Abstract of dissertation entitled

“An Evidence-based Bowel Preparation Guideline for Colonoscopy”

Submitted by

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Colorectal cancer (CRC) is regarded as a preventable disease after the invention of colonoscopy. Colonoscopy is a very common minimally invasive procedure for screening, diagnosis and as a therapeutic intervention for CRC. Bowel preparation is a crucial step for successful examination. Nurses play an important role to guide and monitor patients for adequate bowel preparation using evidence-based practice. With the increased public awareness of CRC, medical expenses coverage by insurance and long queuing time in government hospitals, the admission rate for colonoscopy is dramatically increasing in private hospitals. However, the information provided for patient education is inconsistent between nurses and poor quality bowel preparation has been reported. Therefore, a
standardized protocol for patient education on bowel preparation is necessary. Details on this issue including its background, significance and potential benefits and affirming needs of setting this patient education protocol will be discussed. Followed by demonstration of data search and explanation of appraisal strategies, systematic review and the related results, and further summarize the findings and eventually synthesize some evidence-based recommendations in order to formulate a new innovation to guide nursing practice.

It is crucial to assess the implementation potentials before adopting a new guidelines or protocol in practice. In order to utilize the data synthesized from the critical appraisals of journals related to patient education and bowel preparation for colonoscopy, its implementation potential will be assessed to evaluate the transferability of the findings, feasibility and cost-benefit ratio of the innovation. Beforehand, the target audience and clinical setting will be illustrated. The aim and objectives of the evidence based guideline, and recommendations with reference will be discussed after the evaluation of implementation potential.

Once the evidence-based guideline on bowel preparation for colonoscopy is proven to be transferable, feasible and cost-effective to apply in my clinical setting, a detailed communication plan should be developed during the initial stage of implementation process, and a pilot study should be conducted for
testing the guideline in the proposed setting before actual implementation.

Furthermore, a comprehensive evaluation plan is also important to determine the effectiveness of the proposed guideline in order to achieve maximum positive outcomes and benefits for those patients undergoing colonoscopy.
“An Evidence-based Bowel Preparation Guideline for Colonoscopy”

by

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

August 2015
Declaration

I declare that this thesis 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 ____________________________________________

Leung Chung Man, Ada

August, 2015
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Chapter 1

Introduction

1.1 Background

According to the Centre for Health Protection (2013), CRC is the third leading cause of cancer deaths in males and second leading cause of cancer deaths in females in Hong Kong. In 2014, CRC has become one of the most common cancer in Hong Kong with 4,450 newly diagnosed cases and causing more than 1,900 deaths per year as stated by the press conference of Chinese University of Hong Kong (CUHK, 2014). Early removal of colonic polyps can significantly reduce the chance of CRC whereas the polypectomy can be done via colonoscopy. Colonoscopy is a direct visualization of the colon through a fiber-optic endoscope. It is currently a gold standard procedure to detect colorectal lesions, allow tissue sampling for histology and provide therapeutic intervention by polypectomy and early resection of small tumor via the endoscope. However, the success and diagnostic accuracy of colonoscopy primarily depend on the quality of bowel preparation (Chan, Saravanam, Manikam, Goh & Mahadeva, 2011).

Bowel preparation is a crucial step for successful examination in order to achieve complete visualization of colon, detection of polyps and reduce complications. Generally, low residue diet for three days prior to colonoscopy and
fluid diet on the night before colonoscopy are recommended. Bowel cleansing agents will be prescribed by physician and it is important for nurses to educate and monitor patients on the proper direction of use, how to determine the quality of bowel preparation and those special precautions required.

1.2 Significance and Potential Benefits

According to Sung, Lau, Goh & Leung (2005), the incidence of CRC is increasing rapidly in the Asian population and it is important to increase the awareness of CRC prevention. In the press release conference, it announced that the CUHK Jockey Club Bowel Cancer Education Center had conducted CRC screenings for 10,732 participants aged from 50 to 70 without any symptoms of CRC in 2012 and had recruited additional 5,000 participants from the public aged between 40 and 70 for CRC screening in early 2014. Nowadays, colonoscopy is recommended for all healthy individuals every 5 years from younger age 40 to promote early detection of CRC, and every 2 years for those who had history of colonic polyps to monitor for recurrence of CRC. Early detection of CRC is associated with 5 years survival rate of 90 percent (Lichtenstein, Cohen & Uribarri, 2007). Indeed, CRC is preventable through early detection and removal of polyps, and curable with early diagnosis by screening colonoscopy.
As mentioned by Hillyer et al. (2012), the diagnostic accuracy of colonoscopy is highly dependent on the adequacy of bowel preparation, in which the endoscopists can be able to visualize the whole colonic mucosa clearly. However, Liu et al. (2014) stated that up to 30 percent of all colonoscopies have been reported to have suboptimal bowel preparation leading to decreased detection rate of neoplastic lesions, increased duration of procedure due to difficulty in cecal intubation and increased amount of bowel wash out required, and eventually a greater number of repeated colonoscopy between the follow up intervals. Moreover, poor bowel preparation was also associated with increased complications such as abdominal discomfort and bowel perforation (Chan et al., 2011).

As mentioned by some research papers, the need of adequate hydration was emphasized to enhance the effectiveness of bowel lavage and prevent the potential complications associated with dehydration such as nausea and dizziness (Lichtenstein et al., 2007; Dykes & Cash, 2007). Therefore, patient should be encouraged to drink fluids liberally to prevent fluid volume depletion due to diarrhea. Together with the evidence of the positive effect of walking exercise on the quality of bowel cleansing, patient should be encouraged to increase mobilization during bowel preparation (Kim et al., 2005). The efficacy of
colonoscopy and the overall patient outcome will be affected positively with proper guidance of bowel preparation to patient by nursing professionals. Therefore, a well-planned patient education protocol for bowel preparation is inevitable to develop. Abuksis et al. (2001) stated that patient education can bring about psychological benefits such as patient satisfaction, increased cooperation and reducing anxiety level. With the increased in patient satisfaction, more patients will be willing to or confident to perform colonoscopy in private hospitals. It brings about profit to the hospitals with good reputation. Moreover, the procedural complications and side effects can be minimized and also the ultimate goal of early polyp detection for CRC prevention, diagnosis and treatment can also be achieved.

1.3 Aim and Objectives

The patient education protocol aims to guide nursing care and provide nursing care to the patients in a standardized way and be consistence with evidence. The objective of this paper is to measure the efficacy of patient education on quality of bowel preparation for colonoscopy by different methods and eventually synthesize some evidence-based recommendations in order to formulate a new patient education protocol on preparation for colonoscopy to
guide nursing practice.

1.4 Affirming Needs of the Issue

With the increased public awareness of CRC, medical expenses coverage by insurance and long queuing time in government hospitals, the admission rate for colonoscopy is dramatically increasing in private hospitals. Another major reason is that colonoscopy has been advocated recently in private hospitals by the Hong Kong Cancer Fund (HKCF). In co-operation with private hospitals, HKCF offered trial of public discounted colonoscopy packages limited to 200 candidates on first-come-first served basis in 2013 (Cancer Fund, 2014). There are a profound number of patients admitting to private hospitals for colonoscopy every day and patients will be admitted one day before colonoscopy.

In Hong Kong, Sodium picosulfate (Picoprep), fleet phosphate soda (Oral Fleet) and polyethylene glycol (Klean Prep) are commonly used bowel cleansing formulations in the healthcare settings in my working private hospital. The parameter of low residue diet three days prior colonoscopy cannot be controlled, but the importance of fluid diet and bowel preparation on the night before colonoscopy can be stressed. Nurses working in private hospitals required to provide care for this population of patients preparing for colonoscopy, yet there
is no standardized protocol available for patient education on bowel preparation.

According to an audit report presented in the Hospital Authority Convention (2005), 26.7 percent of patients with poor bowel preparation and accounted for failed colonoscopy. Another audit report released in the Hospital Authority Convention (2014) indicated that the number of colonoscopy is increasing rapidly in Hong Kong and a standardized protocol for colonoscopy was developed in Tuen Mun Hospital to deal with the increasing demand of patient education, including colonoscopy factsheet and patient education video. The audit results showed significant improvement in quality of bowel preparation and patient satisfaction.

In private hospital setting, the physicians prescribe the bowel cleansing agent in admission letter and nurses are responsible to instruct patients to take the prescribed laxatives after admission. In general, the physicians are aware of the importance of bowel preparation, but they will entrust this preparation process to the nurses including the related patient education and monitoring. However, some nurses may not be aware of the latest evidence and so just strictly follow the physicians’ order without giving any guidance or explanation to patients with visual aids, adequate hydration and mobilization. It results in poor bowel preparation and inadequate patient satisfaction.
In current practice, a standard information factsheet will be given to patient during the first visit in outpatient clinic with informed consent signed and appointment will be given for admission. Those details in the factsheet explain the procedure, preparation, potential complications and points to note after the procedure by words without any pictures. However, the quality of bowel preparation has not been emphasized and verbal explanation was required to be given further by nurses. In fact, the depth and clearness of explanation by nurses are frequently affected by the busy working environment (Hsueh et al., 2014). The information provided to patients is inconsistent between nurses and vary from different practice in different units, and yet the quality of bowel preparation remains unsatisfactory.

The research question of this clinical issue in PICO format is “In patients undergoing colonoscopy in surgical setting of a private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?”
Chapter 2

Critical Appraisal

2.1 Search and Appraisal Strategies

A pilot study on this research question should be carried out to assess whether this new innovation can be translated efficiently into daily practice. Translating evidence-based guidelines into nursing practice is essential to facilitate high quality and cost-effective nursing care, and ultimately improve patient outcomes. Walker, Fisher, Korner-Bitensky, McCluskey & Carey (2013) suggested that active strategies such as systemic review of evidence, critical appraisals, data analysis and synthesis, were required to implement research findings into practice but not just simply disseminating the evidence in journals.

In order to indentify the related studies on this topic, a systematic data search has been performed using three electronic databases include Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed and Medline. Keywords included ‘colonoscopy’, ‘education’, ‘patient education’, ‘preparation for colonoscopy’, ‘bowel preparation’, ‘quality of bowel preparation’ were typed in into each electronic database and potential articles were located. The inclusion criteria is those patients are 18 years or older, who were referred for screening colonoscopy and able to make informed consent for the procedure. Whereas the
exclusion criteria include previous colonoscopy and colorectal surgery, impaired mental status and physical mobility, known or suspected gastrointestinal obstruction, severe medical conditions such as renal failure and congestive heart failure. These potential articles are further reviewed by titles and abstracts, and then full papers and reference lists. Eventually the total number of articles for review is retrieved after elimination of duplication.

The data extracted from each article is illustrated by table of evidence with bibliography citation, study type, patient characteristics with inclusion and exclusion criteria, interventions, comparison, primary and secondary outcome measures, and effect size. Quality appraisal on each article is done by using Scottish Intercollegiate Guidelines Network (SIGN) checklists to measure the internal validity and overall assessment of the study with rating of quality, evaluation of the methodology used and statistical power of the study, thus eventually summarize and comment on each study. In SIGN, different checklists were designed according to different methodologies in order to critically appraise the evidence from those studies such as systematic reviews and meta-analysis, randomized controlled trials (RCTs), cohort studies, case-control studies, diagnostic studies and economic studies. Checklist of RCTs can be applied to controlled clinical trials without randomization but questions 1.2, 1.3 and 1.4 are
not relevant and the study cannot be rated higher than 1+. The aim of critical appraisal is to perform a systematic evaluation on the data of published research and identify the most relevant, updated, evidence-based and high quality findings to develop new innovation and ultimately guide nursing practice.

2.2 Results

Data search was done from February 20 to July 8 in 2014. Search history was summarized by a flowchart in Appendix I. A total of seven articles were retrieved after detailed screenings. The table of evidence and critical appraisal for each article was shown in Appendix II. The studies were carried out in different countries in which three studies were done in Asian population. Local study on this issue is not available. In those Asian studies, one study was done in Korea (Tae et al., 2012), China (Liu et al., 2014) and Taiwan (Hsueh et al., 2014) respectively. The remaining four studies were done in United States (Calderwood et al., 2011; Prakesh et al., 2014; Spiegel et al., 2011) and Britain (Rosenfeld et al., 2010). The published period of these articles was from 2010 to the latest 2014. The inclusion criteria are similar with majority of patients aged over 18 years who is capable to make informed consent. There are differences in exclusion criteria and yet the populations recruited were generally healthy without prior
gastrointestinal surgery, obstruction or inflammation, cognitive or sensory impairment and major medical conditions which may vary the process and quality of bowel preparation.

Interventions were tested in these studies include a new cartoon visual educational instructions (Tae et al., 2012), a simple visual aid depicting both clean and dirty colons (Calderwood et al., 2011), an internet website to view the colonoscopy preparation instructional video (Prakesh et al., 2014), a five minutes counseling session with written information (Rosenfeld et al., 2010), a telephone re-education on the day before colonoscopy (Liu et al., 2014), a novel educational booklet with colorful images (Spiegel et al., 2011) and an eight minutes educational film for bowel preparation (Hsueh et al., 2014). The study groups received the interventions and then compared the outcome measures with the control group who received standard instructions. All studies measured the quality of bowel preparation by validated or standard tools including Boston Bowel Preparation Scale (BBPS), Universal Preparation Assessment Scale (UPAS), Ottawa Bowel Preparation Quality Scale (OBPQS), Aronchick Scale, Likert Scale and Cleanliness Quality Score. In which BBPS and OBPQS are more commonly used whereas the validity of Cleanliness Quality score is unknown. There are a variety of secondary outcomes such as polyp detection rate, insertion time,
withdrawal time, cecal intubation time, patient satisfaction, patient tolerance, side effects and need for repeat colonoscopy.

For internal validity, all studies addressed appropriate and clearly focused questions. Among all studies, five are randomized controlled trials (RCTs) (Tae et al., 2012; Calderwood et al., 2011; Prakesh et al., 2014; Liu et al., 2012; Spiegel et al., 2011) and two are quasi-experimental studies (Rosenfeld et al., 2010; Hsueh, et al., 2014). The study and control groups were similar at the beginning of trial according to the comparisons of patient characteristics according to age, gender, race, income, education level and past experience except one study (Rosenfeld et al., 2010). The topic of this study is potentially eligible but it was being rejected due to small sample size (n=38) without true randomization and the baseline patient characteristics were not balance. There was a lack of blinding and validated tool to measure the quality of bowel preparation. This study did not have any exclusion criteria and secondary outcomes, and thus other variables that were known to impact the outcome could not be controlled.

Another study done by Calderwood et al. (2011), the outcomes of quality of bowel preparation were not significant although the validity and overall quality study were acceptable. There was a high dropout rate mainly due to no-show (35%) and the result showed that patient education with simple visual aid
did not significantly change the bowel cleanliness by BBPS score \( (p=0.43) \) and all the secondary outcomes such as insertion time \( (p=0.11) \), withdrawal time \( (p=0.44) \), polyp detection \( (p=0.93) \), patient tolerance and need for repeat colonoscopy \( (p=0.71) \). Therefore, the findings could not be applied to the new innovation although it is a RCT study.

In the study done by Tae et al. (2012), the quality was rated as acceptable with significant improvement on quality of bowel preparation according to BBPS score and UPAS score \( (p<0.01) \) by cartoon visual aids with level of evidence \((1+)\). However, the enrolled population was generally healthy and thus the relationship of medical condition and bowel preparation could not be confirmed. This educational material was written in Korean or English. Translation into Chinese and test in Chinese population is required before applying this method in Hong Kong. An eight minutes educational film was tested in a quasi-experimental study done by Hsueh et al (2014) in Taiwan which significantly improved bowel cleanliness according to Aronchick score \((p<0.01)\). However, a pamphlet was given to the study group after watching film and this act may mask the experimental effect from the film which lower the level of evidence as \((1-)\).

The remained three studies were appraised as high quality with level of
evidence (1+), which showed significant improvement in quality of bowel preparation according to OBPQS score by using an instructional video via internet website ($p=0.0002$) (Prakesh et al., 2013), telephone-based re-education on the day before colonoscopy ($p<0.001$) (Liu et al., 2012) and a novel educational booklet ($p=0.005$) (Spiegel et al., 2011). Endoscopists who were responsible to rate the bowel preparation quality in all RCT studies were blinded to the patient allocation and adequate concealment. Also, the baseline patient characteristics were similar and thus the only difference between the study and control arms is the intervention under investigation. However, all of the above studies were done in a single-centre settings and only one language medium was used in the educational materials which indeed have negative impact on the generalizibility on the research findings in other populations or nationalities.

2.3 Data Summary and Synthesis

Through the data collected from systematic review, several measures are eligible to improve the quality of bowel preparation which includes cartoon visual aids, instructional video via internet website, telephone-based re-education and educational booklet, which were proven to be effective to improve bowel preparation in a RCT (Tae et al., 2012; Prakesh et al., 2013; Liu et al., 2012;
Simultaneously, it is essential to explain the expected outcomes of satisfactory bowel open clearly to patient in order to enhance the insight of patient on the importance of adequate bowel preparation, in which the cecal intubation rate and diagnostic yield can be enhanced whereas the complication rate, procedural time and overall cost can be reduced significantly (Rosenfeld et al., 2010).

From the perspective of patients, they are not familiarized with the preparation for colonoscopy especially those who have no experience before. They have deficit of knowledge to understand the process of bowel preparation, the expected outcomes of good bowel preparation and the impact of inadequate bowel cleansing on colonoscopy. Patients will follow the instructions only if they can understand and agreed to the evidence. Moreover, the tolerance to the bowel preparation will influence their adherence to the regimen. Inadequate communication, trust, guidance, monitoring and support between nurses and patients will affect the overall outcomes. Some patients may have misconception to focus on the quantity of bowel motion rather than the quality of bowel preparation. Therefore, educational intervention is crucial to aim at addressing the perceived severity or consequence of poor bowel preparation and the perceived benefits to comply with the bowel preparation instructions to patient provided by
nurses (Calderwood et al., 2011). It is also important to teach patient how to take
the bowel cleansing agents properly with adequate hydration and mobilization, so
as to minimize the side effects patient may suffer such as nausea, vomiting,
dizziness and abdominal cramping. In addition, visual aids to demonstrate the
requirement of stool texture and a well-cleaned colon can be provided to patients
so that patients can acknowledge the sample of good bowel preparation. By
enhancing the perception of patients and providing clear instructions, the
compliance during preparatory period can be maximized and thus increase the
likelihood of a successful colonoscopy with accurate findings.

According to the results of the study using simple visual aids as an
intervention (Calderwood et al., 2011), the visual aid cannot be over-simplified
that the patient could not understand how to achieve a good bowel preparation
quality. Therefore, more components of photographs with annotation should be
investigated such as the different texture of stool. Moreover, a larger sample size
is required to compensate or the high dropout rate and the reason for dropout
should be investigated.

The cartoon visual aids used by Tae et al. (2012) emphasized on the
preparing for colonoscopy through images of comparing a clean colon and dirty
colon, dietary restriction and recommendations to use purgatives. But the images
of different stool texture and importance of walking exercise were not available.

According to Prakesh et al. (2013), a brief educational video containing bowel preparation instructions had significantly improved the bowel preparation quality. The video included instructions with images and subtitle according to the standard written instructions for bowel preparation plus picture of optimal and poorly prepared colon. The video can be accessed via internet with password. However, the number of times patient actually watching the video could not be controlled and it may affect the study result. Moreover, the level of comprehension and immediate feedback cannot be measured even though it is a low cost educational intervention. It can be modified by playing the video once upon visiting the outpatient clinic before admission instead of internet access and allow immediate enquiry.

Telephone-based re-education on the day before colonoscopy was found to be effective to increases the quality of bowel preparation and rate of polyp detection (Liu et al., 2012). This study showed that patients are unwilling to follow preparation instructions and unable to tolerate and complete the full course of bowel cleansing agents. Re-education aimed to refresh and reinforce patient and achieve better compliance. Instead of re-education on phone, reminders can be given to patient during admission on the day before colonoscopy.
Spiegel et al. (2011) concluded that the novel educational booklet significantly improves preparation quality in patients receiving single-dose purgatives. The effect of the booklet on split-dose remained untested and should be evaluated in future studies. Another concern is the costs of printing this colorful education booklet. The booklet can be printed and share to read among patients on admission instead of offering booklets to each participant. In view of this novel educational booklet is new, the content should be validated in future studies.

Patient characteristics are important parameters to be considered in carrying out a research in health care settings. Common patient characteristics taken into account are age, gender, race, education level, income and prior experience of colonoscopy. For which the baseline characteristics should be similar in both study and control groups to exclude those factors that affect the results. In the study done by Rosenfeld et al. (2010), only gender and age were reported and the difference in gender is large, thus lowering the quality of results.

All studies measured the quality of bowel preparation by validated or standard tools including BBPS, UPAS, OBPQS, Aronchick Scale, Likert Scale and Cleanliness Quality Score. In which BBPS and OBPQS are more commonly used whereas the validity of Cleanliness Quality score is unknown. BBPS was
used by two studies (Tae et al, 2012; Calderwood, 2011) in which it is a validated and reliable instrument for bowel cleanliness and the score ranged from 0 to 9. Three regions of colon: the right side, transverse and left side, each have a segment score 0 to 3. Highest score of 9 represents excellent bowel preparation.

OBPQS was used by three studies (Prakesh et al., 2013; Liu et al., 2012; Spiegel et al., 2011) which is also a validated bowel preparation scale and rating the cleanliness of three segments of colon on a scale of 0 to 4 with 0 representing perfect cleaning. Additionally there is an overall score of fluid quantity from 0 to 2. Therefore the total score ranged from 0 to 14 with 0 score indicated perfect bowel cleaning. The OBPQS defined the bowel cleanliness comprehensively and thus can be used as the primary outcome to measure accurately the effect of the new patient education protocol for colonoscopy on the quality of bowel preparation.

The quality of bowel preparation may be affected by the type of purgatives used, however 4 studies (Spiegel et al., 2011; Tae et al., 2012; Hsueh et al., 2014; Calderwood et al., 2011) did not mention which purgatives they used. In the study done by Liu et al. (2014), two regimen options of purgatives were allowed. Some other studies used split-dose bowel preparation regimen (Tae et al., 2012; Prakesh et al., 2013). Indeed the regimen should be clearly stated in the
study in order to compare the results between different dosage and timing to administer the purgatives.

Based on the data summarized from a systematic review, an evidence-based patient education guideline on preparation for colonoscopy can be developed using an educational video with colorful image and annotation describing the direction of using purgatives, different cleanliness of colon and stool textures, with emphasis on the importance of dietary restriction, hydration and walking exercise. The video will be played in interview room after initial health assessment during the day before colonoscopy when the patients admit to hospital. This intervention will be given to the study group whereas both groups will receive a standard information factsheet for colonoscopy which is available in current setting before starting the same regimen of purgative. Preliminarily, the target group to participate in this study is those patients who are aged 18 or above and able to make inform consent, admit to perform scheduled or screening colonoscopy without prior gastrointestinal surgery and colonoscopy. Further details of this evidence-based educational guideline and implementation plan are discussed in later sessions.
Chapter 3

Translation and Application

3.1 Target Audience and Clinical Setting

In my hospital setting, all patients undergoing colonoscopy referred from out-patient clinics are electives cases. Gastroenterologists assess the clients in out-patient clinics and prescribe the bowel cleansing agent in admission letter. Information factsheet about colonoscopy will be given to patient in the out-patient clinics. The target recipient of the new guideline includes those who are adult referred by resident gastroenterologists, able to make informed consent, intellectually competent to understand the instructions and without prior experience of colonoscopy or gastrointestinal surgery. Patients for colonoscopy will be admitted one day before colonoscopy, allocated by the registration department to different wards preferably surgical units and there are totally 8 surgical wards for adult patients. Upon admission, nurses are responsible to instruct patients to take the prescribed laxatives but there is no standardized guideline available for bowel preparation.

Based on the systematic review through table of evidence, several measures are available to improve the quality of bowel preparation which includes cartoon visual aids, instructional video via internet website, telephone-based
re-education and educational booklet, which were proven to be effective to improve bowel preparation in four RCTs (Tae et al., 2012; Prakesh et al., 2013; Liu et al., 2012; Spiegel et al., 2011). Simultaneously, it is important to explain the expected outcomes of satisfactory bowel output clearly to patient (Rosenfeld et al., 2010) and use visual aids to demonstrate the requirement of stool texture and a well-cleaned colon so that patients can acknowledge the sample of good bowel preparation (Calderwood et al., 2011). By enhancing the perception of patients and providing clear instructions, the compliance during preparatory period can be maximized and thus increase the likelihood of a successful colonoscopy.

3.2 Transferability of the Findings

Based on the data summarized from the systematic review, an evidence-based patient education guideline on preparation for colonoscopy is developed using an educational video with colorful image and annotation, and a pamphlet including all information provided by the video clips with colorful images will be given to patient on admission. The participants in these studies were those patients who are planning for non-urgent screening colonoscopy with aged 18 or above, capable to read and understand the instructions in Chinese, able to make inform consent, is admitted to perform a scheduled or colonoscopy
without prior gastrointestinal diseases or surgery and colonoscopy. Moreover, three studies were done in Asian populations in which one was done in Korea (Tae et al., 2012), China (Liu et al., 2014) and Taiwan (Hsueh et al., 2014) respectively. Therefore, the patient characteristics mentioned above are similar to the target recipient for applying the new guideline in Chinese population.

The philosophy of care underlying the proposed guideline is to achieve complete visualization of colon, detection of polyps and reduce complications for prevention and early detection of colorectal cancer, whereas the philosophy prevailing in the target setting is to provide high quality professional services in restoring patient's health competently and efficiently. They are fundamentally consistent and aimed at the general wellness of patients.

On average, patients for endoscopy account for over 50 percent of all admissions in the target private hospital. There are around 120 endoscopic procedures per day being performed in endoscopy unit. Nurses are required to take care of patients undergoing colonoscopy frequently. From the statistics of a surgical unit in my hospital, there are around 480 admissions per month and 40 percent of patients were admitted for colonoscopy. There are 8 surgical wards mainly receiving these cases. Therefore, by estimation, around 18,500 patients can be benefited from this new guideline annually.
Once this new guideline has been approved by the hospital, 3 months will be required to complete the whole implementation and evaluation process. First of all, 3 identical briefing sessions will be held in a week, targeting the Nursing Officer (NO) and Deputy-in-charge (DIC) representing the target wards, to explain the aim and objectives of the new guideline, its application and special precautions. Afterwards, 2 weeks will be used to carry a pilot study in 2 designated wards and another 1 weeks for evaluating the results of the pilot study. Feedback evaluation will be done after the pilot study through an evaluation form to be filled by all frontline staff while the effectiveness of education will be evaluated by the endoscopists on quality of bowel preparation. All positive and negatives comments are welcome and further improvement on intervention can be achieved. The remaining 2 months will be used to carry out the research in 8 surgical units and have final evaluation. Together with the similarity of clinical settings, patients’ characteristics and philosophy of care between the target setting and the selected studies, and also a significant number of clients benefited from it, the proposed evidence based guideline is proven to be transferable to my hospital setting.
3.3 Feasibility

The bowel preparation guideline standardizes and facilitates the care pathway for clients undergoing colonoscopy. Nurses have freedom to carry out or terminate it if they think that it is undesirable or they do not agree with the evidence. Even if the nurses are aware of the evidence, it may be difficult to accept the new information which is different from their previous knowledge and routines. Moreover, most of the nurses commented that it is time consuming to apply a new protocol into practice. Nurses are busy for ward routines and thus having inadequate time to adopt a new intervention or communicate with patients. Administrative support is another big issue, it is difficult to make it successful without the permission and support by the nursing officers, physicians and hospital executives. Resources were required for printing education materials and disseminate to different units.

Adopting new guideline is a process of change, thus resistance always present throughout the process and strategies are required to remove the obstacles. Therefore, pilot study should be carried out in ward level to assess the feasibility of intervention. Before the pilot study, all the frontline nursing staff will be briefed on how to use the materials properly to provide standard education to the patients. Beforehand, a clear presentation of the proposed intervention to all stakeholders in
order to gain support from nursing colleagues, officers, administration, hospital executives and all medical residents or private doctors via conference, letters or emails. Brodribb (2011) stated that individuals are more likely to accept new information when it was presented in a well-defined and reasonable manner which increases their awareness and acceptance to the issue and thus convincing them to change the current practice.

The utilization of project needs to gain support from other department and health professional including the endoscopy center and physician. However, private doctors from outside clinics will not have a fix time slot for booking time in the endoscopy center and thus having a great discrepancy of time between bowel preparation and procedure. Thus, sample will be taken from the resident gastroenterologists who have regular sessions of colonoscopy and same regimen of bowel preparation for comparison in the study. Data of quality of bowel preparation score will be collected in the endoscopy center. Therefore, cooperation between wards and endoscopy center is very important, yet no conflict exists.

From the technical and resources perspectives, no specialized skill or equipment is required to carry out the patient education session. Educational video can be played in any computer available in wards. For the measuring tools, a
variety of validated tools are available for evaluation including BBPS, UPAS and OBPQS.

3.4 Cost-benefit Ratio

While considering the risks of the intervention, encouraging fluid intake cannot be applied to all patients especially those who have heart disease or renal failure. Walking exercise may increase the risk of fall while patient may have lower limb weakness after several bowel motions related to the effect of laxatives. Therefore, special precautions will be explained and fall prevention will be reinforced.

From the perspective of patients, the tolerance to the bowel preparation will influence their adherence to the regimen. Inadequate communication, trust, guidance, monitoring and support between nurses and patients will affect the overall outcomes. Therefore, a short video education session can be done while administering the bowel cleansing agents or those patients requiring bowel preparation can be group together to receive the information so as to minimize the time required for explanation. Continuous monitoring of bowel preparation process and reinforcement by nurses are required to ensure the patients’ adherence to the regimen.
As mentioned earlier, the diagnostic accuracy of colonoscopy is highly dependent on the adequacy of bowel preparation, in which the whole colonic mucosa can be visualized clearly if patient has good bowel preparation. Suboptimal bowel preparation leading to decreased detection rate of polyps, increased duration of procedure due to difficulty in cecal intubation and increased amount of bowel wash out required, and eventually the worse is failed colonoscopy. Moreover, poor bowel preparation was also associated with increased complications such as abdominal discomfort and bowel perforation (Chan et al., 2011).

The overall material costs for patient education is very low, it will be around $1000 for printing, video-recording and DVD production. The materials are re-usable and user-friendly. Patient education also can bring about psychological benefits such as patient satisfaction, increased co-operation and reducing anxiety level. With the increased in patient satisfaction, more patients will be willing to or confident to perform colonoscopy in private hospitals. It can also enhance the physicians’ preference to admit patients to the hospital in which nurses can achieve good bowel preparation for patients. It brings about profit to the hospitals with good reputation. It can also increase autonomy and morale of nurses to administer the bowel cleansing agents based on standardized guideline
instead of strictly follow the physician order or performing duties without evidence. Moreover, the ultimate goal of early polyp detection for CRC prevention, diagnosis and treatment can also be achieved.

3.5 The Evidence-based Guideline

This guideline is entitled as “An Evidence-based Bowel Preparation Guideline for Colonoscopy”. The aim of developing this guideline is to guide nursing care and provide nursing care to the patients in a standardized way in order to enhance the quality of bowel preparation for colonoscopy through effective patient education. The objectives are to:

1. summarize the clinical evidence for the efficacy of patient education on quality of bowel preparation for colonoscopy by different methods,

2. formulate clinical practice instructions for achieving good quality of bowel preparation based on the best evidence available,

3. standardize the bowel preparation procedure and apply evidence based guideline in private hospital setting.
3.6 Recommendations

From the above evaluation of implementation potential, this guideline is proven to be transferrable, feasible and cost-effective to apply in my clinical setting. Several recommendations are made with level of evidence and grading according to the grades of recommendations proposed by SIGN (2014).

All patients received an information factsheet in outpatient clinic as mentioned earlier. After the patients admitted one day before colonoscopy, initial health assessment will be conducted and educational materials will be provided by nurses in group since the admission time is 5-7pm. All nurses required to re-educate the patients by explaining the purpose of colonoscopy, procedure, expected outcomes, preparation process and complications of poor bowel preparation. An educational video will be provided to each ward so that the nurses can save their time to explain it repeatedly and avoid any discrepancy of verbal explanation. Pamphlet contains colorful visual aids with simple wordings in a double-sided laminated A4 size chart will be shown to patients for ease of understanding and ensuring they can memorize the information, both in Chinese and English. The Each ward will have 7 copies of pamphlets and it is reusable.

Recommendation 1

Re-education on the details of bowel preparation one day before colonoscopy
aimed to refresh and reinforce patient and achieve better compliance

*Grade of recommendation: A*

*Available evidence:*

- Telephone re-education about the details of bowel preparation on the day before colonoscopy significantly improved the quality of bowel preparation and polyp detection rate (Liu et al., 2012). (1++)

*Recommendation 2*

Explain the expected outcomes of satisfactory bowel open clearly to patient in order to enhance the insight of patient on the importance of adequate bowel preparation

*Grade of recommendation: B*

*Available evidence:*

- It is essential to explain the cecal intubation rate and diagnostic yield can be enhanced with good bowel preparation whereas the complication rate, procedural time and overall cost can be reduced significantly (Rosenfeld et al., 2010). (1-)

- Improvement in quality of bowel preparation would enhance colonoscopy completion rate, diagnostic yield and lower the need for repeat procedure (Rosenfeld et al., 2010). (1-)
**Recommendation 3**

Take the bowel cleansing agents properly with proper direction of use, dietary restriction, and adequate hydration with mobilization

*Grade of recommendation: A*

*Available evidence:*

- The cartoon visual aids emphasized on the dietary restriction and recommendations to use purgatives used with adequate fluid intake (Tae et al., 2012). (1+)

- The educational film explained the purpose and importance of water supplementation and principals for taking laxatives (Hsueh et al., 2014). (1-)

- The direction of use and side effects of purgatives and proper food type were especially emphasized (Liu et al., 2012). (1++)

- Education booklet includes pictures showing what is meant by clear liquid and what drinks are appropriate to take while having bowel preparation (Spiegel et al. 2011). (1++)

**Recommendation 4**

Addressing the perceived severity or consequence of poor bowel preparation and the perceived benefits to comply with the bowel preparation instructions

*Grade of recommendation: B*
Available evidence:

- If the bowel is not emptied completely, it can lead to inaccurate tests results or even causes perforation of bowel (Tae et al., 2012). (1+)
- Inadequate bowel preparation results in missed pathology, difficult and time-consuming procedure, increased complication rate and need for repeat colonoscopy (Calderwood et al., 2011). (1-)

**Recommendation 5**

Provide visual aids to demonstrate the requirement of stool texture and a dirty vs well-cleaned colon so that patients can acknowledge the sample of good bowel preparation

*Grade of recommendation: A*

Available evidence:

- The quality of bowel preparation is significantly improved by cartoon visual aids with images of emptied colon and colon with stool (Tae et al., 2012). (1+)
- An eight minutes educational film with images of clean and dirty bowels was tested in a quasi-experimental study in Taiwan which significantly improved bowel cleanliness (Hsueh et al., 2014). (1-)
- There is significant improvement in quality of bowel preparation by using
an instructional video via internet website with photograph of optimal and poorly prepared colon; and a novel educational booklet with images of stool textures, clean and dirty colon (Prakesh et al., 2013; Spiegel et al., 2011).

(1++)

3.7 Summary of Recommendations

5 recommendations with grading A (60%) and B (40%) were generated and applied into the guideline. It includes re-education one day before colonoscopy, explain the expected outcomes of satisfactory bowel open, take the bowel cleansing agents properly, addressing the perceived severity or consequence of poor bowel preparation, and provide visual aids to educate patients in order to enhance the quality of bowel preparation for colonoscopy.
Chapter 4

Implementation Plan

4.1 Communication Plan

Adopting a new evidence-based guideline into practice can improve patient outcomes, promote nurse autonomy and satisfaction at work. However, it is a process of change and poses numerous challenges for nurse leaders (Beck & Staffileno, 2012). A good communication plan is required to persuade all the stakeholders to accept, agree and comply with the guideline. Therefore, all stakeholders should be identified during the first step of communication.

4.1.1. Identifying the Stakeholders

The stakeholders of this bowel preparation guideline in my clinical setting include those patients undergoing colonoscopy, all frontline nurses, DIC, NOs, senior nursing officers (SNOs), and the chief nursing officer (CNO), physicians who admit the patients and perform the colonoscopies, department manager of the endoscopy unit, medical superintendent and managing director of the hospital governing committee. Lyon, Solomon & Harrison (2014) identified barriers to implement a new guideline into practice including patient related factors, staff and practice related issues, and availability of resources. And yet
communication is the key to make change in practice. First of all, patient’s expectation, experience, satisfaction and compliance needed to be considered. Secondly, it is important to explain the evidence behind the bowel preparation guideline, feasibility and effectiveness, so as to promote the change in attitude and behavior towards the change in practice. Last but not least, the resources available within the healthcare system are also a key theme such as the costs, facilities, manpower and nursing time. All of the above elements to solve the barriers can be facilitated by clear verbal communication and written documentation.

4.1.2. Strategies for Communication

In previous sessions, good quality evidence was determined through comprehensive literature review and several recommendations were identified to develop a bowel preparation guideline. It was a strong motivating factor to adopt this guideline into practice via effective communication. Shaffer et al. (2013) suggested that expert support and guidance are important to facilitate nursing staff engagement and participation. Therefore the details of guideline should be presented first to the nursing administrators, physicians and hospital executives in order to obtain approval, support and comments, before communicating with the respective NOs and all frontline nurses. Indeed, the process of communication
mainly divided into three stages: initiating the change, guiding the change and sustaining the change.

**Initiate the change**

A formal letter will be sent via email to the nursing administrators including the CNO and the fellow SNOs, the resident physicians performing colonoscopies, the department manager of endoscopy unit, medical superintendent and managing director of hospital. The letter introduces clearly the aim and objectives of the guideline and invites them to join a conference. During the conference, the significance and potential benefits of achieving good quality of bowel preparation, affirming needs of adopting the evidence based patient education protocol on preparation for colonoscopy and its cost-benefit ratio, transferability and feasibility in the current clinical setting will be presented. Statistics, table of evidence from the literatures, and the recommended educational materials including the proposed newly designed patient education video and pamphlet will be shown as well. Followed by a brief presentation of implementation plan, pilot study, and evaluation plan in time table format. Comments and opposing voices will be collected and further modifications on the guideline can be made.
Guide the change

After obtaining the approval from the hospital administrators, the proposal will be further disseminated to the NOs, DIC and representatives of frontline nurses of 8 surgical wards through 3 identical briefing sessions in a week so that maximum attendance can be achieved with flexible time slot offered. These stakeholders form a communication team. The focus of the briefing sessions will emphasize on the aim and objectives of guideline, its application and special precautions. Time table of implementation and evaluation will be presented. Demonstration on how to use the educational materials will be carried out by role play. PowerPoint notes will be distributed in the meeting so that the ward representatives can further introduce the guideline to all frontline nurses and act as a role model to guide the change. At the end of the briefing session, a program evaluation form (Appendix III) filled by all attendance will be collected to assess effectiveness of briefing session.

Sustain the change

According to Gagliardi et al. (2015), purposeful strategies are required to promote acceptance, adoption and adherence to the guideline. A simple memo with contact information of the committee will be posted on the nursing notice board in each designated ward so that the frontline nurses will be able to voice out
their questions, share opinions and difficulties encountered while implementing the guideline in practice. The committee members will visit the wards periodically to monitor if there is any problems for the staff performance, patient’s adherence and their responses to the new guideline. Reeves, West & Barron (2013) stated that obtaining patient feedback can enhance the intervention’s acceptability and regular meetings allow correction of any misunderstandings. Therefore, weekly meeting will be held with the communication team members to receive the comments and revise the guideline if necessary. The most updated information and revised guideline will be sent to all stakeholders via email.

4.2 Proposal for Pilot Study

According to Leon, Davis & Kraemer (2011), a pilot study is a small scale test to examine the feasibility of an innovation that is intended to be used in a larger scale study. It is not for hypothesis testing, but can facilitate refinement of study design, revision of guideline and implementation. It is the stage of putting the recommendations into practice after raising awareness and building knowledge about the change. The objective of this pilot study is to test the feasibility to apply the newly proposed bowel preparation guideline into the private clinical setting. The expected sample size of this pilot study is 50. It will
be conducted for 2 weeks in 2 designated wards and another 1 week for evaluating the results of pilot study.

4.2.1. Staff Training

All training materials are developed by the author. The PowerPoint of the briefing session on application of new guideline, a short video of role play demonstration, the novel educational video and pamphlet will be uploaded to the hospital intranet before the pilot test starts, all nurses involved in the pilot study must read through the entire information using electronic read and sign mechanism.

The validated OBPQS used in three high quality studies (Prakesh et al., 2013; Liu et al., 2012; Spiegel et al., 2011) will be employed in the pilot study to assess the quality of bowel preparation (Appendix IV). The scale will be introduced to the resident gastroenterologists who will be asked to use this scale to determine the quality of bowel preparation.

4.2.2. Patient Recruitment

All adult patients referred by resident gastroenterologists within the two weeks study period, intellectually competent to understand the instructions and admitted
for colonoscopy without previous experience will be recruited in the pilot study. All of them receiving the same bowel preparation regimen and nurses are responsible to instruct patients to take the laxatives using the new bowel preparation guideline.

4.2.3. Instrument of Pilot Study

A “staff evaluation questionnaire” (Appendix V) is designed by the author to assess the level of acceptance, competency and compliance of all nurses participated in the pilot study on integrating this bowel preparation guideline in daily workflow. Nurses are required to fill in this questionnaire before and after the pilot study. Comparison between the data can evaluate the feasibility of innovation on nursing perspectives.

The demographic data and feedback of patients are also important. The patient will be asked to fill in a modified “patient satisfaction survey” suggested by Lorenzo-Zuniga et al. (2015) (Appendix VI) after bowel preparation completed and before sending to the endoscopy unit. The data collected can able to identify the characteristics of patients, number of sample can be collected in two weeks, and also evaluate the acceptability responses from patient’s perspectives.

Throughout the pilot study, the process of patient recruitment, data
collection and analysis, and measurement of outcomes can be gone through before actual implementation. From the statistics of patient recruitment and data collection, the inclusion or exclusion criteria and the timetable of the study can be adjusted. All positive or negative outcomes, comments, any difficulties or unexpected factors can be determined such as manpower, workload, cost and benefit ratio, acceptability and competency to apply the guideline, patient satisfaction level, any insufficiency of the training session or any impact on daily operation of endoscopy unit. All of the above issues will be discussed in the conference with the communication team members after pilot study. Thus, consideration to revise the guideline can be made before implementing the change in all surgical units. After the above evaluation of pilot study, a finalized pilot study report will be sent to all stakeholders via email and further discussion with the communication team members in conference.

4.3 Evaluation Plan

Evaluation will be done after the large scale study employed in all surgical wards. It aims to determine the effectiveness of the proposed change in practice on achieving the expected outcomes and it is essential to understand clearly about what are being evaluated (Walsh & Duke, 2007).
4.3.1. Identifying Outcomes

Three major outcomes are required to be evaluated include patient outcomes, healthcare provider outcomes and system outcomes. The hypothesis is that the proposed evidence-based guideline is effective if all of the above outcome criteria can be achieved. It ensures the commitment from all stakeholders and informs future development.

For patient outcomes, it aims to assess the clinical benefits of the innovation by measuring the level of bowel cleanliness and patient satisfaction. OBPQS will be employed in my study to assess the quality of bowel preparation which is the primary outcome of this study. The cleanliness of three segments of colon is measured on a scale of 0 to 4 on each segment with 0 representing perfect cleansing. Additionally there is an overall score of fluid quantity from 0 to 2, therefore the total score ranged from 0 to 14 with 0 score indicate perfect bowel cleansing. This scale will be scored by the resident gastroenterologists when they are performing colonoscopy in the endoscopy center. A “patient satisfaction survey” as mentioned earlier will be used to determine the level of patient satisfaction. It include 4 questions in 5 points Likert-typed scale, ranged from 0 to 20 with 20 score indicate the highest level of patient satisfaction.

For healthcare provider outcomes, it aims to assess the acceptance and
compliance level of staff involved. A “staff evaluation questionnaire” as mentioned earlier will be used with 5 points Likert-typed scale on each item, to be filled by all frontline nursing staff before and after the study. A total of 10 questions with maximum score of 50 indicate the highest level of acceptance and compliance on application of the evidence-based guideline in the daily clinical practice.

For system outcomes, it aims to measure system effectiveness such as the affection on procedure, manpower, costs and adverse events due to the innovation. The procedural time of colonoscopy, the overall financial costs of educational materials and nursing time, and the statistics of fall incidents during the study period will be recorded and calculated.

4.3.2. Nature and Number of Clients

The research will be carried out in 8 surgical wards in my hospital. The eligible participants in these studies were those patients who are planning for non-urgent screening colonoscopy referred from the resident gastroenterologists who have regular sessions of colonoscopy and same regimen of bowel preparation, with aged 18 or above, capable to read and understand the instructions, able to make informed consent, admit to perform scheduled or screening colonoscopy
without prior gastrointestinal diseases, or surgery and colonoscopy. Patients with severe cardiac or cerebral vascular or renal diseases will be excluded.

It will be a RCT study with control group receiving standard colonoscopy factsheet in outpatient clinic, while the study group receiving the novel educational video and pamphlet upon admission one day before colonoscopy. The educational tools explain the content of the recommendations mentioned in previous chapter. Sample size calculation was performed by two sample t-test with significance level of 0.05 and a power of 80%. According to the studies using the OBPQS as primary outcome measurement that had been critically appraised (Prakesh et al., 2013; Liu et al., 2012; Spiegel et al., 2011), the standard deviation (SD) will be set conservatively at 3.2 and true value of a mean score at 0.6. Using the sample size calculator (inference for means: comparing two independent samples) by the University of British Columbia (2015), the estimated sample size is 352 for both control and experimental group. Therefore, the total sample size is 704 and the patients will be assigned to the groups alternatively according to the sequence on admission time.

4.3.3. Data Collection and Analysis

According to the statistic in my hospital, there are 120 endoscopic
procedures per day being performed on average in which 40% is purely colonoscopy. In general, the endoscopic procedures include gastroscopy (15%), colonoscopy (40%), combined gastroscopy and colonoscopy (35%), bronchoscopy (2%), nasoendoscopy (2%) and endoscopic retrograde cholangiopancreatography (ERCP) (1%). 25% of the colonoscopies are done by resident gastroenterologists. By calculation, around 12 samples can be collected in a day and 72 samples in a week (every Monday to Saturday). However, not all patients are eligible for the study, thus approximately 12 weeks will be required to complete the data collection process.

Patients will be admitted at about 5pm to 7pm with an admission letter. The frontline nurses will perform screening and initial health assessment. Eligible patients will be recruited to the study and receive the educational video and pamphlet before bowel preparation. After administering the laxative, nurses are responsible to monitor patients’ adherence to the regimen. The regimen will be fleet phosphate soda 45ml followed by 1 liter of water at 8pm and repeat at 6am next morning. A “patient satisfaction survey” will be given to each patient to fill in right before sending down to endoscopy center. The colonoscopy sessions by resident gastroenterologists are scheduled at 12-2pm, and they are responsible to assess the bowel cleanliness using OBPQS. The author will visit the ward and
endoscopy center daily at 3pm to collect the data. A “staff performance evaluation questionnaire” will be given to all frontline nurses participated in the study.

All of the above quantitative data including the OBPQS score, patient satisfaction level, and nurses’ performance score will be analyzed using SPSS software version 22.0, with a p-value of <0.05 was considered statistically significant. Descriptive statistics will be shown in terms of mean score with standard deviation. Student’s t-test will be used to compare the demographic data of patients in control and study groups.

4.3.4. Basis for an Effective Change of Practice

Based on the positive change in the expected patients, healthcare providers and system outcomes such as there are significant improvement on quality of bowel preparation, patient’s satisfaction, staff performance, and cost-benefits ratio of the bowel preparation guideline within the system, the innovation can be proven to implement effectively in my clinical setting. However, numerous efforts should be paid on further research so that the evidence-based bowel preparation guideline can be applied in all wards throughout the hospital or in other hospital settings.
Conclusion

An evidence-based guideline on bowel preparation for colonoscopy is developed through systematic critical appraisal and is proven to be transferrable, feasible and cost-effective to apply in my clinical setting. Ultimately promote early polyp detection for CRC prevention, diagnosis and treatment.

Communication and pilot study are vital elements of implementation plan. A good communication plan involves identifying the stakeholders and prioritizes what and how to communicate with them effectively, whereas a pilot study with adequate staff training and testing by several instruments can examine the feasibility of adopting the new bowel preparation guideline. A comprehensive evaluation plan is necessary to determine its effectiveness on achieving the expected outcomes.

Early removal of colonic polyps can significantly reduce the chance of CRC whereas the polypectomy can be done via colonoscopy. Bowel preparation is a crucial step for successful examination in order to achieve complete visualization of colon, detection of polyps and reduce complications. Yet nurses play an important role to guide and monitor patients for adequate bowel preparation using evidence-based practice.
Appendices

Appendix I

Table of Search History: Data Extraction

<table>
<thead>
<tr>
<th>CINAHL</th>
<th>Medline</th>
<th>PubMed</th>
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<tbody>
<tr>
<td>648</td>
<td>1913</td>
<td>640</td>
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</tbody>
</table>

By Keyword Search:
1. Colonoscopy
2. Education OR patient Education
3. Preparation for colonoscopy OR bowel preparation
4. Quality of bowel preparation

Reviewed by titles:
- 14 articles
- 13 articles
- 12 articles

Reviewed by abstracts:
- 9 articles
- 7 articles
- 8 articles

Reviewed by full papers and reference lists:
- 4 articles
- 6 articles
- 6 articles

Total articles for review after elimination of duplication: 7
Appendix II

Question
In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 1
Impact of patient education with cartoon visual aids on the quality of bowel preparation for colonoscopy

Table of Evidence

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tae et al., 2012</td>
<td>Prospective controlled study with randomization (1+) ①</td>
<td>Patients scheduled for screening colonoscopy in health examination center</td>
<td>A new cartoon visual educational instructions for colonoscopy (n=102)</td>
<td>Existing verbal &amp; written instructions (n=103)</td>
<td>Primary: Quality of bowel preparation by 1. Boston Bowel Preparation Scale (BBPS) (score: 0-9) 2. Universal Preparation Assessment Scale (UPAS) (score: 0-4) ②</td>
<td>1. +1.3 (p&lt;=0.01) 2. -1.0 (p&lt;=0.01)</td>
</tr>
</tbody>
</table>

Level of evidence as defined by SIGN (2011)

① Higher BBPS scores = good quality bowel cleansing; Lower UPAS scores = excellent bowel preparation

② Family history of colorectal cancer

Intestinal symptoms

Did not understand Korean or English
Appendix II

Question
In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 2
An endoscopist-blinded, randomized, controlled trial of a simple visual aid to improve bowel preparation for screening colonoscopy

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
</table>
| Calderwood et al., 2011 | Prospective single-center controlled study with randomization (1-)
| Patients directly referred from outpatient department for screening colonoscopy
| Inclusion criteria:
| 4. Aged 18 years or older
| Exclusion criteria:
| 6. Inflammatory bowel disease
| 7. Prior colonic resection
| 8. Non-polyethylene-glycol-based bowel preparation
| 9. Incomplete colonoscopy for other reasons other than poor bowel preparation
| 10. Missing an endoscopist assessment form
| A 4 x 6-inch laminated visual aid depicting both clean & dirty colons in addition to standard written colonoscopy instructions (n=477)
| Standard written colonoscopy instructions (n=492)
| Primary:
| Quality of bowel preparation according to Boston Bowel Preparation Scale (BBPS)(score: 0-9)
| 7. p = 0.43
| Secondary:
| Need for repeat colonoscopy
| 8. p = 0.71
| Insertion time
| 9. p = 0.11
| Withdrawal time
| 10. p = 0.44
| Polyp detected
| 11. p = 0.93
| Patient tolerance of bowel preparation and colonoscopy
| 12. N/A

① Level of evidence as defined by SIGN (2011)
② Higher BBPS scores = good quality bowel cleansing
Appendix II

Question

In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 3

Improving the quality of colonoscopy bowel preparation using an educational video

Table of Evidence

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
</table>
| Prakash et al., 2013   | Prospective multi-center controlled study with randomization (1++) | Patients enrolled at two outpatient endoscopy centers for colonoscopy  
Inclusion criteria:  
5. Aged over 18 years  
6. English as primary language  
7. Had computer access  
Exclusion criteria:  
11. Inflammatory bowel disease  
12. Previous colon or gastric surgery  
13. Medical conditions including gout, renal impairment, seizures, cardiac arrhythmias | Internet website to view the colonoscopy preparation instructional video with subtitles & pictures of optimal and poor preparation (n=67) | Standard written instructions for colonoscopy preparation (n=66) | Primary:  
13. Ottawa Bowel Preparation Quality Scale ②  
A. Right colon (score 0-4)  
B. Mid colon (score 0-4)  
C. Recto-sigmoid colon (score 0-4)  
D. Fluid content (score 0-2)  
Secondary:  
14. Patient satisfaction | 13. p = 0.0002  
A. p=0.0029  
B. p=0.0027  
C. p=0.0008  
D. p=0.0091  
14. no significant difference |

① Level of evidence as defined by SIGN (2011)

②Lower Ottawa scalescores = good quality bowel cleansing
Appendix II

Question

In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 4

The impact of patient education on the quality of inpatient bowel preparation for colonoscopy

Table of Evidence

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosenfeld et al., 2010</td>
<td>Prospective controlled study without true randomization (1-)  ①</td>
<td>Patient requiring colonoscopy admitted to hospital</td>
<td>5-min counseling session with written information to discuss the importance of bowel preparation &amp; how it should be taken</td>
<td>Routine instructions regarding how bowel preparation &amp; procedure</td>
<td>Primary: Quality of bowel preparation according to Cleanliness Quality Score (score 0-4) ② Secondary: (Not available)</td>
<td>15. P=0.001</td>
</tr>
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</table>

① Level of evidence as defined by SIGN (2011)

②Lower Cleanliness Quality scores = good quality bowel cleansing
Appendix II

Question
In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 5
Telephone-based re-education (TRE) on the day before colonoscopy improves the quality of bowel preparation and the polyp detection rate: a prospective, colonoscopist-blinded, randomized, controlled study

Table of Evidence

<table>
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<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
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<tbody>
<tr>
<td>Liu et al., 2012</td>
<td>Prospective controlled study with randomization (1++)</td>
<td>Outpatients undergoing colonoscopy: Inclusion criteria: 10. Age 18-75 11. Provided written informed consent Exclusion criteria: 1. Colorectal surgery, severe colonic stricture or obstructing tumor 2. Dysphagia, compromised swallowing reflex or mental status 3. Significant gastroparesis or gastric outlet obstruction or ileus 4. Known or suspected bowel obstruction, or perforation, colitis, megacolon 5. Severe chronic renal failure, uncontrolled HT, dehydration, electrolyte imbalance, pregnancy</td>
<td>TRE on the day before colonoscopy: importance of bowel preparation, the directions of use &amp; side effects of purgatives, the proper food type &amp; start time (n=276)</td>
<td>Booklet with clear &amp; written instructions (n=273)</td>
<td>Primary: Quality of bowel preparation according to 16. Ottawa scale (score 0-14) ②</td>
<td>① Level of evidence as defined by SIGN (2011) ②Lower Ottawa score = good quality bowel cleansing</td>
</tr>
</tbody>
</table>

|                   |            |                          |               |            | Secondary: Adequate bowel preparation | 17. P=0.001 |
|                   |            |                          |               |            | 18. Incomplete colonoscopy             | 18. P<0.001 |
|                   |            |                          |               |            | 19. Caecal intubation time              | 19. P=0.806 |
|                   |            |                          |               |            | 20. Withdrawal time                     | 20. P<0.001 |
|                   |            |                          |               |            | 21. Polyp detection rate                | 21. P<0.001 |
|                   |            |                          |               |            | 22. Non-compliance                      | 22. P<0.001 |
|                   |            |                          |               |            | 23. Side effects                        | 23. P=0.573 |
Appendix II

Question
In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 6
Development and validation of a novel patient educational booklet to enhance colonoscopy preparation

Table of Evidence

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiegel et al., 2011</td>
<td>Prospective controlled study with randomization (1++) ¹</td>
<td>Outpatients scheduled for non-urgent, screening, surveillance or diagnostic colonoscopy</td>
<td>Novel educational booklet with colorful images, addressing importance of bowel preparation quality &amp; dietary preparation (n=103)</td>
<td>Standard pharmacy directions for bowel preparation consisting of written diary &amp; purgative instruction + 10-min instructional video &amp; Q&amp;A session (n=134)</td>
<td>Primary: Quality of bowel preparation according to 24. Ottawa Bowel Preparation Quality Scale (score 0-14) Secondary: 25. Likert scale (score 1-6) ²</td>
<td>24. ( p = 0.005 ) 25. ( p = 0.006 )</td>
</tr>
</tbody>
</table>

¹ Level of evidence as defined by SIGN (2011)
² Lower Ottawa scores & higher Likert score = good quality bowel cleansing
Appendix II

Question

In patients undergoing colonoscopy in surgical setting of private hospital (P), how effective is a patient education protocol on preparation for colonoscopy (I) in comparison to the normal standard of care (C) on improving the quality of bowel preparation (O)?

Article 7

The effect of different patient education methods on quality of bowel cleanliness in outpatients receiving colonoscopy examination

Table of Evidence

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Interventions</th>
<th>Comparison</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hsueh et al., 2014</td>
<td>Quasi-experimental (1-)†</td>
<td>Outpatients who receive colonoscopy examinations at a local hospital</td>
<td>8-min ‘preparation for bowel cleanliness’ educational film showing the digestive process, accurate intake methods &amp; types o low-residue &amp; clear liquid diet, importance of water supplementation, principals for taking laxatives, image of clean &amp; dirty bowels</td>
<td>Routine hospital care</td>
<td>Primary: Quality of bowel preparation according to 26. Aronchick Scale (score 1-4) ‡</td>
<td>26. $P&lt;0.001$</td>
</tr>
</tbody>
</table>

† Level of evidence as defined by SIGN (2011)

‡ Lower Aronchick scores = good quality bowel cleansing
**Methodology Checklist 2: Controlled Trials**

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


**Guideline topic:**
An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation

<table>
<thead>
<tr>
<th>Key Question No:</th>
<th>Reviewer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Before** completing this checklist, consider:

1. Is the paper a **randomized 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? Analyze using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

- **(P)** Patients for colonoscopy
- **(I)** Patient education with cartoon visual aid
- **(C)** Existing written and verbal explanation
- **(O)** Quality of bowel preparation for colonoscopy

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

**SECTION 1:  INTERNAL VALIDITY**

<table>
<thead>
<tr>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In a well conducted RCT study...</strong></td>
</tr>
<tr>
<td><strong>1.1</strong> The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.2</strong> The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.3</strong> An adequate concealment method is used.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.4</strong> Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.5</strong> The treatment and control groups are similar at the start of the trial.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.6</strong> The only difference between groups is the treatment under investigation.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.7</strong> All relevant outcomes are measured in a standard, valid and reliable way.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>1.8</strong> What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

5 patients in control group dropped out due to presence of faecal lumps, no patient dropped out in study group in first
27 patients in control group and 29 patients in study group lost to follow up after first colonoscopy.

| 1.9 | All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).<sup>x</sup> | 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.<sup>x</sup> | Yes □ | No □ |
|      | Can’t say □ | Does not apply □ |

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:*<sup>ix</sup> | High quality (++) | □  
Acceptable (+) | √  
Unacceptable – reject 0 □ |

Patient education with cartoon visual aids effectively improved bowel preparation quality as assessed by BBPS and UAPS scores, and the decreased withdrawal time of endoscope with p<0.01.

Multivariate analysis was used to prove that younger age and use of visual aids were significantly associated with good bowel preparation, whereas the mean ages of both groups are similar.

| 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? | |

| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | The enrolled patients were generally healthy. The relationship of medical history and bowel preparation could not be confirmed. The exclusion criteria was required to amend.  
The study was carried out in single centre. Multicentre studies and a larger sample size were required to increase the generalizability of study.  
The educational material was written in English or Korean. Material in Chinese should be tested in Chinese population. |

| 2.4 | **Notes.** Summarize 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 patient education with cartoons effectively improved bowel preparation for colonoscopy. Therefore, cartoon visual aids should be used as a component in patient education for colonoscopy. However, other components should be investigated, e.g. standard guideline for administration of bowel cleansing agents, walking exercise and adequate hydration. Patient satisfaction was not measured in this study. |
Methodology Checklist 2: Controlled Trials

### Study identification

(Include author, title, year of publication, journal title, pages)


### Guideline topic:

An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation

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

Before completing this checklist, consider:

1. Is the paper a randomized 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? Analyze using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

(P) Patients for screening colonoscopy

(I) A 4x6 inch Simple visual aid

(C) Standard written colonoscopy instructions

(O) Quality of bowel preparation

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>Question</th>
<th>Yes</th>
<th>No</th>
<th>Can't say</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes √</td>
<td>No □</td>
<td>Can't say □</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes √</td>
<td>No □</td>
<td>Can't say □</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes □</td>
<td>No □</td>
<td>Can't say √</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes √</td>
<td>No □</td>
<td>Can't say □</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes √</td>
<td>No □</td>
<td>Can't say □</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes □</td>
<td>No □</td>
<td>Can't say √</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes √</td>
<td>No □</td>
<td>Can't say □</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into...</td>
<td>353 patients in control group and 351...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
each treatment arm of the study dropped out before the study was completed? patients in study group dropped out due to no show. The overall no show rate is 35%.

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 □ No □
Can't say □ 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 (++)
Acceptable (+) √
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?

The study design is a large, endoscopist-blinded RCT, using a validated tool (BBPS) to assess the quality of bowel preparation but the assessment was done after all cleansing maneuvers. The result showed that patient education with simple visual aid did not change the quality of bowel preparation quality as assessed by BBPS scores (p = 0.43), whereas others secondary outcomes such as the need for repeat colonoscopy, insertion time, withdrawal time, polyp detection and patient tolerance of bowel preparation and colonoscopy are not significant.

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

The study was carried out in single, urban, academic institution, which may limit the generalizability of the findings.

The visual aid was available in English only, a type II error is certainly possible as majority of patients whose first language is not English. Material in Chinese should be tested in Chinese population.

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 a simple card with photographs as visual aid depicting the importance of bowel preparation did not change the quality of bowel preparation in patients presenting for screening colonoscopy. It may due to the language barrier and the visual aid is over-simplified that the patients could only know the importance of bowel preparation but not understand how to achieve a good bowel preparation quality. Therefore, more components of photographs with annotation should be investigated, e.g. the stool texture. The reasons of high dropout rate should be investigated.
**Methodology Checklist 2: Controlled Trials**

<table>
<thead>
<tr>
<th>Study identification (Include author, title, year of publication, journal title, pages)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Guideline topic:</th>
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<tbody>
<tr>
<td>An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation</td>
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<table>
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<tr>
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<tbody>
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<th>Reviewer:</th>
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**Before** completing this checklist, consider:

1. Is the paper a **randomized 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? Analyze using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

   (P) Patients for colonoscopy

   (I) Internet website to view an educational video

   (C) Standard written instructions

   (O) Quality of bowel preparation

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

<table>
<thead>
<tr>
<th>1.1</th>
<th>The study addresses an appropriate and clearly focused question.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
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</tbody>
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<thead>
<tr>
<th>1.2</th>
<th>The assignment of subjects to treatment groups is randomised.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>1.3</th>
<th>An adequate concealment method is used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.4</th>
<th>Subjects and investigators are kept ‘blind’ about treatment allocation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.5</th>
<th>The treatment and control groups are similar at the start of the trial.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.6</th>
<th>The only difference between groups is the treatment under investigation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes □  No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.7</th>
<th>All relevant outcomes are measured in a standard, valid and reliable way.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes √  No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.8</th>
<th>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A total of 133 patients were enrolled in the analysis, whereas 67 were in the study group and 66 were in the control group. No □  Can’t say □</td>
<td></td>
</tr>
</tbody>
</table>
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 □ | No □ |
| Can’t say □ | Does not apply □ |

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 How well was the study done to minimise bias?</td>
<td>High quality (++) √</td>
</tr>
<tr>
<td>Code as follows:</td>
<td>Acceptable (+) □</td>
</tr>
<tr>
<td></td>
<td>Unacceptable – reject 0 □</td>
</tr>
<tr>
<td>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?</td>
<td>The study design is a single-blinded RCT, using a validated tool (Ottawa scale) to assess the quality of bowel preparation. The result showed that there is a significant improvement in quality of colonic preparation with a supplemental educational video (p=0.0002), however the effect on patient satisfaction is not significant.</td>
</tr>
<tr>
<td>2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>The study was carried out in community-based, single-centre private sector limited to local population, which limit the generalizability of the findings. Moreover, there were significant differences between the two groups in age, income level and level of formal education. The majority of enrolled study patients had high school and college education. Further study should be done on patients with low education level. The educational video was available in English only. Material in Chinese should be tested in Chinese population.</td>
</tr>
<tr>
<td>2.4 Notes. Summarize 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>This study concluded that patients who viewed a brief educational video containing bowel preparation instructions had significantly improved colonic preparation quality. The video can be accessed via internet with password which is a low-cost and risk-free intervention in patient education. However, the number of times patient watching the video could not be controlled, which may affect the result of study. Furthermore, studies with different bowel preparation regimen should be tested with the same intervention to evaluate the impact of educational video on bowel preparation.</td>
</tr>
</tbody>
</table>
# Methodology Checklist 2: Controlled Trials

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


**Guideline topic:**  
An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation

<table>
<thead>
<tr>
<th>Key Question No:</th>
<th>Reviewer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
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</tr>
</tbody>
</table>

**Before** completing this checklist, consider:

1. Is the paper a *randomized 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? Analyze using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

(P) Patients for colonoscopy  
(I) 5 minutes Counselling session with written information  
(C) Routine instructions  
(O) Quality of bowel preparation

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

**SECTION 1: INTERNAL VALIDITY**

<table>
<thead>
<tr>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1</strong> The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>Yes √ No ☐ Can’t say ☐</td>
</tr>
<tr>
<td><strong>1.2</strong> The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td>Yes ☐ No √ Can’t say ☐</td>
</tr>
<tr>
<td><strong>1.3</strong> An adequate concealment method is used.</td>
</tr>
<tr>
<td>Yes ☐ No √ Can’t say ☐</td>
</tr>
<tr>
<td><strong>1.4</strong> Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
</tr>
<tr>
<td>Yes ☐ No √ Can’t say ☐</td>
</tr>
<tr>
<td><strong>1.5</strong> The treatment and control groups are similar at the start of the trial.</td>
</tr>
<tr>
<td>Yes ☐ No ☐ Can’t say √</td>
</tr>
<tr>
<td><strong>1.6</strong> The only difference between groups is the treatment under investigation.</td>
</tr>
<tr>
<td>Yes ☐ No ☐ Can’t say √</td>
</tr>
<tr>
<td><strong>1.7</strong> All relevant outcomes are measured in a standard, valid and reliable way.</td>
</tr>
<tr>
<td>Yes ☐ No ☐ Can’t say √</td>
</tr>
<tr>
<td><strong>1.8</strong> What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
</tr>
<tr>
<td>A total of 38 patients were enrolled in the analysis, whereas 16 were in the study group and 22 were in the control group. No ☐ Can’t say √</td>
</tr>
<tr>
<td></td>
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<tr>
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<tr>
<td><strong>1.9</strong></td>
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<tr>
<td><strong>1.10</strong></td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code as follows:</td>
<td>High quality (++), Acceptable (+), Unacceptable – reject 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.2</th>
<th>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?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The study design is a clinical control trial without true randomization as the subjects were assigned based on timing of enrolment. The sample size is relatively small and thus other variables that are known to impact the outcome could not be controlled.</td>
<td></td>
</tr>
<tr>
<td>A five-point rating scale was used to assess the quality of bowel preparation but the validity of the scale is not known. The result showed that the counselling session with written instruction significantly enhanced the quality of bowel preparation (p=0.001), however other outcome measure is not available.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3</th>
<th>Are the results of this study directly applicable to the patient group targeted by this guideline?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The study only recruited patients who could read English, which limits the generalizability of the results</td>
<td></td>
</tr>
<tr>
<td>Material in Chinese should be tested in Chinese population.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4</th>
<th><strong>Notes.</strong> Summarize 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>This study concluded that patient counselling and education regarding bowel preparation procedures and importance of adequate bowel preparation positively impacts the quality of bowel preparation, which is an inexpensive, safe and simple intervention. However, the sample size should be increased and the subjects should be randomly assigned to achieve a higher quality of study.</td>
<td></td>
</tr>
</tbody>
</table>
### Methodology Checklist 2: Controlled Trials

#### Study identification

(Include author, title, year of publication, journal title, pages)


#### Guideline topic:

An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation

<table>
<thead>
<tr>
<th>Key Question No:</th>
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<tbody>
<tr>
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#### Before completing this checklist, consider:

1. Is the paper a randomized 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? Analyze using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist.

(P) Outpatients undergoing colonoscopy

(I) Telephone re-education (TRE) on the day before colonoscopy

(C) Booklet with clear and written instructions

(O) Quality of bowel preparation and polyp detection rate

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>
</tr>
</thead>
<tbody>
<tr>
<td>Yes ☑</td>
</tr>
<tr>
<td>Can’t say ☐</td>
</tr>
</tbody>
</table>

| 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 | Subjects and investigators are kept ‘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 ☐ |

<p>| 1.8 | What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the analysis, 56 patients from study group and 48 patients from control group dropped out | Yes ☑ | No ☐ |
|     |                                                             | Can’t say ☐ |</p>
<table>
<thead>
<tr>
<th>Study was completed?</th>
<th>due to cancelled appointment and cancelled bowel preparation.</th>
</tr>
</thead>
<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>
</tr>
<tr>
<td>Yes √ No □</td>
<td>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>
</tr>
<tr>
<td>Yes □ No □</td>
<td>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 (+) □
- 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?

The study design is a single-centre prospective, colonoscopist-blinded RCT. Ottawa scale was used to assess the quality of bowel preparation. The result showed that the TRE with booklet instruction significantly enhanced the quality of bowel preparation (p<0.001) and polyp detection rate (p<0.001).

Logistic regression analyses were used to identify any significant factors for inadequate bowel preparation, such as age, gender, body mass index, history of surgery…etc.

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

TRE was designed for outpatients in which face-to-face consultation is impossible, but it could be done in inpatient population. The effect of TRE or face-to-face consultation on bowel preparation should be tested in different settings.

The teaching medium of this study is mandarin, which increased the generalizability of the results in Chinese population.

#### 2.4 Notes. Summarize 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 TRE about the details of bowel preparation on the day before colonoscopy increases the quality of bowel preparation and the rate of polyp detection, which 'the day before' is an appropriate time point to intervene to ensure better compliance with bowel preparation. However, the re-education should be tested in inpatient population as well.
### Methodology Checklist 2: Controlled Trials

**Guideline topic:**
An evidence-based patient education protocol on preparation for colonoscopy on improving the quality of bowel preparation

<table>
<thead>
<tr>
<th>Key Question No:</th>
<th>Reviewer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Before** completing this checklist, consider:

1. Is the paper a randomized 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? Analyze 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

<table>
<thead>
<tr>
<th>In a well conducted RCT study…</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1</strong> The study addresses an appropriate and clearly focused question.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.2</strong> The assignment of subjects to treatment groups is randomised.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.3</strong> An adequate concealment method is used.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.4</strong> Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.5</strong> The treatment and control groups are similar at the start of the trial.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.6</strong> The only difference between groups is the treatment under investigation.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.7</strong> All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes √ No □ Can't say □</td>
</tr>
<tr>
<td><strong>1.8</strong> What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the</td>
<td>A total of 436 patients were enrolled in the analysis, 84 patients from study</td>
</tr>
</tbody>
</table>
study was completed? | group and 86 patients from control group dropped out due to lost to follow up.
---|---
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 □ No □ Can’t say □ 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 (++)
- Acceptable (+)
- 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?

The study design is a single-centre prospective RCT. The validated Ottawa scale was used to assess the quality of bowel preparation. The result showed that the novel patient educational booklet significantly enhanced the quality of bowel preparation (p=0.005). Likert scale was used as secondary outcome if which the result is also significant (p=0.006).

This study did not measure the impact of the booklet on other colonoscopy quality indicators such as cecal intubation rates, polyp detection rates, insertion time and withdrawal time.

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

The study is limited by the population of over-whelming male and English-speaking. The booklet should also be studied in other population in non-English language such as Chinese.

Split-dose preparations were not used.

2.4 **Notes.** Summarize 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 the novel educational booklet improves preparation quality in patients receiving single-dose purgatives. The effect of the booklet on split-dose purgatives remained untested and should be evaluated in future studies. The overall costs of printing the colorful education booklet should be taken into consideration to provide patient education.
Appendix III

Program Evaluation Form

Program: Briefing Session on the Evidence-based Guideline on Bowel Preparation for Colonoscopy

Date: ___________________________________

Time: ___________________________________

In order to evaluate the effectiveness and quality of program, please rate and ‘tick’ the following statements:

5 = Absolutely agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Absolutely Disagree

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The learning objectives were met</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The content was useful for my workplace</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The content was easily understood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The speaker could present clearly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The learning material was easily understood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The schedule of program was appropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>The venue of the program was convenient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The program was overall satisfactory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Score: ________ / 40

Comments:
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
### Appendix IV

**Ottawa Bowel Preparation Quality Scale**

Please select the quality of bowel preparation on each segment of colon and the overall fluid quantity using a ‘tick’ in the boxes below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Excellent ( (0) )</th>
<th>Good ( (1) )</th>
<th>Fair ( (2) )</th>
<th>Poor ( (3) )</th>
<th>Inadequate ( (4) )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right colon</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mid colon</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Rectosigmoid</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td><strong>Fluid quantity</strong></td>
<td>Small ( (0) ) □</td>
<td>Moderate ( (1) ) □</td>
<td>Large ( (2) ) □</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Score (0-14)**

*(to be calculator by researcher)*
Appendix V

**Staff Performance Evaluation Questionnaire**

In order to evaluate the acceptance, competency and compliance level of implementing the bowel preparation guideline, please rate and ‘tick’ the following statements:

5=Absolutely agree 4=Agree 3=Neutral 2=Disagree 1=Absolutely Disagree

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The guideline is effective for bowel preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The guideline is easy to use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Using this guideline is time-saving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The guideline is cost-effective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I attained adequate knowledge to deliver patient education on bowel preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I had enough confident to employ this guideline in my clinical setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I thought this guideline is comprehensive and able to assist us to provide education to patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I will use this guideline every time for patients undergoing colonoscopy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I had greater autonomy on providing instructions on bowel preparation to patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. My colleagues and managers provide adequate support for us to implement this guideline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Score: ________ / 50**
Appendix VI

Patient Satisfaction Survey

Sex: _______  Age: _______  Nationality: _______________________________

In order to evaluate the level of patient satisfaction after bowel preparation, please rate and ‘tick’ the following statements:

5 = Absolutely agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Absolutely Disagree

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have difficulty to understand the process and precautions of bowel preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can follow the instructions of bowel preparation given by nurses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would like to repeat the same preparation if I need to perform colonoscopy in the future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, the rating on my satisfactory level for bowel preparation is good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Score: _______/20
Reference


Appointment waiting times and education level influence the quality of bowel preparation on adult patients undergoing colonoscopy. *BioMed Central Gastroenterology, 11*, 86.


preparation for colonoscopy: the importance of adequate hydration.  

*Alimentary Pharmacology and Therapeutics*, 26, 633-641.


# List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBPS</td>
<td>Boston Bowel Preparation Scale</td>
</tr>
<tr>
<td>CNO</td>
<td>Chief Nursing Officer</td>
</tr>
<tr>
<td>CINAHL</td>
<td>Cumulative Index of Nursing and Allied Health Literature</td>
</tr>
<tr>
<td>CRC</td>
<td>Colorectal Cancer</td>
</tr>
<tr>
<td>CUHK</td>
<td>Chinese University of Hong Kong</td>
</tr>
<tr>
<td>DIC</td>
<td>Deputy-In-Charge</td>
</tr>
<tr>
<td>ERCP</td>
<td>Endoscopic Retrograde Cholangiopancreatography</td>
</tr>
<tr>
<td>HKCF</td>
<td>Hong Kong Cancer Fund</td>
</tr>
<tr>
<td>NO</td>
<td>Nursing Officer</td>
</tr>
<tr>
<td>OBPQS</td>
<td>Ottawa Bowel Preparation Quality Scale</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized Controlled Trial</td>
</tr>
<tr>
<td>SIGN</td>
<td>Scottish Intercollegiate Guideline Network</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>SNO</td>
<td>Senior Nursing Officer</td>
</tr>
<tr>
<td>UPAS</td>
<td>Universal Preparation Assessment Scale</td>
</tr>
</tbody>
</table>