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# Enteral Nutrition among Surgical Patients

## Literature Review

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<p>The purpose of this literature review was to describe what the effects of enteral nutrition are for surgical patients The aim is to improve enteral nutrition of surgical patients. The chosen study question was: what are the effects of enteral nutrition for surgical patients?</p> <p>Database search was conducted using EBSCO CINAHL and Ovid Medline databases, also manual search was performed. A total of 19 articles were chosen for further analysis. The acquired information was examined using the principles of content analysis. The findings were categorized in two main categories: positive and negative effects of enteral nutrition. Each of the categories was divided into subcategories.</p> <p>It was revealed that enteral nutrition has several benefits for surgical patients. Complications such as malnutrition, infections, gastrointestinal problems or pressure ulcers were reduced, gastrointestinal function and clinical outcome improved. It was psychologically beneficial and it had the potential of reducing costs of care and postoperative hospital stay. Especially early enteral nutrition proved to have positive effects. Negative effects were also reported in connection with feeding tube.</p> <p>Enteral nutrition is an important factor in postoperative recovery and nurses are responsible for delivering nutritional care for patients. Therefore, it is important the nurses are equipped with sufficient knowledge about nutritional care.</p>	
Keywords	nutrition, patient, nursing, surgical, enteral

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<p>Tämän opinnäytetyön tarkoitus oli kuvata enteraalisen ravitsemuksen vaikutuksia kirurgisten potilaiden hoidossa. Tavoitteena on parantaa kirurgisten potilaiden ravitsemushoitoa. Työssä haettiin vastausta siihen mitä vaikutuksia enteraalisella ravitsemuksella on kirurgisille potilaille?</p> <p>Toteutusmenetelmänä oli laadullinen kirjallisuuskatsaus. Tietokantahaku suoritettiin käyttämällä EBSCO CINAHL ja Ovid Medline tietokantoja sekä myös manuaalisesti. Yhteensä 19 artikkelia valittiin analysoitaviksi. Kaksi kategoriaa, joita käytettiin tutkimustulosten erottelussa on enteraalisen ravitsemuksen positiiviset sekä negatiiviset vaikutukset. Molemmat kategoriat jaettiin edelleen pienempiin kategorioihin.</p> <p>Tulokset osoittivat että enteraalisella ravitsemuksella on monia hyötyjä kirurgisten potilaiden hoidossa. Komplikaatiot kuten vajaaravitsemustila, tulehdukset, gastroenterologiset oireet sekä makuuhaavat vähenivät ja sekä gastrointestinaalinen toiminta että kliininen ennuste paranivat. Myös psykologisia hyötyjä ilmeni sekä hoitokulut ja sairaalassaoloaika vähenivät. Erityisesti aikaisin aloitettu enteraalinen ravitseminen osoittautui hyödylliseksi potilaille. Negatiivisia puolia ilmeni syöttöletkuun liittyen. Enteraalinen ravitseminen on tärkeä osa postoperatiivista paranemisprosessia ja hoitohenkilökunta on vastuussa potilaiden oikeaoppisesta ravitsemuksesta. On siis tärkeää että hoitohenkilökunnalla on vaadittava tietotaso ravitsemukseen liittyen.</p>	
Avainsanat	ravitseminen, potilas, hoitotyö, kirurginen, enteraalinen

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## **1 Introduction and background**

Nutritional support plays a central role for a wide range of patients (Garrow et al 2000:459). Surgical patients' nutritional status is believed to be an important factor determining surgical outcome (Fearon & Luff 2003).

The ultimate aim of nutritional support is to reduce the risk of negative protein balance by avoiding starvation, thereby preserving muscle, immune, and cognitive function and improving postoperative recovery (Bozzetti et al. 2009).

Patients undergoing a surgical procedure face many metabolic and physiological challenges that may compromise nutritional status. In the case of most surgeries, patients are able to eat after surgery and do not need artificial nutrition. However, major operation or complications after surgery can delay the administration of oral nutrition. Nutritional requirements are often increased in such patients to aid healing of wounds and hypermetabolism related with postoperative recovery. (Huckleberry 2004.)

Nurses are highly involved in tasks in connection with nutrition. They perform malnutrition or obesity risk screenings, assess the need for nutrition and specialized diet, order and distribute food with hospital assistants, help patients eat if necessary, get feedback from patients and they are aware of dietary guidelines. (Nuutinen et al. 2010.)

According to Rautiainen, Pelanteri and Rasilainen (2012), there were more than 290 000 surgical patients in Finland in 2012; most of them were treated on orthopedic and gastroenterological wards. Smeltzer et al. (2007:5) claim the word "patient" refers to individuals who get care. A Dictionary of Nursing (2008:344) defines surgery as a branch of medicine that treats conditions by operation or manipulation. Summarizing the two definitions, we can say surgical patients are individuals undergoing or recovering from surgery. In this work we concentrate on surgical hospital patients and exclude day-surgery patients.

Nutrition means the intake of nutrients and their absorption by the body (A Dictionary of Nursing 2008:344). Nutritional imbalance means having too much or too little of one or more crucial nutrients. If patients receive too few nutrients it can lead to malnutrition,

while too much will result in overnutrition. (Smeltzer, Bare, Hinkle and Cheever 2007:101.)

International studies estimate the prevalence of malnutrition among surgical patients to be in the range 27–52% (Bruun et al. 1999; Garth et al. 2010; Kahokehr et al. 2010; Siribumrungwong et al. 2011). Nutritional depletion or malnutrition has been proven to be a critical determinant in the development of postoperative complications (Ward 2003) in contributing to high morbidity and mortality following surgery (Garrow et al. 2000:483). Poor nutrition is related to changes in body composition, tissue breakdown and weakened organ function, which result in the impairment of the immune system and muscle functions. Thus, patients lacking the access to good nutrition are at great risk of infections and cardiorespiratory complications. (Ward 2003.)

Nutrition can be enteral or parenteral. Enteral nutrition is delivering nutrients to the intestines (A Dictionary of Nursing 2008:344). In current surgical practices it is advised to encourage patients to eat normal food within 1-3 days after surgery (Bozzetti et al. 2009). Not all the patients are able or allowed to eat after the surgery, in these cases tube feeding is introduced. Tube feeding refers to delivering nutrients via nasogastric and nasoenteric tubes and also to gastrostomies. (Smeltzer et al. 2007:1175,1181.) The most common patient groups who require tube feeding are patients with gastrointestinal disorders, patients receiving cancer treatment, patients recovering from trauma, surgeries or severe illnesses, coma patients, mentally ill patients or patients with conditions affecting the mouth, neck, oropharynx or esophagus (Smeltzer et al. 2007:1181). The European Society for Clinical Nutrition and Metabolism (ESPEN) Guidelines for adult parenteral nutrition states that enteral nutrition is usually contraindicated in case of bowel obstruction, malabsorption, multiple fistulas with high output, intestinal ischemia, severe shock and acute sepsis (Bozzetti et al. 2009).

Patients who are not able to achieve their calorie requirements within 7-10 days after surgery orally or enterally are recommended to receive parenteral nutrition (Bozzetti et al.: 2009). Parenteral nutrition is the other option to supply the body with nutrients. Parenteral nutrition means providing nutrients for the body via intravenous route. However, enteral nutrition is always considered first before introducing parenteral nutrition; yet there are some situations when intravenous nutrition becomes necessary. These are loss of 10% of body weight during an illness, not being able to take in food

or drinks enterally within 7 days after a surgery or suffering from serious hypercatabolic conditions. (Smeltzer et al. 2007:1193.)

## **2 Purpose, aim and study question**

The purpose of this final project was to describe what the effects of enteral nutrition are for surgical patients. The aim is to improve enteral nutrition of surgical patients. In our case the chosen study question was: **what are the effects of enteral nutrition for surgical patients?**

## **3 Data collection method and data analysis**

### 3.1 Data collection method

Our work is a qualitative research in literature review form. A literature review is described as a written paper in which a particular topic of study is presented through a logically argued case on an extensive understanding of a current state of knowledge (Onwuegbuzie et al 2012). The main purpose of a literature review is to collect various sources of evidence on a particular topic and to generate knowledge that can possibly be used to enhance clinical practice and health care outcomes. Prior to searching for articles, a research question is formulated to provide a focus that guides the literature review. (Wood-LoBiondo & Haber 2010:63.) A wide spectrum of literature was gathered through multiple resources to answer the research question using an evidence-based practical approach (Wood-LoBiondo & Haber 2010:61).

### 3.2 Database search

Database search was conducted using EBSCO CINAHL and Ovid Medline databases. The search terms used were: nursing, patient, nutrition, surgical, ward, enteral, feeding. Pediatric and geriatric research articles were excluded. During the initial phase the search was restricted to articles published between 2003-2013 but it did not result in enough articles so the following searches were limited to articles published after 2000.

Only articles available in English language were used. Database search is presented in Appendix 1. A total of 19 articles were chosen for further analysis.

### 3.3 Data analysis

One key element of qualitative content analysis is creating categories of the same topics. A category includes a descriptive level of content and thereby it is the expression of the content of the text. Content analysis is the examination of subject; it concentrates on differences and similarities between categories and is often used in nursing research. (Graneheim & Lundman: 2004.)

Appropriate keywords for the article search were chosen after having briefly investigated the background information available related to our topic. By combining keywords, a greater number of articles were acquired. After reviewing the abstracts of potentially relevant articles, studies that appeared usable were identified and chosen. The sufficiency of sample size, quality of the collected data and relevancy of the used procedures were analyzed to examine the validity and reliability of the article. The acquired information was examined using the principles of content analysis. The analyzed articles (n=19) are presented in Table 2, Appendix 2.

## 4 Results

The purpose of our study is to describe what the effects of enteral nutrition are for surgical patients. A total of 19 relevant research articles met the criteria for inclusion in the literature review. The results of the articles are presented in categories and further classified in subcategories. The two main categories were positive effects and negative effects as illustrated in Figure 1.



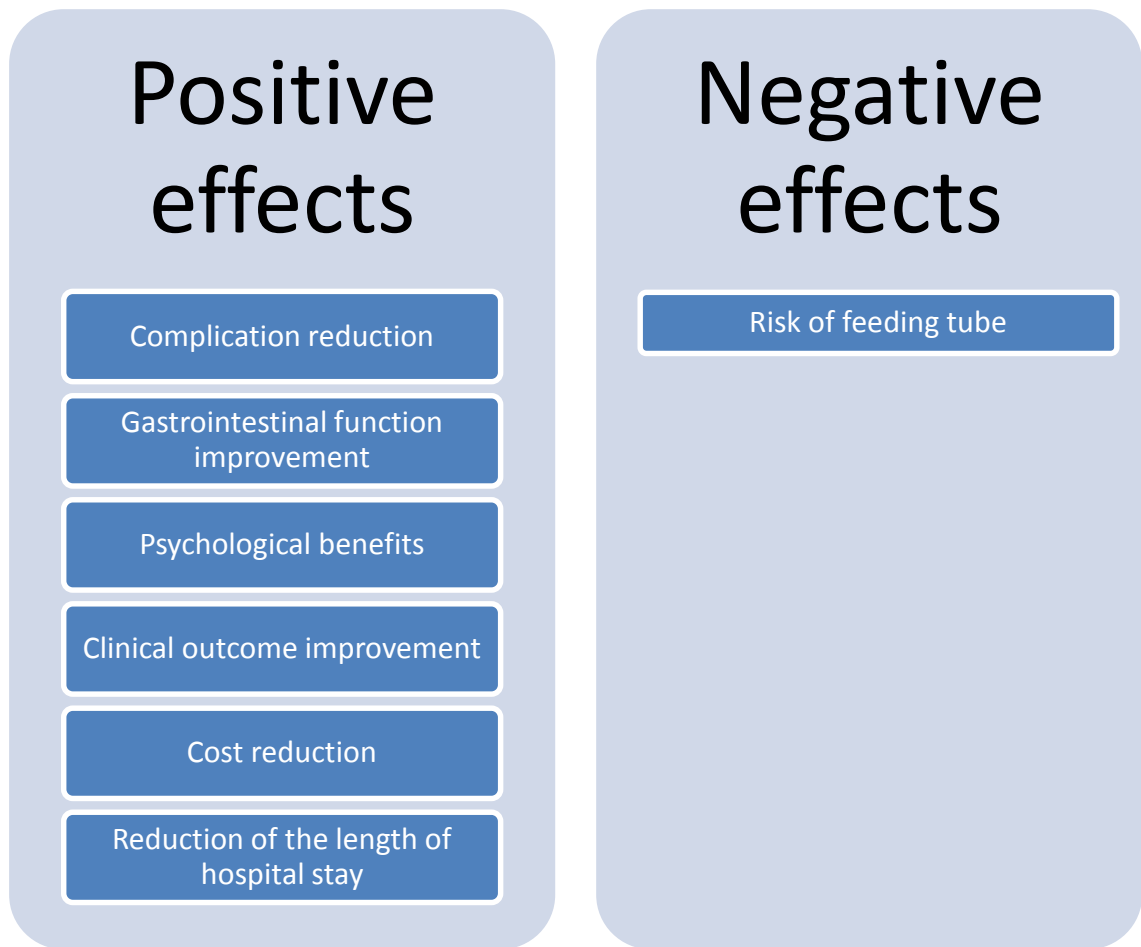


Figure 1. Effects of enteral nutrition for surgical patients

#### 4.1 Positive effects

##### 4.1.1 Complication reduction

Complications were closely related to surgical patients and commonly discussed in most of our articles. Patients undergoing surgeries are at risk of malnutrition due to various reasons such as stress from surgery, extended period of starvation and subsequent increase in metabolic rate. As a result, malnutrition increases the possibility of infection, morbidity and accounts for longer periods of hospitalization. (Beattie et al. 2000.)

A study from UK hospitals revealed that patients who received supplements both before and after surgery lost significantly less weight. The patients who were provided with nutritional supplements either before or after surgery suffered from fewer minor

complications than those who did not receive perioperative nutritional support. The benefit of postoperative oral nutritional supplements on clinical outcome was not dependent on nutritional status and was not limited to malnourished patients. (Smedley et al. 2004.)

After gastrointestinal surgery one of the main goals is recovery of normal gastrointestinal function to allow sufficient food intake and fast recovery. A UK study assigned patients after GI surgery to either a conservative postoperative nutritional schedule or a free diet choice of their own. Patients from the conservative group had liquid diet for 3 days while the free diet group could eat whatever and whenever they wanted. The results revealed that early oral feeding does not reduce the length of postoperative ileus or lead to higher rate of nasogastric tube reinsertion. Gastrointestinal functional recovery was not influenced by the tolerance of oral diet. In return of bowel function, there were no compelling alterations between groups. Mortality and complications were similar in both groups. Evidence shows that sufficient oral intake strengthens intestinal anastomoses and does not lead to anastomotic complications. The research did not find any substantial reason to delay oral intake after open colorectal or abdominal vascular surgery. (Han-Geurts et al. 2007.)

Early enteral feeding has become a part of modern health care protocol after gastrointestinal operations. A study compared patients receiving early enteral nutrition (EEN) to total parenteral nutrition (TPN) after pancreaticoduodenectomy. Participants from the early enteral feeding group had a faster return to normal soft diet than in the TPN group. 4 out of 18 patients in the EEN group experienced side effects related to enteral nutrition. Side effects in connection with enteral nutrition such as diarrhea, abdominal cramps and swelling, aspiration, sore throat and vomiting were observed. Conservative medical management and temporary reducing the amount of enteral nutrition relieved all of these. Occurrence of pancreatic leakage proved to be similar in both groups therefore early enteral feeding is not considered to be risk factor for pancreatic leakage. Periodical enteral feeding is considered to be more beneficial than continuous feeding because it is more natural and follows a daily rhythm. The results reveal that EEN does not lead to delayed gastric emptying after pancreaticoduodenectomy. Additionally, EEN helps achieve prompter recovery of bowel peristalsis by reducing recanalization time for passing gas and feces. Participants of the early enteral feeding group achieved optimal nutrition by following the care guidelines and were able to gain back their preoperative weight in 3 weeks, which was more difficult for the TPN group. (Park, Chung, Hwang, Kim & Yoon 2012.)

Gunnarsson et al. (2009) conducted a study which aimed to investigate whether patients receiving nutritional intervention preoperatively have different clinical outcome in terms of postoperative complications, rehabilitation, length of stay and food and liquid intake. The primal finding of the study was that patients who received nutritional intervention had a significantly smaller occurrence of pressure ulcers within five days postoperatively. The intervention group also did not suffer from severe pain and their quality of life was increased. The decreased occurrence of pressure ulcer also supported saving for the society, as each pressure ulcer costs approximately €1780 to resolve. The length of hospital stay was reduced from nine days to seven days. Staying one day at the orthopedic ward costs €590, while nutritional supplements cost €54.

Early oral feeding was compared with traditional feeding approach. In early oral feeding group the nasogastric tube was removed after the operation in 12 to 24 hours, after which patients were allowed to eat; while in traditional feeding group the nasogastric tube was kept in place until the first passage of flatus. The postoperative complications such as anastomotic leakage, acute dilation of stomach and wound complications were similar in the groups but fever, pulmonary infection and pharyngolaryngitis were much more common in people participating in the traditional feeding method. (Zhou et al. 2006.)

However, a research by Klek et al. (2011) showed no significant difference in infection complication between the patients receiving enteral and parenteral formulas. The postoperative hospital stay was unaffected by immunomodulating formulas or enteral nutrition. The findings of this study differ from other trials and meta-analyses where enteral nutrition was shown to be able to decrease overall complications compared to parenteral nutrition.

#### 4.1.2 Gastrointestinal function improvement

Zhou et al. (2006) found that removing the nasogastric tube during the first postoperative day and starting early oral feeding can improve the return of gastrointestinal function. Not only did the time of first passage of flatus and stool happen sooner but the time of postoperative stay was also shorter in this group.

Removal of the nasogastric (NG) tube within 2 days from upper GI anastomosis surgery and starting an oral diet is safer than keeping the NG tube in place for 3-5 days. Early oral feeding can reduce the time of the first flatulence and bowel movement, postoperative length of stay and expenses. According to the study, early removal of the NG tube and early feeding increased patient satisfaction in all cases and did not increase complications. Patients who were tube-fed reported discomfort due to the long period of the NG tube use. (Haleh, Hosseini, Mousavinasab, & Stotdeh 2009.)

#### 4.1.3 Psychological benefits

Beattie et al. (2000) conducted a research that illustrated the effect of nutrition on physical and mental health and improvement of quality of life. There was a significant improvement in physical and mental health in patients who received nutritional support. The research also showed that nutritional intervention helped prevent depletion of body tissue, improve quality of life and improve clinical outcome.

Jaromahum and Fowler (2010) investigated patients' experiences of eating right after esophagectomy. Most of the patients had psychological problems, for example a fear of pain after the surgery or a fear of returning home and managing there alone. Eating for the first time after the operation was however a joyful moment; all the participants were happy to be able to eat after days or months of not receiving food by mouth. They felt determined and they knew it is very important to eat even though they felt like they were getting full fast. Health care workers should concentrate on foods the patient can enjoy instead of highlighting the meals that have to be avoided.

Early oral feeding is more beneficial to patients than parenteral nutrition in terms of psychological wellbeing and early mobilization, as they are not bound to bed with an IV drip and they can move freely (Shah et al. 2012).

#### 4.1.4 Clinical outcome improvement

Patients who were able to consume a free diet of their choice tolerated solid food earlier than those who received a liquid diet according to hospital protocols and were

not allowed to take in food orally. This emphasizes that most of the patients could decide by themselves when they would like to eat for the first time postoperatively. (Han-Geurts et al. 2007.)

Beattie et al. (2000) conducted a study that showed that nutritional support to patients undergoing surgical procedures lead to improvement of nutritional status and nutritional outcome. Their results showed that there were significantly less complications such as chest and wound infections. The benefit of enteral nutrition was also apparent as it helped decrease weight loss pre- and postoperatively.

Jie et al. (2012) stated that poor nutrition is common in patients undergoing surgery and it can lead to worse clinical outcomes. They continued on by saying that malnourished patients undergoing surgery could benefit from perioperative nutritional support. The results indicate that patients who have at least 5 points at the NRS (Nutritional Risk Screening Tool 2002) could benefit from preoperative nutritional support to reduce the risk of complications. They explain the complication rate was considerably lower in the group that received preoperative nutritional support compared to the control group (no preoperative nutrition). Similarly, the length of stay was shorter for the patients in the preoperative nutrition group.

A Brazilian study investigated the impact of early postoperative oral feeding in patients undergoing elective colorectal resection. Early feeding group could eat freely starting from the first postoperative day while traditional care group could eat after the first pass of flatus. The results of their pilot clinical trial indicate that early oral intake has a positive effect on postoperative recovery of colorectal surgical patients. Even though malnutrition was more common in the early feeding group it still had better postoperative outcome, shorter hospital stay, lower rate of diarrhea and the occurrence of complications was similar. These results support the idea that early nutrition is essential in the recovery of the patient, even when malnutrition is present. (Consoli, Fonseca, Silva & Correia 2010.)

Numerous studies questioned whether improved patient outcomes relate to perioperative nutritional practices after gastrointestinal cancer resection. Malnutrition combined with postponed and insufficient post-operative nutrition is connected with poorer clinical results. The longer it took to reach sufficient nutrition the longer the length of stay and higher the risk for complications was, however the chance for

postoperative weight change decreased. Patients who were kept nil-by-mouth for longer after the operation needed more time to achieve sufficient nutrition. The present study found that insufficient post-operative nutrition was related to worse clinical outcomes in patients with upper GI or colorectal cancer. (Garth, Newsome, Simmance & Crowe 2010.)

#### 4.1.5 Cost reduction

The timing of nutritional intervention also plays a critical role in influencing the outcome in surgical patients. The anti-inflammatory benefits of immunonutrition were more prominent when it was administered preoperatively for malnourished patients. The reason why enteral nutrition was more beneficial for surgical patients was due to the fact that parenteral nutrition often faced catheter-related complications and overfeeding. (Klek et al. 2011.)

In developing countries the costs of prolonged postoperative IV infusion can cause problems. According to a study from a Nepal teaching hospital, early discontinuation of IV fluids and nutrients and introducing oral feeding resulted in financial savings. Patient, family and also nursing staff welcomed this change in practice. (Shah et al. 2012.)

Providing oral nutritional supplements proved to be cost effective according to a study by Smedley et al. (2004). They found that overall costs were greatest in patients who did not receive any nutritional support. They explained costs were calculated by including all aspects of care, staff time, ward expenses and use of special tools for example wound dressings.

#### 4.1.6 Reduction of the length of hospital stay

There are conflicting reports about the effect of early enteral nutrition on the length of postoperative hospital stay. Few studies to date have attempted to identify whether early nutritional support helps reduce costs or not.

Barlow et al. (2011) findings showed that the delivery of early enteral nutrition within 12 hours postoperatively was safe and related to improved clinical outcomes. Early enteral

nutritional support decreased the length of hospital stay. The median postoperative stay for patients receiving early enteral nutrition was 16 days compared to 19 days for patients who did not receive early enteral nutrition. There was less operative morbidity in the early enteral nutrition therapy group. There were no major complications such as catheter site infections, leakage or displaced feeding tubes.

Lucha et al. (2005) conducted a study that aimed to determine whether early postoperative feeding could shorten the length of hospital stay and costs. The cost of hospital stay was fairly similar between the two groups, with only \$72 savings noted in the early feeding group. The length of hospital stay was also similar between the two groups being 6.6 days for the traditional feeding group and 6.3 days for the early feeding group. In order to achieve a great impact on hospital stay, a significant reduction in the length of hospital stay would need to occur. However, the length of hospital stay was about the same between the groups and costs were not reduced.

## 4.2 Negative effects

### 4.2.1 Risk of feeding tube

Enteral feeding tubes appeared to be associated with diarrhea. Patients treated with enteral nutrition were compared with non-treated patients. Diarrhea appeared in both groups but it was 3 times more common in patients receiving enteral nutrition. The reason behind this mechanism is thought to be the administration of large volumes of hyperosmolar liquid solutions with high caloric densities, which may result in diarrhea. Old age and hospitalization during the summer were also found to be risk factors for developing diarrhea. Other issues, such as type of enteral feeding, diet ingredients, way of administration, and size of formula, were not found to have an effect on the occurrence of diarrhea. (Luft, Beghetto, Mello & Polanczyk 2008.)

Hamin et al. (2012) wished to determine how frequently oral intake is delayed and the amount of nutrition delivered via the jejunostomy tube. In Canada, jejunostomy tubes are routinely placed at the time of elective esophagectomy to provide early enteral nutrition, to help reduce perioperative complications and to work as a “safety valve” in case of delay in the resumption of oral intake. The results showed difficulty in meeting

the nutritional target, as only half of the intended nutrition was actually delivered to the patient. Medical difficulties such as diarrhea and abdominal pain were experienced by some patients (44 patients), which resulted in withholding their tube feeding and limited achieving successful nutrition targets. During the study 47.9% of the target nutrition was actually delivered.

## **5 Discussion**

### **5.1 Discussion of the results**

The articles used in our literature review provided evidence that highlights the importance of enteral nutrition for surgical patients. According to Fearon and Luff (2003), surgical patients' nutritional status is considered to be an important factor in determining the surgical outcome. Nurses play a prominent role in nutrition such as in delivering, screening and assessing the need for nutrition and specialized diet for surgical patients. The finding of our literature review falls into two categories: Positive and negative effects of enteral nutrition for surgical patients

One of the main reoccurring themes in the articles that were reviewed was the benefit of early enteral nutrition. Surgical patients receiving early postoperative nutritional support have been shown to have positive clinical outcome. Most of the studies demonstrated that the administration of enteral nutrition to surgical patients helps decrease complications such as infections and pressure ulcers. The studies revealed that surgical patients receiving nutritional support had a better chance of a positive clinical outcome after their surgery. Efficient nutritional care for surgical patients also helps reduce the length of hospital stay and reduces the cost of medical care. Nutritional intervention is also beneficial for the psychological wellbeing of patients after surgery. According to Beattie et al. (2000) nutritional intervention helps prevent depletion of body tissue and improves the quality of life. Early enteral nutrition is also shown to be beneficial in terms of psychological wellbeing and early mobilization of patient as they are not bound to bed with an IV drip and they can move freely (Shah et al. 2012). An earlier research by Quin and Neill (2006) reviewed 15 studies concerning early oral feeding after colorectal surgery. They found that 70% of patients tolerated early oral feeding and it did not increase the risk of complications such as intestinal



obstruction, anastomotic leak, aspiration pneumonia or mortality compared with traditional feeding. They emphasized that providing good nutrition is important but other factors such as patient education, effective pain relief and early mobilization should not be overlooked either. A few of the articles also highlighted the risk related to enteral nutrition. Enteral feeding tubes appeared to be associated with diarrhea.

While the result appears compelling, these studies are not without limitations. One of the major limitations was the lack of research articles from the nursing point of view. The majority of the articles generated by the database search resulted in articles that were aimed for the medical community. It was challenging to find articles that illustrated the role of nurses in delivering nutrition, screening and assessing the need for nutritional support for surgical patients. Another limitation was that some of the articles found tend to focus on certain types of nutritional supplements (such as the use of immunomodulating or immunoenhancing nutrition) for surgical patients rather than the method used for delivering nutrition.

## 5.2 Ethical considerations

Ethical misconduct was avoided by giving credit to original authors, avoiding fabrication, falsification, misappropriation and mislead. The authors tried to be very accurate and clear in conducting research and in presenting and evaluating the research results. Each member of our group was responsible for fulfilling the ethical rules of the responsible conduct of research. (RCR Guidelines, Finnish advisory board on research integrity.)

## 5.3 Validity

The validity of a research is dependent on how well the instrument is constructed to ensure that the instrument measures correctly what it is supposed to measure. In qualitative study, the researcher is the instrument of data collection and analysis. (Patton 2002: 12.) Data for the literature review was collected from credible sources such as EBSCO CINAHL, Ovid Medline in order to retrieve reliable and peer reviewed articles. Search terms for the database search were carefully chosen after thoroughly reviewing the topic. Manual search was conducted using references of reliable articles. Interpreting a text always involves the risk of misunderstanding and the researcher's

interpretation is influenced by his or her personality (Graneheim & Lundman: 2004). The authors of this final project aimed to be as objective as possible when analyzing the data. All three authors read and reviewed the articles chosen to be analyzed.

## **6 Conclusion**

This literature review adds to the already existing evidence about safety, tolerability and the benefit of enteral nutrition for patients undergoing surgical procedure. It also provides nurses with the knowledge of nutrition for surgical patients. Nurses are responsible for delivering nutritional care for patients. Therefore it is important that nurses are equipped with sufficient knowledge about nutritional care. Nurses should be able to screen, assess, plan, implement and evaluate nutritional care for surgical patients.

## References

*A Dictionary of Nursing* (2008). Oxford: Oxford University Press

Baradi H, Walsh M, Henderson M, Vogt D, Popovich M (2004). Postoperative Jejunal Feeding and Outcome Of Pancreaticoduodenectomy. *The society for surgery of the alimentary tract*, 9 (4), 428-432.

Barlowa R, Price P, Reid DT, Hunt S, Clark WBG, Havard JT, Puntis CAM and Lewis GW (2011). Prospective multicentre randomised controlled trial of early enteral nutrition for patients undergoing major upper gastrointestinal surgical resection. *European Society for Clinical Nutrition and Metabolism*, 30 (5), 560-6.

Beattie AH, Prach AT, Baxter JP, Pennington CR (2002). A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients. *BMJ journals* 46, (813–818).

Bozzetti M, Ljungqvist O, Soeters P, Fearon K, Weiman A, Braga M (2009). The European Society for Clinical Nutrition and Metabolism. <<http://www.espen.org/education/espen-guidelines>> Read 29.09.2013.

Bruun LI, Bosaeus I, Bergstad I, Nygaard K (1999). Prevalence of malnutrition in surgical patients: evaluation of nutritional support and documentation. *Clinical Nutrition*, 18 (3), 141-147.

Butler R, Francis M, Lucha P and Plichta J (2005). The Economic Impact of Early Enteral Feeding in Gastrointestinal Surgery: A Prospective Survey of 51 Consecutive Patients. *The American surgeon*, 71 (3), 187-90.

Consoli MLD, Fonseca ML, da Silva GR, Correia MITD (2010). Early postoperative oral feeding impacts positively in patients undergoing colonic resection: results of a pilot study. *Nutrición Hospitalaria*, 25 (5) 806-9.

Fearon KCH, Luff R (2003). The nutritional management of surgical patients: enhanced recovery after surgery. *The Proceedings of the Nutrition Society* 62 (4), 807-811.

<<http://medical-dictionary.thefreedictionary.com>> Read 17.01.2014

Garrow JS, James WPT, Ralph A (2000). Human nutrition and dietetics. *Churchill Livingstone*, London, UK.

Garth AK, Newsome CM, Simmance N, Crowe TC (2010). Nutritional status, nutrition practices and post-operative complications in patients with gastrointestinal cancer. *Journal of Human Nutrition and Dietetics*, 23 (4), 393-401.

Graneheim UH, Lundman B (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24 (2), 105–112.

Gunnarsson AK, Gunningberg L, Lönn K (2009). Does nutritional intervention for patients with hip fractures reduce postoperative complications and improve rehabilitation?. *Journal of Clinical Nursing*, 18 (9), 1325–1333.

Haleh R, Hosseini NS, Mousavinasab NS, Stotdeh S (2009). Comparing early oral feeding with traditional oral feeding in upper gastrointestinal surgery. *The Turkish Journal of Gastroenterology*, 21 (2), 119-24.

Hamin T, Guyatt G, Uhrh WT, Srinathan KS, Tan LA, Walter S. (2012). Jejunostomy tube feeding in patients undergoing Esophagectomy. *The American surgeon*, 56 (6), 409-14.

Han-Geurts IJM, Hop WCJ, Kok, NFM, Lim A, Brouwer KJ, Jeekel J (2007). Randomized clinical trial of the impact of early enteral feeding on postoperative ileus and recovery. *British Journal of Surgery*, 94 (5), 555-61.

Huckleberry Y (2004). Nutritional support and the surgical patient. *American Society of Health System Pharmacists*, 61 (7), 671-682.

Jaromahum J, Fowler S (2010). Lived Experiences of Eating After Esophagectomy: A Phenomenological Study. *MEDSURG Nursing*, 19(2), 96-100.

Jiang MZ, Jie B, Kondrup J, Nolan TM, Yu K, Zhu NS (2012). Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk. *Nutrition Journal*, 28 (10), 1022-7.

Kahokehr AA, Sammour T, Wang K, Sahakian V, Plank LD, Hill AG (2010). Prevalence of malnutrition on admission to hospital – Acute and elective general surgical patients. *European e-Journal of Clinical Nutrition and Metabolism*, 5 (1), e21–e25.

Klek S, Sierzega M, Szybinski P, Szczepanek K, Scislo L, Walewska E, Kulig J (2011). Perioperative nutrition in malnourished surgical cancer patients - A prospective, randomized, controlled clinical trial. *European Society for Clinical Nutrition and Metabolism*, 30 (6), 708-13.

LoBiondo-Wood G, Haber J (eds.) (2010). *Nursing research: Methods and critical appraisal for evidence-based practice*. St. Louis: Mosby Elsevier.

Luft VC, Beghetto MG, de Mello ED, Polanczyk CA (2008). Role of enteral nutrition in the incidence of diarrhea among hospitalized adult patients. *Nutrition*, 24 (6), 528-35.

Nuutinen O, Siljamäki-Ojansuu U, Mikkonen R, Peltola T, Silaste ML, Uotila H, Sarlio-Lähteenkorva S (2010). Ravitsemushoito, Valtion ravitsemusneuvottelukunta.

<[http://www.ravitsemusneuvottelukunta.fi/files/attachments/fi/vrn/ravitsemushoito\\_netti\\_2.painos.pdf](http://www.ravitsemusneuvottelukunta.fi/files/attachments/fi/vrn/ravitsemushoito_netti_2.painos.pdf)> Read 22.1.2014.

Onwuegbuzie JA, Leech LN, Collins MTK (2012). Qualitative Analysis Techniques for the Review of the Literature. *The qualitative report*, 17, 1-28.

Park JS, Chung HK, Hwang HK, Kim JK, Yoon DS (2012). Postoperative Nutritional Effects of Early Enteral Feeding Compared with Total Parental Nutrition in Pancreaticoduodenectomy Patients: A Prospective, Randomized Study. *Journal of Korean Medical Science*, 27(3), 261-7.

Patton MQ (2002). *Qualitative research and evaluation methods*. 3<sup>rd</sup> Ed. United Kingdom: Sage publication Ltd.

Quin WN, Neill J (2006). Evidence for early oral feeding of patients after elective open colorectal surgery: a literature review. *Journal of Clinical Nursing*, 15 (6), 696-709.

Rautiainen H, Pelanteri S, Rasilainen J (2012). *Somaattinen erikoissairaanhoito* Terveyden ja Hyvinvoinnin Laitos.

RCR guidelines: Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Finnish advisory board on research integrity. <[www.tenk.fi](http://www.tenk.fi)> Read 22.1.2014.

Shah JN, Maharjan SB, Manandhar K, Paudyal S, Shrestha S, Shah S, Lamichane D (2012). Early Feeding and Discontinuation of Intravenous Fluid After Laparoscopic Cholecystectomy. *Journal of Nepal Health Research Council* 10(1):28-31.

Siribumrungwong B, Srithamma B, Kuntongpreeda K, Tomtitchong P, Paochareun V. (2011). Prevalence of malnutrition and nutritional assessment in abdominal-surgical patients; a prospective cross-sectional study. *Journal of the Medical Association of Thailand*, 94(7) 19-23.

Smedley F, Bowling T, James M, Stokes E, Goodger C, O'Connor O, Oldale C, Jones P, Silk D (2004). Randomized clinical trial of the effects of preoperative and postoperative oral nutritional supplements on clinical course and cost of care. *British Journal of Surgery* ;91(8):983-90.

Smeltzer S, Bare B, Hinkle J, Cheever K (2007). *Brunner & Suddarth's Textbook of Medical-Surgical Nursing*, Philadelphia: Lippincott Williams & Wilkins.

UNICEF: 2014 <[www.unicef.org](http://www.unicef.org)> Read 17.01.2014

Ward N (2003). Nutrition support to patients undergoing gastrointestinal surgery. *Nutrition journal*, 2:18, 1-5.

WHO: 2013 <<http://www.who.int/topics/nutrition/en/>> Read 25.09.2013

Zhou T, Wu XT, Zhou YJ, Huang X, Fan W, Li YC. (2006). Early removing gastrointestinal decompression and early oral feeding improve patients' rehabilitation after colectostomy. *World Journal of Gastroenterology*, 12(15), 2459-63.

**Table 1** Database search from different databases

Database	Search terms	Limitations	Number of hits	Chosen by title	Chosen by abstract	Chosen by full text
EBSCO CINAHL,	nutrition AND surgical AND nursing	Peer Reviewed Published after 2000	138	20	14	2
EBSCO CINAHL	enteral AND surgical AND nursing	Peer Reviewed Published after 2000	18	8	4	0
EBSCO CINAHL	nutrition AND surgical AND patients AND adult	Peer Reviewed Published after 2000	160	21	15	4
EBSCO CINAHL	nutrition AND nursing AND hospital AND adult	Peer Reviewed Published after 2000	101	13	5	0
EBSCO CINAHL	malnutrition AND surgical AND nursing	Peer reviewed Published after 2000	15	4	1	1
EBSCO CINAHL	nutrition AND nursing AND ward	Peer reviewed Published after 2000	27	3	0	0
EBSCO Cinahl	feeding AND post-operative	Peer reviewed Published after 2000	12	3	2	1
EBSCO Cinahl	feeding AND nursing AND surgical	Peer reviewed Published after 2000	61	9	4	0
EBSCO CINAHL	enteral AND surgical AND impact	Peer reviewed Published after 2000	113	4	1	0
OVID Medline	nutrition AND surgical AND nursing	Published after 2000	106	11	4	1
OVID Medline	enteral AND surgical AND nursing	Published after 2000	37	3	0	0
OVID Medline	nutrition AND surgical AND patients AND adult	Published after 2000	881	15	7	2
OVID Medline	nutrition AND nursing AND hospital AND adult	Published after 2000	127	10	3	1
OVID Medline	malnutrition AND surgical AND nursing	Published after 2000	26	3	1	0
OVID Medline	nutrition AND nursing AND ward	Published after 2000	45	4	2	0
OVID	feeding AND	Published after	155	12	7	2



Medline	post-operative	2000				
OVID Medline	feeding AND nursing AND surgical	Published after 2000	63	5	1	0
OVID Medline	enteral AND surgical AND impact	Published after 2000	136	6	2	1
Manual search from references		Published after 2000	11	8	5	4
Total number						19

Table 2 Articles (n=19) analyzed in the literature review

Author, country, year	Title of article	Purpose of the study	Sample size (n=)	Data collection and analysis	Main findings
Baradi H., Walsh M., Henderson M., Vogt D., Popovich M. USA 2003	Postoperative jejunal feeding and outcome of pancreaticoduodenectomy	To investigate the effect of early postoperative enteral feeding on outcome of pancreaticoduodenectomy and find out the best technique for administering enteral nutrition.	182	Randomized clinical trial	<ul style="list-style-type: none"> <li>- The incident of infections such as wound infection, urinary tract infection, line sepsis and pseudomembranous colitis was significantly decreased in the early enteral feeding group.</li> <li>- Fewer patients from the enteral feeding group was readmitted to hospital in 30 days after discharge</li> </ul>
Barlowa R., Price P., Reid D.T., Hunt S., Clark W.B.G., Havard J.T., Puntis C.A.M., Lewis G.W. Cardiff, UK 2011	Prospective multicentre randomised controlled trial of early enteral nutrition for patients undergoing major upper gastrointestinal surgical resection	To determine if Early Enteral Nutrition (EEN) enhances postoperative outcomes and decreased the length of hospital stay.	121	Open, prospective multicentre randomised controlled trial.	<ul style="list-style-type: none"> <li>- Early Enteral Nutrition (EEN) significantly reduced the postoperative hospital stay.</li> <li>- Operation morbidity was less in EEN patients compared to CON.</li> </ul>

<p>Beattie A.H, Prach A.T, Baxter J.P, Pennington C.R. Dundee, UK 2000</p>	<p>A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients</p>	<p>To find out if oral supplements have an impact on quality of life, morbidity nutritional status after surgical procedures.</p>	<p>101</p>	<p>A prospective, randomised, controlled trial</p>	<p>The administration of nutritional supplements: -Reduces complications such as chest and wound infection. -Significantly improves physical and mental health. - decreases weight loss after surgery.</p> <p>Length of stay was similar in both groups</p>
<p>Eley K., Shah R., Bond S., Watt-Smith S. UK 2011</p>	<p>A review of post-operative feeding in patients undergoing resection and reconstruction for oral malignancy and presentation of a pre-operative scoring system</p>	<p>The purpose was to investigate positive and negative effects of PEG and nasogastric (NG) nutrition in patients and develop a scoring system that would help to choose the best suitable tube</p>	<p>144</p>	<p>retrospective review</p>	<p>The negative effects of using PEG were bleeding, damage to the intestines, airway compromising and possible metastasis of cancerous cells. Not using muscles to swallow food while on PEG might postpone the return of normal feeding</p> <p>Concerns about NGT are tube dislocation, nasal irritation and formation of ulcers</p>
<p>Garth A.K.; Newsome C.M; Simmance N.; Crowe T.C. Melbourne,</p>	<p>Nutritional status, nutrition practices and post-operative complications in patients with gastrointestinal</p>	<p>To find out if certain perioperative nutritional techniques are in connection with better patient outcomes in surgical patients with upper gastrointestinal</p>	<p>95</p>	<p>- Retrospective audit of the medical histories</p>	<p>-Postoperative recovery took longer for patients who lost significant weight preoperatively in comparison to those patients who could keep their weight - Low albumin and losing weight after surgery were also prognostic of longer hospital stay. - Malnourished participants were hospitalized twice as long as those who did not suffer from malnourishment</p>

Victoria, Australia 2010	cancer	and colorectal cancer			
Gunnarsson A.K., Lönn K., and Gunningberg L. Uppsala, Sweden 2009	Does nutritional intervention for patients with hip fractures reduce postoperative complications and improve rehabilitation?	To determine whether nutritional intervention before the surgery and within five days postoperatively for patients undergoing surgery can affect patients' postoperative complications, rehabilitation, length of stay and food and liquid intake.	100	A quasi-experimental, pre- and post-test comparison group design without random group assignment.	Nutritional intervention helped to: <ul style="list-style-type: none"> <li>- Decreases the risk of pressure ulcer formation.</li> <li>- Hospital stay was reduced from nine to seven days.</li> <li>- Increased nutrient and liquid intake.</li> <li>- decreased risk of nosocomial infections.</li> </ul>
Haleh R., Hosseini N.S., Mousavi nasab N.S., and Stotdeh S.  Zanjan, Iran 2009	Comparing early oral feeding with traditional oral feeding in upper gastrointestinal surgery	To compare the outcome of early oral feeding (EOF) and traditional oral feeding (TOF) in patients who underwent Upper GI surgery.	52	A prospective randomized clinical trial study	<ul style="list-style-type: none"> <li>- The result illustrated that EOF in upper GI surgery patients is safer than TOF.</li> <li>- EOF helped to shorten postoperative hospital stay and cost as well as decreased the time of first gas passing and defecation.</li> </ul>
Hamin T., Guyatt G., Uhrh W.T., Srinathan K.S., Tan L.A., and Walter S.	Jejunostomy tube feeding in patients undergoing Esophagectomy	To determine how frequently oral intake is delayed and the amount of nutrition delivered via the jejunostomy tube.	111		<ul style="list-style-type: none"> <li>- The study found that 66% of patients were able to commence oral intake by the end of 8 postoperative days.</li> <li>- 40 patients had abdominal pain, diarrhea or other issues serious enough to warrant withholding their tube feeds.</li> <li>- Only half of the intended nutrition which is (45.6%) is nutrition delivered by jejunostomy within the first 8 days after surgery. Complication such as abdominal pain, diarrhea or other issues serious hindered the targeted</li> </ul>

2012 Canada					nutrition delivery.
Han-Geurts, I. J. M.; Hop, W. C. J.; Kok, N. F. M.; Lim, A.; Brouwer K. J.; Jeekel, J.  The Netherlands 2007	Randomized clinical trial of the impact of early enteral feeding on postoperative ileus and recovery	To evaluate the effects of early oral feeding on the recovery of gastrointestinal function and quality of life	128	Randomized clinical trial	Participants were divided into traditional feeding group and free diet group Early oral feeding did not result in shorter postoperative ileus  -Gastrointestinal function recovery did not depend on the tolerance of oral diet. The results show no difference in term of return of bowel function between the two groups  Participants of the free diet group could eat solid food earlier than participants of traditional feeding group. This suggests that most of the patients could decide when they would like to eat for the first time and there is no reason to delay oral intake after colorectal or abdominal vascular operations
Jaromahum, J., Fowler, S. Morristown, New Jersey, USA 2010	Lived Experiences of Eating After Esophagectomy : A Phenomenological Study	To investigate patients' lived experiences of eating following esophagectomy.	7	- A purposeful sampling method was used. - Life experiences were described and analyzed using qualitative methods	Most of the participants experienced somatic difficulties such as feeling of early fullness after eating, and psychosocial concerns just as fear of pain after esophageal cancer operation. However they reportedly experienced joy about being able to eat
Jiang M.Z., Jie B., Kondrup J., Nolan T.M.,	Impact of preoperative nutritional support on	To explore the impact of nutritional interventions preoperatively in patients at risk of malnutrition	1085	A meta-analysis performed of 13 Prospective randomized	Preoperative nutritional support proved to be advantageous and lowered the risk of complications for patients who had not less than 5 points at NRS (Nutritional Risk Screening Tool 2002).

<p>Yu K., and Zhu N.S.</p> <p>2012 Beijing, China</p>	<p>clinical outcome in abdominal surgical patients at nutritional risk</p>	<p>(defined by the Nutritional Risk Screening Tool 2002) undergoing abdominal surgery</p>		<p>trials.</p>	<p>The control group had higher complication rates and longer postoperative hospital stay.</p>
<p>Klek S., Sierzega M., Szybinski P., Szczepanek K., Scislo L., Walewska E., Kulig J. Skawina, Poland 2011</p>	<p>The immunomodulating enteral nutrition in malnourished surgical patients - A prospective, randomized, double-blind clinical trial</p>	<p>-The purpose of the research was to find out the clinical importance of the route of administration and form of perioperative nutritional support.</p>	<p>167</p>	<p>prospective, randomized, double-blind clinical trial</p>	<p>- There was no significant difference in infection complication between patients receiving standard diet and immunomodulatory formula diet. -24 of 84 patients from the enteral nutrition group developed infections -19 of 83 patients from the parenteral group developed infections - Neither immunomodulating formulas nor enteral feeding had significant effect on postoperative length of stay, morbidity and mortality,</p>
<p>Lobato Dias Consoli M; Maciel Fonseca L.; Gomes da Silva R, Toulson Davisson Correia MI. Brazil,2010</p>	<p>Early postoperative oral feeding impacts positively in patients undergoing colonic resection: results of a pilot study</p>	<p>The purpose was to explore the effects of early oral feeding postoperatively in patients undergoing elective colorectal resection</p>	<p>29</p>	<p>pilot study</p>	<p>Early oral feeding proved to be beneficial by resulting in shorter hospital stay, less frequent diarrhea and did not increase the risk of complications</p>

<p>Lucha P; Butler R.; Plichta J., Francis M.</p> <p>USA 2005</p>	<p>The Economic Impact of Early Enteral Feeding in Gastrointestinal Surgery: A Prospective Survey of 51 Consecutive Patients</p>	<p>To determine if Early Postoperative Feeding shortened length of hospital stay and lowered costs.</p>	<p>121</p>	<p>Prospective Survey</p>	<p>-Early postoperative feeding confers minimal financial advantage over more traditional postoperative feeding regimens at a potential risk of more frequent nasogastric tube use and increased use of antiemetic therapy</p> <p>-Length of stay is not improved by early feeding nor is there a decrease in the nursing skill level required to care for these patients.</p>
<p>Luft V.C, Beghetto M., Daniel de Mello E. and Polanczyk A.</p> <p>Brazil 2007</p>	<p>Role of enteral nutrition in the incidence of diarrhea among hospitalized adult patients</p>	<p>To observe the risk of diarrhea caused by enteral nutrition in a hospital</p>	<p>604</p>	<p>Double-cohort study.</p>	<p>-Enteral nutrition in hospitalized adults, is connected with a higher risk for developing diarrhea which can be the result of neglecting hygiene standards</p>
<p>Park J.S, Chung K.H, Hwang H.K, Kim J.K, and Yoon D.S</p> <p>Korea 2011</p>	<p>Postoperative Nutritional Effects of Early Enteral Feeding Compared with Total Parental Nutrition in Pancreaticoduodenectomy Patients: A Prosepective,</p>	<p>To evaluate the postoperative nutritional status and clinical outcome of pancreaticoduodenectomy (PD) patients receiving either EEN or TPN and compare the results</p>	<p>40</p>	<p>A Prosepective, Randomized Study</p>	<p>All participants suffered from abdominal malignancies.</p> <p>The two groups did not have considerable alterations in age, gender, presence of additional diseases and blood loss during the surgery and nutritional index preoperatively.</p> <p>Preoperative weight loss changed significantly in EEN group.</p>

	Randomized Study				
Shah JN, Maharjan SB, Manandhar K, Paudyal S, Shrestha S, Shah S, Lamichane D Kathmandu, Nepal, 2012	Early Feeding and Discontinuation of Intravenous Fluid After Laparoscopic Cholecystectomy	Observe the prospects and assess the acceptability, safety and benefit of early oral feeding and discontinuing IV fluid after LC.	294	Cross-sectional observational study	Most of our patients (97%) tolerated early oral feeding. Early oral feeding was advantageous to patients in our study in terms of psychological wellbeing and early mobilization, as they were not bound to bed with IV drip. - financial benefit - no complication in this series after early feeding
Smedley, F.; Bowling, T.; James, M.; Stokes, E.; Goodger, C.; O'Connor, O.; Oldale, C.; Jones, P.; Silk D. UK, 2004	Randomized clinical trial of the effects of preoperative and postoperative oral nutritional supplements on clinical course and cost of care	Observe the effects and cost of administration of oral supplements both before and after surgery	152	Randomized clinical trial	Patients undergoing gastrointestinal surgery received nutritional supplements perioperatively, which reduced weight loss and the occurrence of smaller complications, furthermore it was financially beneficial compared to the control groups.  Providing oral supplements is easy, safe and inexpensive compared to tube feeding or parenteral nutrition.
Zhou T, Wu XT, Zhou YJ, Huang X, Fan W, Li	Early removing gastrointestinal decompression and early oral feeding improve	To compare early oral feeding (removal of nasogastric tube within 1 day from operation, after which patients were	316	Randomized study	Complications after surgery such as anastomotic leakage, acute dilation of stomach and wound complications were similar in the groups, but fever, pulmonary infection and pharyngolaryngitis were much more common in people



<p>YC. 2006 Sichuan Province, China</p> <p>World Journal of Gastroentero logy</p>	<p>patients' rehabilitation after colorectostomy</p>	<p>allowed to eat) with traditional feeding approach (NG tube until first pass of flatus).</p>			<p>participating in traditional feeding method.</p> <p>- Removing nasogastric tube during the first postoperative day and starting early oral feeding can enhance the return of gastrointestinal function. Not only the time to first flatulence and bowel movement happened sooner but also the time of postoperative stay was shorter in this group.</p>
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