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Enteral Feeding and Medication Administration via Percutaneous Endoscopic Tube Gastrostomy Tube

The Evaluation of an Educational Digital Book

DEGREE PROGRAMME IN NURSING
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ABSTRACT

Uprety Denika : Enteral nutrition and medication via PEG tube.
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A Percutaneous endoscopic gastrotomy tube (PEG) is a stoma used for the implementation of nutrition when a person's ability to swallow is impaired. PEG tube is an enteral nutrition feeding for patients who have preserved absorption and motility function of the gastrointestinal tract but are unable to swallow solid or liquid food due to many disorders. Maintaining adequate nutrition of the utmost important goal in PEG tubes.

The purpose of this thesis is to collect feedback on the digital book which was authored by Anjana Bhandari from SAMK nursing students and report it as part of my thesis.
The objective of this thesis is to understand the quality of this booklet from our readers, the nursing students at SAMK, and report the feedback of the reader to the author.

The project management used on this project was a Hybrid methodology. The hybrid methodology is a combination of the waterfall and agile methodology. In 2023 may feedback survey was conducted among the 125 nursing students of SAMK. The author created a feedback survey in the form of a questionnaire that consist of nine questions. Both the digital book and a link to the survey's web address were emailed to respondents. The email contained a cover letter for the survey. Out of 125 students who were requested to complete the survey, 21 students' responses were gathered, which is a response of 16.8%.

Keywords: Percutaneous Endoscopic Gastrostomy, enteral feeding, nutrition, medication.

CONTENTS

1 INTRODUCTION

Percutaneous endoscopic gastrostomy tube (PEG) was first introduced by Gauderer in 1980 as an internal nutrition therapy. A Percutaneous endoscopic gastrotomy tube (PEG) is a stoma used for the implementation of nutrition when a person's ability to swallow is impaired. A PEG tube is a flexible tube insertion directly into the stoma through the abdominal wall. (Hitawala & Mousa, 2022.) It is mostly performed endoscopically with a success rate of more than 95% (Hitawala & Mousa, 2022) and is safest with a 0.5% mortality rate (Friginal-Ruiz & Lucendo, 2015).

PEG tube is an enteral nutrition feeding for patients who have preserved absorption and motility function of the gastrointestinal tract but are unable to swallow solid or liquid food due to many disorders. Maintaining adequate nutrition of the utmost important goal in PEG tubes (Friginal-Ruiz & Lucendo, 2015). PEG tube is the most common existing enteral nutrition for patients who need nutritional supplementation that exceeds three–four weeks. PEG can be in-stalled in patients of all age groups whether they are children or elderly people. PEG tube insertion depends upon patients' needs. (Wei, Ho & Hegde, 2021).

According to the Friginal-Ruiz & Lucendo (2015) "Patient with potentially reversible diseases in which it is expected that the PEG can be removed once the progress solved and patient who have irreversible diseases with prolonged survival in which the PEG is placed permanently and helps improve their qual-ity life". Indications for the short term are chemotherapy and radiotherapy for head and neck cancer, anorexia nervosa, severe burns, illness of oesophagus, multiple injuries and facial trauma, transplants with prior malnutrition, anorexia, and so on. Indications for long-term are neurological diseases such as multiple sclerosis and dementia, Parkinson's diseases, head

and neck tumors, inflammatory bowel diseases, oropharynx tumors, cystic fibrosis, and so on. Likewise, contraindications for short-term PEG tube insertion are non-swollen oesophageal obstruction, active gastric pathology, total gastrectomy, extreme obesity, and previous midline laparotomy. Similarly, contraindications for long-term PEG tubes are colonic interposition, partial or subtotal gastrectomy, mas-sive ascites, sepsis, and coagulation disorder (Friginal-Ruiz & Lucendo, 2015).

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The cooperation partner of this project is Satakunta University of Applied Sciences (SAMK) located in Satakunta, Pori. SAMK's economic and industrial structure is to provide a wide range of education research opportunities in the field of health care and social services, business, and technology which contains approximately 600 students with 40 different degree programs. It promotes international students, teachers, and research for studying and working. (Website of Satakunta University of Applied Sciences).

2 THEORETICAL BACKGROUND

2.1 PEG tube insertion

Basically, here are two methods of PEG tube insertion, pull-through methods, and push methods. In both methods, through the mouth endoscopic insertion is to visualize the patient's stomach to localize the best sport for the PEG tube. After finalizing a suitable place with the help of an endoscopic and a nurse perform the procedure. Mostly PEG tube insertion procedure is performed under local anaesthesia. It is the best-suited place for tube insertion in midline Linea alba as it prevents hematoma formation and infection in the recut comportments. At finalized sport, skin is numbed and punctured with a puncture cannula, and through the stomach wall, a guide wire is threaded into the stomach. The primary tube has a backing plate on the side of the stomach that holds the tube in place in the stomach and a fixing plate whose function is to prevent the hose from shipping too far to the side of the stomach. The first tube is changed after four to five weeks until the ostomy channel is formed. (Friginal-Ruiz & Lucendo, 2015.)

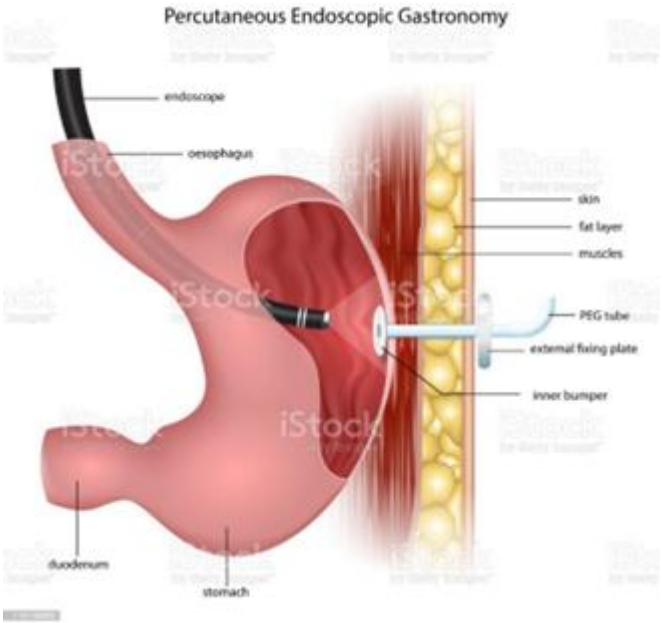

Figure 1. Percutaneous Endoscopic Gastronomy. (Pixabay).

2.2 Enteral feeding through PEG tube

Enteral nutrition through a PEG tube is a supportive therapy for chronically ill patients who have functional gastrointestinal tract but cannot meet their nutritional needs orally. The nutritional support offered consists of water, minerals, vitamins, fiber, carbs, protein or amino acids, and fat (Vudayagiri, Hoilat & Gemma, 2022).

Enteral nutrition therapy may decrease complications as well as hospital length of stay and improve the progress in discharge (Allen & Hoffman, 2019). It is recommended for patients who need long-term nutritional support for more than 30 days (Aguila, Lontok & Francisco, 2020). People who suffered from dysphagia, ischemia, heart problems, and other people who became disabled for extended periods will require ongoing, expensive care. Up to 30 %–50 % of very ill hospital patients rate these outcomes, which include relying on feeding tubes for nourishment, being unable to get out of bed, and needing constant care for recovery (Hawang et al., 2018).

The need for enteral feeding comes down to a plethora of conditions and diagnoses. Approximately, congenital abnormalities represent 42 % of the indications for tube feeding, followed by perinatal problems at 38 %, and lastly neurologic diseases at 16 % (Krom et al., 2019). There are varieties of nutritional formulas in the markets which are designed to enrich nutritional needs. Nutrition formula meets the needs of patients in every aspect like weight, height, activity level, and health status. Tube-feeding nutrition formula covers all nutrition needs. Example,

Low or high energy

Fibrous or non-fibrous

Contains a lot of protein.

Lactose-free/dairy-free options (website of Nutricia).

After installing the PEG tube, patients can start tube feeding after 4-6 hours depending upon the condition after the procedure or doctors' instruction. A small amount of liquid, usually 10-30 ml/hour, is given first and drip speed gradually increases within 1-2 weeks after the procedure. Fluid like 5% sugar solution or room temperature sterile water is given. (Lapin Keskussairaala, 2020).

Administration of nutrition through PEG tubes in hospital settings is mainly done by nursing staff through the feeding tube. It is mainly divided into three different phases and the first one is tube feeding preparation. Wash hands before starting the procedure and keep the food at room temperature. Supplies like a feeding pump, 60 ml syringe, graduated container, 30 ml of water, and feeding set should be gathered for feeding. Before feeding ensure the proper position of the patients and patients should be kept propped up in bed or on a couch in a half-sitting position with the head raised at least 30 to 40 degrees or in a sitting position to reduce the aspiration. Explain the procedure to the patients. Inspect the patient's tube areas for any redness dislodgment. Always remember formula should be prepared as per the doctor's order. A big catheter syringe's plunger should be removed, and the tip should go into the connecting tube. Flushing the tube with water (room temperature water) and monitoring the patient's tolerance level for tube feeding like abdominal pain, cramps, Increased bowel sounds, diarrhea, vomiting, and so on. Fill the syringe with the formula. To make the formula go in more quickly, raise the syringe. To proceed more slowly, lower the syringe. After finishing feeding, flush with lukewarm water i.e., 3o ml of water. Proper documentation is needed after the procedure. (Website of Western Australia Government, 2019)

There are there different dosing methods to implement the feeding tube.

1. Continuous feeding – In this feeding method tube feeding nutrition formula (e.g., 1000ml or 1500 ml) is dosed slowly for several hours. It is regulated with the help of a pump maintaining the feeding rate. (Website of Nutricia).
2. Dose delivery – In this method tube feeding nutrition is given in small doses. For example, 200ml per time. In this method, feeding product is

given by a pump, manual, or syringe. (Website of Nutricia). It can be started one -two days after the PEG procedure. Starting dose is 50-100ml and three to four times a day in starting. The single dose delivery can be more than 400ml at a time. (Lapin Keskussairaala, 2020).

3. Combine feeding- This method is a combination feeding of both continuous and dose delivery methods. This method increases the flexibility of tube feeding and nutrition is delivered according to patients' wishes. (Website of Nutricia). Figure 1 below is a feeding pump used for enteral feeding.

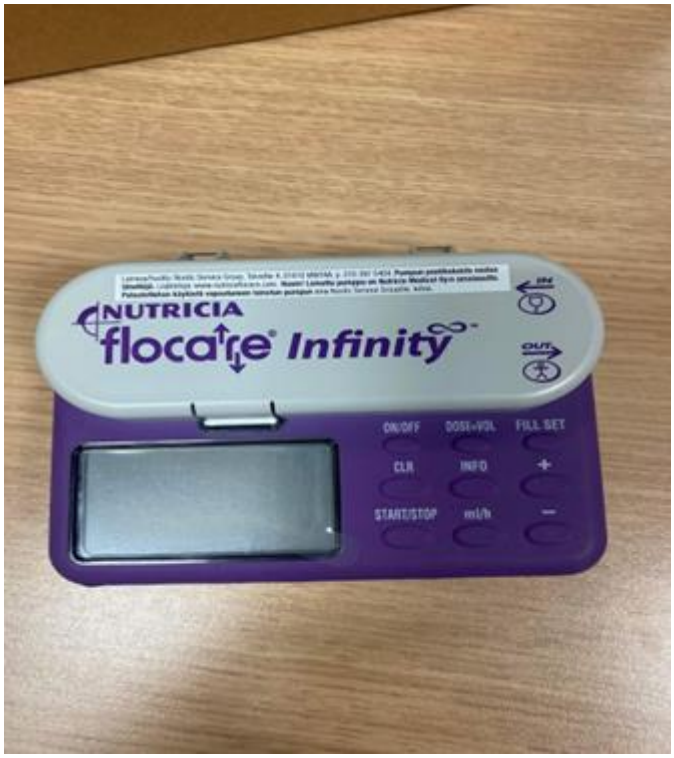

Figure 2. Feeding Pump (Timalsina, 2023).

Over 80% of nutrition feeding formula prepared in home setting have been found to be contaminated with bacteria. Mostly industrial nutrition formula is used in PEG nutrition, which are rich in fiber, nutrition rich, ready to use and sterile. (Boullate & Carrera et al., 2017).

Table 1 below contains examples of Nutricia Medicals tube feeding products commonly used. The table below describes the product indication for use, the name of the products, and the nutritional content.

Table 1. Example of Feeding tube products available and its indication. (Website of Nutricia).

Product name	Indication	Nutritional content
Nutrison Protein Intense®	Trauma and burn patients, and overweight intensive patients.	100g/l It is sucrose-free, gluten-free, and low-lactose.
Nutrison Advanced Peptisorb®	Patients suffering from food absorption disorder and for early postoperative tube feeding	Energy density - one Kcal/ml. It contains short-chain peptides and MCT fats. It is low-fat, low-lactose, sucrose-free and gluten free.
Nutrison Advanced Diason®	For diabetic patient	Energy density – one Kcal/ml. It is lactose-free, milk-free, sucrose-free, and gluten-free.
Nutrison Advanced Cubison®	Chronic ill patients especially pressure ulcers.	Dietary fiber – 15g/l. Energy density – one Kcal/l. It contains fiber, arginine, antioxidants, selenium, and zinc with low-lactose, sucrose-free, and gluten-free.
Nutrison Soy Multifiber®	Milk protein intolerant patients.	Dietary fiber – 15g/l. Energy density – one Kcal/l. It is lactose-free, milk-free, sucrose-free, and gluten-free.

Nutrison Soya®	Fiber-free tube feeding or milk protein intolerant	Soy protein – 40g/L Energy density – one Kcal/l It is lactose-free, milk-free, sucrose-free, and gluten-free.
Nutrison Protein Plus Multi Fiber®	Milk intolerant patients and for catabolic patients undergoing surgery and intensive care.	Dietary fiber – 15g/l/ Energy density – 1.28 Kcal/l
Nutrison Protein Plus®	Patients need high protein diet	Protein – 63g/l. Energy density – 1.25 Kcal/l. Low-lactose, sucrose-free and gluten-free
Nutrison 1200 complete multifiber®	Patients require low energy tube feeding products.	Energy density – 1.24g/l

Although the PEG tube is 95% safe with a 0.5% mortality rate, PEG nutrition therapy may still associate with adverse effects. Nutrition assessment is a comprehensive assessment of a patient's history, physical examination, anthropometric, and laboratory tests to identify, diagnosis, or treat any nutrition-related problem. Patients' history helps to identify nutrition history (dietary supplements and diet intake), social background, mental health status, interventions (medical and surgical), and medication. Likewise, physical examination determines Gastrointestinal (GI) functions. For example, GI intolerance, nutritional supplementation intolerance, metabolic disturbance, and fluid disturbance. Anthropometrics contains height, weight, and body mass index. Laboratory tests include finding abnormalities through a urine test, blood tests, or radiologic tests (Boullate & Carrera et al., 2017).

The success of PEG tube feeding depends upon a person's illness or health status. Thus, a person's illness affects the frequency of monitoring the

nutritional status. When a patient starts PEG nutrition therapy, the patient's weight, mid-upper arm, skin integrity, hand grip, and fluid accumulation (swelling) should be monitored on a regular basis. (Boullate & Carrera et al., 2017).

PEG nutrition therapy assessment helps in identifying the presence and risk of malnutrition. In PEG cases, laboratory values take special attention. It plays an important role in identifying hydration status with laboratory tests like serum albumin, urea nitrogen, urine sodium, visceral protein, and C-reactive. It is important to maintain 24 hours intake and output chart (Boullate & Carrera et al., 2017).

2.3 Medication through PEG tube

Administration of medication through a PEG tube is important for long-term illness patients and its primary goal is to optimize the drug's therapeutic actions without interfering with enteral 2015 nutrition. The initial stage of medication should be to adjudicate which drugs is suitable via the PEG tube and other alternative methods of drugs administration. Most medication formulation is suitable through the gastrointestinal tract. Although other routes like intravenous, subcutaneous, or intramuscular injection can be used with 100 % absorption. But it can be cost-effective repeated injections that can lead to compaction and are not suitable for long-term use. (White & Bradham, 2015.)

When medications are supplied through the same tube that is used for enteral feeding, compatibility, and stability issues might arise for both medication and enteral nutrition products. Drugs and enteral nutrition cannot be dosed at the same time. Infusing together can disrupt one another's activity and effects. Drugs-enteral product interactions could cause the tube to become occluded, affects nutrition and drugs bioavailability, or disrupt gastrointestinal function if medications are added to enteral nutrition bags. Considering the nutrition component that is numerous macros and micro nutrition adding drugs amendments incompatibility and stability. While utilizing enteral products with unhydrolyzed

protein and fiber, enteral nourishment should be stopped before and after the administration of medications because these products are typically incompatible with them. (Ekincioglu & Demirkan, 2013.)

Additionally, some of the medications can make a patient's electrolyte imbalance. Diuretics typically reduce a patient's sodium and potassium levels as well as their amount of hydration. Glucose, sodium, and potassium levels can be affected by steroids. Amphotericin B causes a drop in potassium and magnesium levels, whereas angiotensin-converting enzyme inhibitor enhances potassium levels. Calcium preparation reduces levels of phosphorus. Food severely reduces the absorption of various medications, including loratadine, ampicillin, and tetracycline, so this medication must be given on an empty stomach. Eternal nutrition should be stopped when those medications are administration through a feeding tube. (Ekincioglu & Demirkan, 2013.) The examples of medication that interactions with the enteral feeding is further illustrated in the figure 3 below:

Table 2: Examples of drug interactions with enteral feeds

Medication	Type of interaction	Suggestion
Ciprofloxacin	Absorption decreased by a possible 25 per cent due to interaction with feeds. Chelation with ions in tap water[72]	Stop enteral feed for one hour before and two hours after dose or administer higher doses or use IV treatment in severe infections. Liquid should not be diluted further with water. Use sterile water if dissolving tablets
Hydralazine	Decreased absorption and concentration[74]	Monitor changes in blood pressure
Penicillin V	Unpredictable absorption (30 to 80 per cent)[73]	Stop enteral feed for one hour before and two hours after dose. Administer higher doses or use amoxycillin
Sucralfate	Binds to the protein in the feed[75]	Use alternatives, eg, ranitidine because enteral feed has to be stopped for a total of 12 hours per day
Theophylline	Absorption decreased by 60 to 70 per cent; metabolism increased	Stop feed for one hour before and two hours after dose and monitor levels
Warfarin	May interact with vitamin K content of feed	Monitor international normalised ratios (INR) closely or use parenteral heparin when critical

Figure 3. Examples of drugs interaction with enteral feeds. (Thompsom, Naysmith and Lindsay, 2004).

2.3.1 Consideration while dosing medication through PEG tube

Numerous factors should be considered while determining which dose forms are best for delivery through the enteral tube. Commercially accessible liquid dose formulation isn't always appropriate for feeding tube administration.

Despite the fact that both are liquids, suspensions have a substantially higher density than solutions. When two or more medications are crushed to be administered through the feeding tube, there is a chance of physical and chemical interaction, tube obstruction, and a changed therapeutic drug response occurring. Each drug needs to be given separately via proper access. (Joos, 2015.)

Suspensions are heterogeneous liquids with an active ingredient that isn't easily dissolved and are floated in a liquid medium with thickening or suspending agents. When suspension or emulsions are not shaken, the doses that are provided are highly variable, which results in underdosing and therapeutic failure on occasion, as well as overdose and potential toxicity effects. (Joos, 2015.) When suspension or emulsions are not shaken, the doses that are provided are highly variable, which results in underdosing and therapeutic failure on occasion, as well as overdose and potential toxicity effects. The drugs in liquid dosage forms may need to dilute with water before dosing via a feeding tube due to density and osmolarity. The fluidity is increased, and the change of the tube clogging is decreased by the dilution of medication in liquid dose forms. (Ekincioglu & Demirkan, 2013). Solid medication cannot be dosed directly into the feeding tube. Solid medication should be dispersed or dissolved in at least 10 ml of water converting solid medication into a liquid form. (Joos, 2015).

If allowed hard gelatin capsules should be opened, dispersed, or dissolved with water before administering through a PEG tube. Enteric coatings are applied to tablets to prevent drug breakdown by the stomach’s acidic environment or to lessen the likelihood of gastrointestinal side effects. Therefore, the enteric coatings table should not be crushed before dosing through the PEG tube. (Joos, 2015.) A clear pathway of guidelines recommended for medication preparation is shown in below figure 4:

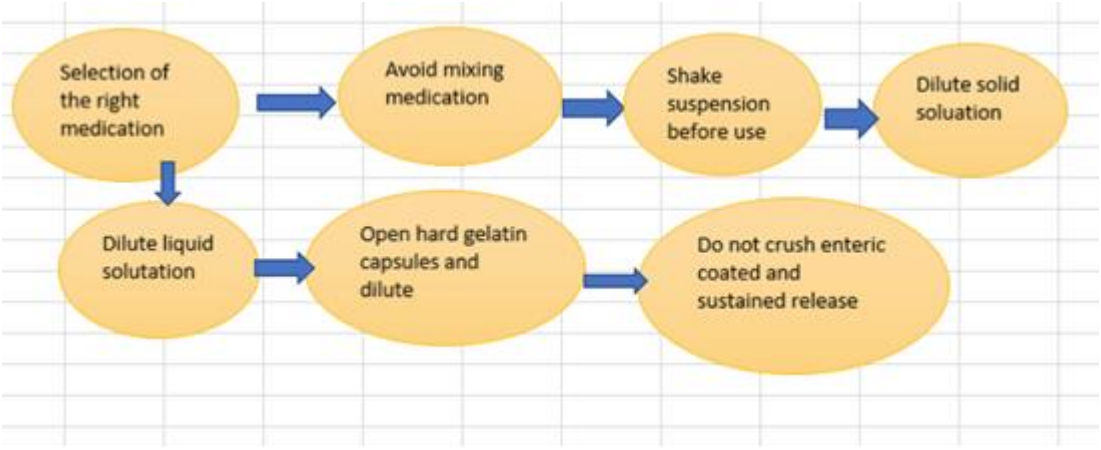

Figure 4. Guidelines recommended for medicine preparation (Joos, 2015).

Before dosing the medication, nutrition feeding should be stopped, and the tube needed to be flushed with at least 15 ml (about 0.51 oz) of water. To prevent lessening debris inside the lumen and to ensure the total dose is delivered tube needed to be flushed before, in between drugs, and after the medication with at least 15 ml of water. (Joos, 2015.)

2.3.2 Pharmaceutical forms suitable for administration through PEG tube

Liquid Formulation

Solution

A solution is a homogenous mixture of one or more components, which usually dissolve in water. Its dissolving nature in water make suitable solutions to administration through feeding tube. (White & Bradham, 2015.)

Suspension

Suspension is formed when a solid does not dissolve in a liquid. When suspension id dilutes in liquid, their granular cannot be dissolve. Although

suspension contains granular it could be dosed through the PEG tube. But before dosing the suspension its granule size and density of the formulation should be monitored, must be diluted well, and shaken before administrating. (White & Bradham, 2015.)

Solid formulation

Soluble tablets

Soluble tablets are suitable for dosing through PEG tube. A soluble tablet is deigned to dissolve completely when placed in liquid and form solution drugs. It is diluted in 10ml (about 0.34 oz) of water and shaken thoroughly before administering through PEG tube. Soluble tablets allow accurate dosing and easy to calculate dose. (White & Bradham, 2015.)

Dispersible tablets

A dispersible tablet uncoated or film coated tablet that disintegrates in water. Dispersible tablets are suitable for administrating through enteral feeding. It should be diluted in 10-15ml (about 0.51 oz) water before dosing. (White & Bradham, 2015.)

Orodispersible tablet

Orodispersible tablet also known as orally disintegrating tablet which dissolve on the tongue. It does not require water and is not required to use sublingually. This form of drugs can be administered through PEG tube by dissolving tablet in water. (White & Bradham, 2015.)

Effervescent tablet.

Effervescent tablets, also known as carbon tablets, dissolve in water and release carbon dioxide in its presence. It is suitable to administrate through PEG (Percutaneous Endoscopic Gastrotomy) tube as it rapidly breaks when kept water. (White & Bradham, 2015.)

Table 2. Pharmaceutical forms and example of drugs suitable for dosing through PEG tube (Grampian Medicine Information center 2023, 3–36).

Pharmaceutical forms	Examples of drugs name
Liquid Formulation	
Suspension	Fluoxetine® Levetiacetam®
Solution	Amitriptyline® Amlodipine®
Solid Formulation	
Effervescent tablets	Calcium® Potassium Chloride®
Dispersible tablets	Madopar® Dispersible®
Orodispersible	Donepezil® Lamotrigine®
Soluble tablets	Paracetamol® Folic acid®

2.3.3 Pharmaceutical forms not suitable for PEG tube

Medicines that cannot be crushed or ground cannot be given through the PEG tube. Some of the types of medication that are prohibited through PEG tube are described in Table 3.

Buccal/sublingual tablets

Buccal\sublingual form of medication to administration to administrate through PEG tube. Buccal\sublingual tablets are designed to melt in the mouth and be absorbed from the mucous membranes of the mouth. Administration through a PEG tube reduced drug absorption, or it might block the tubes if they are given in powdered form through a hose. (White & Bradham, 2015.)

Enteric-coated tablets

Enteric-coated tablets have a coating that protects the medicine from being released in the stomach by the acidic level of the stomach. These tablets only broken down in the small or large intestine. Administration of enteric-coated tablets through PEG causes tube obstruction. Enteric-coated tablets cannot be crushed or removed to dose from a feeding tube. Removing or crushing the tablets causes unpredictable degradation resulting decrease in the absorption of drugs. (White & Bradham, 2015.)

Non-diluting liquid medication

Half of the liquid medication cannot be diluted in a liquid solution. Therefore, its density, consequently, and sticky nature make it unsuitable to administer through a PEG tube. It also leads to tube obstruction. (Joos, 2015.)

Sustained release/modified release tablets

Sustained release/modified tablets are medicine that cannot be crushed because these medicines release their contents usually extended period (12 to 24 hours). Crushing the drugs and dose through the PEG tube leads to absorption of drugs in shorter period (one to two hours). Decrease in absorption time causes toxicity. (Joos, 2015.)

Table 3. Pharmaceutical forms that are non-suitable via PEG tube and their example (Joos, 2015).

Pharmaceutical forms	Example of drugs name
Buccal/sublingual tablets	Nitroglycerin® Buprenorphine®

Enteric-coated tablets	Pantoprazole® Baclofen®
Non-diluting liquid medication	carbamazepine® Phenytoin®
Sustained release/modified release tablets	Valproic acid® carbamazepine®

2.3.4 Assessment patient's condition and drugs affects.

The patient should be monitored continuously throughout the enteral medication. A patient's health and effects of drug treatment are monitored and evaluated during medication dosing and after dosing. Evaluation of patient response to medication through visual assessment is monitoring vital signs, measuring the pain using various tools, and weight monitoring. At the same time, any allergic reaction to medication or medication interaction is monitored. Listening and attending to patients for verbal cues. Proper documentation of dosed medication with time, date, and finding. The implementation of medication and the side effects of medication must be communicated with other staff orally and in written forms (Joos, 2015).

2.4 PEG tube care and possible complication

Nutrition support through a PEG tube is considered a minor surgical procedure and a less complicated procedure than another enteral feeding. However, it is associated with complications like pain, wound infection, catheter displacement, leakage, catheter obstruction, diarrhoea, constipation, and irritation

around the stoma area. Nurses play a significant role in preventing and minimizing the risk of complications. The medical team especially nurses contribute to minimizing complications through various support, caring, therapeutic approaches, PEG care, and medication. Negligence or inadequate nursing skills in the care of PEG patient pilot to complications. (Mahmodabadi, 2020.) It is suggested patients should take bed rest for at least 6 hours after the insertion of the PEG tube. Nurses should closely monitor vital signs, and any pain especially abdominal pain, saturation, bleeding, and abdominal distension. (Friginal-Ruoz & Lucendo, 2015.)

As mentioned above nurses plays a meaningful role in the prevention and identification of PEG tube complication by properly accessing the stoma site, stoma care, proper position and location of the PEG tube, pain management, cleaning around the stoma skin, flushing the tube, using proper technique to feed, aseptic technique, rotating tube, documentation and notifying doctors if any problem notices. (Anne, 2020). Infection and complication can be observed through drainage, wound secretion, odor, pain, tube blockage, necrotic discoloration, leakage, and malposition (Cyrany & Rejchrt, 2016). Figure 5 below provides a graphic representation of the peg tube complication.

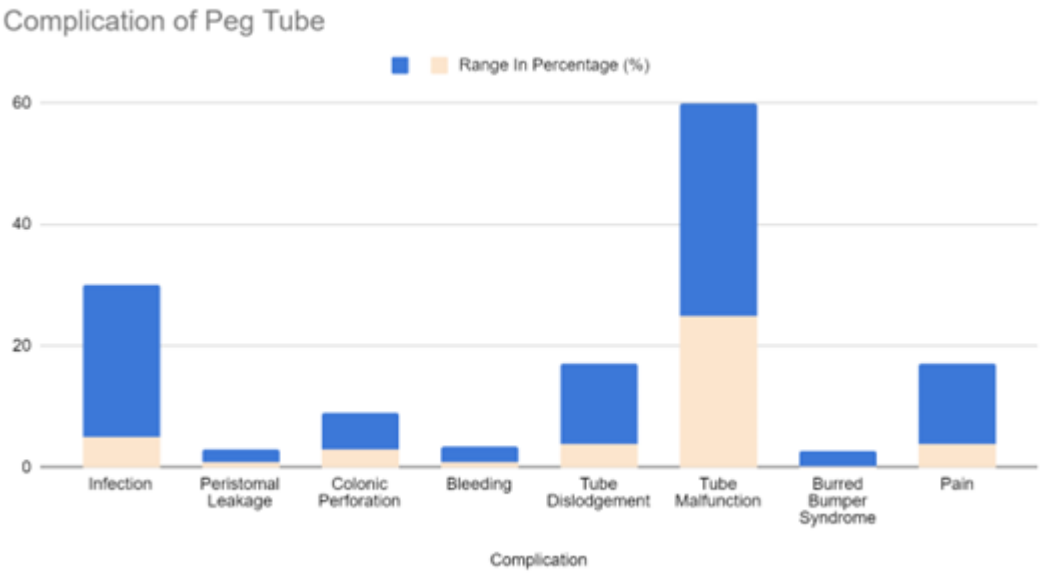

Figure 5. The complication of PEG tube (Sealock & Munot, 2018).

After the insertion of a PEG tube complications may arise so nurses should check or monitor the complications from time to time. Minor complications like granuloma formation, local wound infection, peristomal leakage, tube dislodgment, gastric outlet obstruction, and pneumoperitoneum. Major complications after insertion of a PEG tube are bleeding, aspiration pneumonia, internal organ injury, necrotizing fasciitis, and buried bumper syndrome. Therefore, nurses should be well trained, and educated and be able to manage the pre-and post-operative consequences. (Sealock & Munot, 2020.)

2.4.1 Stoma care

Stoma care is a fundamental part of nursing care in PEG tube patients. During the two weeks post insertion, the peri-stoma skin should be cleaned daily using soft shop and water, the inside-out technique, letting it completely, dry, and applying antiseptic for disinfection. Observation of the dressing site, any kind of abnormalities, color, order, smell, or small liquid secretion from the wound site during the first week is expected. (Friginal-Ruiz & Lucendo, 2015.) One day after the procedure the patient can shower as usual. Patients should shower at least once a week in case there are not any signs of infection present. (Alsunaid et al. 2021.) Swimming and sauna are not recommended for at least 2 weeks after the insertion of the PEG tube (Heuschkel & Gottrand, 2015).

2.4.2 PEG tube care

The PEG tube should be taken care of on a daily basis. During the PEG procedure, a skin plate is placed under the tube. There should be 0.5cm between the skin plate and the skin margin. (Lapin keskussairaala, 2017). PEG enteral tube feeding may be started shortly after the insertion, despite waiting three to six hours before administering solution through the tube to prevent early

complications. Before administering the full prescribed volume nutrition solution, lesser amounts of water or formulation should administer primarily, and upgrade volume within two to three days. (Friginal-Ruiz & Lucendo, 2015.)

Daily rotation of the tube clockwise and anticlockwise wise, it helps in the prevention of decubitus ulcer which might form between the abdominal and gastric walls. Flushing the gastrostomy tube with water is recommended. Flushing tube before and after the implementation of nutrition helps to maintain tube patency, prevent tube blockages and prevent bacterial overgrowth. (Alsunaid et al., 2021.) Supporting the tube with soft wrist restraints, mittens, tape or abdominal belts prevents the tube from dislodging (O'rear et al., 2015). The feeds of the same day can be administered through the same infusion line, but it is necessary to change them every 24 hours. (Lapin keskussairaala, 2017).

Preventing PEG tube clogging is vital in nutrition therapy. Flushing the tube prevents PEG tube clogging. If tube blockage is encountered, it can be raised with warm water or a carbonated drink. If it does not work then in the doctor's instructions, sodium bicarbonate, and a non-enteric-coated pancreatic enzyme table can be used. Both tables are mixed in warm water and installed with a PEG tube. (McClave et al. 2016.) Figure 6 down below shows the PEG tube.

Figure 6. PEG tube. (Pixabay).

2.4.3 Oral care

Maintaining good oral hygiene is critical to live a healthy and happy life. When the patient does not receive nutrition orally, the importance of oral care is emphasized. Inability to chew, swallow food, or use of enteral feeding methos contributes to dental diseases. A bacterial layer is also created in the mouth when food is given through a feeding tube which leads to infection in the mouth area. When the food intake through the mouth decreases, likewise the production of saliva decreases leading to a dry mouth. Improper oral hygiene may directly lead to oral infection, tooth decay or tooth loss, and oral cancer. (Wang et al. 2021.)

Brushing teeth or dentures twice a day plays a significant role in maintaining hygiene and preventing tooth decay. Dry mouths are treated with regular application of lip balm, mouth moister gel, or sprays. If it is impossible to brush, gargle with a saline solution to clean and moisturize the mouth's mucous membranes. Wet the patient's mouth with a small amount of water or by sucking ice cubes. In the doctor's recommendation, artificial saliva can be used. Regular inspection of the mouth cavity for early identification of an oral illness. Early identification plays a crucial role in preventing tooth decay or all illness and is treated in time. (Wang et al. 2021.)

2.4.4 Patient guidance

Patient guidance is the core of nursing care. According to the Act on the Status and right of patients (785/1992), the law regulates "The patient must be given information about their state of health, the significance of the treatment, alternative forms of treatment and their effects, as well as other matters relating to the treatment that is significant in terms of treatment decisions." Before the procedure, the patient and their family members are informed about the

procedure and its pros and cons. After the procedure, the patient and their relatives are taught about the use of the PEG tube and care. Patients and family members need special education that helps them to familiarize themselves with devices and methods of feeding and acquire clear information regarding long-term care. The guidance should be in both written and oral form. (Heuschkel & Gottrand, 2015.)

Patients should be instructed not to pull the tube forcefully or to avoid any pressure in the stoma site. Sometimes feeding tube might loosen or detach (coughing, rapid movement, or pulling tube) in this case immediately stop the dosing feeding product. If a patient or family member is instructed or demonstrates how to change the new tube yourself then ou can change yourself. In case PEG falls out completely cover the stoma and contact to health care immediately. (Website of Nutricia, 2022).

Patients who require clinical nutrition products can apply for the right to reimbursement for medical and clinical products. Patients need a B statement from doctors. B statement is a doctor’s states that explain the patient’s illness, functional capacity, and needs for nutrition therapy through a feeding tube. This means that Kela compensates those who require daily tube feeding premises up to 65% of the price of the product. (Kela, 2023.)

3 PURPOSE AND OBJECTIVES

The purpose of this thesis is to collect feedback on the digital book which was authored by Anjana Bhandari from SAMK nursing students and report it as part of my thesis.

The objective of this thesis is to understand the quality of this booklet from our readers, the nursing students at SAMK and report the feedback of reader to the author.

4 IMPLEMENTATION OF PROJECT

4.1 Project methods

The Author selected the hybrid method as it allows the implementation of the changes at a later stage of the project. It is flexible in nature and helps an author to correct or improve the project quality after receiving feedback from the teacher and supervisor. New adjustments in the project can help the author to avoid the same mistake, can implement feedback from the teacher, avoid delay, minimize risk, and deliver an excellent product on time. (Kukhnavets, 2020.)

4.2 Stage of project

The author of the project clarified the four steps of the project, initiating, planning, executing, and closing. Our official thesis started at the end of August 2021 when the thesis topic was chosen. In the initiation phase, selection of a topic, seminar of a different thesis, identifying the purpose and objectives, dividing the role and responsibilities of project members, familiarizing the topic and project methods, scheduling timetable, identifying project stakeholders, and research of thesis topic. After the project plan was approved, it needed to be sent to stakeholders to sign it. After the approval from stakeholders, the project moved to the second stage.

Table 4. Stage and timetable of project.

Project phase	Project date	Task list

Initiating phase	December 2021	➢ Project topic selection ➢ Identify project purpose and objectives. ➢ Identify the target groups. ➢ Familiarize the topic. ➢ Pre-plan meeting.
Planning	December 2021 – January 2022	➢ Planning schedule. ➢ Resources analysis ➢ Risk analysis. ➢ Theoretical back-ground. ➢ Review the related arti-cles or literature. ➢ Evaluation plan. ➢ The thesis agreement with SAMK.
Executing	February 2022- November 2022	➢ Product planning ➢ Evaluating progress ➢ Documentation. ➢ Communication with the supervisor ➢ Receiving feedback.
Closing	February 2023 – June 2023	➢ Completion of project ➢ Delivering the final pro-ject ➢ Project implementation ➢ Evaluation of a project ➢ Project report

4.3 Description of target group

This thesis is implemented as a functional thesis, the output of which is a digital booklet. The thesis is a project -based, which focuses on the nurse's significant role to provide adequate nutrition and medication via PEG tube by providing quality care. Considering the language barriers for international students, the booklet will be published in English. Hence, the majority targeted nursing students of the Satakunta University of Applied Science who are studying for a bachelor's degree in nursing English. This thesis is also beneficial for Finnish students who speak and write in English.

4.4 Literature retrieval and previous research and project-related topics

Evidence-based is the core of this project. Different literature retrieval is used to acquire evidenced-based information through reliable databases like an electrical book from SAMK Finna, PubMed, CINAHL, Google Scholar, and Theseus. The articles search was limited to 2015–2022 while doing a literature search. Authors have limited references since these resources are updated and provide the newest discoveries, theories, and newest practices. Filtered applied on databased were free full text, English, and timeframe from 2014–2022. Information was found using various search terms such as percutaneous endoscopic gastrotomy tube (PEG), enteral feeding, PEG care, oral care in PEG, PEG pump, medication via PEG tube, and nutrition via PEG tube. Table 5 below explains briefly the inclusion and exclusion criteria.

Table 5. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
➢ Studies published time limit from 2015- 2022. ➢ English language	➢ Studies published period before 10 years. ➢ Sources in other languages

➢ Free text ➢ Articles relevant to the topic ➢ Peer reviewed	➢ Cannot access freely. ➢ Articles out of topic ➢ Nom-peer reviewed.

4.5 Risk and resources

Risk is a potential threat to or, potential opportunities that do exist on the project. Risk in the project starts from the beginning of the planning process and lasts until the closing date that might occur in any phase of the project. A risk impacts the product and outcome of the project. Projects are important to pre-analysis the potential threats and potential opportunities to develop plans and strategies to avoid risk impacts. (Heldam 2018, 148.)

This project's risk analysis is conducted with a SWOT analysis chart. It helps to analyze both internal and external factors. SWOT analysis helped the author to recognize the possible potential threat. The potential risks and opportunities illustrated in Figure 7 below were identified by the author with the aid of a SWOT analysis:

Figure 7. SWOT analysis chart.

Originally, at the beginning of the thesis authors planned to complete the thesis and its product together. But due to some health issues, I could not focus, and work together on the thesis. So, we authors decided to divide the task of the thesis product. My thesis partner part was to create comprehensive educational materials as a booklet on enteral nutrition and medication via PEG tube and mine part was to evaluate the educational materials. Thesis educational materials will be evaluated by both supervisor teachers and targeted nursing students through a survey website that will be sent via email. The email is also attached to a cover letter explaining the survey and our educational materials.

Resources describe all the resources needed for the project including people, equipment, supplies, and software that are necessary to complete the product including skills assessment, and physical resources needed for the project (Heldam, 2018, 139). The laptop was the main resource for the project.

5 RESULTS

5.1 Feedback form

Feedback is a communication sent to a student or a group of students that contains detailed information about what has been done effectively and where mistakes have been made, as well as recommendations for consolidating strengths and addressing shortcomings. The information and abilities needed for learning and teaching are developed in large part through feedback. (Mashaan, 2020.)

The author created a feedback survey in the form of a questionnaire (Appendix 3). The author used an internet application called E-form software (office 365)

provided by SAMK University to create a digital survey. There were 9 questions in the survey: four multiple questions, three rating questions on a scale one to five, and two open-ended questions.

5.2 Data collection

A survey form was initially sent to first- and third-year students (nursing students participating in Gerontological Nursing Course) by e-mail. Firstly, the teacher of the course explained the purpose to the student during the course and the link for the form was linked on Moodle course platform, and on the second round, sent the survey link to the students through the e-mail. Both the digital book and a link to the survey's web address were emailed to respondents. The email contained a cover letter (Appendix 1) for the survey. The feedback topic selected in the survey was based on the content of the educational book. The objective of the survey is to identify the key characteristics of the digital book.

The students were asked to anonymously and voluntarily fill in the survey and were notified that their responses would be used strictly for educational purposes. The survey was open for a period of a week. All the participants who responded to the survey acknowledged and agreed that their data would be used for the thesis. The data were represented in clear graphs using the means for visual clarity.

5.3 Results of Survey

The author received 12 responses out of 55 students. So, the author requested to first, second- and third-year nursing students of SAMK to get more response. The survey was sent to a total of 125 students. Out of 125 students who were requested to complete the survey, only 21 students' responses were gathered, which is a response of 16,8%. The author received 9 responses from

the second round. Table 6 illustrates the demography of participating students.

Table 6. Demography of participating students

Academic year	Responses	Percentage (%)
First-year	8	38%
Second year	6	28%
Third year	7	33%

Figure 8 illustrates the feedback on the product beneficial for Nursing students graphically presented in a pie chart. All participating students agreed that the topic 'Enteral Nutrition and Medication via Percutaneous Endoscopic Gastrotomy Tube' was beneficial for nursing students. Respondents 100% agreed that the product is useful and necessary for teaching and learning.

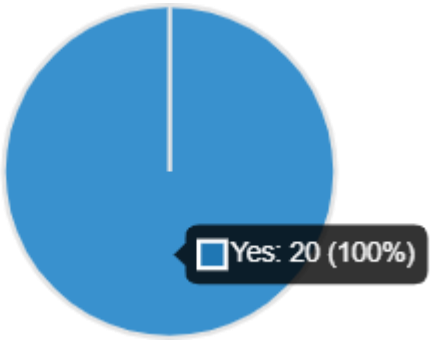

Figure 8. product beneficial for Nursing students

Also, respondents 100% agreed that the images in the booklet helpful for their learning and support.

Figure 9 shows the comprehensiveness of the product. There were 21 respondents who provided feedback/ rating on a scale of 1 to 5 Little (1), quite little (2), quite (3), quite much (4), and much (5). 19% (4 students) of respondents has provided rating 3, 14% (3 students) of respondents has provided rating of 4, 67% (14 students) of respondents has provided rating 5 respectively. To sum up the respondents has provided positive feedback with

an average rating of 4,48 out of 5 rating. Below bar graph shows the break-down of rating of the comprehensiveness of this content.

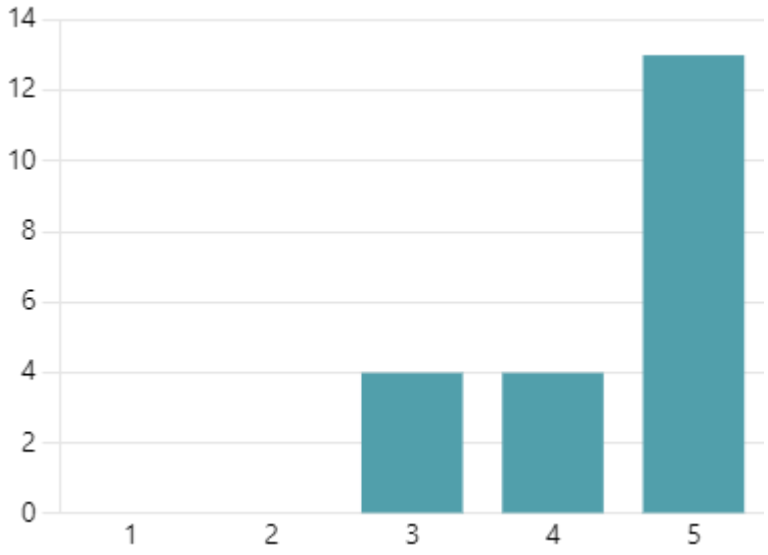

Figure 9. the comprehensiveness of this content.

Figure 10 shows below graph shows the rating distribution whether the booklet increase the knowledge on the topic. There were 21 respondents who provided feedback/ rating on a scale of 1 to 5 Little (1), quite little (2), quite (3), quite much (4), and much (5). 19% (4 students) of respondents has provided rating 3, 19% (4 students) of respondents has provided rating of 4, and 62% (13 students) of respondents has provided rating 5 respectively. To sum up the respondents has provided positive feedback with an average rating of 4,43 out of 5 rating.

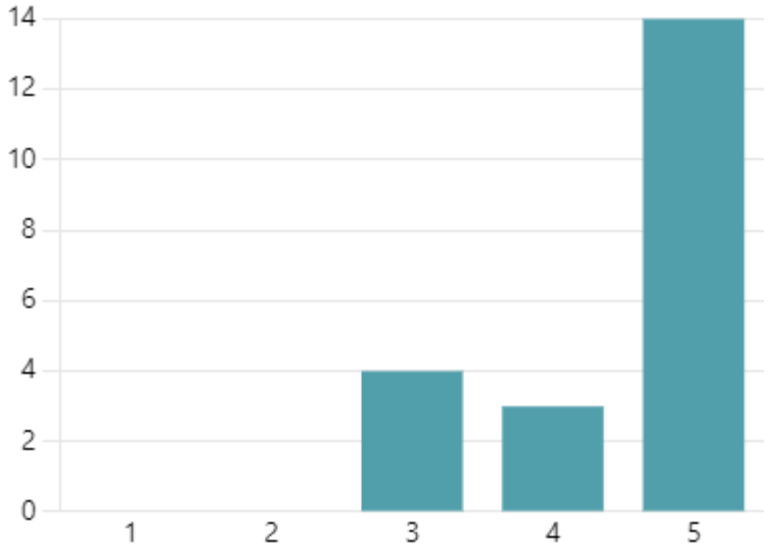

Figure 10. Knowledge in the subject matter.

There were 21 respondents who provided feedback/ rating on a scale of 1 to 5 Little (1), quite little (2), quite (3), quite much (4), and much (5). Most of the students found the layout quite good, with 14/21 (around two-thirds of students) giving it a 5-star rating. The average rating was 4.52. The below graphs show the distribution of ratings.

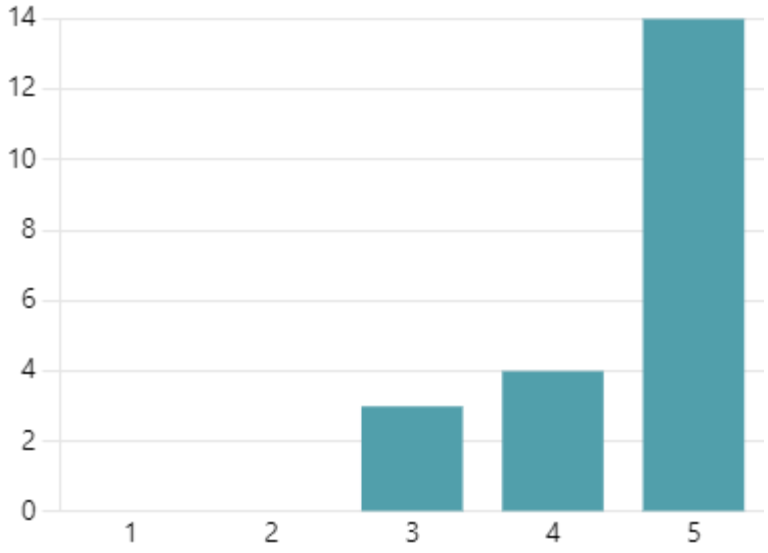

Figure 11. Rating of layout.

An open-ended question is a crucial component of the survey since it allows respondents to express their own ideas, opinions, and creativity. There was two open ended question. the survey's open-ended questions garnered responses from a total of 21 respondents. The two topmost responses in open ended question for what you learn from booklet are the eternal medication and nutrition through PEG tube, and how to manage PEG tube. Similarly, second open ended question was do you have any suggestions to make this material better? Respondents commented that the product was materials was good, no suggestions, booklet seems attractive for reader, easy to follow for international students since it was in English, very informative, and so on.

Based on the students' overall responses, we could see that the material was designed and presented well. We could infer that most of them found the content to be helpful and provided the reason why they found it helpful.
We could also infer that the layout and overall presentation received positive feedback.

Based on the open questions, the students found the topic relevant and suggested what they found informative. They also found the topic and booklet good enough and had minimal suggestions to improve. The objective of this survey was to understand the quality of this booklet from our readers, the nursing students at SAMK and we could present their opinion in a qualitative matter. As some students suggested the booklet be in Finnish.

5.4 Ethical consideration

The word ethics is derived from the Greek word ethos which refers to custom, habit, character, disposition, right or wrong. Similarly, in Finnish, the term research ethics (tutkimusetiikka) is a general concept that covers all the ethical viewpoints and evaluations that are related to science and research. (Finnish National Board on research integrity TENK, 2012).

The copyright act consideration in own thesis by taking permission from the material subject owner unless otherwise set by rules and regulations on limitation. Copyright act consists of research materials, results, and publication. Whereas by maintaining the sources of used background information on a thesis, original authors and sources will be maintained in our thesis. According to The RDI committee of the Rectors conference of the Finnish University of Applied Sciences (2017), agreements are made among collaboration parties in which they agree on ownership and use of research materials and results that are projected by the copyright.

Unbiased opinions and understanding of the results of sources used are relevant to having a concise outcome of the research. Giving total credit to the original writer by mentioning the authors and year, providing subject descriptions, outlining the reasons why the specific sources were used, and how it was relevant to the topic discussed. Using scientific-based resources and data collection. Preventing plagiarism while conducting research. Plagiarism means misleading the research community and often misleading decision-makers. While doing thesis author prevent plagiarism by avoiding presenting false data or by publishing the wrong or presenting evidence base data. Plagiarism also refers to taking credit for others' research work as own. (Finnish Advisory Board on Research Integrity 2012, 28-32.)

6 DISCUSSION

Since the beginning of the thesis process, there have been several unexpected challenges and problems. This process was often postponed due to difficulties in time management, organization of the lecture, time management, and obtaining credible and sufficient evidence. Overcoming the difficulties, the author was able to expand own expertise on a various topics from the beginning to the end of the functional thesis. After deciding on a topic, the author began

working on the thesis strategy and the knowledge base. The topic analysis and exposition of the theoretical elements aided the author in critically thinking about the key concept, and scope of the project and evaluating the project. Acquiring theoretical knowledge was time-consuming and laborious because the literature on the subject was already older.

The literature for the thesis was obtained from credible sources such as CINAHL, Pubmed, and publications on the topic. The search phrases varied from subtopic to subtopic, however, the word 'PEG' was used in every search to confine the papers to a certain topic. The second most popular search terms after "PEG" were enteral feeding, medication, and nutrition delivered via PEG, thus we concentrated on those topics as well. Primary sources were favoured while picking literature. Another criterion for participation was that the publication year is between 2015 and 2023.

The main purpose of this thesis is to evaluate the digital book of eternal feeding and medication via a percutaneous endoscopic gastrostomy tube. The main objective of this thesis is to evaluate the educational materials for students of SAMK. Engaging with feedback is an essential feature of student’s earning experiences in higher education, both as part of their time at university as well as a skill for lifetime learning.

The literature search for the paper was meticulous, and the sources were cited in accordance with Satakunta University of Applied Sciences regulations, with the use of source criticism considered. When writing the work, copyright was taken into consideration.

The thesis was a joint project of two authors. Initially, the thesis authors intended to complete the thesis and its output concurrently. However, due to various health concerns, I was unable to focus and collaborate on the thesis. As a result, the authors decided to divide the task of creating the thesis product. My thesis partner's role was to construct comprehensive educational materials in the form of a booklet on enteral nutrition and medicine via PEG tube, while mine was to analyze the educational material.

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APPENDIX 1: COVER LETTER

Dear nursing students,

The digital book "Enteral Nutrition and Medication via Percutaneous Endoscopic Gastrostomy Tube" https://publuu.com/flip-book/132168/338948 is a product of the thesis of Anjana Bhandari. The aim of my thesis is to collect feedback on the digital book from SAMK Nursing students and report it as a part of my thesis.

I would like to request you read the digital book and answer the survey https://forms.office.com/e/STYG3mAhuV. Answering the survey is completely voluntary and does not affect the grading of the course. Familiarizing yourself with the guide and responding to the survey takes approximately 15 minutes. By participating, you help us improve the digital guide.

Thank you for your participation!

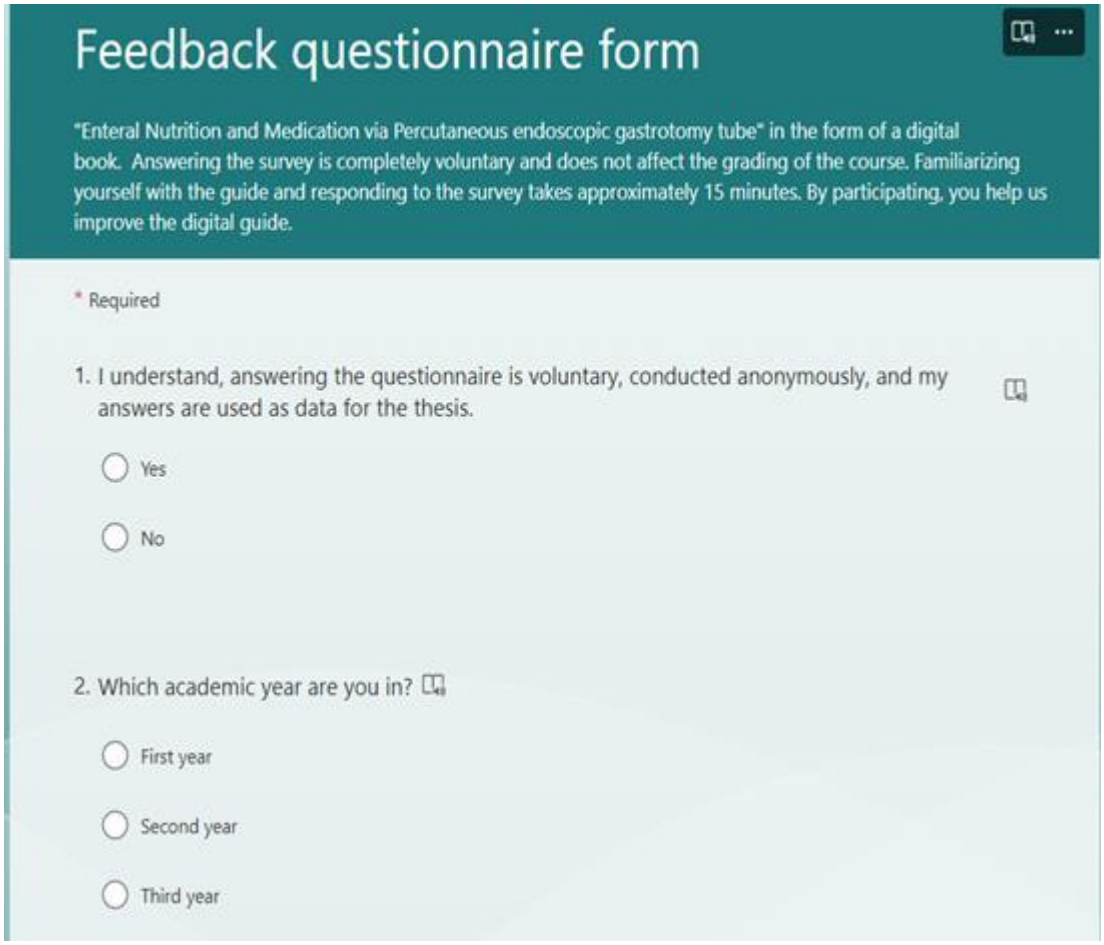
Best Regards,
Uprety Denika

Appendix 2

Feedback form in excel.

	Start time	Completion time	Email	Name	Last modified time	I understand, answe	Which academic yea	Is the topic, "Enteral	Do the images in the
1	5/23/23 14.29.03	5/23/23 14.31.31	anonymous			Yes	Third year	Yes	Yes
2	5/24/23 9.00.42	5/24/23 9.05.28	anonymous			Yes	Third year	Yes	Yes
3	5/24/23 9.45.36	5/24/23 9.47.03	anonymous			Yes	Third year	Yes	Yes
4	5/24/23 9.46.56	5/24/23 9.48.48	anonymous			Yes	Third year	Yes	Yes
5	5/24/23 14.53.29	5/24/23 14.54.04	anonymous			Yes	Third year	Yes	Yes
6	5/24/23 14.54.32	5/24/23 14.55.49	anonymous			Yes	Second year		Yes
7	5/24/23 14.54.22	5/24/23 14.57.16	anonymous			Yes	Second year	Yes	Yes
8	5/24/23 14.52.45	5/24/23 14.58.32	anonymous			Yes	Third year	Yes	Yes
9	5/24/23 14.57.33	5/24/23 14.59.51	anonymous			Yes	Third year	Yes	Yes
10	5/24/23 14.57.17	5/24/23 15.00.22	anonymous			Yes	First year	Yes	Yes
11	5/24/23 15.00.23	5/24/23 15.01.43	anonymous			Yes	Second year	Yes	Yes
12	5/24/23 15.01.09	5/24/23 15.02.35	anonymous			Yes	Second year	Yes	Yes
13	5/24/23 18.35.05	5/24/23 18.37.18	anonymous			Yes	First year	Yes	Yes
14	5/28/23 14.21.10	5/28/23 14.35.03	anonymous			Yes	Second year	Yes	Yes
15	5/28/23 14.39.45	5/28/23 14.46.18	anonymous			Yes	First year	Yes	Yes
16	5/29/23 10.19.05	5/29/23 10.19.48	anonymous			Yes	Second year	Yes	Yes
17	5/29/23 16.03.13	5/29/23 16.04.58	anonymous			Yes	First year	Yes	Yes
18	5/29/23 16.09.52	5/29/23 16.11.19	anonymous			Yes	First year	Yes	Yes
19	5/29/23 16.21.00	5/29/23 16.23.32	anonymous			Yes	First year	Yes	Yes
20	5/29/23 16.21.32	5/29/23 16.25.57	anonymous			Yes	First year	Yes	Yes
21	5/29/23 20.27.55	5/29/23 20.29.34	anonymous			Yes	First year	Yes	Yes

Appendix 3.



Feedback questionnaire form

"Enteral Nutrition and Medication via Percutaneous endoscopic gastrotomy tube" in the form of a digital book. Answering the survey is completely voluntary and does not affect the grading of the course. Familiarizing yourself with the guide and responding to the survey takes approximately 15 minutes. By participating, you help us improve the digital guide.

* Required

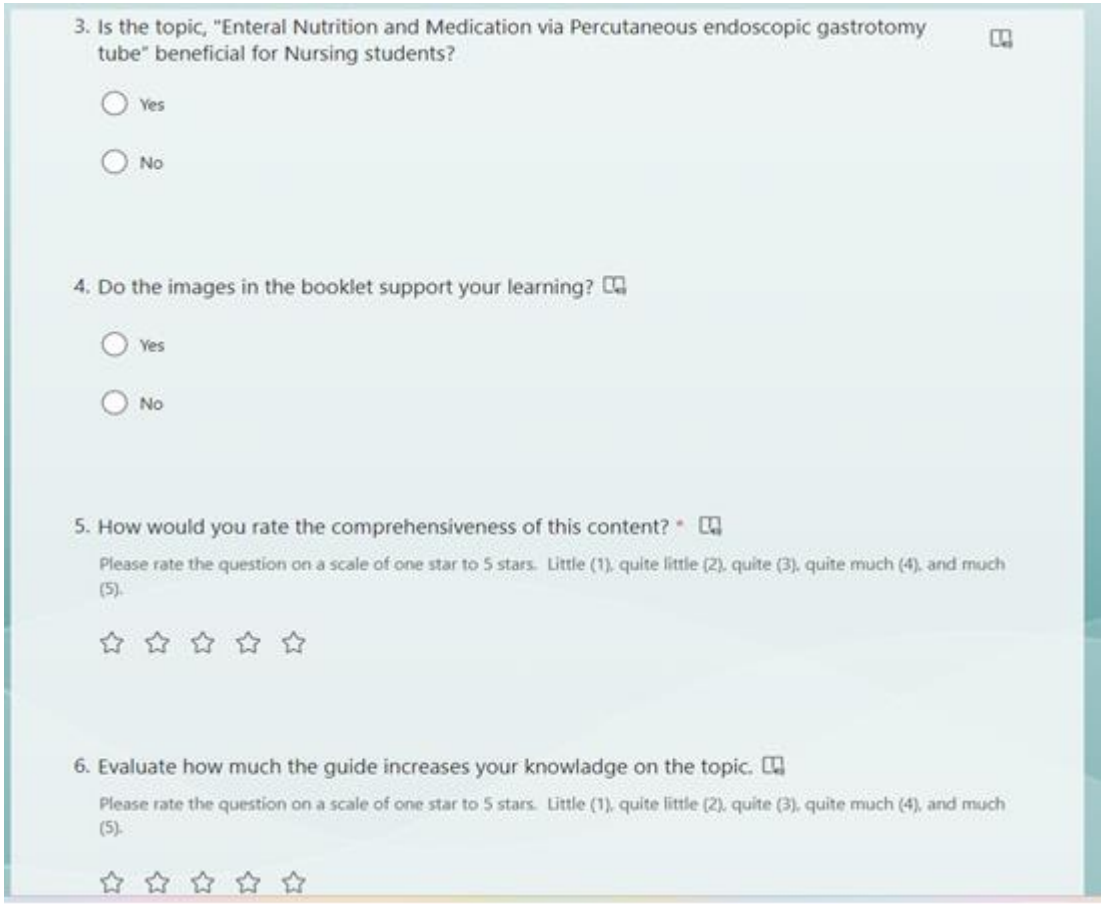
1. I understand, answering the questionnaire is voluntary, conducted anonymously, and my answers are used as data for the thesis.

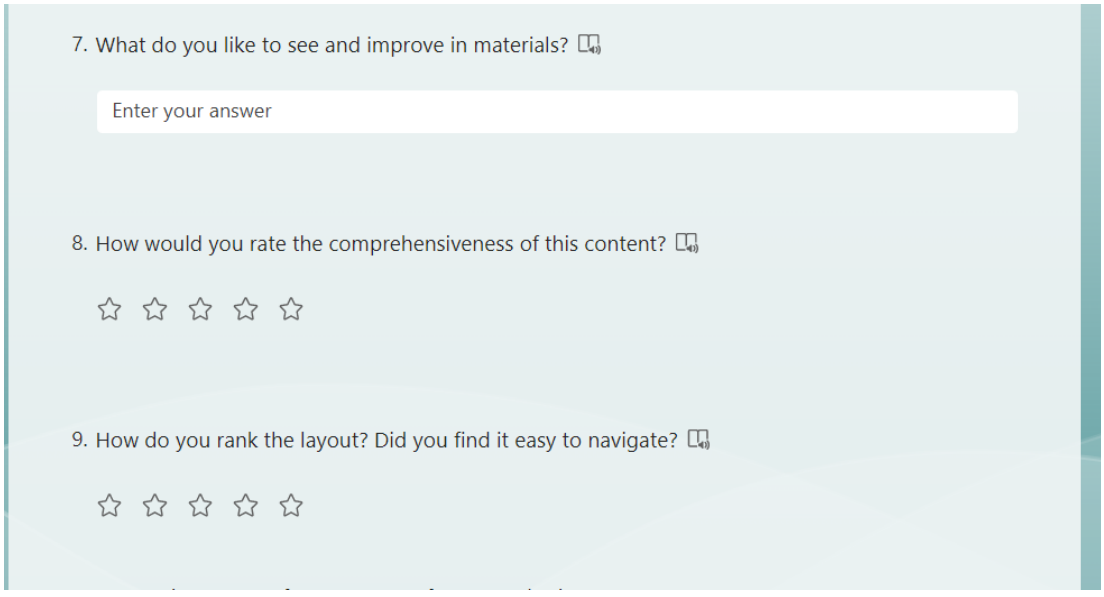
- ○ Yes
- ○ No

2. Which academic year are you in?

- ○ First year
- ○ Second year
- ○ Third year

Appendix 4


3. Is the topic, "Enteral Nutrition and Medication via Percutaneous endoscopic gastrotomy tube" beneficial for Nursing students?
Yes
No
4. Do the images in the booklet support your learning?
Yes
No
5. How would you rate the comprehensiveness of this content? *
Please rate the question on a scale of one star to 5 stars. Little (1), quite little (2), quite (3), quite much (4), and much (5).
6. Evaluate how much the guide increases your knowladge on the topic.
Please rate the question on a scale of one star to 5 stars. Little (1), quite little (2), quite (3), quite much (4), and much (5).


7. What do you like to see and improve in materials?
Enter your answer
8. How would you rate the comprehensiveness of this content?
9. How do you rank the layout? Did you find it easy to navigate?