that RN's sparsely collaborate with dieticians. Contact is mostly established when the RN feel like he or she has done all available nutritional interventions without a positive result. After consultation with the dietician it emerged that nutritional supplements which the RN's chose as a primary intervention however, the dietician considered it to be the last way out, after trying all other possible interventions regarding dietary changes (Sjögren Forss et al., 2018).

RN's can have great help of conversation with relatives when planning nutritional interventions, especially in the presence of cognitive impairment in the older adult. Information about the older adults' food preferences, eating habits, religious needs etcetera can be valuable when planning nutritional interventions (Tsai et al, 2020).

The RN's attitude and experience regarding nutritional care seems to determine how engaged the RN is in preventing and treating malnutrition and which interventions are planned and implemented. The RN's attitude and prioritization regarding nutritional care also affects to which degree the older adults are informed and involved in their own nutritional care (Sjögren Forss et al., 2018).

Scales and assessments

A registry study concluded that some older adults had more than one intervention planned but despite that, 17 percent that were evaluated to be at risk for malnutrition did not have any planned intervention (Backlund et al., 2020). The most common interventions used according to this study was nutritional treatment, for example snacks, supplements, texture adaption etcetera. This was followed by dietary support, for example environment adaption, encouragement, feeding assistance etcetera. Interventions aimed at information and education regarding nutrition were only used in 1.4 percent of the cases (Backlund et al., 2020). In one study the RN's and older adults expressed that the given information was lacking in quality (Sjögren Forss et al., 2018). Backlund et al. (2020) showed in their study that less than half of the interventions planned were evaluated. The interventions that were most likely to be evaluated were those involving continuous small improvements like dietary support or weight control, while interventions used in preventative care were infrequently documented (Backlund et al., 2020; Lannering et al., 2017).

The RN's experiences of assessment scales like Mini nutritional assessment (MNA) was that it did not always reflect the reality and that is why they do not make a nursing intervention for every single person that gets a result that borders on malnutrition. Some RN's noted the score outcome from the assessment basis but took also into consideration their own observation, the so-called clinical intuition, of the older adult's abilities and restraints when making the risk assessments. A difference between assessment made by different professions was also a factor that the RN's addressed, where the assistant nurse often assessed the older adult on more general notes, while the RN's took into consideration more aspects that could affect the outcome (Lannering et al., 2017).

Supplements

Several studies found that general oral nutritional supplements (ONS), provided as an energy dense drink or through enrichment of regular meals for example with double cream and butter, increased the daily calorie intake (Allen et al., 2013; Beck et al., 2010; Lee et al., 2013; Leslie et al., 2013; Simmons et al., 2015). Four of the studies found that ONS interventions resulted in weight gain (Allen et al., 2013; Lee et al., 2013; Leslie et al., 2013; Simmons et al., 2015) and in one study the participants lost weight (Beck et al., 2010).

When looking for interventions aiming to increase the daily intake of proteins, three studies found that protein enriched ONS drinks increased the daily intake of both proteins and calories in the older adults (Allen et al., 2013; Beck et al., 2010; Lee et al., 2013). One study found that protein enriched ONS drinks increased the mid-arm and calf circumference and raised levels of serum albumin and serum cholesterol in persons that were assessed as being at risk of malnutrition (Lee et al., 2013)

One study found that prescription of ONS is the first intervention implemented by RN's, even before attempting dietary changes and without consultation with the older adult. This happened despite that the older adults preferred normal food over ONS, and that the prescribed daily amount felt overwhelming and too filling (Sjögren Forss et al., 2018).

Personalized care and customized diets

Several studies highlighted that many older adults needed mealtime assistance (Chen et al., 2016; Miles et al., 2020; Simmons et al., 2015; Tsai et al., 2020; Young et al., 2013). Part of one intervention was to provide an appropriate assistance, by this was meant that the older adult was not rushed to eat and that actions were performed gently and in accordance with the person's needs. That resulted in increased food intake (Chen et al., 2016). An intervention that focused on increasing health care staff awareness of mealtime assistance resulted in an increased mealtime assistance from 30 percent from the pre intervention group up to 79 percent in the intervention group (Young et al., 2013). In another study, relatives mentioned that staff members had to feed too many residents at once which made it impossible to provide individual care (Tsai et al., 2020).

The large need for assistance was also connected to different diet types. About 72 percent of residents that were on texture modified diets needed feeding assistance (Miles et al., 2020). Two studies highlighted that there was an inadequacy of texture of the food in nursing homes in order to help the older adults to meet the estimated energy requirement (Pezzana et al., 2015; Tsai et al., 2020). However, another study indicated that those that were on a pureed diet were more likely to complete their meal (Miles et al., 2020).

The older adults were not particularly involved nor had the opportunity in the shaping of their nutritional care (Sjögren Forss et al., 2018; Tsai et al., 2020). In one qualitative study the older adults experienced that when it came to the nutritional care, they were passive receivers (Sjögren Forss et al., 2018). Two studies mentioned that there was very little variety of food offered to the residents in nursing homes which negatively affected the appetite of the residents (Sjögren Forss et al., 2018; Tsai et al., 2020). On the other hand, an intervention when the residents were able to choose the portion size themselves, they

consumed less compared to when being served a standard portion by the personnel (Divert et al., 2015).

Environment

Several studies showed that adjusted meal environment influenced both appetite and nutritional intake (Chen et al., 2016; Divert et al., 2015; Miles et al., 2020; Sjögren Forss et al., 2018; Tsai et al., 2020). A calm surrounding with reduction in sharp and sudden noises, along with playing music in a low volume raised the mood and resulted also in an increased calorie intake (Chen et al., 2016; Divert et al., 2015; Miles et al., 2020)

One study highlighted the importance of making the meal into a meaningful and pleasant experience. How the dish was presented verbally or in text, and how the dish was arranged on the plate, both affected the calorie intake and experienced meal enjoyment. Dining tables set with several condiments, such as spices and sauces to choose from also had a positive effect on enjoyment and calorie intake (Divert et al., 2015).

A prospective study explored the benefits of protected mealtimes by limiting interruptions while eating, showed that even though the health professionals were aware of the protected meal concept there were no reductions in overall occurrence of interruptions. However, there was a reduction in non-clinical nursing tasks such as cleaning or making beds during mealtimes (Young et al., 2013).

Social factors

In three studies social interactions were evaluated as a factor in nutrient intake (Miles et al., 2020; Sjögren Forss et al., 2018; Tsai et al., 2020). Of these, two showed that social interactions were limited (Miles et al., 2020; Sjögren Forss et al., 2018). For example did one participant experience that she was not involved in the shaping of the environment and had to sit in the same place in the dining area, always next to a person she did not like interacting with (Sjögren Forss et al., 2018). On the other hand, there was a positive effect on the nutritional intake when the older adult ate with family members in the nursing homes. The relatives mentioned that it created a comfortable atmosphere that resembled family meals at home (Tsai et al., 2020). One intervention study resulted in an increased frequency of offers of snacks or dietary supplements between meals and therefore the staff spent on average 7,9 minutes per person to promote consumption (Simmons et al., 2015). An intervention where the older adults participated in social activities which were new to the residents, such as playing instruments and singing together or performing arts and crafts twice a week for 24 weeks, resulted in a better MNA status after the intervention but the results were not statistically significant. However, there was a minor change in weight and BMI status of the participants after the intervention (Maltais et al., 2018).

DISCUSSION

Results discussion

The aim of this literature review was to examine nursing interventions used to treat and prevent malnutrition in older adults. The results described the effect of different actions made, scales and assessments used as well as the RN's and the older adults' experience or

perspective on care for treating and preventing malnutrition. The main results showed that the majority of the interventions had positive effects on the nutritional status of the older adults. Additionally, the most common intervention in the studies was implementation of oral nutritional supplements. The discussion will be based on the theoretical framework person-centred care.

The result showed that the usage of ONS is an effective intervention to increase daily intake of calories among older adults. Although the intervention can increase the calorie intake, there are no indications that a supplement intervention ensures that the person reaches his recommended daily calorie intake. The usage of ONS also results in weight gain. This indicates that it is a reasonable intervention for older adults which are at borderline of risk of malnutrition due to a low BMI. Weight gain resulting in an increased BMI can give higher scores in the MNA-assessment, which indicates normal nutrition status (Nestlé nutrition institute, 2009).

Common to all articles that examined the effects of ONS was a main focus on evaluating possible increased calorie intake and weight gain. None of the studies concerned or examined possible interventions to prevent or treat malnutrition caused by an inadequate intake of micronutrients. Micronutrients are essential for the body's various systems to function properly and a lack of these can lead to various symptoms and diseases that can increase the health care needs for an older adult. For example can a lack of Vitamin D lead to osteoporosis, which in turn increase the risk of obtaining a fracture if the older adult falls and will thus cause more suffering and increased care need which possibly could have been avoided (Christenson & Sundling, 2010). According to Chen et al. (2019) does an adequate intake of micronutrients from food decrease mortality. On the other hand, an excess use of micronutrient supplements can be harmful and possibly increase mortality. This along with the results of this literature review reinforce the indication of a need for more research and new interventions to guide RN's how to prevent deficiency diseases with nursing actions, such as dietary changes, rather than depending on the physician to prescribe micronutrient supplements.

The present study found that yet still the older adult seldom were involved in their nutritional care and felt like they only are passive receivers of the care. When performing nursing care of older adults, it is important to have a holistic perspective and a person-centred approach due to different diseases and increased fragility. That means that the RN has a responsibility to make thorough assessments of various needs of the older adults (Edvardsson, 2020; Svensk sjuksköterskeförening, 2017). In order to perform person-centred care, it is important to encourage the older adult to be a participant of the personal care plan and implementations (Edvardsson, 2020; Kumlin et al., 2020). In contrast to this, showed the results that the prescription of ONS seemed to be the primary intervention implemented by RN's. Though prescription and implementation of ONS generally results in an increased calorie intake and weight gain, it is a far too general intervention to prevent and treat malnutrition and may not suit everyone. The authors found that only one of the studies (Sjögren Forss et al., 2018) examined the older adults feelings about the supplement drinks, such as how well they enjoyed the texture and taste. The RN's generally prescribes ONS in beverage form which can quickly fill one up and decrease the appetite for general food. A more person-centred approach would be to implement ONS in a more dense liquid form which can be taken as a shot or presented in a solid form such as a bar, depending on individual preference. The results confirmed that the use of protein supplements increased both body weight and anthropometric measurements such as mid

arm and calf circumference, indicating that protein supplements is an useful intervention to prevent and treat sarcopenia. This is consistent with a randomized controlled studie that found a correlation between protein supplements and muscle mass (Verreijen et al., 2014).

The results showed that those on texture modified diets were more likely to complete their meals, however it was not stated whether or not they met their daily energy or protein requirements. Previous research confirms that individuals in need of a texture modified diet have significantly lower intake of protein and energy compare to those on a normal diet (Wright et al., 2005). There has also been found associations between decreased skeletal muscle mass and consumption of texture modified diets (Shimizu et al., 2017). This indicates that protein supplements can be useful for older adults on texture modified diets.

The results showed that the assessment basis MNA is frequently used when screening for risk of malnutrition. Some of the RN's considered the tool to be useful but not always completely relevant, since they complemented the results with use of their clinical intuition when making risk assessments. This slightly contradicts with the findings of other studies (Lei et al., 2009; Miao et al., 2019; Stange et al., 2013), which have validated MNA, used correctly in its full-lenght form, to have a high sensitivity of detecting risk of malnutrition. The assessments led to a large number of implemented interventions, however did the result show that many of these never got evaluated after their implementation. Cho et al. (2020) finds that full documentation is a commonly missed task by RN's. It is possible that the implementations in this literature review actually did get evaluated but wasn't documented. This question highlights the importance of proper documentation, not only in the aspect of providing qualitative and safe care, but a lack of documentation can distort statistics in quality registers and complicate future research.

The result finding of that the assistant nurses felt like they didn't have enough time to complete all the tasks they were given and were unable to perform person-centred care, indicates that the problem might be due to organizational guidelines beyond the RN's control. The use of stress as excuses for not performing person-centred care contradicts with the finding of Orrung Wallin et al. (2015), where the managers implementation of a higher level of personalised care provision actually reduced stress among the assistant nurses. Despite this, Svensk sjuksköterskeförening (2017) states that one of the RN's core competencies is leadership, where they has a responsibility to lead, organize, prioritize and coordinate the nursing care. This means the RN's have a responsibility to delegate and educate the assistant nurses, let them know how they can think, organize and prioritize their daily work in order to work as person-centred as possible. By doing so the nurse also gives the assistent nurse's a bigger role in the team and strengthens the teamwork. The nurse should also educate the assistant nurses of the importance of assessments and evaluations.

Antonther indication of poor performance of teamwork, which is one of RN's six core competencies (Svensk Sjuksköterskeförening, 2017) is the finding of RN's unwillingness to collaborate with physicians and dietitians. It is the RN's duty to initiate and coordinate a teamwork with other professionals in order to design an individualized and holistic care plan. In order to provide person-centred care the older adult must be able to be a participant in the care plan, and be informed of available interventions which are then carried out by different professions. The results highlighted that appropriate assistance is a factor that can increase the food intake. But since the staff members had to feed many

residents at once it was seen as a barrier of individual care provided which is contrary to the concept of person-centred care (McCormack, 2003).

The environmental factors were not highly prioritized when choosing adequate nutritional intervention as the prescription of ONS was the RN's primary intervention of choice. There were, however, a few studies that examined effects of the environmental factors. The results indicated that by adjusting the environment and making it into a meaningful and pleasant experience influenced the appetite and increase nutritional intake. The sense of home in nursing homes is influenced by various factors and is an important factor for the quality of living (van Hoof et al., 2016). The home-like atmosphere can consist of the interior design, the smell of home cooked meals or being able to go to the refrigerator and get what you want to eat. Social factors can also create a home like feeling (van Hoof et al., 2016). When the social factors were looked at it showed that there were limited interactions between the older adults during mealtime. In comparison when the older adults were eating with family members it increased the nutritional intake as this simulated an "at home" atmosphere. The presence of a family member is also connected to the person-centred care as this is a way of involving the older adult in his or her care (Edvardsson, 2020). Moving into a nursing home can mean great changes for the older adult especially when it comes to eating habits. You go from choosing when and what you want to eat each time to having it almost always decided for you. Care arrangements such as these complicate a person-centred care which requires that the daily care is designed based on the older adults' daily routines and therefore cannot be designed based on the fixed mealtimes that the organization determines (McCormack, 2003). The results indicated that the variety of food offered at the nursing homes was scarce, and the older adults believed that if they were offered different meals it would boost their appetite and food intake. Only one study talked about that the older adults were provided preferred special foods from relatives and it can be assumed that older adults stores their own food in their rooms which they might eat between meals. In connection to this there might be a basis to examine furthermore how to involve relatives into the nutritional care of the older adults.

Method discussion

The method literature review was chosen since the authors found it to be a suitable choice to be able to get answers to the aim, which intended to examine already implemented interventions, rather than examine the outcome of a new intervention. A literature review also contributes to creating an overview of the state of knowledge in the relevant research area and the quality of current research (Polit & Beck, 2021). The findings of the literature review can hopefully be relevant to put into practice in the authors' future professional practice. If a systematic review had been chosen where all relevant literature is included, the result could have been more qualitative and reliable (Kristensson, 2014), yet still the authors took a joint decision that a literature review was a more suitable design with the available time and resources.

The criteria specifications affect the quality of the study and to strengthen the credibility only peer-reviewed articles were included (Henricson, 2017). Both the inclusion- and exclusion criteria were constructed in order to find articles that could answer the aim of the study (Polit & Beck, 2021). Since the aim was based on older adults it was important to make a criterion on the age range. At first the criterion was intended to be 65 years or older for the older adult participating patients but when the authors started the data collection it turned out that this criterion excluded studies that were still relevant to the aim. Since the

authors wanted to have a global perspective it became an obstacle that different countries have different age restrictions for moving in to nursing homes, resulting in findings of relevant studies which included nursing home residents younger than 65. Therefore, a decision was made to not exclude studies with different age criteria if the mean age range was ≥ 65 years. There is a possibility that by doing this, it may have affected the results in a way that did not provide relevant information in relation to the focus group who were older adults.

The authors chose to exclude articles that required payment and which the library at Sophiahemmet Högskola did not have access to. When the data collection took place a few articles that required payment were found, which based on the abstract could have been included in this study, therefore if this exclusion had not been made the results might have been different. This decision may weaken the validity of this literature review.

The data collection was made in Public Medicine (PubMed) and CINAHL, those databases were found to give relevant search results. The majority of the articles were found in PubMed and only one from CINAHL. The reason for this division is that when the authors began the data collection in PubMed and when they then searched in CINAHL many of the same articles were also found there, in other words, duplicates. According to Henricson (2017) it is a sign that relevant search terms have been used and that it increases the result sensitivity and therefore increases the credibility of the study.

Selection of search terms was done in collaboration with a librarian at Sophiahemmet Högskola which is also a strength of the study since the right selection of search terms is a central factor in a literature review (Henricson, 2017). Based on the aim were the search terms “malnutrition” “interventions” and “aged” selected. Since the term “older adult” is not an approved mesh term but is used in many of the articles was the term “older” and “elderly” also searched in title abstract. A test search indicated that some articles went beyond the responsibility and competence of the nurse. Therefore, was the search term “nursing” included in the search.

A lot of the articles were about the implementation of supplements and in order to get more diverse interventions did the authors do a search to include articles that covered the environmental factor by adding the term “environment” to the search. If the authors had chosen to include the search term “experience”, it is possible that more qualitative articles would have been found, which could have resulted in more thoughts from the older adults if they did or did not enjoy the interventions. But when a test search was made using the term “experience” it narrowed the search results too much.

The search results led to a numerus different articles from different parts of the world. It has a positive effect on the study as it makes the results more relevant and generalizable regardless of country (Henricson, 2017). Because the sample included a very diverse group, and no exclusions were made regarding the older persons’ diseases or other health problems, there is a larger possibility to generalize the results of this study to this diverse group.

The authors decision to include one article from a manual search weakens the credibility of the study as it increases the likelihood of bias. It also reduces the likelihood of getting same results if the study was to be re-performed. According to Östlundh (2017) a manual search done using the automatic suggestion-tool in a database, which lists articles that are

similar, gives a less precise result compared to when searching with decided search terms. However, the authors decided that this one article contained information that would be relevant to this study.

The first two steps of the integrated data analysis (Kristensson, 2014) did the authors do separately which strengthens the reliability of the study. The reason was to avoid influencing each other on how the data were interpreted. In the last step when the authors presented and discussed the categories it emerged that the same categories had been brought to attention by both authors. According to Kristensson (2014) a usage of an assessment basis is crucial to perform a qualitative review in a systematic way, therefore the authors separately used the assessment basis created by Sophiahemmet Högskola (Appendix A) to evaluate the quality of the articles, by doing so strengthens the reliability of the study. If an article were assessed differently by the authors, the articles were reread and discussed to set a joint decision on the quality of the article. This was also done to avoid bias since both authors had a pre-understanding of this subject area from working within the geriatric care. There is also a possibility that the authors pre-understanding could also have influenced the inclusion of the articles which then could have affected the results of this review.

The authors' work has been continuously reviewed by a supervisor and six other students, to ensure that the work has good reliability and validity. The choice to write in English turned out to be slightly time consuming and translations was made with online translation tools with a following search for appropriate synonyms to avoid a colloquial language.

The authors evaluated which quality the articles had overall, how the data were collected and which group of participants were recruited and had given their consent. In this literature review both quantitative and qualitative studies have been included and therefore have both subjective and objective measuring instruments been used. By including both it can often be more difficult when compiling the results, but the authors found it useful to be able to see both numerical results on the effect of an intervention and compare with how they experienced the intervention (Henricson, 2017).

All articles included in the literature review were reviewed and evaluated by both authors in the greatest possible extent to ensure that the studies have been executed in an ethically defensible manner. The majority of the articles had a special section with a text paragraph describing that the study was ethically approved. Two of the studies executed in Sweden (Lannering et.al., 2017; Sjögren Forss et.al., 2018) claimed with reference to Swedish law that their studies did not require ethical clearance. Despite this, the researchers of both studies executed their studies according to ethical guidelines such as the Declaration of Helsinki (World Medical Association, 2013) and with an informed consent. The authors evaluated these two to be ethically approved, and able to be included in the result.

Conclusion

Malnutrition in older adults is a prevalent problem and is often de-prioritized in nursing care. The results showed that the interventions had an overall positive effect on treating and preventing malnutrition. The most common intervention used was oral nutritional supplements but there are other interventions that also provides positive results and provide more individual care, often disregarded by the RN's. The older adults' involvement in the nutritional care can be increased and improved as well as involvement of relatives and, in

that way, the person-centred care also improves. By also examining the older adults experiences of these interventions the RN's can get a deeper understanding on how to provide a better person-centred care. The interprofessional team does also play an important role in providing good and safe care and the RN's have a responsibility to involve and initiate cooperation within the team. The importance of treating and preventing malnutrition is a topic that could be emphasized more within the geriatric care. With continued research within the subject and further education, healthcare workers can provide person-centred care that reduces the prevalence of malnutrition in older adults.

Further research

This literature review provided an overall look at the current state of knowledge in malnutrition in older adults and raised an awareness of knowledge gaps leading to some proposals for further research. There is a great deal of knowledge about how to successfully treat malnutrition caused by an insufficient calorie intake, however research studies that treat malnutrition caused by a lack of the essential vitamins and minerals are underrepresented within the field. Although prescription of ONS yielded good results in increasing calorie intake, there is a need to explore and evaluate the effects of other types of interventions which are more individually tailored. A larger range of more qualitative studies that examine the older adults' attitude to ONS and what they themselves prefer as nutrition interventions would be desirable.

The assessment basis MNA was created in the early nineties which indicates the need for an update and has also in this literature review been shown to not always be used correctly and that the nurse often includes own values in the assessment. A proposal for further research is to test and evaluate this assessment basis aiming to increase its relevance and usability.

In connection to the theoretical framework person-centred care it is important to involve the older adult but also the relatives in the nutritional care. However, the results indicate that further research on how to involve relatives more into the nutritional care of the older adults is needed.

Clinical applicability

Since untreated malnutrition causes several potentially fatal secondary diseases, the work to prevent and treat malnutrition is necessary to achieve the global goal for sustainable development 3.4, which aims to reduce the number of people dying prematurely from non-communicable diseases (United Nations Development Programme, n.d.).

The study sheds light on different interventions such as adapted environment and prescription of ONS that can be used in every part of the geriatric care system. The results are not based on a single specific cause or problem for malnutrition and therefore can this information serve a diverse group of older adults with different diseases and health problems.

By increasing and deepening the nurse's knowledge in nutrition, more adequate and individualized interventions can be implemented, which optimizes the chances of effectively reducing the incidence of malnutrition in older adults. A reduced incidence of malnourished older adults will lead to reduced personal suffering, increased well-being and a reduction in social and healthcare costs caused by malnutrition itself, as well as its secondary diseases.

Author's contribution

The authors Hanna Pettersson and Soffia Stephensen have equally contributed to all parts of this essay.

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Sophiahemmet Högskolas bedömningsunderlag för vetenskaplig klassificering samt kvalitet avseende studier med kvantitativ och kvalitativ metodansats, modifierad utifrån Berg, Dencker och Skärsäter (1999) och Willman, Bahtsevani, Nilsson och Sandström (2016).

KOD OCH KLASSIFICERING	VETENSKAPLIG KVALITET		
	I = Hög kvalitet	II = Medel	III = Låg kvalitet
Randomiserad kontrollerad studie/Randomised controlled trial (RCT) är prospektiv och innebär jämförelse mellan en kontrollgrupp och en eller flera experimentgrupper.	Större välplanerad och välgenomförd multicenterstudie med adekvat beskrivning av protokoll, material och metoder inklusive behandlingsteknik. Antalet deltagare tillräckligt stort för att besvara frågeställningen. Adekvata statistiska metoder.	*	Randomiserad studie med få deltagare och/eller för många delstudier, vilket ger otillräcklig statistisk styrka. Bristfälligt antal deltagare, otillräckligt beskrivet eller stort bortfall.
Klinisk kontrollerad studie/Clinical controlled trial (CCT) är prospektiv och innebär jämförelse mellan kontrollgrupp och en eller flera experimentgrupper. Är inte randomiserad.	Välplanerad och välgenomförd studie med adekvat beskrivning av protokoll, material och metoder inklusive behandlingsteknik. Antalet deltagare tillräckligt stort för att besvara frågeställningen. Adekvata statistiska metoder.	*	Begränsat/för få deltagare, metoden otillräckligt beskriven, brister i genomförande och tveksamma statistiska metoder.
Icke- kontrollerad studie (P) är prospektiv men utan relevant och samtida kontrollgrupp.	Väldefinierad frågeställning, tillräckligt antal deltagare och adekvata statistiska metoder.	*	Begränsat/för få deltagare, metoden otillräckligt beskriven, brister i genomförande och tveksamma statistiska metoder.
Retrospektiv studie (R) är en analys av historiskt material som relateras till något som redan har inträffat, exempelvis journalhandlingar.	Antal deltagare tillräckligt stort för att besvara frågeställningen. Väl planerad och välgenomförd studie med adekvat beskrivning av protokoll, material och metoder.	*	Begränsat/för få deltagare, metoden otillräckligt beskriven, brister i genomförande och tveksamma statistiska metoder.
Kvalitativ studie (K) är vanligen en undersökning där avsikten är att studera fenomen eller tolka mening, upplevelser och erfarenheter utifrån de utforskades perspektiv. Avsikten kan också vara att utveckla begrepp och begreppsmässiga strukturer (teorier och modeller).	Klart beskriven kontext. Motiverat urval. Välbeskriven urvalsprocess, datainsamlingsmetod, transkriberingsprocess och analysmetod. Beskrivna tillförlitlighets/reliabilitetshänsyn. Interaktionen mellan data och tolkning påvisas. Metodkritik.	*	Dåligt/vagt formulerad frågeställning. Deltagargruppen är otillräckligt beskriven. Metod/analys otillräckligt beskriven. Bristfällig resultatredovisning.

* Några av kriterierna utifrån I = Hög kvalitet är inte uppfyllda men den vetenskapliga kvaliteten värderas högre än III = Låg kvalitet

Matrix of included articles

Author Year (published) Country (where the study was conducted)	Title	Aim	Method (Design, sampling, Data collection and Data analysis)	Participants (Non-completion)	Results	Type of Quality
Allen, V., Methven, L., & Gosney, M. 2013 United Kingdom	The influence of nutritional supplement drinks on providing adequate calorie and protein intake in older adults with dementia	Investigate the impact of the provision of ONS on protein and energy intake from food and ability to meet protein and calorie requirements in people with dementia.	<u>Design:</u> Cross over design study <u>Sampling:</u> People over the age of 65 in hospitals and nursing homes with cognitive impairment. <u>Data collection:</u> Assessment of food intake and then conversion into calories (kcal) and protein (g) consumed. <u>Data analysis:</u> Statistical analysis was performed using Wilcoxon signed-rank test for paired data.	26 (-)	By providing nutritional supplement drinks three times a day, more people met their energy and protein requirements without having a big impact on their usual food consumption.	CCT I
Backlund, A., Holmbeck, O., Kumlien, C., & Axelsson, M. 2020 Sweden	A registry study of nursing assessments, interventions and evaluations according to nutrition for persons living in municipal residential care homes	Explore planned nursing interventions and evaluations of such interventions, in older people at risk for malnutrition living in municipal residential care homes.	<u>Design:</u> Registry study <u>Sampling:</u> Older men and women living in 14 municipal residential care homes. <u>Data collection:</u> Data collection from the quality register “Senior alert”. <u>Data analysis:</u> Descriptive statistical analysis. Student’s t-test to compare subgroups and Chi-square test to compare proportions. Logistic regression to identify predictors of evaluated interventions	587 (-)	The three most common prescribed nursing interventions were nutritional treatment, dietary support and weight control. Less than half of the interventions were evaluated and were preventative interventions much less likely to be evaluated.	R I

Randomized controlled trial (RCT), Controlled clinical trial (CCT), Non-randomized clinical trial (P), Retrospective study (R), Qualitative study (K)
I = High quality, II = moderate quality , III = Low quality

Author Year (published) Country (where the study was conducted)	Title	Aim	Method (Design, sampling, Data collection and Data analysis)	Participants (Non-completion)	Results	Type of Quality
Beck, A. M., Damkjaer, K., & Sørbye, L. W. 2010 Denmark	Physical and social functional abilities seem to be maintained by a multifaceted randomized controlled nutritional intervention among old (>65 years) Danish nursing home residents.	Test the hypothesis that a multifaceted 11 weeks RCT, comprising nutrition, group exercise and oral care would have a significant influence of functional abilities in old nursing home residents.	<u>Design:</u> Randomized controlled trial <u>Sampling:</u> Residents aged 65 and older living in one of seven nursing homes in Denmark. <u>Data collection:</u> Measures of height, chocolate preference and observation of the residents chewing and swallowing abilities during meals. Measures of Body weight, MDS-ADL, MDS-CPS and MDS-SE. <u>Data analysis:</u> Intention to treat analysis using Pearson's chi-squared test, t-test and Wilcoxon or Mann-Whitney test.	121 (-)	Results showed that after the intervention a percentage increase in weight, BMI, energy intake and protein intake in the intervention group compared to the control group.	RCT I
Chen, L., Li, H., Lin, R., Zheng, J., Wei, Y., Li, J., Chen, P., & Chen, H. 2016 China	Effects of a feeding intervention in patients with Alzheimer's disease and dysphagia	Investigate the effects of a feeding intervention in patients with Alzheimer's disease with dysphagia.	<u>Design:</u> A prospective cohort study <u>Sampling:</u> Patients with Alzheimer's disease and dysphagia <u>Data collection:</u> All variables were measured pre and post intervention. Kubota water swallow test, Triceps skinfold thickness, upper arm circumference, serum, albumin, hemoglobin, food intake, EdFED, MMSE. <u>Data analysis:</u> Wilcoxon signed rank test for continuous and ordinal variables as well as McNemar test for categorical variables	30 (-)	Overall improvement post intervention in eating and feeding abilities as well as increased food intake.	P I

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Divert, C., Laghmaoui, R., Crema, C., Issanchou, S., van Wymelbeke, V., & Sulmont-Rossé, C. 2015 France	Improving meal context in nursing homes. Impact of four strategies on food intake and meal pleasure	Test the impact of four contextual factors, implemented individually, on food intake and meal pleasure in elderly people living in nursing homes.	<u>Design:</u> Experimental design <u>Sampling:</u> Nursing home residents ≤71 years old. <u>Data collection:</u> Surveys were filled before and after lunch, weight of plates and observation of quantity of condiments consumed. <u>Data analysis:</u> Two-way analysis of variance with generalized linear model and post-hoc analyses	42 (-)	By making changes in the environment, table settings and offer different condiments with the meal can improve the resident's satisfaction with their meals.	CCT I
Lannering, C., Ernsth Bravell, M., & Johansson, L. 2017 Sweden	Prevention of falls, malnutrition and pressure ulcers among older persons - nursing staff's experiences of a structured preventive care process.	Describe nursing staff's experiences of preventive work by using the structured preventive care process outlined by Senior Alert.	<u>Design:</u> Qualitative design <u>Sampling:</u> Healthcare staff in both nursing homes and home healthcare. <u>Data collection:</u> Semi-structured interviews <u>Data analysis:</u> Qualitative content analysis using an inductive approach by moving data from specific to general by open coding, creating categories and abstraction	44 (-)	The staff experienced that there was a lack of reliability in the assessments regarding malnutrition as well as there could be a difference in interpretation of the scales between professions.	K I

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Lee, L. C., Tsai, A. C., Wang, J. Y., Hurng, B. S., Hsu, H. C., & Tsai, H. J. 2013 Taiwan	Need-based intervention is an effective strategy for improving the nutritional status of older people living in a nursing home: a randomized controlled trial	Examine the effectiveness of a need-based "routine screening and timely intervention" strategy in improving the nutritional status of persons living in nursing homes.	<u>Design:</u> A 24-week randomized, double-blind, controlled trial. <u>Sampling:</u> Residents aged 65-years or older, who were ≤ 25 kg/m ² , >1-month residence <u>Data collection:</u> A structured questionnaire, Mini nutritional assessment (MNA) as well as anthropometric indicators were measured according to Lee and Nieman (2003), at baseline then every 4 weeks. <u>Data analysis:</u> Simple descriptive statistics with t-test and Chi square-test and Generalized estimating equations (GEE) analysis	92 (10)	The nutritional supplements resulted in an increase in body weight, BMI-status, mid-arm circumference, calf circumference and serum albumin and cholesterol.	RCT I
Leslie, W. S., Woodward, M., Lean, M. E. J., Theobald, H., Watson, L., & Hankey, C. R. 2013 United Kingdom	Improving the dietary intake of under nourished older people in residential care homes using an energy-enriching food approach: a cluster randomised controlled study	Determine if daily energy intake could be increased using food enrichment without increasing meal sizes and whether nutritional status of those whose BMI was <18.5 kg m ⁻² could be improved.	<u>Design:</u> A cluster randomized trial design. <u>Sampling:</u> Twenty-one residential care homes. All residents, not acutely unwell, were invited to take part. <u>Data collection:</u> Anthropometric measurements and three-day weighed intake diaries. <u>Data analysis:</u> Primarily a linear mixed model Further descriptive statistics analysed changes in macro- and micronutrients with use of Fisher's exact test.	41 (10)	By using enrichments in usual meals such as adding double cream helped residents gain weight. There was no statistically significant difference in energy and nutritional intake between the intervention and control group.	RCT II

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Maltais, M., Rolland, Y., Hay, P. E., Armaingaud, D., Cestac, P., Rouch, L., & de Souto Barreto, P. 2018 France	The Effect of Exercise and Social Activity Interventions on Nutritional Status in Older Adults with Dementia Living in Nursing Homes: A Randomised Controlled Trial	Examine the effects of a 24-week exercise intervention against a social intervention on body weight, body mass index (BMI) and nutritional status in people with dementia living in nursing homes	<u>Design:</u> Randomized controlled trial. <u>Sampling:</u> Older persons diagnosed with Alzheimer’s disease or vascular or mixed dementia <u>Data collection:</u> MNA, BMI was used to measure the nutritional status <u>Data analysis:</u> Multi-level analysis on body weight, BMI & MNA using a three-level regression model with group, time and group by time interaction as fixed effects	91 (-)	After the intervention the social activity group had better MNA status, but the difference was not statistically significant.	RCT I
Miles, A., Liang, V., Sekula, J., Broadmore, S., Owen, P., & Braakhuis, A. J. 2020 New Zealand	Texture-modified diets in aged care facilities: Nutrition, swallow safety and mealtime experience	Characterise textured modified diets prevalence and practice in residential aged care facilities	<u>Design:</u> Mixed method/exploratory design <u>Sampling:</u> Residents from 10 residential care facilities <u>Data collection:</u> Dining observation, meal and textured-modified diets audits. <u>Data analysis:</u> Descriptive statistics analysis with Pearson’s Chi square-test. Kruskal-Wallis test was used to explore differences in frequency using Dunn’s post hoc testing	400 (59)	Residents on texture-modified diets were more likely to need feeding assistance and were also more likely to complete their meal. Social interactions were limited during the meal as well as different environmental factors in the residential care facilities were addressed.	P I

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Pezzana, A., Cereda, E., Avagnina, P., Malfi, G., Paiola, E., Frighi, Z., Capizzi, I., Sgnaolin, E., & Amerio, M. L. 2015 Italy	Nutritional Care Needs in Elderly Residents of Long-Term Care Institutions: Potential Implications for Policies	Collect information on actual nutritional requirements in long-term care institutions and on the role of institutional factors in nutritional care.	<u>Design:</u> Cross-sectional study. <u>Sampling:</u> Persons aged ≥ 60 years living in long-term care institutions. <u>Data collection:</u> Previous medical records, interviews and physical examinations. <u>Data analysis:</u> Inferential statistics. Continuous and categorical variables were compared using Student's t-test, analysis of variance or Fisher's exact test.	1394 (-)	50 percent of residents that were assessed as in need of a nutritional care plan were not receiving it. The most common reason why residents were not meeting their energy requirements was due to inadequacy of texture in food/drinks.	P I
Simmons, S. F., Keeler, E., An, R., Liu, X., Shotwell, M. S., Kuertz, B., Silver, H. J., & Schnelle, J. F. 2015 USA	Cost-Effectiveness of Nutrition Intervention in Long-Term Care	Determine the cost-effectiveness of two nutrition interventions on food, beverage, and supplement intake and body weight.	<u>Design:</u> Randomized controlled trial <u>Sampling:</u> Long-term care residents capable of oral intake, and not receiving end-of-life (hospice) care <u>Data collection:</u> Previous medical records, measures of body weight and height. Measures of food and beverage intake. <u>Data analysis:</u> Baseline characteristics were compared using Kruskal-Willis tests for continuous variables and Pearson's Chi square-test for categorical variables. Multivariate, repeated-measures regression analysis. Effects of each intervention relative to the control were tested using Wald tests and the empirical variance estimator.	154 (41)	Both interventions increased the total caloric intake as well as caloric intake between meals. There was a greater frequency of staff offers of snacks and supplements between meals, which means that the staff spent on average 7,9 minutes more per person per day than before the intervention.	RCT I

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Sjögren Forss, K., Nilsson, J., & Borglin, G. 2018 Sweden	Registered nurses' and older people's experiences of participation in nutritional care in nursing homes: a descriptive qualitative study	Illuminate the experience of participating in nutritional care from the perspectives of older people and registered nurses.	<u>Design:</u> Qualitative, descriptive design <u>Sampling:</u> Older persons living in nursing homes (NH) and registered nurses with permanent position in NHs. <u>Data collection:</u> Semi-structured interviews <u>Data analysis:</u> Method influenced by content analysis using codes, themes and sub-themes	12 (-)	Those RNs reflecting a greater awareness of, and proactive engagement in nutritional care also tended to indicate knowledge about the relationship between nutritional status, older people's health and their function. The older persons' experience of not being involved or having the possibility to discuss things with the RNs about how the nutritional care was to be planned indicated frustration.	K I
Tsai, M. R., Tsai, H. H., Tsai, Y. F., & Liao, F. Y. 2020 Taiwan	"Tailoring homely meals": Family members' motivations underlying nursing home visits during residents' meals.	Explore motivations behind family member visits with nursing home residents during mealtime in Taiwan	<u>Design:</u> Qualitative, descriptive phenomenological design <u>Sampling:</u> Family members of two hospital-based nursing homes and two independent NH's in a rural setting <u>Data collection:</u> Individual face-to-face interviews <u>Data analysis:</u> Phenomenology analysis with a van Manen approach	18 (-)	The family members motivations for visits during mealtimes in nursing home was to provide a comforting family atmosphere, monitoring food consumption, providing special food wishes and assisting residents.	K I

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Young, A. M., Mudge, A. M., Banks, M. D., Ross, L. J., & Daniels, L. 2013 Australia	Encouraging, assisting and time to EAT: improved nutritional intake for older medical patients receiving Protected Mealtimes and/or additional nursing feeding assistance	Implement and compare three interventions designed to specifically address mealtime barriers and improve energy intakes of medical inpatients aged ≥ 65 years.	<u>Design:</u> Pre-post study design <u>Sampling:</u> Patients aged 65 years or older who had a hospital stay of more than 2 days, and were admitted from the emergency department to the study wards. <u>Data collection:</u> Ethnographic observation of participants and nursing staff, and data collection of food and drink intake of patients. <u>Data analysis:</u> One-way, analysis of covariance (ANCOVA) and sensitivity analysis	254 (-)	Mealtime assistants increased in the interventions. Post intervention group was more likely to achieve adequate energy intake. There was a reduction in non-clinical nursing tasks at mealtimes.	P I

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