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The Impact of Nutrition on Patient Recovery in Postoperative Care

A Literature Review

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Abstract

Malnutrition is a problem affecting people's health worldwide. Nutrition plays a significant role in the wellbeing of a human. Patient's nutritional status is associated with postoperative results. Nurses have a significant role in assessing patient's nutritional status and in delivering proper nutritional care.

The aim of this study was to compile information about the effects of nutrition on patient recovery in postoperative care. The purpose was to share the compiled information and for it to be utilized in nursing care of postoperative patients.

The study was conducted as a literature review. Two databases, Cinahl (EBSCO) and PubMed, were used in the search of articles. Altogether six articles were chosen and analyzed using inductive data analysis method. As a result of data analysis two main categories were formed, effects on patient's body and effects on postoperative conditions.

The results of the study indicate that patients with good nutritional status experience less postoperative complications. Results show that the use of early enteral nutrition and supplementing enteral nutrition with w-3 fatty acids, probiotics or immunonutrients can reduce infectious complications and the length of hospital stay.

Based on the results of this literature review, the author suggests further research to be conducted on the effects of nutrition on patient recover in different surgical fields. In addition, research could be aimed to find out patients' and nurses' experiences and attitudes about their own role regarding to postoperative nutritional care.

Keywords/tags (subjects)

Nutrition, nutritional status, malnutrition, postoperative, postoperative care

Miscellaneous

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1 Introduction

Malnutrition has been established as a negative factor associated with poor postoperative outcomes. These negative factors include mortality, longer hospital stays and increased costs. During recent years surgical patients spend less time in hospitals postoperatively, thus nutritional support has been restricted to a smaller number of patients than before. (Tahull, & Talaverón 2014, 377.) Clinical nutrition's significance has been increasing in recent years as there are more multidisciplinary co-operation on the part of healthcare professionals. Personnel working in operative units should be proactive in identifying patient's nutritional status, therefore, established evidence on nutrition and its indications is needed. (Tahull, & Talaverón 2014, 378.)

In the world about 462 million adults are underweight and 1,9 billion adults are overweight or obese. For children under the age of five 47 million are wasted, 14,3 million are severely wasted and 144 million are stunted. Of the world's children under the age of five years old 38,3 million are overweight or obese. Malnutrition is associated in around 45% of the deaths among children under five years of age. (Malnutrition 2020.) Studies show that malnutrition is detected in Finland. Mostly malnutrition is met within elderly population (Korkalo 2017). Earlier research shows that most of the Finnish population does not get enough nutrients from their diet. Both men and female have a lack of vitamins in their nutrition. However, female have richer entirety of nutrients in their nutrition compared to the male. For adults addition of fiber containing carbohydrates would improve the nutrition. (Kaartinen, Männistö, Saaksjärvi, Tapanainen, & Valsta 2018, 133.)

Patient's good nutritional status is critical to achieve successful postoperative results and malnutrition is a huge factor contributing to postoperative complications. (Berger, Devin, Palazzo, Pucci, Rosato, & Zheng 2019, 4428; Ma, Liu, Xiao, & Cao 2016, 568). Therefore, this literature review aims to compile information about the effects of nutrition on patient recovery on postoperative care. This is done with the purpose

of bringing the information to nursing professionals so that information can be utilized in the care of patients.

2 Background

2.1 Effects of nutrition on health

The main role of nutrition is to suppress hunger (Ruuti 2012, 14). Nutrition composes of, water, fiber, energy containing nutrients and small amounts of minerals and vitamins (Huttunen 2018). Carbohydrates, fats, and proteins are energy containing nutrients, from which the cells in the human body produce energy (Huttunen 2018; Ruuti 2012, 14). Vitamins and minerals ensure that cells remove metabolic waste and produce energy and proteins (Ruuti 2012, 14). Nutrients may have beneficial effects on the body. Eicosapentaenoic, linolenic, docosahexaenoic and docosapentaenoic acids are w-3 polyunsaturated fatty acids, which have anti-inflammatory and immunomodulatory effects. (Ma, Liu, Xiao, & Cao 2016, 568.)

Malnutrition is a serious condition that can lead to undernutrition or overweight, and therefore can cause a thread to the human health. (Nutrition n.d.). Good nutrition plays a huge role in the wellbeing of the human, as it is one of the main factors in the prevention and the care of illnesses (Ruuti 2012, 11). Poor nutrition increases the risk for many non-communicable diseases, such as diabetes mellitus, cancer, and coronary heart and lung disease. As malnutrition can lead to overweight, the risk for insulin resistance, high blood pressure and elevated blood cholesterol levels increase. (Patience 2016, 1182.)

Individual's nutritional habits effect their entire life habits, and these have an impact on the health and the quality of life (Ruuti 2012, 11). Nutritional education based on up to date information and recommendations is beneficial throughout one's life and

can help with preventing non-communicable diseases (Patience 2016, 1186). During illness the importance of nutrition is even greater and therefore it has a crucial role in the care. In some cases, nutrition is the only care method to be used which means that ensuring good nutrition and intake of all the important nutrients is essential. Rounded diet ensures the sufficient intake of nutrients. (Ravitsemusterapeutien yhdistys ry 2009, 11.)

2.2 Postoperative recovery and care

Postoperative care is defined as the care a patient receives after a surgical procedure. Postoperative care begins after a surgical procedure is over and continues even after the discharge of the patient. The care a patient receives is dependent on a multitude of factors such as the type of surgery the patient undergoes as well as the patient's medical history. Postoperative care includes treatment of the surgical wounds and pain management. Patient education about potential side effects and complications play a key role in the postoperative care of a patient. (Pietrangelo 2016.) The first 24 hours postoperatively is the immidiate postoperative period in which patient that have undergone general or regional anesthesia, and needs observation and specific care. During this period nurses are responsible for the planning and performing of postoperative care. (Albuquerque, Araújo e. Silva, Carvalho Junior, Ferreira da Silva Filho, Oliveira Serra, & Santos 2015, 162.)

Patient recovery can be viewed as a continuous process or as a continuum with a beginning and an end. Definition of recovery changes depending on the viewpoint. As recovery can be viewed as an absolute or relative, it may be difficult to state whether a patient has recovered or not. (Bowyer, & Royse 2015, 74.) Recovery means different things for different patients, however according to Bowyer, and Royse (2015) postoperative recovery is finished when adverse symptoms are absent, and the patient's functional capabilities have been restored. (72-73.) Postoperative recovery is an individualized process comprising of multitude of factors such as the age of the

patient, overall health prior to the operation, the extent of the injuries, the type of operation and the amount of rest. Some patients recover quickly while others may take longer. (Perry, & Potter 2007, 1087-1094.)

After a surgical procedure has been completed it is part of the nursing staffs' duties to monitor the patient. Because the patient is more susceptible to infections after surgeries, the role of monitoring becomes increasingly important. Signs of infections should be carefully monitored in addition to the patient's vital signs. Recovery from anesthesia after surgery can take a long time during which nurses might deliver fluids and medication intravenously. Nurse will observe patient's body temperature and can take actions to make the patient feel warmer if needed. Effects of anesthesia still linger after waking up in the post-operative unit, assessing pain and providing pain relief for the patient is a nurse's responsibility. As anesthesia increases the risk for postoperative complications nurses should be educated on the most common complications of each operation so that if needed, they can take proper actions. (Albuquerque et al. 2015, 162-165; Perry, & Potter 2007, 1115-1127.)

Nowadays nurses have a big role in the assessment and the management of postoperative pain. It is a responsible task since the misuse of analgesics can cause life threatening complications and postoperative pain can lead to negative consequences in patient's health and recovery. (Khatib, & Razvi 2018, 49.) As postoperative pain management is such an important work task for nurses, should nurses have up to date knowledge about handling pain management and their attitudes should be positive towards the delivery of postoperative pain management. (Bekele, Jemebere, Tsegaye, & Yohannis 2020, 910). Perry, and Potter (2007) explain that nurses working in postoperative units are also responsible for patient education and motivation. If patient is in pain or is depressed can it be difficult for them to be motivated on self-care. Keeping the patient informed and giving realistic expectations in their progress can help motivate the patient and the family. (1126-1127.)

A part of nursing assessment and care is nutritional screening, meaning the identification of malnutrition or the risks leading to malnutrition. Nutritional screening involves the measures of height, weight, weight change, primary diagnosis, and the presence of comorbidities. If the patient is at risk for nutritional problems, nutritional assessment should be performed. Nutritional assessment is a more detailed process to identify and diagnose nutritional issues. Patients might have some underlying conditions leading to poor nutritional status. It is nurse's job to identify those at risk for inadequate feeding or malnutrition and to come up with a plan on how to administer the proper nutrients to the patient. For example, difficulties in swallowing, trauma or operation to the gastrointestinal tract or incapability to administer food independently might lead to the use or enteral nutrition. Enteral nutrition or enteral tube feeding means that the nutrients are given into the stomach or intestinal tract via a feeding tube. Enteral feeding is preferred over parenteral feeding, which means intravenous feeding, since nutrients are utilized better, it maintains bowel functions and structure, and is less expensive. Nurse's responsibilities include the assessment of the best route of nutrition administration, administration of the nutrition and the maintenance of the administration route, such as feeding tube. (Perry, & Potter 2007, 877-892; Benbenishty, Bruyneel, Gutysz-Wojnicka, Klas, Scelsi, Schaefer, & Slijepcevic 2018, 86-88.)

3 Aim, purpose and research question

The aim of this thesis is to compile information in the form of literature review about the effects of nutrition on patient recovery in postoperative care. The purpose is to share the compiled information and for it to be utilized in nursing care of postoperative patients.

Research question:

• What are the effects of nutrition on patient recovery in postoperative care?

4 Methodology

4.1 Literature review

A literature review is a form of research, in which the researcher analyses information from published studies. It is a synthesis that gives an answer to researcher's own research question. Literature review can be done in many ways but in all of them the integrative factor is that the researcher searches for published articles and analyses the data collected from the articles. (Ward-Smith 2016, 253-254.) For this bachelor's thesis literature review was conducted, as the goal was to compile already existing, relevant information regarding to the effects of nutrition on patient recovery in postoperative settings. Literature review was determined to be the most effective way to conduct this research, as it gives an opportunity to browse through plenty of data and eventually includes only the relevant data relating to the research question.

A literature review consists of three main phases. Researcher first decides on the topic or phenomena and forms a research question that can serve information on the selected topic. As research question is formed, aims and purpose of the research are determined to develop a base for the research. Researcher then searches and analyzes for data from relevant sources. In the second phase data is read through with purpose and in- or excluded with critical evaluation. Data and knowledge that is included to the research is then synthesized to form a text that answers researcher's own research question. (Hart 2018, 2-6.)

The author of this literature review had a personal interest on the phenomena of nutrition and its effects on patient care. Therefore, research was focused on the post-operative field of nursing and the phenomena of nutrition. Existing information and literature about the topics were browsed, and a research question was formed into its current form. As aim and purpose was determined, and research question was formed the author of this review started the process of data analysis and collection. When data was collected and analyzed, were the results presented and the findings discussed. In the final stage of this literature review conclusions based on the results and discussion of the results were drawn and suggestions for further research were given by the author.

4.2 Literature search

To find relevant articles to use in this literature review, Cinahl (EBSCO) and PubMed databases were used. With a proper inclusion and exclusion criteria, search results were narrowed down. For the article selection process PICOS method was utilized in both databases. The initial search yielded 18 results in Cinahl (EBSCO) database and 452 results in PubMed database, bringing the total number of results to 470. As seen on the table below (Table 1) PICOS consisted of the following keywords: (nutrition OR diet OR nourishment OR food intake OR eating) AND (effects OR impact OR consequences OR influence OR outcomes) AND (post-operative OR postoperative OR

post-surgery OR post-surgical). To narrow down the search an additional keyword, gastrointestinal, was added. The inclusion criteria used were full text available for JAMK students, peer reviewed, English language and from year 2015 to date. In PubMed database inclusion criteria humans was applied in addition to other inclusion criteria.

Population	Nutrition OR diet OR nourishment OR food intake OR eating
Phenomena of interest	Effects OR impact OR consequences OR influence OR outcomes
Context	Post-operative OR postoperative OR post-surgery OR post-surgical OR postop OR post-op
Additional keyword	Gastrointestinal
Type of studies	Full text available for JAMK students, peer reviewed, English language, 2015 to date, (humans, in PubMed)

Table 1. Inclusion criteria (PICOS)

As this thesis process went on, these 470 results were narrowed down by screening the title of the search results. In this screening the titles were read and those relevant to the research question were chosen. Screening of the titles lead to 6 results from Cinahl (EBSCO) and 67 results from PubMed. Altogether these 73 results were screened by their abstract. Screening of the abstract reduced result to 6 results from Cinahl (EBSCO) and 10 results from PubMed, according to the abstract's ability to answer the research question. These 16 articles were then narrowed down with an exclusion criteria.

To guarantee up to date information, was an exclusion criteria considering the publication year used. Articles published on year 2018 or after were included to the screening of the full text. This resulted in 7 articles, 1 from Cinahl (EBSCO) and 6 from PubMed. Finally, the screening of full text resulted in 0 articles from Cinahl (EBSCO) and 6 articles from PubMed. One article from Cinahl (EBSCO) was excluded at this

stage since it did not answer the research question. This literature review was written based on the answers found in these selected 6 articles. All 6 articles are presented in Appendix 1. Article selection process can be found from Figure 1 below.

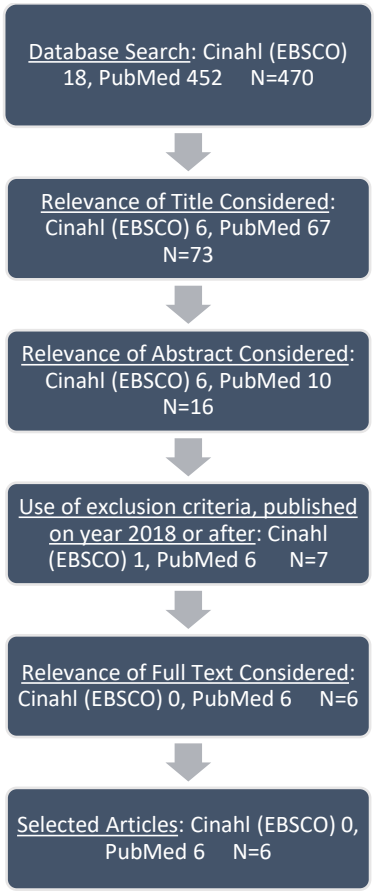

Figure 1. Article Search Process

4.3 Data analysis

Data analysis is a tool used when analyzing data for research. Qualitative data analysis strives to increase the value of information by combining information from dispersed sources. Data analysis aims to create a clear summary of the material without losing its information. There are two forms of qualitative data analysis, inductive and deductive, in which the material is broken down, conceptualized, and collected to

form a new logical entirety. As literature reviews aims to compile and summarize information from published research, inductive data analysis can be utilized to form categories in which the useful data can be presented. Formed categories are not the results of the literature review but a tool to examine the summarized information. Results of literature review are clearer when the data within these categories is viewed based on the statements in the references. When inductive data analysis is used in a literature review, should be noted that it is merely an aid to organize data rather than an instrument for analysis. This differs from the use of data analysis in a qualitative research, where data analysis is always used as a tool to analyze data. (Tuomi, & Sarajärvi 2018, 122-159.)

Inductive data analysis consists of three stages, reduction, grouping and conceptualization, from which only the first two are used when utilizing inductive data analysis in the conduction of a literature review. First stage of inductive data analysis is reduction. Reduction aims to extract all the unnecessary information out of the data and to leave the researcher with data that answers the research question. Original data relevant to the research is simplified to form phrases. In the second stage of inductive data analysis, these simplified phrases are grouped based on similarities or differences within a concept. Phrases describing the same concept are combined to form a category. Withing one category phases can be combined further to form subcategories. Further in the research project these categories and subcategories helps the researcher to form a structure to their article. Data analysis creates clarity to the collected data and therefore gives the ability to make clear and trustworthy conclusions. (Tuomi, & Sarajärvi 2018, 140-159.)

In this thesis inductive data analysis has been utilized as an aid to organize material found from articles. Inductive data analysis was determined to be the most suitable way of data analysis, as it helped the author to reduce data to answer the research question. In addition, inductive data analysis helped to group the data into categories and subcategories, therefore, creating a structure to the literature review. Selected

articles were read through thoroughly and data was collected. Significant data, answering the research question, was highlighted from the articles, and sorted into categories based on the common themes presented in the articles. Two main categories were established based on the themes discussed in the results. Main categories of the results are 'effects on patient's body' and 'effects on postoperative conditions'. Under these two main categories subcategories were formed. Subcategories formed according to the themes discussed within the results of each main category. Subcategories within the main category 'effects on patient's body' are 'patient's nutritional status', 'immune functions of the body' and 'postoperative digestive symptoms'. Main category 'effects on postoperative conditions' has a subcategory 'length of hospital stay'. These main categories and subcategories are presented in Figure 3 under the headline "Results". Below in Figure 2 is presented the process of analysis and formation of the categories and subcategories.

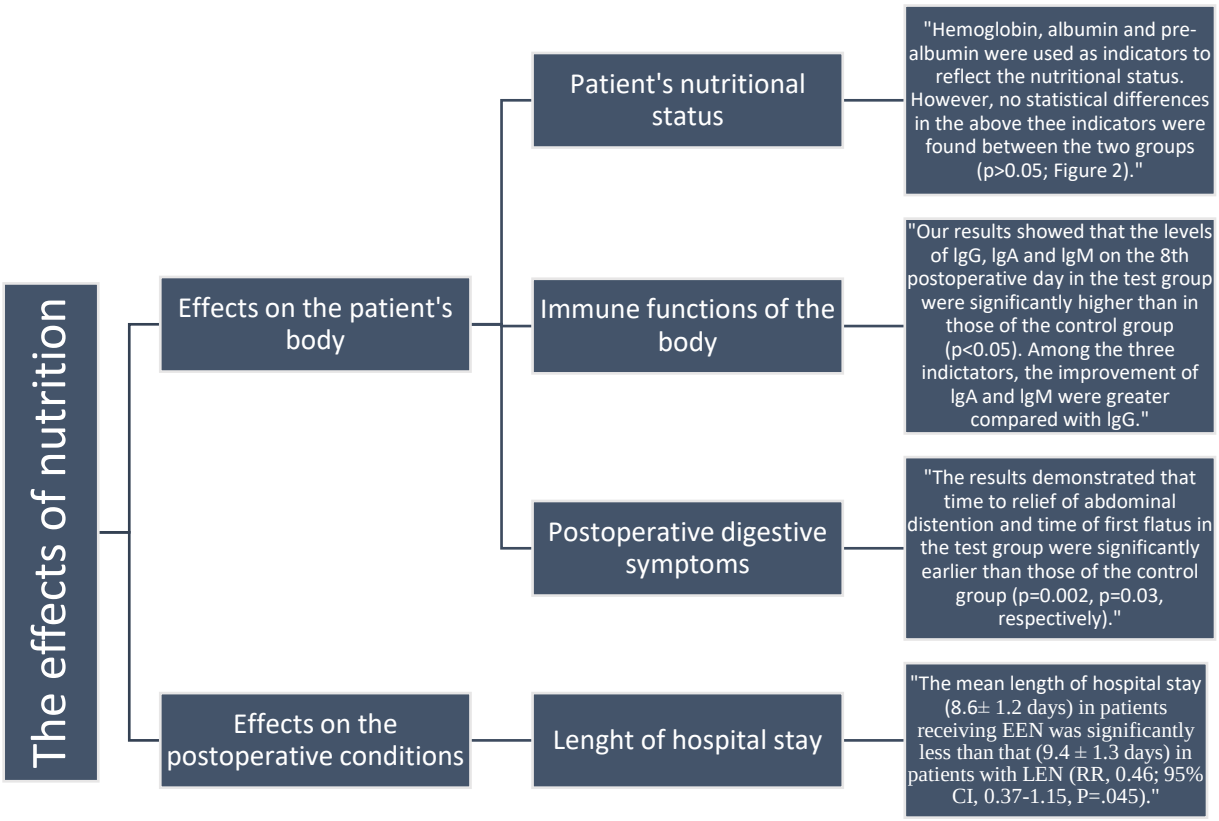

Figure 2. Data analysis process illustration

5 Results

Analysis of the data revealed two main categories: effects on patient's body and effects on postoperative conditions. These main categories have altogether four subcategories: patient's nutritional status, immune functions of the body, postoperative digestive symptoms and length of hospital stay. Main categories and subcategories of the results are presented below in Figure 3.

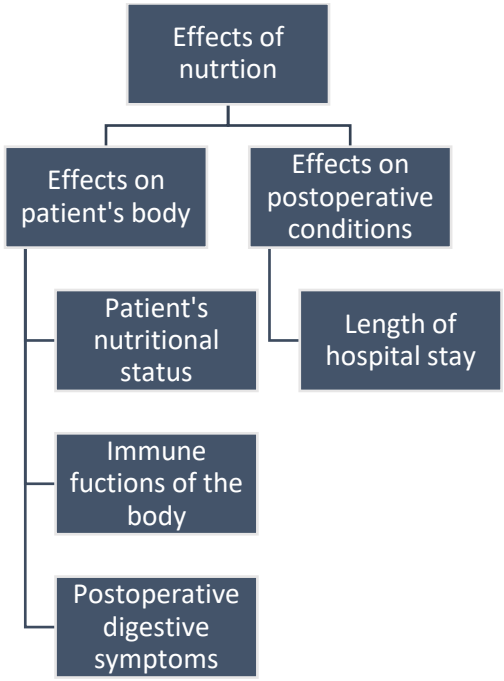

Figure 3. Main categories and subcategories of the results

5.1 Effects on patient's body

Patient's nutritional status. Preoperative malnutrition causes lower albumin and hematocrit levels on patients, therefore, leading to worse physiological reserve to metabolic response and poor clinical evaluation in the malnourished patients. Malnourished patients suffer more often from severe postoperative complications than

patients with good preoperative nutritional status. These postoperative complications can lead to worse clinical outcomes, such as death. Results of this literature review show that preoperative malnutrition can lead to lower values of phase angle and higher distribution of water in the extracellular compartment. (Albertini, Godoy, Moraes, Netinho, & Nishiyama 2018, 399-400.)

No notable differences on the levels of albumin and prealbumin are seen on postoperative day five between early enteral nutrition and late enteral nutrition. A slight decrease on the prealbumin levels is noted on postoperative day five in the patients receiving early enteral nutrition. (Chunbao, Hongfang, Qiankun, Qingjuan, & Xuebing 2018, 3-5.) The use of probiotics combined to enteral nutrition does not have an effect on the levels of patients' hemoglobin, albumin and prealbumin levels, indicating that the use of probiotics combined with enteral nutrition does not effect on the patients nutrient uptake (Haitao, Honghu, Qicheng, Xianbo, and Zhong 2018, 680-682).

Immune functions of the body. Body's lgG, lgA and lgM values on postoperative day eight are notably higher in gastric cancer patients receiving probiotics with their enteral nutrition than in those patients who do not receive probiotics. These results indicate that probiotics combined with enteral nutrition improve the immune functions of the patients. (Haitao et al. 2018, 679-682.) The values of lgA, lgG and lgM were significantly increased on patients who received enteral immunonutrition after their operation. Therefore, improving patient's immunological status and lowering the number of postoperative infectious complications. (Juan, Junfeng, Liwei, Ying, & Zhen 2018, 6-10.) W-3 polyunsaturated fatty acid supplemented parental nutrition increases the values of lgA, lgG and lgM on postoperative day six. Increase in these values indicates the improvement of immune functions. (Chengfeng, & Yajie 2018, 5-6.)

The values of IL-6, IL-8 and TNF decreased significantly faster in patients who received probiotics with enteral nutrition than in patients who did not receive probiotics. This leads us to believe that the use of probiotics combined with enteral nutrition can successfully reduce the inflammatory response. (Haitao et al. 2018, 679-682.) In addition, enteral immunonutrition reduces the values of IL-6 and TNF-a (Juan et al. 2018, 6-9). W-3 polyunsaturated fatty acid supplemented nutrition increases patient's lymphocyte count and decreases the patient's IL-6 and TNF-a values postoperatively. Therefore, reducing damage to body's immune system and enhancing immune functions. By increasing the lymphocyte count the body's defense system is improved and therefore the number postoperative infectious complications are lower. (Chengfeng, & Yajie 2018, 5-9).

Postoperative enteral immunonutrition raises immune related factors effectively after the first seven postoperative days. The increase in these factors suggests improvement on the patient's immunological status and recovery. The increase in the CD4+, which belongs to the T cells, indicates improved cellular immunity. (Juan et al. 2018, 5-9.) Patient's values indicating immune related factors increased after the consumption of w-3 polyunsaturated fatty acid enriched nutrition. Therefore, indicating that the consumption of w-3 polyunsaturated fatty acid enriched nutrition can enhance body's cellular immunity. In addition, consumption of w-3 polyunsaturated fatty acid enriched nutrition enhances humoral immunity and promotes cell activation and differentiation. (Chengfeng, & Yajie 2018, 2-6.) Regarding to the effects of w-3 fatty acid supplemented nutrition, results show a difference in the postoperative values of CD4+, CD8+ and CD4+/CD8+. The w-3 supplementation is beneficial for patient's immune functions according to the changes in values mentioned. W-3 fatty acid supplementation can be effective in reducing postoperative infections complications. (Deqiang, Hao, Huanhuan, Liyong, Yan, Yue, & Zhaoping 2018, 124-126.)

On postoperative day five, a decrease in the c-reactive protein (CRP) value of patients receiving early enteral nutrition was noticed. CRP value on patients with early

enteral nutrition recovered faster, therefore the amount of infections complications was notably decreased. (Chunbao et al. 2018, 3-6.) Patient's CRP values are decreased when using w-3 polyunsaturated fatty acid-supplemented nutrition. Decreased values were noted on the sixth postoperative day. This indicates that the uses of w-3 polyunsaturated fatty acid enriched nutrition can minimize the postoperative inflammatory reactions. (Chengfeng, & Yajie 2018, 5-9.)

Postoperative digestive symptoms. Early postoperative ileus occurs more on patients receiving late enteral nutrition, no such differences occur in the appearance of late postoperative ileus between the patients receiving late enteral nutrition and early enteral nutrition. Complications related to enteral nutrition were evaluated with symptoms including diarrhea, abdominal cramps, and abdominal distention. There were no differences in the appearance of these symptoms between the use of early and late enteral nutrition. Appearance of constipation was notably lower on patients receiving early enteral nutrition than on patients receiving late enteral nutrition. Early enteral nutrition within 48 hours of the operation can advance postoperative intestinal function recovery. (Chunbao et al. 2018, 3-4.) The use of probiotics combined with enteral nutrition reduces the time of first latus and the relief of abdominal distention. Cases of diarrhea are lower in the patients consuming probiotics combined with enteral nutrition than in patients who did not receive probiotics. However, comparing the use of probiotics combined with enteral nutrition and not using probiotics, did not have any notable differences to other adverse effects, such as vomiting, anastomotic fistula, pulmonary infection, and duodenal stump fistula. (Haitao et al. 2018, 680-682.)

5.2 Effects on postoperative conditions

Length of hospital stay. Patients suffering from malnutrition are not shown to have longer hospital stays than patient with good nutritional status, even if they have higher prevalence of severe postoperative complications (Albertini et al. 2018, 399).

The use of early enteral nutrition compared to late enteral nutrition reduces postoperative complications and the length of hospital stay. No notable difference was detected in hospital readmission rates between patients receiving early enteral nutrition and late enteral nutrition. (Chunbao et al. 2018, 4-5.) There is no difference on the length of hospital stay between the use of enteral immunonutrition and enteral nutrition. In addition, no notable improvements on morbidity of postoperative complications were discovered. (Juan et al. 2018, 9.) The use of w-3 fatty acid supplemented nutrition can shorten the length of hospital stay (Deqiang et al. 2018, 125).

6 Discussion

6.1 Discussion of the results

This literature review compiled data about the effects of nutrition on patient recovery on postoperative care from six articles. The results show that malnutrition set the patient at risk of postoperative complications. Patients nutritional status should be considered in the preoperative phase, for the effects of poor preoperative nutritional status can be seen in the postoperative care. (Albertini et al. 2018, 399-400.) In addition to patient's nutritional status also patient's preoperative experiences have a big impact on their postoperative satisfaction. Studies show that patient's preoperative expectations can influence on the postoperative recovery and results, therefore, the nurses should discuss with patients about nutritional care preoperatively (Auer, Broadbent, Doering, Glombiewski, Laferton, Rief, & Winkler 2015, 60). During the preoperative phase of care nurses should explain the definition of enteral and parenteral nutrition to those patients that are likely to receive those forms of nutritional care in their postoperative care. When patients have clear expectation on the postoperative use of enteral or parenteral nutrition, they might be more accepting towards the form of treatment.

Patients who received either parental or enteral nutrition focus on the discomfort and negative experiences of artificial feeding. Nurses are required to be understanding and sensitive towards patient's experiences and to be able to articulate the benefits of artificial nutrition in enhancing the recovery from operation. Once patients move from enteral or parenteral feeding to oral feeding they feel negatively towards oral supplements. Patients wish to consume food that has texture and flavor. (Burden, Cooper, & Molassiotis 2014, 1031-1032.)

The results of this literature review indicate that whether enteral nutrition is started early or late, it does not show significant difference in the patient's postoperative nutritional status. The use of probiotics combined with enteral nutrition does not improve patient's nutrient uptake. (Chunbao et al. 2018, 3-5; Haitao et al. 680-682.) However, probiotics and immunonutrients combined with enteral nutrition have a positive impact on the body's immune functions. Enriching enteral nutrition with w-3 fatty acids improve the body's immune functions. Supplemented enteral nutrition has a positive effect on the body's inflammatory response. Results indicate that patient's cellular immunity can be improved, and cell activation and differentiation can be promoted with the use of supplemented enteral nutrition. When patient's immune functions and cellular immunity are improved, lower number of infectious postoperative complications are noted. Results show that supplementing patient's nutrition with w-3 fatty acids and giving patients early enteral nutrition helps reduce the CRP values. Decrease in the values lowers the number of infectious complications and minimized the postoperative inflammatory reactions. (Chengfeng, & Yajie 2018, 5-9; Chunbao et al. 2018, 3-6; Deqiang et al. 2018, 124-126; Haitao et al. 2018, 679-682; Juan et al. 2018, 6-10.)

Bjerrum, Pedersen, and Tewes (2012, 81-88) have stated that nurses acknowledge the assessment of nutritional status and the nutritional care as one of the responsibilities of their job. However, doctors and nurses agree that the responsibility of nutritional care is not defined clearly. Nutritional topics are a part of the basic nursing

training but still many nurses feel lack of knowledge within the topic. According to Bjerrum and colleagues guidelines for nutritional care have been put in place to ease the implementation of nutritional care and to change the behavior of nurses, however the aims of these guidelines have not been fully reached. More education is needed to change the behavior and attitudes of the nurses and to give them a better understanding of the guidelines. Nurses who receive in depth education on the nutritional responsibilities of a nurse are more aware of their role in the nutritional care and feel more confident and responsible carrying out the task. Deeper education gives the nurses confidence in their abilities to carry out nutritional care and decreases the need for consulting doctors. In addition, deeper knowledge gives the nurses confident in educating others in the topic and therefore spreading the information for others. Nurses with deeper knowledge of nutritional guidelines and nutritional care are more capable of taking care of a nutritional problems and have more possibilities in satisfying patients suffering from malnourishment. In addition, nurses with deeper knowledge tend to be more determined in identifying issues with patient's nutritional status**.** (Bjerrum et al. 81-88.) According to Atinyagrika Adugbire and Aziato (2018, 7), patients feel that some nurses rush in with educating patients about the benefits of nutrition and end up educating them with incomplete information or with information that the patient cannot understand.

This literature review shows that early enteral nutrition can promote the recovery of intestinal functions postoperatively. Early postoperative ileus can be reduced with the use of early enteral nutrition. However, the appearance of other postoperative complications such as diarrhea, abdominal cramps, and abdominal distention was not affected using early enteral nutrition compared to the use of late enteral nutrition. The results indicate that using probiotics with enteral nutrition quickens the time of first latus and the relief of abdominal distention as well as reduces the numbers of cases of postoperative diarrhea. However, the use of probiotics with enteral nutrition does not influence the appearance of postoperative symptoms such as

vomiting, anastomotic fistula, pulmonary infection, and duodenal stump fistula compared with the use of enteral nutrition. (Chunbao et al. 2018, 3-5; Haitao et al. 2018, 680-682.) In addition to the acknowledgment of the effects of nutrition on postoperative symptoms, nurses should guide patients in other means that might help reduce discomfort related to postoperative eating. Patients going through surgeries that effect the esophagus describe their experiences of eating immediately after operation. Patients describe feelings of fear of physical pain and feelings of early satiation after eating. The shared roles of patient and nurse are emphasized in situations of early oral nutrition to achieve optimal nutritional status. Nurses can advise patients in eating small portions frequently, avoiding carbonated drinks to avoid gas from building up, sitting during and after eating, and sleeping with their upper body slightly elevated to avoid postoperative symptoms and discomfort after surgery of the gastrointestinal tract. (Fowler, & Jaromahum 2010, 98-100.)

Patients who underwent surgery to their esophagus and stayed in the hospital for more than seven days developed a fear of going home and maintaining their nutritional care at home. Nurses should understand that these fears are real for the patients and can affect to their social, psychological, and physical wellbeing. (Fowler, & Jaromahum 2010, 99-100.) As can be seen from the results of this literature review nutrition has effects on the length of hospital stay. Length of hospital stay can be reduced with the use of early enteral nutrition and the use of w-3 fatty acids supplemented nutrition. Use of enteral immunonutrition does not quicken the release from the hospital compared to the use of enteral nutrition. (Chunbao et al. 2018, 4-5; Deqiang et al. 2018, 125.) Nurses should acknowledge the effects nutrition can have on the length of hospital stay but also understand the patient's feelings and fears of being discharged from the hospital. Understanding these fears helps nurses to give emotional support to the patient and to educate the patient about nutritional care at home. In addition to results indicating the effects of patient's nutritional status and

postoperative nutrition having on the length of hospital stay, it would have been interesting to know about patient's own experiences, worries and attitudes towards nutritional care.

As seen on the results of this literature review, proper nutrition can have beneficial impacts on patient recovery in postoperative care. However, some patients feel that nurses do not emphasize the effects of nutrition enough, even if they would be willing to make changes to their eating habits. (Atinyagrika Adugbire, & Aziato 2018, 7.) On the other hand, some postoperative cancer patients, knowing the benefits of nutrition on the recovery, feel like nurses and dietitians pressure them too much in making changes in their eating habits. Patients feel that when they get to be in control of their own nutritional care, they are more confident in their postoperative recovery. (Burden et al. 2014, 1031-1032.) A nurse might find difficulties in the assessment of how much information and control to take of the nutritional care of a patient since each patient is an individual needing different level of support and education concerning the nutritional care. Therefore, discussions should be had with the patient during the entire course of care to ensure they understand the benefits of nutrition to their recovery and to make sure they do not feel uncomfortable or pressured in the performing of the care.

6.2 Ethical considerations, bias, critical appraisal, and reliability and validity in research

Ethics can be described as norms that differentiate between acceptable and unacceptable behavior. Ethics exist in all aspects of life and therefore they are concerned when conducting research. For research to be effective and meaningful should it be done in ethical manner. Whilst conducting research should the overall potential for harm and the benefits for participants of the study be assessed realistically. Formal procedures have been placed to protect research participants from harm. These pro-

cedures protect participants by avoiding harm, securing informed consent, and maintaining privacy and confidentiality. (Clark 2019, 394.) In this thesis all articles used had considered research ethics. The meta-analysis used as sources for the data analysis in this thesis had all considered the appearance of bias and all consisted of good quality articles without bias. The three articles consisting of clinical trials were all approved by ethics committees. Studies using patient data informed that patients' information was kept private and that confidentiality was maintained. Studies reported that signed consent forms were obtained from patients participating to the studies.

Research misconduct or research fraud is a term that consist of fabrication or falsification of data and/or results and plagiarism. Research misconduct can occur in any type of research and at any stage of the research. Fabrication of data is described as making up data or results and reporting or recording them. Data falsification means the manipulation of research materials, equipment, or process as well as the changing or excluding of data or results in a way that the research is not correctly represented. Taking credit of another person's ideas, process, results, or words and presenting them as one's own is called plagiarism. If research misconduct is suspected should the allegations be credible and specific. (Barnes, & Bierer 2014 ,2-4.) The author of this thesis aims to avoid any research misconduct by acknowledging the determination of the term. Plagiarism is avoided by the correct citation of sources and by giving the credit to the authors of the research. The author of this thesis included all the results and data that answered the research question to maintain the results of this study free of falsification or fabrication.

Biases can influence research, therefore, understanding and acknowledging them during research is important. Biases are present in all research and as they are detected by the researcher they should be reported in the work. This literature review aims to have minimal bias, however as all research also this work involves bias. As material was sorted according to the availability for JAMK students some relevant articles might have been sorted out in the selection of articles. The author of this thesis

acknowledges that bias related to languages can be present in this literature review as only articles written in two languages could be utilized. (Grossoehme 2014, 111-117.)

Whilst conducting this literature review it was kept in mind that data should be valid and reliable. Therefore, in the article selection process data published before the year 2018 was sorted out to guarantee up to date information. Selected articles were assessed by using a specific appraisal tool. A literature review is a powerful form of research as it combines relevant data from multiple sources. A good literature review consists of good quality articles. Therefore, the use of critical appraisal tool should be used to assess the quality of articles. The author of this literature review used a critical appraisal tool that assesses and scores nice areas of an article. These areas include the abstract and title, introduction and aims, method and data, sampling, data analysis, ethics and bias, results, transferability or generalizability, and implications and usefulness. Each area of assessment is scored from 1 to 4. 4 being Good, 3 being Fair, 2 being Poor, and 1 being Very Poor. Using this method of scoring gives the maximum total of 36 and minimal total of 9. By scoring articles the strength and weaknesses of a research can be revealed. (Hardey, Hawker, Kerr, Payne, & Powell 2002, 1292-1297.) The critical appraisal assessment and scoring of the articles used in this literature review can be seen in Appendix 2.

In research reliability means the extent to which the results of the research are repeatable. Reliability ponders the question “if someone else were to conduct the same research would the results be same?”. As means of demonstrating reliability in this literature review each step was documented and reported in this work. The author of this literature review wishes that the results are presented in a way that they truly represent what they claim to insure validity for the literature review. By ensuring validity and reliability in research rigor of the study can be improved. (Grossoehme 2014, 111-112.)

The results of this study consider a topic that is at hand in many countries and therefore can be utilized worldwide. However, as this literature review consists of six articles, may material be limited, therefore, leading to the generalization of the results being restricted. As original articles all relate to operations of gastrointestinal area considerations about the relevance of results should be mostly utilized in the care of postoperative patients within this field of surgery. However, some results apply to the overall care of operative patients and with careful consideration can be utilized in the treatment of all postoperative patients. Research that conducted the results of this literature review were conducted in different countries. Reader should acknowledge that nutritional habits and recommendations vary by country, and therefore education about the topic might differ and the results of this literature review might be utilized differently.

6.3 Conclusions

From the results of this literature review, it can be gathered that patients with good nutritional status experience less postoperative complications. The use of early enteral nutrition and probiotic, immunonutrient or w-3 fatty acid supplemented enteral nutriton can reduce the risk of postoperative infectious complications and shorten the length of hospital stay. As this literature review focused on the postoperative effects of nutrition, could information about patient's preoperative nutritional status and its effects be studied and compiled.

This literature review forms and introduction to the topic of what impacts nutrition has on patient recovery on postoperative care. As the purpose was to bring the information found to the knowlede of professionals to utilize in the nursing care of postoperative patients, this thesis starts the process of unraveling the information. However, plenty of information is left to be compiled within the topic. Even as there is available information about this topic, should the topic be further researched. Research could be directed to the effects of nutrition to the recovery of a patient in

spesific fields of surgery. As discussion reveals there might be confusion about the roles and responsibilities conserning nutritional care. Therefore, further research about the topic could be conducted to enlighten the attitudes of healthcare professionals regarding to the matter. As nutrtional care is often pondered from the health care professionals point of view, might patient's attitudes and fears be left in the background. Therefore, additional research could be conducted and findings could be gathered on the patient's perspective of the topic.

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Appendices

Appendix 1 - Information about selected articles.

Writers of the article	Name of the article	Publication information	Main findings	Type of study
Albertini et al.	Malnutrition and clinical outcomes in surgical patients with colorectal disease.	2018 in Arquivos de Gastroenterol, 55, 397-402.	According to findings lower values of phase angle can be caused by malnutrition. Malnutrition is associated in greater distribution of water in the extracellular compartment.	Retrospective and analytical cross-sectional study performed in Brazil.
Chengfeng, & Yajie	Effect of w-3 polyunsaturated fatty acid-supplemented parenteral nutrition on inflammatory and immune function in postoperative patients with gastrointestinal malignancy.	2018 in Medicine, 97:16, 1-12.	Findings of the study show that early intervention with w-3 fatty acids combined with parenteral nutrition can improve immune functions, reduce inflammatory reactions and improve the postoperative curative effect in patients with gastrointestinal malignancy.	A meta-analysis of randomized control trials in China.
Chunbao et al.	The impact of early enteral nutrition on pediatric patients undergoing gastrointestinal anastomosis a propensity score matching analysis.	2018 in Medicine 97:9, 1-7.	Study indicates that early enteral nutrition promotes rapid postoperative intestinal function recovery as well as reduces postoperative complications and length of hospital stay.	Retrospective controlled clinical trial.
Deqiang et al.	Effects of perenteral w-3 fatty acid supplementation in postoperative gastrointestinal cancer on immune function and length of hospital stay: a systematic review and meta-analysis.	2018 in Asia Pacific Journal of Clinical Nutrition, 27, 121-128.	Findings show that parenteral w-3 fatty acid supplementation reduces the length of hospital stay and the occurrence of infections complications. Supplementation benefits the immune functions and inflammatory response.	Meta-analysis of published data.

Haitao et al.	Effects of probiotics combined with enteral nutrition on immune function and inflammatory response in postoperative patients with gastric cancer.	2018 in Official Journal of the Balkan Union of Oncology, 3, 678-683.	Study's findings indicate that combining probiotics with enteral nutrition has a beneficial effect on patient's nutritional status, immune functions and inflammatory response. The use of probiotics combined with enteral nutrition can reduce postoperative adverse effects.	Prospective randomized controlled trial in China.
Juan et al.	Enteral immunonutrition versus enteral nutrition for gastric cancer patients undergoing a total gastrectomy: a systematic review and meta-analysis.	2018 in BMC Gastroenterology, 18:11, 1-11.	Enteral immunonutrition can benefit gastric cancer patients after operation by improving their nutritional and immunological status. Enteral immunonutrition does not influence postoperative complications that lead to death or the length of hospital stay.	Meta-analysis of published data.

Appendix 2 – Critical appraisal of the articles (Hardey et al. 2002).

Author	**1. Abstract /title**	**2. Introducation and aims**	**3. Methods and data**	**4. Sampling**	**5. Data analysis**	**6. Ethics and bias**	**7. Results**	**8. Transferability or generalizability**	**9. Implications and usefulness**	**Total**	**Comments**
Albertini et al.	4	4	3	3	4	4	4	4	2	**32**	Does not suggests ideas for further research. Does not suggests implications for policy and/or practice.
Chengfeng, & Yajie	4	4	4	4	4	4	4	4	4	**36**	
Chunbao et al.	4	4	4	4	4	4	4	4	4	**36**	
Deqiang et al.	4	4	4	4	4	4	4	4	4	**36**	
Haitao et al.	4	4	3	4	3	4	4	4	4	**34**	
Juan et al.	4	3	4	4	4	4	4	4	4	**35**	