Abstract of the thesis entitled

An evidence-based guideline of chewing gum to reduce the postoperative ileus among adult major abdominal surgery

Submitted by

Lee Siu Ho

For the Degree of Master of Nursing At the University of Hong Kong
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Postoperative ileus is one of a common postoperative complication after major abdominal surgery. It is a great burden for the patients, health care workers and health care system. Prolonged of hospitalization will occur and increased patient’s risk of infection rate in the hospital due to postoperative ileus. It also brings an increasing workload for the frontline staffs and increases the cost expenditure for the health care system. Traditional prevention of postoperative ileus bring patients suffer and not easy to compliance for the staffs.

In many recent studies, gum chewing is a safe and cost-effective method to prevent postoperative ileus and promote bowel movement after operation, it’s also shorten patients length of stay by keep patients away from ileus.

An evidence-base protocol is important for the clinical setting to implement. By using the translational research methods, it produces a transferable and feasible protocol from the previous literatures.

Successful implementation of the program can bring benefits to patients, staffs and hospital that is worth to adopt in the clinical setting.
An evidence-based guideline of chewing gum to reduce the postoperative ileus among adult major abdominal surgery

By

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A thesis submitted in partial fulfillment of the requirement for the Degree of Master of Nursing at the University of Hong Kong

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed: ________________________________________

LEE SIU HO
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### Abbreviation

<table>
<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>APN</td>
<td>Advanced Practice Nurse</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>COS</td>
<td>Chief of Service</td>
</tr>
<tr>
<td>DOM</td>
<td>Department Operation Manager</td>
</tr>
<tr>
<td>GMN</td>
<td>General Manager of Nursing</td>
</tr>
<tr>
<td>HA</td>
<td>Hospital Authority</td>
</tr>
<tr>
<td>HCE</td>
<td>Hospital Chief Executive</td>
</tr>
<tr>
<td>HK</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
</tr>
<tr>
<td>LOS</td>
<td>Length Of Stay</td>
</tr>
<tr>
<td>POI</td>
<td>Postoperative Ileus</td>
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<tr>
<td>WM</td>
<td>Ward Manager</td>
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Chapter 1: Introduction

1.1 Background

Postoperative ileus (POI) is one of the common postoperative complications of abdominal surgery. 10-25% patients who undergone major abdominal surgery have this problem. (Vather and Bissett, 2013) Failure of the postoperative patient to tolerate a diet, have flatus, and experience a bowel movement within 5 days after laparotomy or within 3 days after laparoscopic surgery, are indicative of a prolonged POI. (Bashankaec et al., 2009)

According to Vather et al., 2013, POI is frequently occurring after abdominal surgery, the definition of POI is an abnormal pattern of gastrointestinal motility distinct from mechanical obstruction. The signs and symptoms of POI including nausea and vomiting, intolerant of oral diet, abdominal distension, increase postoperative pain and delayed passage of flatus and stool. There are many impacts of paralytic ileus after operation, it can prolong the length of hospital stay of patient and increase their rate of complication like infections. It also brings an extra financial and resources burden to the health care system.

In Hong Kong, as my hospital setting, POI is also common after patients underwent major abdominal surgery, there were around 300 patients admitted to the surgical ward each month, and 7-8% of them, around 20 patients, may undergo a major abdominal operation. 10-20% of them, around 2 to 4 patients, may have the problem of POI.

After major abdominal surgery, postoperative ileus usually return the motility in the small bowel (<24 hours), then in the stomach (24-48 hours), and finally in the large bowel (>48 hours). But the recovery of large intestine motility is much less predictably than other parts of guts, traditionally, the passage of flatus and stool are the indicators of the endpoint of postoperative paralytic ileus.
Over the past decades, many studies have been done and also there are many cares to treat or prevent POI and promote recovery. Including pain control, early oral feeding, providing laparoscopic surgery, early mobilization, administrate PONV anti-emetics agents. (Kehlet, 2008)

Nowadays, there are many methods to prevent POI, including using of NSAID, undergoing laparoscopy surgery and epidural anesthesia, early nutrition, nasogastric decompression and gum chewing method (Lubawski & Saclarides, 2008). As gum chewing is a relatively new method, but it is a safety, cost-effective one, so it is worth to implement this new method to prevent POI.

In this dissertation, chewing gum is mostly focused to use as an evidence-base guideline to prevent or resolve postoperative ileus after abdominal surgery. There are several literatures concluded that the use of gum chewing method was a type of sham feeding that beneficial to promotes intestinal motility though cephalic-vagal stimulation. These method has been already proved as effective to prevent the onset of POI fooling various main abdominal surgery like gastrointestinal surgery and Caesarean sections by several RCTs. (Marwah et al., 2012, Abd-El-Maeoud et al., 2009) One of the essential components to prevent POI and shorten the hospitalization is to set up an evidence-base and effective guideline to update the care to patients undergone abdominal surgery. As a result, nursing staff competent of care can be improved and the patients can acquire a safe, reliable and consistent care which eventually promotes an early and safe discharge.

It is quite common for a nurse to take care of patients who undergone main abdominal surgery especially in a surgical ward, or sometimes in a postnatal gynecology wards. There are many complications can be occur after an abdominal surgery, one of the common complications is postoperative ileus (POI). POI can bring a lot of burden to the patient and the general ward. For the general ward, according to Shrividyav et al., 2009, the length of stay (LOS) and hospitalized cost increased for the patent with POI after abdominal surgery compared with patients after abdominal surgery who without POI. According to the literature review conducted by Shrividyav et al., 2009, patients who had POI after abdominal surgery were associated with a 29% increase in hospital LOS
and a 15% increase in hospitalization costs. In United State, mean hospital LOS for abdominal surgery patients with POI was 13.8 days total, compared with 8.9 days total for abdominal surgery patient without POI. And the mean per stay hospitalization costs for colectomy patients with and without postoperative ileus were respectively, $25,089 and $16,907 (Shrividyav et al., 2009). Moreover, Prolonged hospitalization have a negative psychological impact to patients and create a barrier to postoperative recovery and increase the rate of complication like infection (Vather et al., 2013).

1.2 Affirming the Need

In Hong Kong, my ward setting is a surgical department which under hospital authority, in my ward practice, there are many methods used to treat or prevent POI like nasogastric tube insertion and walking exercise. However, those methods may have their own limits, patients may suffer from nasogastric tube insertion and some patients are not fit for walking exercise due to wound pain or high risk of fall. As a result, the risk of POI of patients may increase and the LOS and the costs of hospitalization will be increased.

Therefore, finding an effective way to prevent of postoperative ileus could give benefits in reduction of patients’ hospital LOS and associated health care costs. Although the suggested practice of prevention of POI care guidelines was documented in several researchers, the implementation and application protocol was limited. Nowadays, the nursing practice and management in the wards setting are based on the routine of the ward itself or the usual practice of the ward, sometimes add on the staffs’ individual judgments and their subjective opinion. As a result, it may leads to the deviation of providing a safe, standard and effective care to the patient to manage of POI. In Hong Kong, surgeon and nurses obviously recognized the needs and importance of providing adequate care or treatment to patients for undergone major abdominal surgery like colectomy. There are different practices via different surgeon, and some are proved as strong evidence in previous studies like thoracic epidural local anesthetics, intravenous or wound local
anesthetics, peripheral opioid antagonists, goal-directed fluid therapy and avoiding fluid excess, laparoscopic surgery and PONV anti-emetic agents. (Kehlet, 2008) However, there is no guideline for the nurse with an evidence-based practice to the patient with POI. Even not a care plan for the postoperative care of a major abdominal surgery, or it didn’t specify the details of the caring of different kinds of surgery, therefore there is no reliable or supportive for the ward practice. Nursing practice getting more advance with innovation these years, an also more focus on evidence base practice that the past, so keep update the practice and catch up the latest worldwide nursing care is very important. It can help nurse to provide an more effective, correct and coherence care for the patients who undergone main abdominal surgery, also maintain the high reputation of nursing care in Hong Kong. Moreover, there is no standard guideline for nurses to take care the patients to prevent POI in Hospital Authority (HA), different clusters or different hospitals have its own practice. For example, at my hospital setting, we believe that early mobilization can help prevent POI, in fact there is no evidence-base guideline in my ward setting to prevent POI. Some surgeons’ practice would like to insert nasogastric tube for decompression after abdominal operation. Besides, total parental nutrition(TPN) will provide to patient for prolonged POI and just wait it resolved spontaneously, not much active nursing care can provide to patient. As a result, the LOS of patients who undergone main abdominal surgery like colectomy increased, also they may have some infections like wound infection or hospital acquired pneumonia (HAP) during the increased LOS. Over the decade, chewing gum as a method to prevent POI has been studied and practiced in the other countries. It’s already proved as an effective and a reliable, safety way to prevent or treat POI, however, in the local setting, there is still not common to use this method and not providing a guideline or protocol to use as a usual practice. It’s need time to promote and set up a guideline for the clinical. It also needs time for the hospital to accept and absorb the new innovation.
1.3 Objectives and Significance

1.3.1 Significance

It is very common for a patient who undergone a major abdominal surgery worldwide. They included gastrointestinal and Caesarean surgery. In united states, more than 500,000 elective major abdominal operation were performed in 2006, and the total cost of these procedures exceed $10billion. (Bashankaev et al., 2009) In Hong Kong, there are many major abdominal surgery proceeded every year especially colectomy. According to Hong Kong Cancer Registry (2012), there are 4,563 new case of colorectal cancer which is a increasing trend of it. Most of the cases are potential candidates who will undergo surgery for colectomy. In my ward setting, there are around 10-25% patients who undergo the abdominal surgery may have POI, that case a lot of burden for the patients and health care system.

1.3.2 Objectives

Based on the local health care situation as mentioned above, the objectives of this dissertation are:

1) To gather of the evidence of the effect of gum chewing to prevent/treat patients with POI who undergone major abdominal surgery
2) To establish an evidence based guideline of chewing gum for the patient who undergone major abdominal surgery to prevent/treat POI
3) To assess the feasibility of the evidence based chewing gum guideline in the local ward setting
4) To Implement and evaluate the effectiveness of patient to chewing gum after major abdominal surgery in clinical setting

Research Question:
How effective is chewing gum in reducing the postoperative ileus among adult major abdominal surgery?

This searchable and answerable question is formulated according to PICO framework which focuses on population, intervention, control and outcome.
Chapter 2: Critical Appraisal

2.1 Search and appraisal Strategies

For the literature studies related to the chewing gum to prevent POI for the patients who undergone major abdominal surgery, the searching progress began from 20th November, 2015 to 13th December, 2015. Three electronic searching engines was used for searching the data, they included Pubmed, Clinical Key and Mosby’s Nursing Consult. The searching keywords are “chewing gum”, “postoperative ileus”, “recovery”, ”prevent”, ”gastrointestinal function” and “randomized control trail”. For the result, by using the advanced search for the individual database, 23 citations were found in Pubmed; 33 citations were found in Mosby’s Nursing Consult and 40 citations were found in Clinical Key. Limits were applied to full text available only. Journals which are duplicated were not double counted and by reviewing the abstracts, 5 randomized control trail were chose as most suitable for the area of the interest.

2.1.1 Inclusive Criteria

Inclusive criteria are set up for choosing and screen out the most suitable study selection. The inclusive target criteria including:

1) Full text

2) Randomized control trail

3) The selection of the paper must be published within 10 years (from 2005), that can ensure the reliability of the study

4) The target group criteria would be adults with age equal or older than 18 of both genders

5) Patients who undergone major abdominal surgery and under general anesthesia

6) The trail was conducted in clinical setting
2.1.2 Exclusion Criteria

1) Patients who undergone emergency abdominal surgery, ICU stay after operation and post operation intubation

2) Patients who have dental problem or contraindicated with gum chewing

2.1.3 Data Extraction

The 5 selected randomized control trails studies were summarize as the table of evidence (TOE) and it will be show in appendix 2. The TOE included the citation name/ design (study quality), the sample characteristics, intervention, control, outcomes and the effect size of intervention verse control. The interventions of these studies mainly focus on the time of first flatus, time to first bowel movement, first stool and the length of hospital stay with and without chewing gum after major abdominal surgery. The results were similar compare with the 5 selected studies.

2.1.4 Appraisal strategy

The tool that used to criticize the 5 selected papers is Scottish Intercollegiate Guidelines Network (SIGN), it is a checklist that to appraise the quality of the RCT articles. Appendix 3 will show the full table of the following criteria:

1) Study question

2) Randomization

3) Concealment method

4) Blinding treatment allocation

5) Similarity of the intervention and control group at the start of trail

6) The measurement of the outcome
7) The dropout rate of the study
8) Intention to treat analysis
9) Comparable for all sites

2.2 Results

2.2.1 Searching result
After the advanced search from 3 databases, 99 citations were retrieved, 23 from Pubmed; 33 from Mosby’s Nursing Consult and 40 from Clinical Key. The duplicated studies were eliminated. By screening the abstracts from the articles, 5 RCTs paper meet the inclusion and exclusion criteria. The content of the 5 selected studies were analyzed and summarized. Searching history was summarized by a PRISMA flowchart in Appendix 1. The table of evidence and critical appraisal for each article was in Appendix 2 and 3.

2.2.2 Study Characteristic
The studies were carried out in 3 countries in which are in western country like Turkey(Pekin et al., 2015), United States (Matros et al., 2006), Sweden (Andersson et al., 2015) and in 2 Asian studies were done in South Korea(Choi et al., 2014) and Iran (Ledari et al., 2013). The published period of these articles was from 2006 to 2015. The inclusion criteria are similar that the candidates’ aged over 18 years old with mentally capable to sign the informed consent. The exclusion criteria also similar like history of drug consumption or alcohol abuse, history of pancreatitis, peritonitis, inflammatory bowel disease abdominal surgery and inability to chew gum, diabetes. All 5 articles named the topic very clear that chewing gum related to the recovery the bowel mobility or prevent postoperative ileus after major abdominal surgery. These studies outcome were grossly similar that measuring the time of first flatus, time of first bowel sound/bowel movement, time of first defecation, length of hospital stay.
2.2.3 Table of Evidence

The table of evidence was made by the extraction of the data of each journal, it occluded the bibliography citation, study types, patient characteristics, numbers of participants, interventions, comparison and the effect size. It was listed in the appendix 2. After the critically appraisal of the paper, one studies ranked the highest level of evidence with 1++, three studies with 1+ and one study with 1-.

Matros et al., 2006 was ranked as 1++. Although it is a single site center study, there was no drop out found in the study and the randomization was good and fully mentioned in the paper compared with others. All primary data collected are analyzed.

Pekin et al., 2015, and Ledari et al., 2013 were ranked as 1+ because of the randomization details is not adequate and single center. Moreover, Pekin et al., 2015 has the largest sample size (137) compared with others studies. Although Choi et al., 2014 has patient dropped out during the study, but the rate is not high (7.5%)

Choi et al., 2014 and Andersson et al., 2015 were rated as 1- because of the randomization method was limited and single center. Andersson et al., 2015 dropout rate were relatively higher (39%), which may has a potentially higher chance of bias occur. Choi et al., 2014 did not mention the randomization method, so it’s study was downgrade.

2.2.4 Quality appraisal

The quality appraisal on each article was made by the Scottish Intercollegiate Guidelines Network (SIGN) checklist to assess the internal validity and overall assessment of the study with evaluating the methodology used in the study, then rating the quality and comment on each study. The RCT checklist of SIGN was used to critically appraise the randomized control trials (RCTs)
2.2.4.1 Research Question

All of the articles were clearly stated the essential elements of the research question, including the population, intervention, comparison group and outcome.

2.2.4.2 Randomization

All of the articles were clearly stated the randomization method. Three articles used sealed envelope (Pekin et al., 2015, Andersson et al., 2015, Ledari et al., 2013), one articles used computer-generated randomization (Matros et al., 2006). In Choi et al., 2014 study, there is lack of information about the randomization method despite randomization process was claimed to be done in the study. Therefore, a comment ‘Can’t say’ was given to this paper.

2.2.4.3 Concealment and ‘blinding’

For the adequate concealment method, this method can ensure the researchers are unaware which group patients are being allocated before they enter the study. Most of the study did not mention the concealment method, however, the nature of the study design and the randomization method can prevent the researcher to aware the patients characteristic before enter the study. Three articles used the concealed envelop method can help the allocation concealment. (Pekin et al., 2015, Andersson et al., 2015, Ledari et al., 2013)

For the blinding process, it is easy to ‘blind’ the patients and the health care givers during the study, patients who participated the study have to sign the informed consent, also the health care givers have to perform the intervention or placebo treatment to the participants, so it is difficult to design the blinding process. One article mentioned that asked the participants not to tell the experiment to the surgeons, trying to ‘blind’ the surgeons and minimize the bias. (Matros et al., 2006)
2.2.4.4 Outcome measure

Most of the articles were clearly list out the primary outcome by the authors. The measurements, including the time of first flatus, time to first defecation, time to start of clear fluid and the length of stay of hospitalization were all recorded by the researcher. (Pekin et al., 2015, Andersson et al., 2015, Ledari et al., 2013, Choi et al., 2014, Matros et al., 2006)

2.2.4.5 Dropout rate

Three of the studies are no participant dropout before the study was completed (Pekin et al., 2015, Ledari et al., 2013, Matros et al., 2006). One of the paper has 7.5% drop out rate, the reasons of dropped out included not giving enter the trail and discontinue chewing gum for malocclusion (Choi et al., 2014). One of the paper has a high dropout rate as 39%, the reasons included disliked chewing gum, nausea, postoperation confusion and severe postoperative pain. (Andersson et al., 2015) The high rate of drop out may due to the small of sample size (n=28) and the participants are undergone pancreaticoduodenectomy, which is a more high risk operation and more postoperative complications compare with others studies.

2.2.4.6 Intention-to-treat principle

Intention-to-treat principle is used in two articles to analyzed data; it’s useful in handling trial with high dropout rate (Choi et al., 2014, Andersson et al., 2015). Three remaining articles have no dropout before the study completed, therefore intention to treat was not applicable in those articles (Pekin et al., 2015, Ledari et al., 2013, Matros et al., 2006)

2.2.4.7 Statistical Analysis

Statistical Analysis was performed to calculate the sample size and power estimation to ensure the outcome validity (Pekin et al., 2015, Ledari et al., 2013, Matros et al., 2006, Choi et al., 2014, Andersson et al., 2015).
2.3 Summary and Synthesis

2.3.1 Data Summary

Total 5 RCTs designed studies were retrieved and the level of evidence are 1++ (Matros et al., 2006), 1+ (Pekin et al., 2015, Ledari et al., 2013) and 1- (Choi et al., 2014, Andersson et al., 2015) respectively.

For the patient’s characteristics, sample size ranged from 28 to 137 over the five studies. Participants in the studies underwent major abdominal surgery who including pelvic surgery, retropubic prostatectomy, colectomy, pancreatic duodenectomy and cesarean section. The ages of participants are from 25 to 66. All of the demographic characteristics of the patients were clearly list in all articles.

For the summary, five studies examined the effect of chewing gum to prevent POI. Two studies indicated that chewing gum have no significant different between intervention group and control group but there is a positive effect to promote bowel movement and it’s a side-effect-free method, it may because of the small sample size (Choi et al., 2014, Matros et al., 2006). In two studies, there are significant different of first defecation time compare with intervention and control group, it indicated that chewing gum can prevent the development of POI and help promote early defecation (Pekin et al., 2015, Ledari et al., 2013). One study also indicated that chewing gum doesn’t significantly reduce the duration of ileus, but it also suggest that it is a safe and no side effect method for patients to use when awaiting resolution of ileus. (Matros et al., 2006) From the five studies, the participants in intervention group can experience a shorter period of first time flatus, first defecation and length of the hospital stay. That’s mean chewing gum can help prevent the POI by promoting the bowel movement. The five studies have different methodology like blinding, randomization process, even the conclusion is not all the same, but they all agree that the positive
effect to promote the bowel movement and prevention of POI, so it should be consider that five articles are consistent.

2.3.2 Data Synthesis

After summarizing the data from the 5 studies, some data can be synthesized to a new guideline or a protocol. An evidence based guideline of chewing gum in reducing the postoperative ileus among major abdominal surgery can be made by using the five articles.

2.3.2.1 Choice of gum

4 out of 5 studies using sugar free gum for the intervention group. In one study, researchers used a biodynamic manufactured chewing gum with glucose, and it recorded one participant dropout due to dislike the texture and taste (Andersson et al., 2015). Therefore sugar free gum is preferable to use, it can also prevent affect the blood sugar level for the patients with diabetes mellitus. Different ingredients or tastes are also preferable like honey, menthol, watermelon that can let’s patients to choice the favor taste to chew and prevent the dropout.

2.3.2.2 Starting time of chewing gum

There is two studies start to implement chewing gum on the day 0, just after the surgery, when the patient fully recover from anesthesia(Pekin et al.,2015, Ledari et al., 2013). Two studies start the treatment on day 1 morning after the surgery.(Matros et al., 2006, Andersson et al., 2015) It is believed that start the treatment on day 0 is more preferable if patient have no contraindication of chewing gum or already fully awake. Starting the treatment earlier can help promoting the bowel movement earlier. Nurses can help to remind and encourage patient to start the treatment.
2.3.3.3 Nurses role

In this practice, the role of nurse is to administrate the gum following by the protocol. Since the patients range of age is wide, some patient do not so familiar to chewing gum, so nurses can educate patients the instruction of chewing gum, like the duration and the frequency of chewing. Nurse can also supervise the patients to see whether their compliance is good or not. Monitoring the patients’ gum chewing condition especially elderly, some elderly may have some dental problems and loose tooth, nurse can ask patients to inform if they can’t tolerate due to the dental issue. Also Nurse can give encouragement to patients who are not interest for chewing gum frequently.

2.3.3.4 Chewing gum regime schedule

In the five studies, all of studies have different duration and frequency of chewing gum. Three articles suggested chewing gum three times a day, one article suggested chewing 30 minutes each time, one suggested 45 minutes and one suggested 1 hour. Two studies suggested chewing gum four times a day and 30 minutes each time. According to the results of the studies, the studies suggest chewing gum three times per day for 30 mins and 1 hour have the shortest time of first flatus, 27.1 hours and 20.89 hours respectively. (Choi et al., 2014, Ledari et al., 2013). Also from the other results, patients chewing more frequencies do not have a better performance of first flatus compare with other studies. Therefore, chewing gum three times daily is a most suitable way for the clinical situation. It is because administrate too frequencies gum to the patients is a burden for the nurse and the patients. Patients may feel quite ‘suffer’ if chewing gum all the day. 30 to 45 minutes each time is also a suitable range as consider some patients cannot tolerate nor may feeling tired of chewing for a long time after the surgery. It can make sure patients can more easily to comply the treatment.
2.3.3.5 Target Group

For the target group, patients who undergone abdominal surgery can be consider as beneficial from the gum chewing guideline. Since abdominal surgery is a very common operation, the group of participants must be large. It can be frequently apply the guideline at the surgical ward, sometimes in the gynecology ward. For the inclusion criteria, there are quite similar among the five studies, including age 18 or above, mentally capable to sign the inform consent, no contraindication or dental problems to chewing gum, no ongoing alcohol or drugs abuse, undergo abdominal surgery with general anesthesia. For the exclusion criteria, most of the articles also found similar, including patients with metastatic disease, history of inflammatory bowel disease, wore dentures, having nasogastric tube drainage after day 1 of the surgery and patients who need ICU support for intubation after operation. Most of the studies excluded the patients who has history of bowel disease may because researcher doubt these disease can affect the result of the studies, and bias occurs.

2.3.3.6 Conclusion of synthesis

To conclude the above data synthesis, it is suggested that using of sugarless gum with different ingredient or taste, administering the gum to the patients once fully awake (>6 hours after operation) from the general anesthesia, with three times daily and 30 to 45 minutes each time are the most ideal and effective way to implement to guideline after summarize and analyzed the 5 articles. For the inclusion and exclusion criteria of select the patients, the five studies have quite familiar criteria.

After reviewing the literatures and studies, there are strong and sufficient evidence to use chewing gum as a nursing care guideline for patient undergone abdominal surgery to promote bowel movement and prevent postoperative ileus. In this dissertation aim to set up evidence based
guideline on chewing gum for patients after abdominal surgery and implement that innovation in the surgical ward in Hong Kong.
Chapter 3: Implementation Potential and Clinical Guideline

In the previous chapter, the burdens of post-operative ileus to the health care system have been described. From the critical appraisal of the literatures of RCT studies and the synthesis of the results in the previous chapters, it is provided that chewing gum for the patients with major abdominal surgery done can significantly reduce the postoperative ileus. In this chapter, the implementation potential of the nurse-led program will be assessed, including transferability, feasibility, cost-benefit ratio and the evidence-based practice guideline.

3.1 Transferability

3.1.1 Target setting and target audience

For the target setting, an acute hospital in the East Cluster of Hong Kong Island under Hospital Authority will be selected, which included five general surgical wards. Each ward averagely occupied 40 beds and mainly serves the residents in east cluster of Hong Kong Island. Patients who diagnosed with the surgical disease or surgery related cancer will be admitted to the ward. In the admission, adult patients who aged over 18 who are emergency or clinical admitted for the major abdominal surgery under general anesthesia will be the target audience. Around 120 patients will be the target audience a year in my department.

3.2 Transferability of the innovation in target setting

3.2.1 Target setting

All the clinical trial studies method in the previous chapters were also performed in acute hospitals, which is similar to the target setting.
3.2.2 Audience

The characteristics of the patients in the previous RCT are similar to the target audience like age and intervention. They are all aged over 18 with major abdominal operation. Moreover, most of the studies were conducted in the developed countries like USA and South Korea, which are well development, economic status and social background with the proposed setting country, Hong Kong.

3.2.3 Philosophy of care

The core value of the target hospital is to provide a holistic and people-centered care to the patients, patients safety and their health status are the first priority, understanding and meeting the need of patients are very important. To achieve the goal, a professional and safety service is essential, that ensure patients can have the most benefit during the hospitalization and less complication. This proposed innovation nurse-led service can increase the recovery of bowel movement and decrease the rate of POI, it can also decrease the length of stay in hospital. That can help patients to gain a better recovery by using this non-invasion, low risk and low side-effect intervention.

Prevention is always better than cure, this is one of the important philosophy of care. The aim of this proposed innovation is used to help patients to prevent from postoperative ileus and prevent the complication bring from POI. Moreover, the core value of the target hospital is to provide a holistic care to the patients, patients’ safety and their health status are the first priority. After comparing the target setting and the target audience with the previous studies and the clinical setting, it is believed that the proposed innovation is fit to the target sitting with high level of transferability from the findings.
3.2.4 Patients to be benefited

The proposed innovation will benefit patients who undergone abdominal surgery. According to the target hospital, there were around 300 patients admitted to the surgical ward each month, and 7-8% of them, around 20 patients, may undergo a major abdominal operation. They may face the POI after the surgery and prolonged hospital stay and hospital acquired infection may occur. This is not only giving a have burden to the health care system and the health care worker, but also affect the recovery state of patients and increase the rate of hospital acquired infection. It is believed that the proposed innovation can help to solve such problems, in particular help shortage the hospital stay for the patients. It is anticipated that approximately 200 patients can be benefit by this program.

3.2.5 Time for implementation and evaluation

The time of implementation will separated into three phases, preparation intervention and evaluation. One month time will be taken for preparations, including forming a team, prepare the material like choosing gum and the assessment form. Two weeks for communication with the ward staffs, training and pilots some cases in the clinical setting. The implementation of program will run for half year. The team also supervises the staffs for problem solving and quality control during the program. After 6 months, data will be collected and evaluation can be connected one month later.

3.3 Feasibility

An evidence-based protocol will be developed that provide a significant benefit to the clinical setting compare with the present practice. As mentioned before, the core value of care is provide a people centered care, this low risk, low cost and non-invasive intervention to the patient should be supported by the hospital management level. In the management level point of view, they always concern the length of stay of patients and the shortage of bed in hospital, this innovation will be welcomed by the administration as it can help to solve the problems. The department can support the funding of this program as it is a low cost innovation. Moreover, a nurse-led, evidence based
innovation can increase the quality of nursing care and the autonomy of nursing. The department head would encourage and give autonomy to nurses to provide more high quality care to patients.

In the clinical situation, nurses are considered as a very important part of this innovation, since this is a nurse-led program, they can have the authority to carry out the program and the freedom to terminate the intervention once they noted abnormal finding or adverse effect to the patients. Beside, this innovation, administrate gum to patient after major abdominal surgery, will not interfere the current nursing staff function or giving extra work load to them. It is not hard to understand that nurses may feel fear or reluctant to accept that new protocol will increase their workload or giving burden to their routine, also they may have doubt to the effectiveness of the intervention. They may also worry about they may not have enough knowledge to deal with the innovation by themselves. Since the evidence-based gum chewing protocol is not complicated and the nurses in the target wards already have basic postoperative care, so it won’t be difficult for them to learn knowledge and carry out the innovation in the ward.

Besides, patients may not get used to the new innovation of postoperative care that is chewing gum, compare with traditional postoperative care if no significant benefit is noted. Therefore, a good communication and education is important for nurse to explain the effectiveness of the intervention and help patients to eliminate the doubt of the care.

In addition, some doctors may have questions and concern about the ability of nurse to carry out and led the program, they may doubt about the effectiveness of the new postoperative care and the compliance of the new protocol. Therefore, a clear and well organized plan should be presented to administer or the head of department to ensure they have enough faith and support to the program.

The biggest challenge that may face is the reluctant to compliance the protocol by the nurses, although this innovation is not difficult and complicated, nurses may not feel comfort and confidence to adapt the change or new thing. Therefore the team members should conduct more promotion activities and a better communication to the ward staffs, emphasize to the staffs that
there is only take a short time to learn and implement the innovation. Adequate education and communication can help colleague lower the fear of increasing workload and ensure the good compliance of the protocol.

To assess the effectiveness of the proposed innovation, a chart will be created for the ward staffs to record the first flatus time of patient and first bowel sound heard by nurses. Also the questionnaire of satisfaction and opinions of the intervention will give to the staff and the patients.

Moreover, an important message should be delivered to administer, department head and the nursing staffs is that the proposed innovation does not erase or substitute the traditional nursing care to the patients. Conversely, using chewing gum as a additional method to help patients to regain the normal bowel movement. Chewing gum method may not have a strong effect or strong relationship of returning the bowel movement. But this intervention is proved to prevent the POI and also this intervention is safe to the patients and the cost is low. Therefore, this intervention is feasible.

**3.4 Cost- benefit ratio of the proposed protocol**

**3.4.1 Potential risk of the innovation**

For this innovation, chewing gum is a relatively lower risk intervention for the patients. Most predictable risks of this intervention is accidentally ingested of the gum, parents with dental problem may also get harm with chewing gum and some of the patients may feel discomfort after chewing gum with unfavorable taste. There are some precautions to overcome the potential risk, such as assess patients ability of chewing gum and make sure they done have dental problems, also different taste of gums will be prepared for the patients to choose.
3.4.2 Potential benefit of the innovation

From the literatures selected before, this proposed innovation can bring benefits to patients with a shorter hospital length of stay, reduce the time for patients to return of bowel function and flatus, reduce the risk of post-operative ileus and help tolerate the meal. Besides, chewing gum is a low cost and low risk intervention, it brings not much cost and expenditure for the hospital, also shortage the length of patients’ stay ca preserve more resource and manpower to provide more service to patients. For the staffs, this intervention is not difficult, complicate and time consuming, it does not give an extra workload for them, and they may increase the job satisfaction due to the patients decrease the POI rate and enhance the recovery. For the patients, chewing gum is low risk and low adverse effect, it’s also not difficult for patients to learn, since patients may feel tired and pain after operation, chewing gum is an energy consuming activities for them and, so the compliance rate will be high. By using the sugarless gum can ensure that this intervention will not affect the blood glucose level especially the patients with DM.

3.4.3 Risk of maintaining current practice

The risk of maintaining current practice is accountable, it included increased the risk of POI for the patients, therefore length of hospital stay will increase, also the cost of expenditure of hospital and the chance of patients getting hospital acquired infection. It also a burden for patients’ relative due to increase the length of stays and increased the workload of health care workers. Therefore, a new innovation should be implemented.
3.4.4 Materiel cost

Cost of the innovation can be divided to material and non-material costs. The material cost mainly spends on the set up cost and the evaluation. Materials required is not much because the intervention is simple, no extra staffs or skills needed. The main material of this innovation is gum, each pack sugarless gum with 25 pellets is $10 dollars for each patient, approximately there are 200 patients will receive the intervention during six months, therefore $2000 is needed for buying gums. For the evaluation charts and the education leaflets, assuming each page costs $0.5, the estimated cost of this 6 months pilot study will be $200.

For the non-material cost, in the period of transition required ward staffs to get familiar with the intervention, including familiar the time of administration of gum to patients and the evaluation of the effect. As a result, they can able to identify patients’ needs and the response of the intervention, and also prevent the burden of staffs and turnover rate. In this innovation, the advantage of it is staffs do not need a lot of training because the protocol is not complicated. During the adaptation period, manager and the innovation team can give more support to the staffs to help them overcome the difficulties, for example, holding a briefing session at the beginning of the shift and debriefing session for staffs to express their feeling or room of improving of the innovation. The innovation team can provide psychological support and help to solve the difficulties of the staffs.

3.5 Evidence-Based Practice Guideline

The evidence-based practice guideline is develop from the five previous chosen studies, it including the title and the objectives of the guideline, the target group which is adult patients undergo major abdominal surgery under general anesthesia. In the guideline, there are seven evidence based recommendations which based on the five RCTs. The recommendations included assessment, intervention and evaluation.
Inclusion & Exclusion criteria

There is the briefly contents of the recommendation. First, the target patients aged should be 18 or above, mentally capable to sign the inform consents, to chew gums and report the time of first flatus. Second, exclude the patients who are not suitable as a candidate to chew gum after major abdominal operation. Third, use sugarless gum. Forth, start the gum chewing protocol on postoperative day 0, once patients are fully awake. Fifth, the duration, amount and frequency of chewing gum: Chewing 1 stick gum three times a day, at least 30 minutes for each time. Sixth, the chewing gum protocol will be terminated once patients return of bowel functions. Finally, nurse will assess and hearing patient’s first bowel sound and also record the time of first flatus once patient experienced the first flatus to confirm the return of bowel movement.

Appendix 5 will go further and more details of the evidence-based guideline.
Chapter 4: Implementation Plan

After the development of the evidence-based guideline of the gum chewing innovation, the implementation plan will be discuss in this chapter, it included communication plan, pilot study plan, evaluation plan and the basis for implementation. The above planning can ensure the feasibility and transferability of the study are fit into practice and implement the use of chewing gum into the clinical practice smoothly.

4.1 Communication Plan

Applying an evidence-based guideline into clinical practice can improve patients’ outcomes, promote nurse autonomy and the satisfaction of practice. In this session, communication plan will be discussed as it is important to persuade the stakeholders to understand and agree the protocol and finally follow the plan. Therefore, identifying all the stakeholders is an important step.

4.2 Identifying the stakeholders

Identifying the stakeholders is the first step to carry out the communication plan. The stakeholders of this evidence-based guideline are referred to people who involved in it. The key stakeholders in this gum chewing program mainly separated into four levels. That’s included frontline users of the wards, management level of the department and administrative level of the hospital.

4.2.1 Frontline users of the protocol of the wards

The users of the protocols are nursing staff in the department of surgery. Frontline staffs including RNs and APNs in the clinic are the large party of stakeholders. For RNs, they are the main users to apply the protocol. They will be asked for the pilot test as doing the assessment and evaluation the protocol, also providing feedback and comments in modifying and smoothing the launch of protocol. And the roles of APNs are take part as the leading role to monitor and assist the other staffs during the implementation stage. Also they can be trained as a trainer, helped to solve the
problems and act as a bridge of communication between frontline staffs and the administrators. As nurses are the mainly users of the protocol, a good communication, high satisfaction and competent for them are essential to implement the program smoothly.

4.2.2 Management level of the department

The Chief of Service (COS), Department Operation Manager (DOM) of the surgical department and Ward Manager (WM) in each ward are the key person in the level. They are people to make the decision of the development of department. Therefore, getting support and approval are very important to implement the new evidence-based protocol. They can provide many professional suggestions and sources to improve the program or make it run more smoothly.

4.2.3 Administration level of the hospital

Before implementing the program in the department, getting an informed consent and agreement by the administrative level of the hospital are essential. They approve the execution of the program and also approve the funding. The Hospital Chief Executive (HCE) and General Manager of Nursing (GMN) are the key persons for the program as they allow the implement of the program.

4.3 Communication process

The initiations of the proposed program started by the management level of the surgical department for the agreement of a new protocol bring into the department. It is because they are the decision maker of the department, their support and approval can make things easier in the later stage. Moreover, they are an important bridge of communication between the frontline staff and also the administrator of the hospital. The proposal of gum chewing program will be bring out during the senior meeting between the COS, DOM and WM. In the proposal, the latest evidence practices, the gap of the current practice, the benefits and potential of the implementation, the pilot and implementation period and the needs of resources and manpower will be presented clearly to
managerial staffs. The aim of the presentation is to gain the approval and support from the management level. The proposal will also mention the plan of implementation and the feasibility of the program. Gaining the support and approval by the managerial staffs is a very important step in the program, in the next step, they will communicate with the administration level in the hospital to gain a formal agreement and funding.

4.3.1 Setting up a team

An organized team will be set up to hold this program, the team is responsible for planning, implementing and evaluating the program in different stage like pilot stage and evaluation stage to ensure the program implement smoothly. Another function of the team is act as a communication bridge to receive and listen the feedback by the frontline staffs and the recommendation of the managerial staffs. As there is a multi-functions team, some experience staffs must be invited to join the team. Cancer case manager (colorectal) in the department can be invited as he handle with many cases with major abdominal surgery, he also responsible for the rehab phase of these patient after surgery, so he is very experienced and also have a communication with patients, frontline staff and the case doctor. Link nurses (total four) will be selected in each ward for updating the progress of the program. For the doctor aspects, one specialist and one medical officer will be the facilitator for giving comment and the guide during the program. For the sustaining the change of this nurse-led program, documentation and chatting is very important, it can monitor the outcome of the protocol for patients. Besides, holding a regular meeting with cancer case manager, link nurse and doctors is also essential. It can keep update the progress go the program and also provided some feedback and recommendation by the frontline staffs. As a result, the program can be modified and reinforced to meet the needs at the clinical setting. In appendix 6, a program timeline will figure out the whole process.
Chapter 5: Pilot Study Plan

The purpose of the pilot study is to examine the feasibility of the innovation that is intended to be used in a larger scale study. A pilot study is a initial step to explore an innovation application of an intervention. Pilot results can inform feasibility and identify modifications needed in the design of a larger study. (Leon, Davis & Kraemer, 2011)

5.1 Objectives of the pilot study:

1) Testing the feasibility of the gum chewing protocol

2) Assess the staffs compliance and satisfaction toward the protocol

3) Assess the appropriation of evaluation tools

5.2 Pilot Test setting

The pilot test will be performed in one of the wards in the surgical department

5.3 Timelines

1 month after the program introduced and trained to the frontline staffs, the test will be last for one month

5.4 Subject recruitment strategies

In the pilot test, the inclusion and exclusion criteria of samples will be the same as the criteria in the proposed gum chewing guideline. Adults with age equal to or above 18 with both gender, mentally capable to sign the inform consents and to chew gums and report the time of first flatus who undergo major abdominal surgery. 20 patients who meet the criteria will be selected as around 10% estimated number of eligible clients in the implementation phase. The selected subjects will be screened for the eligibility by the doctors.
5.5 Outcome measures

The time of first flatus (hours), the time of bowel movement (hours), the length of stay and the satisfaction of frontline staff will be the outcomes that would like to obtain in the program. The frontline staffs will administrate the gum as prescribed when the patients fully awake after the surgery on postoperative day 0. Nurses will monitor patients’ bowel sound hourly, patients also have to report to the nursing staff once first flatus occurred. Documentation or charting is an important tool in this pilot study to record the patients’ compliance and response to the gum chewing. Length of stay will be recorded once patients discharged. Some patients may prolonged the hospital stay due to others complications included postoperative ileus, therefore nurses should make a remark or record the reason of patients prolonged the hospital stay. Besides, evaluation forms will be distributed to the frontline staffs to obtain the opinions and feedback to the program after the pilot study.

5.6 Data analysis

For patients, time of first flatus and bowel movement will be used to compare will the previous record in the ward, also obtaining the satisfactory of this program to ensure the effectiveness and feasibility of the program. For staffs, their compliance, satisfaction and acceptance will be focused in the study. Questionnaires will be used to obtain the staff recommendation and feedback. Link nurse in each ward will also act as an observer, to observe the logistic during the pilot test period and evaluate the effectiveness of the program.
5.7 Evaluation of pilot study

The feasibility and the acceptability of the program will be evaluated in the form of survey. For the patients, a 5 points scale questionnaire (appendix 7) will be used to assess the patients’ satisfaction about the gum chewing program, open-end question will also provide to let them to comment or giving feedback. On the other hands, there is another set of questionnaire (appendix 8) to the frontline staffs, to evaluate the satisfaction and workload of this program. Moreover, all frontline staffs are invited to attend a meeting with the program team member to give comment or express the feeling about the program after the pilot test.

After the pilot test, the program team member can gain more experience and feedback from patients and staffs, and then they can modify the program to become more user friendly and more suitable for the clinical situations.
Charter 6: Evaluation Plan

After finish the program, it comes to the final part, evaluation. Evaluation is a vital part of the program as it decided whether the goal reached or not. It’s also can point out the rooms of improvement if further modification is needed in the future. And for the stakeholders, evaluation is important to give detail information about the positive outcome for the clinical setting, so that they can sure the protocol’s sustainability. There are several outcomes that can be evaluated: patients’ outcomes, health care provider outcomes and system outcomes.

6.1 Patients outcomes

In this gum chewing protocol, the aim is to enhance patients’ recovery rate and shorten the length of stay. This program has a positive effect to reduce rate of post-operative ileus. Therefore, the primary outcome is increasing the time of return bowel sound and bowel movement. It can be measured by patients’ self-reporting of first bowel flatus or first movement. Another ways is nurse can auscultate patients’ abdomen regularly to ensure the bowel sound appear. This measurement will start on the postoperative day 0 once patients fully awake.

The secondary outcome is the length of hospital stay, which is directly affected by the time of first flatus and bowel movement. The result will be collected and analyzed by the team members of the program to effectiveness of the protocol. Moreover, patients’ satisfactory level of this program will also be evaluated.
6.2 Health care providers’ outcomes

For the health care providers’ outcomes, it will mainly focus on the compliance and satisfactory level towards the program. A set of questionnaire will be distributed to the frontline staff to evaluate their compliance all along the program, satisfaction and competent. The team members will also audit the nursing documentation and charting in the gum chewing period of patients to evaluate the compliance of staff towards the program.

6.3 System outcome

For system outcomes, it is used to measure the effectiveness in the whole system. It included the procedures, manpower, cost that in the program. Indeed, patients’ outcomes and health care providers’ outcomes will also be counted to evaluate in the system outcome. Finally, the cost-effectiveness result of the program will be compared with the current practice.

6.4 Nature of clients to be involved

The nature of clients for the evaluation plan is patients who eligible to the target population of the gum chewing protocol. For the inclusion criteria, adults who are aged equal to 18 or above, with both gender, who undergo major abdominal surgery with general anesthesia, mentally compatible to sign inform consent and able to chew gum without contraindications. For the exclusive criteria, patients who undergone emergency abdominal surgery, ICU stay after operation, post-operative intubation is needed and receiving chemotherapy as their major treatment will not be considered.

6.5 Number of clients to be involved

For the number of clients to be involved, by reviewing the previous studies, one of the studies, Andersson, T., Bjerså, K. & Falk, K. (2015), it showed that the power is 80 % and the alpha value is 0.05. This study can make a significant p value <0.05, the recruited patients is 18 patients in each group. Besides, the study showed that patients who start chewing gum after surgery have an earlier
return of bowel sound and flatus. Therefore, this study can prove statistically significant in gum chewing to prevent post-operative ileus. As a result, 36 patients will be recruited in to evaluate the effectiveness in the program. It will take 3 months to recruit 36 patients who meet the inclusion criteria in the program.

6.6 Data Analysis

For the quantitative data included first flatus time (hours), first bowel movement (hours), length of stay (day) will be analyzed using SPSS software version 22.0, with a p-value <0.05 will be consider as statically significant. Descriptive statistics will be applied to illustrate the outcomes and will be shown in terms of mean score with standard deviation. Chi square test will be used to compare the demographic data and student’s t-test will be used to compare the data of control group and study group.

For qualitative data like job satisfaction, a set of questionnaire are rated by numerical level from 1 to 5. Open-ended comments will be considered as different coding data, and then turned into categories and theme for further analysis and interpretation.

6.7 Basis for practice effectiveness

This program considered as effective and bring an positive outcome to the expected patients, healthcare provider and system outcomes such as reduce the first flatus and bowel movement and length of stay, improvement of staff performance, compliance and satisfaction, cost-benefits ratio of the gum chewing protocol within the system, the innovation can be proved to implement effectively in the clinical setting.
Chapter 7: Conclusion

As POI is a common post-operative complication after main abdominal surgery, chewing gum is a safe and cost-effective method to prevent POI and promote bowel movement after operation, it is also believed that patients can have a shorter length of stay. This evidence-base protocol is feasible and transferable from the literatures that selected. Moreover, this program can bring benefits not only to the selected patients, but also the frontline staffs, the clinical setting and the system. In view of the positive effect to the patients and the system, an evidence-based guideline, the implementation and evaluation plan of gum chewing was developed to facilitate the adoption of practice to the unit. I hope this program can implement all over the hospitals or in other clinical setting.
Appendix 1: Prisma Flow Chart

PRISMA 2009 Flow Diagram

Records identified through database searching (n =116 )

Records after duplicates removed (n =99)

Records screened (n =42)  Full-text articles assessed for eligibility (n =10)

Studies included in qualitative synthesis (n =0)

Studies included in quantitative synthesis (meta-analysis) (n =7)

Additional records identified through other sources (n =12)

Records excluded (n =32)  Full-text articles excluded, with reasons (n =3)

Records after duplicates removed (n =99)

Records included in quantitative synthesis (meta-analysis) (n =7)
Appendix 2: Table of evidence


<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Participants/Setting</th>
<th>Number of patients</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Effect size</th>
</tr>
</thead>
</table>
| Pekin et al. (2015)     | RCT (1+)   | Patients who has undergone elective gynaecologic surgery with same anaesthetic technique and same treatment during the postoperative period | N= 137  
Intervention group=67  
Control group=70 | Intervention group : chewing gum at the post-operative 3rd h and chewed gum every 4 h daily, for 30 min each time and standard postoperative care  
Control group : standard postoperative care without chewing gum | To compare:  
1) time of first flatus(hours)  
2) time of first bowel sound(hours)  
3) time of the first defecation (hours)  
4) Length of hospital stay (days)(median) | 1) 30h vs 33 h (p=0.381)  
2) n= 36(4h) vs n=30(4h) (p=0.270)  
3) 45h vs 67h (p<0.01)  
4) 3(2-5) vs 3(2-6) (p=0.870)  
Interpretation: Gum chewing can significantly reduce the time of first flatus |

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Participants/Setting</th>
<th>Number of patients</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Effect size (Intervention group vs control group)</th>
</tr>
</thead>
</table>
| Choi et al. (2014)      | RCT (1-)   | Patients who undergone elective retropubic radical prostatectomy for localized prostate cancer. Patients’ demographic and operative outcomes are no differences. | N=37               | Intervention group: chewing gum three times a day, 30mins for each time and standard postoperative care  
Control group: standard postoperative care without chewing gum | To compare:  
1) time of first flatus (hours)  
2) time of bowel movement (hours)  
3) Length of hospital stay (days) | 1) 27.1h vs 39.1h (p<0.01)  
2) 46.1h vs 60.7h (p<0.01)  
3) 6.4 vs 5.1(p=0.03)  
Interpretation: Gum chewing can significantly reduce the time of first flatus and bowel movement in elective prostatectomy |

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Participants/Setting</th>
<th>Number of patients</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Effect size (Intervention group vs placebo group vs control group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matros et al. (2006)</td>
<td>RCT (1++)</td>
<td>Patients who undergone an elective open colectomy</td>
<td>N=66 Intervention group:22</td>
<td>Intervention group: chewing sugarless gum three times a day, at least 45 mins for each time and sips of water</td>
<td>To compare: 1) time of first flatus (hours) 2) time of bowel movement (hours) 3) length of stay (hours)</td>
<td>1) 60 vs 72 vs 67 (p=0.384) 2) 80 vs 74 vs 88 (p=0.913) 3) 119 vs 116 vs 117 (p=0.787)</td>
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<td></td>
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<td></td>
<td>Placebo group:22</td>
<td>Placebo Group: wear accupressure wrist bracelet three times a day, at least 45 mins for each time and sips of water</td>
<td></td>
<td>Interpretation: Gum chewing method is not significant in this study of open colectomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control group:22</td>
<td>Control group: Sips of water</td>
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<tr>
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<th>Intervention</th>
<th>Comparison</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersson et al. (2015)</td>
<td>RCT (1-1)</td>
<td>Patients who undergone elective pancreaticoduodenectomy with pancreatic tumors</td>
<td>N=28</td>
<td>Intervention group: 14 (7 drop out)</td>
<td>To compare: 1) Time of first flatus (days) 2) Time to first defecation (days) 3) Start of clear fluids (days) 4) Length of hospital stay</td>
<td>1) 3.7 vs 5.6 (p=0.340) 2) 7.6 vs 9.1 (p=0.882) 3) 5.1 vs 7.7 (p=0.068) 4) 18 vs 21.8 (p=0.286)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control group: 14 (4 drop out)</td>
<td></td>
<td></td>
<td>Control group: standard postoperative care without chewing gum</td>
<td><strong>Interpretation:</strong> Gum chewing method is not significantly improved of pancreaticoduodenectomy.</td>
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<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Participants/Setting</th>
<th>Number of patients</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Effect size (Intervention group vs control group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ledari et al. (2013)</td>
<td>RCT (1+)</td>
<td>Patients who underwent elective/emergency cesarean section in nulliparous women</td>
<td>N=60</td>
<td>Intervention group : chewing gum three times a day, at least 1 hour for each time during the whole hospital stay with standard postoperative care</td>
<td>Control group: 30</td>
<td>To compare: 1) time of first flatus (hour) 2) Time to first defecation (hours) 3) Time to feeling hunger (hours)</td>
</tr>
</tbody>
</table>

Interpretation: This study showed significant improvement of time of flatus, defecation and feeling hunger in cesarean surgery with gum chewing.
Appendix 3: SIGN Checklist

Methodology Checklist 2: Controlled Trials

Study identification  (*Include author, title, year of publication, journal title, pages*)

Guideline topic: An evidence-based guideline of chewing gum to prevent postoperative ileus after major abdominal surgery

Key Question No: N/A
Reviewer: N/A

Before completing this checklist, consider:

1. Is the paper a *randomised controlled trial* or a *controlled clinical trial*? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a *controlled clinical trial* questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+

2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

Reason for rejection: 1. Paper not relevant to key question ☐ 2. Other reason ☐ (please specify):

SECTION 1: INTERNAL VALIDITY

**In a well conducted RCT study…**

<table>
<thead>
<tr>
<th></th>
<th>Does this study do it?</th>
</tr>
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<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
</tr>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
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<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
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<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
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<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
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<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
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<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
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</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | High quality (++), □  
Acceptable (+), √  
Low quality (-), □  
Unacceptable – reject 0 □ |
<table>
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<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes. The assignment of control and intervention group were randomized with adequate treatment. Also the result showed that the intervention was significant. So it is certain that the overall effect is due to the study intervention.</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td></td>
</tr>
</tbody>
</table>
The study concluded that chewing gum prevents the development of postoperative ileus and allows early defecation. Gum chewing could be added as an adjunct treatment in postoperative care.

Methodology Checklist 2: Controlled Trials

Study identification  

Guideline topic: An evidence-based guideline of chewing gum to prevent postoperative ileus after major abdominal surgery
Key Question No:  N/A
Reviewer:  N/A

Before completing this checklist, consider:
1. Is the paper a randomised controlled trial or a controlled clinical trial? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a controlled clinical trial questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+
2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

Reason for rejection: 1. Paper not relevant to key question □ 2. Other reason □ (please specify):

SECTION 1: INTERNAL VALIDITY

In a well conducted RCT study…

<table>
<thead>
<tr>
<th>Does this study do it?</th>
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<tbody>
<tr>
<td>Yes ✓</td>
</tr>
<tr>
<td>No □</td>
</tr>
<tr>
<td>Can’t say □</td>
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</table>

1.1 The study addresses an appropriate and clearly focused question.
1.2 The assignment of subjects to treatment groups is randomised.
<table>
<thead>
<tr>
<th>1.3</th>
<th>An adequate concealment method is used.</th>
<th>Can’t say ✓</th>
</tr>
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<tbody>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Yes ✓ No □ Can’t say □</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓ No □ Can’t say □</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓ No □ Can’t say □</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓ No □ Can’t say □</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>3 out of 40 dropped out before the study was completed. The percentage is 7.5%</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes ✓ No □ Can’t say □ Does not apply □</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes □ Can’t say ✓ Does not apply □</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

| 2.1 | How well was the study done to minimise bias? *Code as follows:* | High quality (++)[□]  Acceptable (+)[✓]  Low quality (-)[□]  Unacceptable – reject 0[□] |

53
| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. The assignment of control and intervention group were randomized with adequate treatment. Also the result showed that the intervention was significant. So it is certain that the overall effect is due to the study intervention. |
| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes |
| 2.4 | **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | The study concluded gum chewing has a positive effect on the recovery of bowel motility and reduction of surgical hospital stay after a radical prostatectomy. Gum chewing is an effective and side-effect-free method for the resolution of ileus after surgery. |

---

## Methodology Checklist 2: Controlled Trials

**Study identification** *(Include author, title, year of publication, journal title, pages)*


**Guideline topic:** An evidence-based guideline of chewing gum to prevent postoperative ileus after major abdominal surgery

**Key Question No:** N/A

**Reviewer:** N/A

**Before** completing this checklist, consider:

1. **Is the paper a randomised controlled trial or a controlled clinical trial?** If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a controlled clinical trial questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+

2. **Is the paper relevant to key question?** Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

**Reason for rejection:** 1. Paper not relevant to key question □ 2. Other reason □ (please specify):
### SECTION 1: INTERNAL VALIDITY

**In a well conducted RCT study...**

<p>| | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes ✓</td>
</tr>
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<td></td>
<td></td>
<td>Can’t say □</td>
</tr>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Yes ✓</td>
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<td>Can’t say □</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓</td>
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<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
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<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓</td>
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<td></td>
<td></td>
<td>Can’t say □</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>No patient dropped out before the study was completed</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes □</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not apply ✓</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes □</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not apply ✓</td>
</tr>
</tbody>
</table>

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY
2.1 How well was the study done to minimise bias?  
*Code as follows:*  
- High quality (++): ✓
- Acceptable (+): □
- Low quality (-): □
- Unacceptable – reject: 0 □

2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?  
Yes. The assignment of control and intervention group were randomized with adequate treatment. Also the result showed that the intervention was significant. So it is certain that the overall effect is due to the study intervention.

2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?  
Yes

2.4 **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

The study concluded that gum chewing does not significantly reduce the duration of ileus, but it’s safe and can be consumed without deleterious effects in those patients who desire to chew gum while awaiting resolution of postoperative ileus.

---

**Methodology Checklist 2: Controlled Trials**

Study identification  
(*Include author, title, year of publication, journal title, pages*)
Thomas Andersson, Kristofer Bjerså, Kristin Falk and Monika Fagevik Olsén (2015) Effects of chewing gum against postoperative ileus after pancreaticoduodenectomy – a randomized controlled trial BMC Research Notes 8:37

Guideline topic: An evidence-based guideline of chewing gum to prevent postoperative ileus after major abdominal surgery  
Key Question No: N/A  
Reviewer: N/A
Before completing this checklist, consider:

1. Is the paper a *randomised controlled trial* or a *controlled clinical trial*? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a *controlled clinical trial* questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+

2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

Reason for rejection: 1. Paper not relevant to key question ☐ 2. Other reason ☐ (please specify):

### SECTION 1: INTERNAL VALIDITY

In a well conducted RCT study… | Does this study do it?
--- | ---
1.1 The study addresses an appropriate and clearly focused question. | Yes ✓ No ☐ Can’t say ☐
1.2 The assignment of subjects to treatment groups is randomised. | Yes ✓ No ☐ Can’t say ☐
1.3 An adequate concealment method is used. | Yes ✓ No ☐ Can’t say ☐
1.4 The design keeps subjects and investigators ‘blind’ about treatment allocation. | Yes ☐ No ☐ Can’t say ✓
1.5 The treatment and control groups are similar at the start of the trial. | Yes ✓ No ☐ Can’t say ☐
1.6 The only difference between groups is the treatment under investigation. | Yes ✓ No ☐ Can’t say ☐
1.7 All relevant outcomes are measured in a standard, valid and reliable way. | Yes ✓ No ☐ Can’t say ☐
1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed? | 11 out of 28 dropped out before the study was completed. Dropped out rate is 39%
<table>
<thead>
<tr>
<th>Section</th>
<th>Question</th>
<th>Answer</th>
<th>Comment</th>
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<tbody>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes ✓</td>
<td>No □</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
<td>Does not apply □</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Yes □</td>
<td>No □</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can’t say □</td>
<td>Does not apply ✓</td>
</tr>
</tbody>
</table>

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

#### 2.1
How well was the study done to minimise bias?

*Code as follows:*

- High quality (++)
- Acceptable (+) ✓
- Low quality (-)
- Unacceptable – reject 0

#### 2.2
Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

- Yes. The assignment of control and intervention group were randomized with adequate treatment. Also the result showed that the intervention was significant. So it is certain that the overall effect is due to the study intervention.

#### 2.3
Are the results of this study directly applicable to the patient group targeted by this guideline?

- Yes

#### 2.4
**Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

- This study concluded that did not find statistically significant differences of chewing gum for postoperative ileus, but a positive trend was observed of a reduction of the impact of POI among patient after pancreatic surgery.
**Study identification**  *(Include author, title, year of publication, journal title, pages)*

**Guideline topic:** An evidence-based guideline of chewing gum to prevent postoperative ileus after major abdominal surgery  
**Key Question No:** N/A  
**Reviewer:** N/A

**Before** completing this checklist, consider:

1. Is the paper a **randomised controlled trial** or a **controlled clinical trial**? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist. If it is a **controlled clinical trial** questions 1.2, 1.3, and 1.4 are not relevant, and the study cannot be rated higher than 1+
2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

Reason for rejection: 1. Paper not relevant to key question ☐ 2. Other reason ☐ (please specify):

### SECTION 1: INTERNAL VALIDITY

**In a well conducted RCT study…**  
**Does this study do it?**

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<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes √</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Can’t say ☐</td>
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</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes √</td>
<td>No ☐</td>
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<td></td>
<td>Can’t say ☐</td>
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<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes √</td>
<td>No ☐</td>
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<td></td>
<td>Can’t say ☐</td>
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<td></td>
</tr>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Can’t say √</td>
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<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes √</td>
<td>No ☐</td>
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<tr>
<td></td>
<td>Can’t say ☐</td>
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<td></td>
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<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes √</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Can’t say ☐</td>
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</tbody>
</table>
1.7 All relevant outcomes are measured in a standard, valid and reliable way. | Yes √  No □  Can’t say □
---|---
1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed? | No patient dropped out before the study was completed
---|---
1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis). | Yes √  No □  Can’t say □  Does not apply □
---|---
1.10 Where the study is carried out at more than one site, results are comparable for all sites. | Yes □  Can’t say □  No □  Does not apply √
---|---

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

2.1 How well was the study done to minimise bias? *Code as follows:*  
High quality (++)| High quality (++)
Acceptable (+)| Acceptable (+)
Low quality (-)| Low quality (-)
Unacceptable – reject 0| Unacceptable – reject 0
---|---
2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. The assignment of control and intervention group were randomized with adequate treatment. Also the result showed that the intervention was significant. So it is certain that the overall effect is due to the study intervention.
---|---
2.3 Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes
---|---
2.4 Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | This study concluded that gum chewing can accelerate the bowel motility after cesarean section in nulliparous women which is a useful, inexpensive and well-tolerated method
---|---
Appendix 4: Levels of Evidence and Grades of Recommendations: SIGN

Levels of scientific evidence

1++ High-quality meta-analyses, high-quality systematic reviews of clinical trials with very little risk of bias.

1+ Well-conducted meta-analyses, systematic review of clinical trials or well-conducted clinical trials with low risk of bias.

1- Meta-analyses, systematic reviews of clinical trials or clinical trials with high risk of bias.

2++ High-quality systematic reviews of cohort or case and control studies; cohort or case and control studies with very low risk of bias and high probability of establishing a causal relationship.

2+ Well-conducted cohort or case and control studies with low risk of bias and moderate probability of establishing a causal relationship.

2- Cohort or case and control studies with high risk of bias and significant risk that the relationship is not causal.

3 Non-analytical studies, such as case reports and case series.

4 Expert opinion.

Grades of recommendations

A At least one meta-analysis, systematic review or clinical trial classified as 1++ and directly applicable to the target population of the guideline, or a volume of scientific evidence comprising studies classified as 1+ and which are highly consistent with each other.

B A body of scientific evidence comprising studies classified as 2++, directly applicable to the target population of the guideline and highly consistent with each other, or scientific evidence extrapolated from studies classified as 1++ or 1+.

C A body of scientific evidence comprising studies classified as 2+, directly applicable to the target population of the guideline and highly consistent with each other, or scientific evidence extrapolated from studies classified as 2++.

D Level 3 or 4 scientific evidence, or scientific evidence extrapolated from studies classified as 2+.
Appendix 5 Evidence-based practice guideline

Title

Nurse-led program of gum chewing in preventing postoperative ileus in adults patients after major abdominal surgery.

Objectives

1. To enhance patients with major abdominal surgery to recovery from the surgery and improve their satisfaction.

2. To shorten the length of hospital stay of the target patients, as a result, preserve the resource of hospital and decrease the workloads of health care workers.

3. To guide nurses to provide a higher quality of nursing care and management to prevent POI for the patients.

4. To ensure patients can receive a standardized, effective evidence-based nursing care.

Target group

Patients who are

1. Aged equal or over 18

2. Undergo major abdominal surgery with general anesthesia

3. Mentally compatible to sign inform consent and able to chewing gums without contraindications.
Rating scheme for the level of evidence and grades of recommendations

The level of evidence and grades of recommendations are graded with SIGN (Scottish Intercollegiate Guidelines Network) which scoring from highest (1++) to lowest (4)

Recommendations

The recommendation including three parts, assessment, intervention and evaluation.

Assessment

Recommendation 1

The target patients aged should be 18 or above, mentally capable, to chew gums and report the time of first flatus.

Available evidence:

Patients mentally capable and can make decisions by themselves is important to fully understand and decide to receive the intervention or not. Also ensure patients that there are no contraindication of chewing gums like dental problems (loose tooth or wore tooth). Patients who can cooperative with nurses that report the first flatus time is important to help to make the data more accurate. (Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)

Recommendation 2

Exclude the patients who are not suitable as a candidate to chew gum after major abdominal operation. Patients who have history of inflammatory bowel disease, earlier abdominal radiation, mint allergy, concomitant resection of small intestine, had nasogastric tube
drainage beyond the first post-operative morning, had a diverting ileostomy or had more than one bowel anastomosis during the operation will not be considerate.

Available evidence:

Patients may have the adverse effect or contraindications of chewing gums after operation, to prevent do harm to patients, some high risk patients will be excluded to minimize the misuse of chewing gums. Also prevent the effectiveness of chewing gums for some patients. (Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)

Recommendation 3  
Grade of Recommendation: A

Using sugarless gum as a tool in this protocol

Available evidence:

Sugarless gum is a good choice for patients who needed to control with the blood sugar level.  
(Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)

Intervention

Recommendation 4  
Grade of Recommendation: A

Implement the gum chewing protocol when patient fully awake

The gum chewing protocol is strongly recommended to start on postoperative day 0. As soon as patient fully awake and able to chew gum.
Available evidence:

There is highly recommended that the sooner of patients to chew the gum, the effectiveness of prevent POI is better. Normally, patients will get fully awake after 3-6 hours after operations. Observation of fully awake and prevent aspiration of patients is important before administrate the gum to patients. (Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)

Recommendation 5  Grade of Recommendation:B

The duration, amount and frequency of chewing gum: Chewing 1 stick gum three times a day, at least 15 to 30 minutes for each time.

Available evidence:

There are different duration, amount and frequency of chewing gum regime via different studies, some studies prefer chewing more gums, more frequency and longer duration each time, however, there is no significant reduce the first bowel movement as increase the frequency and duration of gum chewing. Therefore, Pekin(2015)(1+) study is chosen as the example of the regime, it is considered the cost and benefit and the toleration of patients, also the workload of the ward staffs.

Recommendation 6  Grade of Recommendation:A

The chewing gum protocol will be terminated once patients experience first flatus and first bowel sound heard.
Available evidence:

Patient can stop chewing gum till bowel movement returned. Patients can resume soft diet or normal diet afterwards (Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)

**Evaluation**

**Recommendation 7**

Nurse will assess and hearing patient’s first bowel sound hourly by using stereoscopes and also record the time of first flatus once patient experienced the first flatus.

Available evidence:

Hearing of the first bowel sound and the time of first flatus are the main criteria of returning bowel movements. This is an important data to compare the effectiveness of gum chewing intervention (Pekin, 2015; Matros, 2006; Choi, 2014; Anderson, 2015; Ledari, 2013)
Appendix 6: Program Timeline

1/2 Month
Formation of Gum Chewing
Program Committee

1 Month
Program Training and Briefing

1 Month
Pilot Test

1/2 Month
Pilot test Evaluation

6 month
Full Scale Program

1/2 month
Evaluation
**Appendix 7: Patient satisfaction questionnaire**

Please “tick” in the appropriate space

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
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</thead>
<tbody>
<tr>
<td>1. Gum chewing is helpful for resume bowel movement</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2. Gum chewing instruction is easy to follow</td>
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<tr>
<td>3. Gum chewing does not induce any discomfort</td>
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<tr>
<td>4. Information about gum chewing is sufficient</td>
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<tr>
<td>5. Gum chewing intervention is helpful for rehabilitation after operation</td>
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<td>6. Nurses are always helpful and competent for the gum chewing intervention</td>
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<td>7. You are satisfy of the whole gum chewing intervention</td>
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8. Other Comments:

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## Appendix 8: Staff satisfaction questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. You are clearly understand the purpose of gum chewing program</td>
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<td>2. You think this program can bring positive effect to patients</td>
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<td>3. You have enough time and information to prepare is program</td>
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<td>4. This program increased my workload</td>
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<td>5. This protocol can easily be followed</td>
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<td>6. I can get satisfy from this program</td>
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<td>7. patients are willing to follow this intervention</td>
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<td>8. I think this program is worth to be executed</td>
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<td>9. I am confident to execute the protocol</td>
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Please “tick” in the appropriate space

10. Other Comments:

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References


