University of Colorado
College of Nursing
NURS 6019: EBP: Evaluating Evidence
Quantitative Research Critique

Name: Bridget Everhart and Erica Rossignol Date: Due 9-24-2023

Article reviewed: (Author names, year, title of article, Journal, volume, page numbers) *Hsu, Y. C., & Szu, S. Y. (2022). Effects of Gum Chewing on Recovery From Postoperative Ileus: A Randomized Clinical Trial. The journal of nursing research : JNR, 30(5), e233. https://doi.org/10.1097/jnr.0000000000000510*

Use the grid below to rapidly appraise the study.

	YES	NO	Page number/comments
Research Purpose			
1. Is the purpose of the study clearly stated?	Y		Page 1 in Abstract- Purpose of study was to evaluate the efficacy of post-surgical gum chewing in restoring normal bowel movements in patients diagnosed with colorectal cancer who had abdominal surgery for colon resection.
2. Is the research question clearly identified?	Y		Page 2- not identified in question format. It was stated in a hypothesis: The research hypothesis was that the time to first post operative flats and dedication would be shorter in participants who performed the gum chewing intervention than in their non-gum-chewing counterparts.
Review of the literature/background			
1. Is the review of the literature logically and clearly organized?	Y		Pages 1,2 Review of pathology of ileus and then review of related aspects like NG tubes, sham feeding
2. Was current literature included in the review (published within the last 5 years)?	y		Pages 1,2 Older references were used for the review of the pathophysiology related to ileus. Newer review, within 5 years, were discussed related to evidence for decreasing ileus risk (e.g., sham feeding with gum)
3. Were primary citations used in the review of literature? (primary sources are written by the person who originated the ideas)	y		Page 1,2 Several primary sources were cited. One secondary source was also used (a meta-analysis on gum chewing after colectomy)
Research Design			
1. (circle or highlight) Experimental; Quasi-experimental; Correlational; Exploratory;	Pg 2 A prospective, single-blind, parallel group, randomized control trial		

Descriptive; Survey; other:			
2. Was institutional review board approval obtained?	Y		Page 3 Approved by IRB of Kaohsiung Medical University Chung-Ho Memorial Hospital (KMUHIRB-E-20150036).
3. What type of sampling method was used?			Purposive Sampling
4. Were subjects randomly assigned to the experimental and control groups?	Y		Page 3-Trials Flow Diagram. Page 3, paragraph 2. Randomized using coin toss. Heads control/Tails intervention
5. Were the subjects and researchers blind to the study group?	Y		Pg 4, end of the Procedure section The Subjects knew they were in the study group so they were not 'blind' to it because they were chewing the gum. The researchers were blind to the study group. One researcher collected the data and a second researcher analyzed it (so was blind to the study group)
6. What is the sample size of each group?	Both Intervention and Control group N=30 for a total of 60 participants		
7. Were inclusion criteria clearly stated?	Y		Pg 2 Samples and Sampling section: 40-75 years old, diagnosed with colorectal cancer Stg I, II, or III, scheduled for open colorectal resection with only one bowel anastomosis; conscious, alert and able to communicate in Mandarin or Taiwanese. Not fittted with NG tube after surgery
8. Were exclusion criteria clearly stated?	Y		Pg 3 paragraph 1- Karnofsky Scale 2-4, emergency surgery, evidence on the abdominal CT of intra-abdominal infection before surgery, loop colostomy after surgery, ileostomy after surgery, prior pelvic radiation therapy, TMJ or chewing muscle dysfunction
9. Was the setting for the study clearly described? Setting:	Y		Page 2 Setting conducted in GI surgical ward of medical teaching hospital in Southern Taiwan.
10. List the study variables: Independent variable: Dependent variable:	Found on page 1 Independent: Chewing gum postoperatively Dependent: Time to 1st postop flatus & defecation		
11. Do the subjects in each group have similar	Y		Pg 4 Baseline characteristics are similar.

demographics at baseline?			
Measurement/Analysis			
1. Did you understand how data was collected?	Y		Pg 4 under Measurement There is a description that baseline data and postop characteristics were all assessed by the researcher. Presence of postop ileus was evaluated daily at the same time of day by the researcher
2. Are the instruments/tools used reliable and valid?	Y	?	Pg 4 under Measurement A known scale (with reference) was used to assess overall functional status - Karnofsky Scale. Tools to assess flatus = self-report and also abdomen was auscultated to assess for peristaltic activity. Self-report can be unreliable but auscultation of the abdomen was an additional, more objective measure.
3. Was the process for data analysis clear?	y		Pg 4 There were descriptions of the stats program used, the types of statistical tests that were run, and the level for a significant p value was defined. They also used correlational analyses to identify correlations between time to first flatus and time to first defecation
Results			
1. Were the results logically presented?	Y		Pgs 4-6 Results section that included baseline characteristics and a Table (1). Postop ileus and recovery results were described and presented in Table 2
2. Could you determine the effect size and level of significance?			Pg 3 under Sample and Sampling describes this. A priori analysis was performed that determined using an independent sample *t* test with 30 participants per group would have a large effect size of Cohen's d = 0.87. Level of significance was set at $p < .05$ (pg 4) and significance in the study results was described on pg 5
3. Were study findings clinically important?	Y		Pg 6 Discussion section. Gum chewing reduced the time to first flatus and defecation. An earlier postoperative flatus reduced the time to first defecation. Return to bowel function is important to recovery - see Introduction section. It was speculated that the earlier the postop flatus, the sooner the patient can start eating. While not specifically elucidated, a patient must be eating after surgery to indicate full return of bowel function and ability to discharge from the hospital. Hence, this earlier time to flatus and defecation could have a positive impact on length of stay. This study found a shorter length of stay in the intervention group but it was not significant.
4. What are the risks and benefits to treatment?	Pg 4. Risks: Neither the assessment or gum chewing was expected to cause obvious side effects to those who meet inclusion criteria.		

	Benefits: Possible positive effects of gum chewing on time to first postoperative flatus and defecation. Participants can refuse to participate or withdraw at any time without consequence.		
5. Is the intervention feasible in practice?	Y It's possible		Pg 4 Intervention and Control section described the procedure for the intervention. The RN gave a patient gum 3 times a day and they chewed it for 15 minutes. This is cheap and easy. However, a process would be needed to ensure this was standardized; maybe ordered similarly to a medication for specific times
6. Explain the results (interpret the statistical findings) in your own words	Chewing gum in the immediate postoperative period after colorectal resection decreased time to resumption of normal bowel function as evidenced by earlier first flatus and earlier defecation, as compared to those who did not chew gum. The mean time to first flatus was significantly shorter in the intervention group than the control group with a *p* .004. Time to first defecation between the intervention and control groups was also significantly shorter except when controlled for age and surgical duration. When these factors were controlled there was a similar time to first defecation between the groups		

Conclusion/Discussion

1. What are the strengths and limitations of the study? There are several strengths of this study. One strength is that there is a body of knowledge related to postoperative ileus and its importance in surgical recovery. So this is a clinically important topic. There is also supporting evidence for this study and it contributes to that literature. Also, this was an RCT that appeared to be rigorous.

   The authors listed the limitations on page 7. These Included that there was no quantification of physical activity postoperatively, gum chewing speed could not be standardized, the xylitol in the gum may have an effect on GI function, and age and digestive capabilities may affect recovery In addition, the study was in southern Taiwan and may not be generalizable.

2. What are the biases of the study? Selection bias may have been present due to the age ranges where the youngest and oldest were excluded - pg7

3. Were populations inclusive in the study? If not what populations were missing based on the study purpose? The study participants were from a regional teaching hospital in southern Taiwan so may not be generalizable to other populations.

   The authors state that the study results support a body of literature that supports the practice of chewing gum to alleviate postoperative ileus in a "well-defined sample" (pg 2), and includes patients after colorectal resection surgery. The population selected for this study was inclusive of that well-defined sample, in this specific setting on the hospital surgical unit.

4. Overall impression of the study This appears to be a rigorously performed RCT. The research design is appropriate for the clinical question. Randomization was done well. Data review was blind. There is awareness of the possible bias present (some age ranges were excluded). The results contribute to an existing body of knowledge. The results are clinically relevant and could be applied in a clinical setting.

5. Provide a 5-7 sentence paragraph summary of the article. Elements to include: Purpose, Research Method, Results to include Statistical Findings, Clinical "so what"

This article addressed all the elements expected in a research article. The introductory sentence stated what the background to the research is. The purpose statement (hypothesis) was clear and supporting evidence was described showing the clinical relevance related to ileus and a review of research on the topic. The choice of a randomized control trial was an appropriate research method for this question, which was to compare the intervention of gum chewing to non-gum chewing after colorectal cancer resection. The results were clear and the statistical analysis seemed appropriate with findings including that the time to first flatus in the intervention group was significantly shorter than that in the control group, $t(52) = 2.80$, $p < .05$, $d = 0.73$, $\eta 2 = .119$. In terms of the clinical "so what" these findings are relevant to practice whereas gum chewing reduced the time to first flatus and defecation, which are important indicators of return to bowel function after surgery.

6. Did the article answer the PICO question? (support your answer based on the article)
   The PICOT question appears to be "In patients 40-75 years old who had a colorectal resection, how does postoperative gum chewing, compared to no gum chewing, affect the time to first flatus and first defecation (T = was not clear but could be described as the first postoperative days or maybe time to first flatus but this is also the outcome)?"
   The article answered the question clearly. Gum chewing was shown in this study to decrease the time to first flatus and time to first defecation. The time to first flatus in the control group was 52.92 hours and it was 39.13 hours in the control group that chewed the gum. This difference was significant. The time to first defecation was not significant when controlled for age and surgical duration.
   So the specific answer to the PICOT question in plain language would be - Gum chewing in the postoperative period after colorectal cancer resection decreased the time to first flatus and decreased the time to first defecation in those who were younger and had shorter duration of surgery.

Adapted from: Melnyk, B.M. & Fineout-Overholt, E. (2015). Evidence-Based Practice in Nursing & Health Care. 3rd ed. Philadelphia, PA: Wolters Kluwer Health, Appendix B. Fink, R., Oman, M., Makic, M.B. (2015). University of Colorado Hospital, Research and Evidence Based Practice Manual.

Complete the Evidence Table for this article:

Resources:

Melnyk, B.M & Fineout-Overholt, E. (2023). Hierarchy of evidence for intervention questions. Evidence-Based Practice in Nursing & Healthcare, 4th edition. Philadelphia, PA: Wolters Kluwer Health. p. 21 box 1.3 and p.118-145.

Garrard, J. (2017). Health Sciences Literature Review Made Easy, 5th ed. Burlington, MA: Jones and Bartlett Learning.

Levels of Evidence: I-VII (Melnyk, 2023 text p. 21)

Not all articles will have elements for each column of the evidence table.

Author/ year/Title/ Journal	LOE	Aim/ Purpose	Theoretical Framework	Design/ Methods/ Instruments	Sample/ Setting	Variables/ studied	Data analysis	Relevant findings	Strengths/ Limitations	Overall Strength /Quality of the study based on biases, etc.
Hsu, Y. C., & Szu, S. Y. (2022). Effects of Gum Chewing on Recovery From Postoperative Ileus: A Randomized Clinical Trial. The journal of nursing research : JNR, 30(5),	Level II: Evidence from well-designed single RCTs (experimental studies)	Evaluate if gum chewing compared to non-gum chewing in patients after colorectal resection shortened time to first flatus and first defecation	Not defined	Single Blind RCT Methods Purposive sample of postop colorectal resection patients. Intervention group received chewing gum postop after resection. Time to first flatus and first defecation were reported. Instrument/ Measurement: Gum Chewing (GC) Self Report flatus & abdominal auscultation Karnofsky Scale	n=30 intervention n=30 control A power analysis was performed. It was a Purposive sample. Random. Setting: Hospital in Taiwan	Chewing gum post operative and time to first flatus and first defecation	IBM SPSS Statistics Version 20.0 Independent T Test Mann -Whitney U Test Analysis of covariance (ANCOVA) Spearman's Rank	Gum chewing intervention after colorectal cancer resection reduced times to first postop flatus and defecation significantly compared with those who did not receive the intervention The mean time to first flatus was significantly shorter in the intervention group than the control group with a *p* .004.	Is a rigorously performed RCT. Contributes to an existing body of knowledge with supporting evidence. Clinically relevant and feasible. <u>Limitations</u> No assessment of physical activity postop, gum chewing speed not standardized xylitol may have a separate GI effect, age & digestion may vary recovery, may not be generalizable outside of study area in Taiwan	High Quality of Evidence Single RCT with supporting body of evidence and little bias

LOE: Level II: Evidence from well-designed single RCTs (experimental studies)

Aim/Purpose: Purpose of study was to evaluate the efficacy of post-surgical gum chewing in restoring normal bowel movements in patients diagnosed with colorectal cancer who had abdominal surgery for colon resection.

Theoretical Framework: (Conceptual Framework): not defined

Design/Methods/Instruments: Single Blind RCT

Gum Chewing (GC)/Self Report/abdominal auscultation/Karnofsky Scale

Sample/Setting: Random Sample of 40-75 year olds diagnosed with colorectal cancer (Stg I, II, or III) and scheduled for open colorectal resection

Setting: GI surgical ward of Taiwan Hospital

Variables: Chewing gum post operatively and time to first flatus and first defecation
Data analysis: IBM SPSS Statistics Version 20.0
Independent T Test
Mann-Whitney U Test
Analysis of covariance (ANCOVA)
Spearman's Rank
Relevant Findings
The study showed that the gum-chewing intervention after colorectal cancer resection reduced times to first postoperative flatus and defecation significantly compared with those who did not receive the intervention. The mean time to first flatus was significantly shorter in the intervention group than the control group with a *p* .004. Time to first defecation between the intervention and control groups was also significantly shorter except when controlled for age and surgical duration. When these factors were controlled there was a similar time to first defecation between the groups

Strengths/Limitations Strengths: There is a body of knowledge related to postoperative ileus and its importance in surgical recovery. There is supporting evidence for this study and it contributes to that literature. Also, this was an RCT that appeared to be rigorous.
Limitations: There was no quantification of physical activity postoperatively, gum chewing speed could not be standardized, the xylitol in the gum may have an effect on GI function, and age and digestive capabilities may affect recovery In addition, the study was in southern Taiwan and may not be generalizable.

Overall Strength/Quality based on biases, etc.
The overall quality of the research appears to be High. It was a rigorously performed RCT, and this was the appropriate research method for this clinical question. It was randomized. The researcher analyzing data was blind to the participants. The statistical analysis seems appropriate and is described clearly and the findings appear valid. It is clinically relevant and feasible to implement in a clinical setting. It may not be generalizable because the population was confined to one hospital in Taiwan. The possible bias related to age exclusions was described.