APPENDIX A. SEARCH STRATEGY

Database: Ovid MEDLINE(R)

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1 colonoscopy/
2 colonic.ti,ab.
3 (endoscop$ and (colon$ or rect$)).ti,ab.
4 or/1-3

5 cathartics/ or polyethylene glycols/ or phosphates/ or laxatives/ or senna extract/ or bisacodyl/ or cascara/ or enema/ or administration, oral/
6 (prepara$ or enema$ or cathart$ or (polyethylene adj glycol$) or phosphat$ or laxativ$ or (senna adj extract$) or bisacodyl or cascara or PEG or miralax or golytely or nulytely or halflytely or fleet or dulcolax or pico selax or bowel prep$ or bowel purgative or oral or liquid).mp.
7 5 or 6

8 respiratory aspiration of gastric contents/ or respiratory aspiration/ or pneumonia, aspiration/ or dyspnea/ or vomiting/
9 (emesis or vomit$ or reflux or bronchoaspirat$ or aspirat$ or quality or detection).ti,ab.
10 8 or 9

11 4 and 7 and 10

12 limit 11 to yr="1990 -Current"
13 limit 12 to English language
14 limit 13 to humans
15 limit 14 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)")
16 limit 14 to ("all adult (19 plus years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)")

17 14 not 15
18 16 or 17

APPENDIX B. PEER REVIEW COMMENTS/AUTHOR RESPONSES

Are the objectives, scope, and methods for this review clearly described?	
Yes	Thank you
Yes	
Yes	
Yes	
Yes	
Yes	
Yes	
Yes	
Is there any indication of bias in our synthesis of the evidence?	
No	Thank you
No	
No	
No	
No	
No	
No	
No	
Are there any published or unpublished studies that we may have overlooked?	
Yes - Diagnostic and Therapeutic Endoscopy published online July 14, 2008 (see comments below, and also attachment) Complications Following Colonoscopy With Anesthesia Assistance: A Population-Based Analysis FREE Gregory S. Cooper, MD; Tzuyung D. Kou, PhD; Douglas K. Rex, MD	Thank you for the suggestions. The first article is Schanz 2008. We have reviewed this article and would not include it because all three groups completed the prep regimen by 7 am for an afternoon colonoscopy. The article does not report aspiration or other adverse events associated with the colonoscopy procedure. The article is a comparison of prep agents, not timing. The second article suggested is Cooper 2013 which we have already included.
No	
No	
No	
No	
No	
No	
Yes - Though it seems reasonable on the face of it to restrict the review only to papers that compare different durations of NPO status, one could make an argument for inclusion of papers that examine the impact of an inadequate bowel preparation on colonoscopic findings. Though this could be considered indirect evidence, there is direct evidence that longer NPO status is associated with lower quality bowel preparation. Therefore, I believe that many key references may have been missed, especially concerning the impact of a poor bowel preparation on neoplasia miss rates. For example: 1) Froehlich	As noted, the suggested references do not directly assess the effect of NPO status, the focus of the review. Froehlich 2005 and Harewood 2003 provide no information about NPO status. Siddiqui 2009 compared prep completed < 14 hours before colonoscopy to > 14 hours.

F, Wietlisbach V, Gonvers JJ, et al. Impact of colonic cleansing on quality and diagnostic yield of colonoscopy: the European Panel of Appropriateness of Gastrointestinal Endoscopy European multicenter study. Gastrointest Endosc 2005;61:378–384. 2) Harewood GC1, Sharma VK, de Garmo P. Impact of colonoscopy preparation quality on detection of suspected colonic neoplasia. Gastrointest Endosc. 2003 Jul;58(1):76-9. Also, 3) Siddiqui AA1, Yang K, Spechler SJ, Cryer B, Davila R, Cipher D, Harford WV. Duration of the interval between the completion of bowel preparation and the start of colonoscopy predicts bowel-preparation quality. Gastrointest Endosc. 2009 Mar;69(3 Pt 2):700-6. doi: 10.1016/j.gie.2008.09.047.	We have modified the discussion to address the reviewer's point about indirect evidence.
Additional suggestions or comments can be provided below. If applicable, please indicate the page and line numbers from the draft report.	
1. There was not any discussion regarding the risk of aspiration of the actual prep solution which was used for the bowel preps. In private practice, there is some amount of variability with the choice of preps used (sodium phosphate vs PEG) and the fact that PEG is hygroscopic, and may incite an ongoing inflammatory resp reaction once aspirated, whereas sodium phosphate may be more benign, although there does not seem to be much evidence in animal literature to support that. 2. Diagnostic and Therapeutic Endoscopy July 14, 2008 (published online) compared sodium phosphate to PEG and found greater patient tolerability and at least equivocal conditions for colonoscopy with 2PEG prep volume deliveries. For difficult, non-compliant patients, this may be a good option for the VA population, since this is a much lower volume fluid, and provided at least as good scoping conditions for most endoscopists (it was a double-blinded study). 3. In reading the actual JAMA article on complications from colonoscopy (JAMA Intern Med. 2013;173(7):551-556. doi:10.1001/jamainternmed.2013.2908.), the authors did identify some possible origins of the 173 occurrences of aspiration, including a deeper plane of anesthesia with anesthesia providers, and higher patient morbidity, which may also affect prep potential, going along with patient compliance with prep instructions and ability to complete the volume load prior to the scope.	1. Discussion of individual prep agents and aspiration during bowel preparation were outside the scope of our review. 2. Schanz 2008. As noted above, this is a comparison of prep agents and not timing. The focus of our review is a comparison of NPO status prior to colonoscopy. 3. We would refrain from suggesting certain populations may be better candidates for shorter NPO based on anesthesia risk, since we find such little evidence to support risk overall with shorter NPO.
My answer to the last boiler-plate Q should be "I don't know". Additionally: 1. Only moderate and deep sedation are mentioned as far as anesthesia methods are concerned. In fact - most of anesthestics delivered by anesthesia teams for colonoscopies are TIVA (total intravenous anesthesia), i.e. general anesthesia (GA) (be it - without airway instrumentation). Per ASA document from 2011, the definition of GA is: "General Anesthesia is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired." Since the goal of our intervention is to have an insensate/ amnestic and IMMOBILE patient (i.e. not responding with movement to painful stimulation) - what we do easily satisfies the definition of GA (and we code it locally as such). 2. Page 4, lines 26-29: what is the meaning of the statement "... two (studies) reported aspiration with no episodes"?	1. The key questions, developed with input from stakeholders and technical expert panel members, focused on moderate or deep sedation. We could only comment on the level of sedation as reported (or often not reported) in the individual studies. 2. Two studies reported that they were specifically monitoring patients for aspiration events but did not observe any events. We have attempted to clarify this statement. 3. That is correct – the stakeholders nominated the topic and may use the findings of the review to guide VA policy. As with a journal, peer reviewers do not have an ongoing connection to the topic. 4. Thank you.

3. Page 8, lines 13-19: I did not see my name among the stakeholders. As such I understand that my input into this project is completed. 4. I read very carefully the "executive summary" and speed-read the detailed report. It is exhaustive and well executed.	
1. Please note that the four studies that addressed aspiration and sedation related complications did not include those with significant comorbidities. This is a key theme that needs to be emphasized. Subjects that may be at a theoretical risk for aspiration are not necessarily included in the studies addressing the efficacy of split dose preps. 2. Another important issue is the definition of aspiration and how it would be diagnosed. Clearly one could theorize that a transient episode of hypoxemia during the colonoscopy may in and of itself the related to an aspiration episode. However without radiographic evidence or clinical suspicion this would be undetected. 3. In the studies addressing gastric volume and acidity, please ensure that potential confounders such as the concomitant use of anti-secretary agents, antispasmodics or narcotic analgesics have been included in the methodology. 4. We still do not know whether deeper levels of sedation do indeed impart an increased risk for aspiration. According to the ASA Continuum of Sedation, we would expect this to be the case. 5. Additionally, all cases that are performed under anesthesia assistance, please comment as to whether elective endotracheal intubation was performed. This would perhaps, lead to confounding by protecting the airway as opposed to MAC without ET intubation. All of this needs to be discussed in the Research Gaps/Future Research section	1. This was noted in the Limitations section of the full report. We have also added a statement to the key findings in the Executive Summary. 2. Thank you – we have added a statement addressing this limitation in the Limitations section. We also updated the discussion on aspiration definitions and implications. Most clinicians would agree that aspiration needs to be a clinically significant event. Having said that, we were limited by the definition used by individual studies. 3. One of the studies reporting gastric volume did not report on the potential confounders listed. The other reported only that patients taking metoclopramide without proven gastroparesis were not excluded. 4. Risk of aspiration appears greater with deeper sedation, but we did not find enough studies to distinguish the harms of moderate versus deeper sedation prior to colonoscopy in relation to NPO. We have added this concern to the Research Gaps/Future Research section. 5. We provided information about sedation as reported in the published studies. Unfortunately, few details were provided. Furthermore, if the overall risk of aspiration is low, it would not be helpful to split it between anesthesia with or without endotracheal intubation. We have modified the Research Gaps/Future Research to address these concerns.
It would been better if moderate sedation, deep sedation and general anesthesia are reviewed separately. There is mention that aspiration rate is higher with deep sedation compare to moderate sedation. Would the rate be even higher with general anesthesia and how would the rate change if the patient was intubated versus no intubation. The other comment is that there is not enough research to answer the questions asked.	As noted in the review, only 26 of 40 included studies reported on use of sedation during colonoscopy and few details were provided. We agree that more research is needed.

The review is well written and comes to well formulated and reasonable conclusions based on the evidence. I would make a few minor changes. The most fundamental is the concept of low risk. To an anesthesiologist 0.1% risk of aspiration is not low risk. That is a significant risk. Page 4 Line 24: I would not say "the risk of aspiration during colonoscopy is very low (1 in 1000 or less). If the risk is 0.1%, that is a high risk to an anesthesiologist. The risk of aspiration during general anesthesia for C-Section without intubation is listed as 1:200. That risk is considered, extremely high. The risk for general anesthesia is quoted as 1:20,000. So, 1:1000 is high. Page 5 Line26 I would not say "Aspiration incidence during colonoscopy with moderate or deep sedation is very low. 0.1% is a high risk to an anesthesiologist. Page 6 Line 39. You need to include a statement about the contents and volume of colon prep solutions. Colon prep solutions contain ethylene glycol which is toxic to the lung. Colon prep solutions may be transparent but would not be considered "clear liquids". Moreover, the volume, 1 liter, is more than what is standard in NPO guidelines. Page 6 Line 16 If colon preps are inadequate 25% of the time, the efforts of GI docs to understand and correct that causes of failure: compliance, volume, diet may be more fruitful than merely having the prep closer to the time of anesthesia. Page 19 Paragraph 30-38. This paragraph isn't clear enough. There are two very separate issues. What is the time for NPO for clear liquids (water, clear juice) and what is the time for completing bowel preparations? The liquids in bowel prep solutions are very different from water. They have ethylene glycol. This paragraph needs to be in two parts. Time for NPO for clear liquids (water, clear juice). Then there needs to be a separate paragraph for Time for NPO for bowel preparation solutions. The issues are fundamentally separate to an anesthesiologist. Aspirating water is different from aspirating a liter of ethylene glycol containing salt water. Page 20 line 9: 8 hours versus 1-7 isn't very helpful. The range of 1-7 is too wide. Page25 Line 13 1:1000 is not "very low". To an anesthesiologist, 1:1000 is a serious problem. Page 25 Line 24 The granularity of your time scale is too coarse. 1-6 hours versus 8 is not very helpful. How about 0-2, 2-4, 4-6? Is there a difference in 0-2, 2-4, 4-6? Page 25 Line 19 An absence of reported complications does not imply an absence of complications. I am suspicious when there are no events reported. No hospitalizations after a procedure is suspicious. Page 28 Line 34 "Many studies excluded patients with serous comorbidities. " This sentence is critical to applicability. The VA patients have a high risk population with higher ages and many, many comorbidities. Page 29 Paragraph 11-31 Yes. Very well stated. Page 29 Line 35 An aspiration risk of 0.1% is NOT very low. 1:1000 is a big deal to an anesthesiologist.	Thank you. In general a 0.1% risk of an event, where the clinical consequences are not clear, would be regarded as low. Page 4. See above Page 5. See above Page 6. We have added information about contents and volume. Page 6. We have included the need to better understand patient compliance in our Research Gaps/Future Research section. Page 19. This section has been rearranged for clarity. No study reported on differences in quality of preparation between water up to the time of procedure vs no water. The studies that allowed liquids up to the time of procedure did so for all patients. Page 20. Few studies provided exact times between completion of preparation and procedure. We are only able to be as precise as the reported information. Page 25. See above Page 25. There were few comparisons between 0-2, 2-4, etc. so we are comfortable with this statement as written. Page 25. We have modified this statement to clarify that few studies specified adverse events as an outcome of interest. Page 28. As noted above, we have added this statement to the key findings. Page 29. Thank you. Page 29. See above

This was a very high quality review. I have few comments on the methodology. Unfortunately, the evidence base itself was insufficient to enable a meaningful conclusion regarding the key questions posed. My comments are mostly minor: Page 4 "Of 16 studies with NPO duration prior to colonoscopy (either bowel preparation or liquids) as low as 0 to 2 hours, 2 reported aspiration with no episodes." – No episodes of what? Reported no episodes or did aspiration events not occur? Page 4 "Strength of evidence was insufficient for our primary outcomes of aspiration" – Does this mean the strength of evidence was insufficient for the entire meta-analysis or only for this one key question? " and rescheduled colonoscopy." – Was the primary outcome rescheduling? Were there multiple primary outcomes? There is some confusion here between key questions (of which there can be many) and primary outcomes (of which there should only be one) Page 5 – Conclusion- This is very well written and very clear Page 6 Lines 35-37 – these are important since they define what current standards of practice are for NPO. Later this will factor in when reviewing the literature since few of the studies examined NPO status outside of these standard windows. Thus, few studies contributed to any new knowledge on this topic. Page 9 Line 26 – What scale or system was used to assess risk of bias? Please also specify at this point in the report what constitutes low, moderate or high risk of bias. Also, I applaud the investigators for not using the GRADE system. There is an increasing trend for evidence-synthesizing bodies to use GRADE –However, GRADE is very subjective and not an optimal system	Thank you. Page 4. We have clarified this statement. Page 4. Strength of evidence is evaluated for key outcomes. For aspiration and for rescheduled colonoscopies, our primary outcomes of interest, we found insufficient evidence. We have separated this into 2 bullet points to clarify. Although "primary" implies only one, we chose to designate a harm (aspiration) and a resource use (rescheduled colonoscopy) outcome as the key outcomes for the review based on input from stakeholders and Technical Expert Panel members. Page 5. Thank you Page 6. As noted, the guideline authors acknowledge that there is insufficient clinical evidence. Page 9. For RCTs we used a modification of the Cochrane approach. For observational studies, we used a 3 criteria system that we developed. We have added information about what we considered low, moderate, or high risk of bias.
1) Page 11, Table 1: There appear to be errors in the row labels. Specifically, the age values appear to be the "range of means" not the actual range of ages. Also, the Location percentages seem to be incorrectly labeled. 2) There seems to be an important gap in the analysis of the evidence with respect to the impact of an inadequate bowel preparation on patient outcomes. The authors do a very nice job reviewing the direct evidence linking NPO status with bowel preparation quality. However, while there may be limited direct evidence on the impact of NPO status on downstream patient outcomes, such as adenoma detection rate (ADR) or interval cancers, there is considerable evidence on the impact of an inadequate bowel preparation on these important outcomes. Recent evidence has linked the ADR to interval colorectal cancer incidence and mortality (Corley NEJM 2014). Since longer NPO status results in lower quality bowel preparation, and other studies have documented that lower quality bowel preparation is associated with lower rates of adenoma or polyp detection, then it would seem that this would be indirect evidence of lower adenoma detection with longer NPO status. This would then raise concern that longer NPO status will result in increased risk of interval cancer incidence and mortality. The risk of cancer in a VA screening colonoscopy population is between 0.5% and 1%. Among FOBT/FIT positive patients, it is as high as 5%. The lifetime risk of colorectal cancer is around 7% and it is estimated that around 5% of all cancers are now interval cancers. Most of these interval cancers are believe to be due	1. The row labels have been corrected 2. The Discussion section has been modified to address the indirect evidence. 3. We have modified this statement. 4. We have modified this paragraph. 5. See above – we have modified this paragraph. 6. We have modified the reporting of the survey results. 7. The Research Gaps/Future Research section has been modified. 8. We have modified this paragraph.

to missed lesions during colonoscopy. Therefore, the impact of poor bowel preparation on true patient outcomes is more than a hypothetical concern. 3) Page 26, line 14: The study showing higher aspiration incidence associated with deep sedation may be due to confounding by indication (i.e. patients at higher risk for aspiration may have anesthesia assistance brought in to reduce the risk). Endoscopists chose to have anesthesia assistance for any of a number of reasons, including significant comorbidity. 4) Page 27, line 39: The Discussion on resource implications seems incomplete. Clearly if a longer NPO status leads to lower quality bowel preparation, there will be important resource implications. Current guidelines call for repeating the exam within 1 year (Johnson et al. USMSTF Guidelines. Gastro 2014). In many cases, the patient is asked to ingest additional bowel preparation and return the following day. The paper by Rex et al. discusses the cost of inadequate bowel preparation. Within the VA, there are many facilities that lack adequate capacity for providing colonoscopy to the Veterans who need it and, therefore, they send the Veterans to the community at considerable expense. Besides the direct financial implications, there are also direct and indirect patient costs. Moreover, some Veterans decline to return for a follow-up examination, increasing the risk of missed pathology (and subsequent increased risk of morbidity and mortality). Another key related issue is that the variable policies of individual anesthesiologists with respect to NPO status leads to canceled procedures. It is common practice at my facility for anesthesiologists to cancel a colonoscopy on the day of the procedure because the patient ingested bowel preparation <6 hours before the procedure even when some of their colleagues have a 2 hour NPO rule. This variability has resulted in our nurses advising all patients to ingest their preparation the night before and to be NPO for 6 hours. Therefore, our anesthesia cases frequently have a poor quality preparation and need to return for a repeat procedure. This exposes the Veteran to increased risk from repeat procedures and repeat sedation, in addition to the inconvenience and cost. Despite the lack of studies on this issue, these issues are commonplace in the VA and merit discussion. 5) Page 27, line 42: It seems strange to hypothesize that a shorter NPO status might be more difficult to tolerate or adhere to when there are published meta-analyses that demonstrate that patients generally prefer a split-dose prep which generally requires a shorter NPO status. Which is even stated by the authors at line 52. 6) Page 28: Applicability Section: It is interesting that this informal survey was included in the report. There is no doubt that some patients will have an aspiration event during sedation. But there are two major issues with presenting this information. First, related to risk: what evidence is there that a 2 hour NPO status would increase the risk of aspiration compared to 4 or 6 hours? The data presented from the EGD studies shows that there is no difference in gastric contents between shorter and longer NPO status. Since liquids empty very rapidly, it is unlikely that there is a clinically significant difference. Second, there is no consideration of the benefits of a shorter NPO status. Clearly, anesthesiologists focus on trying to reduce the risk of sedation-related complications. However, it is the responsibility of the care team (including the endoscopy AND the anesthesiologist) to consider both the risks and benefits of the procedure. If the colonoscopy has an inadequate bowel preparation, then there is risk of missed neoplasia AND risk of sedation for an inadequate examination. The authors should take a step back and discuss the overall risks and benefits. I suspect a survey of gastroenterologists will yield anecdotal reports of poor bowel preparation, interval cancers and patients who have cases canceled by	

anesthesiologists and then never show for their repeat exam. What value is added by including this section other than to document that anesthesiologists don't follow their own professional society guidelines? This variability leads to endoscopy units being held hostage by the anesthesia providers. 7) Page 29: Research Gaps: While it would be nice to have high quality evidence to answer all questions in clinical practice, the reality is that this is unlikely to happen. Given that the current standard of care is to use split-dose bowel preparation for all colonoscopy, one might question the ethics of a randomized study of 2 hour vs. 6 hour NPO status. The current European guidelines state that the bowel preparation should be finished no more than 4 hours before the procedure begins. The USMSTF guidelines state that the last dose of preparation (typically 1-2 liters) should begin no more than 4-6 hours prior to the procedure (essentially finished 2-4 hours before the procedure start time). Therefore, any study that requires completing the preparation more than 6 hours before the procedure is intentionally asking patients to expose themselves to a greater risk of a poor bowel preparation. As noted by the authors, there is no evidence of harm from a shorter NPO status. Therefore, it is questionable whether an IRB would actually approve such a study. Even if it was ethical to do such a study, the low risk of aspiration would suggest that a study would need tens of thousands of subjects in each treatment arm. Perhaps the authors should include an estimated sample size for a randomized study (e.g. to show a 30% increase in aspiration risk, a study would require X subjects in each arm). There are some patients who decline a split-dose bowel preparation and have a >6 hour NPO status. However, they are not randomly selected. This raises concern about bias in observational studies in an era of split-dose preparation. 8) As noted by the anesthesiologist survey results, there is variable practice within the VA. As noted by the authors, there is no evidence that longer NPO status increases safety for colonoscopy. Can the authors shed any light on why the anesthesiologists believe that more than 2 hours is required despite the ASA recommendation for 2 hours for clear liquids?	

APPENDIX C. EVIDENCE TABLES

Table 1. Study Characteristics

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Abdul-Baki 2008[13] **Location: Lebanon** **Study design: RCT (4-way)** **Funding source: Industry**	Inclusion Criteria: ambulatory outpatient adults undergoing elective colonoscopies Exclusion Criteria: patients <18 years of age, presence of severe renal impairment, moderate or severe hepatic impairment, a history of bowel obstruction, known allergies to PEG or tegaserod	N=382 Age (yr): 55 Gender (Male %): ~61 Race (%): NR BMI: NR Co-existing conditions (%) Inflammatory bowel disease: 4 Indications for colonoscopy (%) Screening: 25 Abdominal pain: 24 Changes in bowel habits: 15 Rectal bleeding: 21 Anemia: 4 Surveillance of colon cancer/polyps: 7	NPO status group 1a: Split-dose PEG-E with 2L consumed evening before and 2L day of colonoscopy (to be completed 2 hours before the procedure) + tegaserod 6 mg pills (1 tablet night before and one 2.5 hours before procedure); (n=92) NPO status group 1b: matched placebo (n=107) Patients allowed regular diet until 6 pm day before colonoscopy and water until procedure time NPO status group 2a: PEG-E consumed evening before colonoscopy + tegaserod 6 mg pills (1 tablet night before and one 1.5 hours before procedure) (n=94) NPO status group 2b: matched placebo (n=89) Patients allowed liquid diet until 6 pm day before colonoscopy and water until procedure time Sedation: conscious Study withdrawals: none	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: yes, endoscopist, participant (tegaserod) Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Aoun 2005[14] **Location: Lebanon** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: ambulatory outpatient adults undergoing elective colonoscopies Exclusion Criteria: patients <18 years of age, presence of a severe illness (cardiac, renal, or metabolic), active alcoholism, drug addiction, major psychiatric illness, known allergies to PEG	N=141 Age (yr): 57 (range 20-84) Gender (Male %): 57 Race (%): NR BMI: NR Co-existing conditions (%) Inflammatory bowel disease: 4 Indications for colonoscopy (%) Abdominal pain: 28 Screening: 25 Changes in bowel habits: 15 Rectal bleeding: 14 Anemia: 4 Family history of colorectal cancer: <1	NPO status group 1: PEG-E split-dose - 2L night prior and 2L morning; finish morning dose at least 1.5 hours before procedure, regular diet until 6:30 pm day before colonoscopy; water allowed up to colonoscopy (n=68) NPO status group 2: 4L PEG-E - 6:00 to 10:00 pm day before procedure; liquid diet only day before colonoscopy; only water after midnight (n=73) Sedation: conscious Study withdrawals: none	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: yes, endoscopists Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: :Low
Arya 2013[15] **Location: USA** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: patients 21–70 years of age referred for colonoscopy with good general physical status (American Society of Anesthesiologists [ASA] class 1 or 2) Exclusion Criteria: history of chronic heart, liver, or kidney disease; hypertension, diabetes mellitus, arthritis (spine, shoulder, hip and knee joints) severe constipation, or concurrent severe diarrhea, ileus, suspected intestinal obstruction, bowel perforation, previous gastrointestinal tract surgery, gastro-paresis, toxic colitis, ulcerative colitis, pregnancy, and lactation	N=147, 14 excluded. 133 completed study (demographics based on 133) Age (yr): 44 Gender (Male %): 38 Race (%): white 88; black 8 BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) Screening: 42 Rectal bleeding: 20 Mild constipation: 19 Abdominal pain: 11 Anemia: 3 Mild diarrhea: 3	NPO status group 1: Rapid-prep Shudh™ colon cleanse (SCC) - patients start SCC around 6 am on morning of colonoscopy drinking 240-480 ml every 5 minutes (total 1-2 L); last glass ≥2 hours prior to procedure (n=74) Day prior to colonoscopy, patients instructed to eat light breakfast up to 12 pm and then stay on clear liquids NPO status group 2: Half-Lytely® colon prep (HCP) - 2 bisacodyl delayed-release tablets taken at 1 pm; patients start drinking 2L solution after a bowel movement or around 7 pm if no bowel activity occurred (n=73) Patients stay on clear liquids entire day prior to colonoscopy Sedation: NR Study withdrawals: 10% (n=14) excluded prior to procedure (no-shows)	*For RCTs* Sequence generation: adequate Allocation concealment: unclear Blinding: yes, endoscopists Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Athreya 2011[16] **Location: Australia** **Study design: CCT** **Funding source: None reported**	Inclusion Criteria: elective colonoscopy patients Exclusion Criteria: prior surgical resection, patients who had taken GlycoPrep™ (polyethylene glycol electrolyte) as the bowel preparation or those administered a Fleet™ enema on arrival, and failure to achieve caecal intubation	N=325 Age (yr): 57 (24-92) Gender (Male %): 50 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) Symptoms (not specified): 36 Screening: 35 Family history: 21 Family history & symptoms: 8	NPO status group 1: PM group- 2 sachets PicoPrep-3™ day prior and 3rd sachet 6 to 7 am on day of procedure; solids ceased after 8 am day prior; clear fluids continued until 4 hrs prior to procedure (n=150) NPO status group 2: AM group- 3 sachets PicoPrep-3™ day prior to procedure; solids ceased after 8 am day prior; clear fluids continued until midnight prior to procedure (n=175) Sedation: conscious Study withdrawals: none	*For RCTs* Sequence generation: not applicable Allocation concealment: inadequate (alteration) Blinding: Investigator Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: High
Barclay 2004[17] **Location: USA** **Study design: RCT** **Funding source: Industry**	Inclusion Criteria: ambulatory outpatient adults undergoing elective colonoscopies Exclusion Criteria: patients <18 years of age, congestive heart failure, renal insufficiency (creatinine > 120 lmol/L), ascites	N=303 randomized, 47 excluded. 256 completed study (demographics based on 256) Age (yr): medians 57-59 Gender (Male %): 45 Race (%): NR BMI: NR Co-existing conditions (%) Diabetes: 9 On diuretics: 11 Indications for colonoscopy (%) Rectal bleeding/+ FOBT: 29 Abdominal pain: 25 Screening: 23 Changes in bowel habits: 20	NPO status group 1: 3-dose regimen; aqueous NaP day before procedure; 2nd dose 5 hours later; 3rd dose 3 hours before scheduled time of procedure (n=131) NPO status group 2: 2-dose regimen (n=125) a) morning colonoscopy; aqueous NaP day before procedure; 2nd dose 5 hours later (same day) b) afternoon colonoscopy; aqueous NaP day before procedure; 2nd dose 5 hours before scheduled time of procedure All patients: clear fluid diet for 24 hours before colonoscopy; instructed to drink 3.8L of commercially available carbohydrate-electrolyte solution during preparation period Sedation: NR Study withdrawals: 18% (n=47) excluded prior to procedure	*For RCTs* Sequence generation: adequate Allocation concealment: not reported Blinding: yes, endoscopists Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Bryant 2013[18] **Location: Australia** **Study design: Retrospective observational** **Funding source: None reported**	Inclusion Criteria: mostly outpatients (89%) undergoing colonoscopy Exclusion Criteria: patients with a prior history of large bowel resection, colonoscopies where cecal intubation could not be achieved due to an obstructing lesion, and colonoscopy reports which did not report on bowel preparation	N=1,785 Age (yr): <55 34%; ≥55 66% Gender (Male %): 53 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) Anemia/Rectal bleeding: 37 Screening: 34 Altered bowel habit: 12 Colitis: 6 Other: 11	NPO status group 1: Afternoon colonoscopies; prep to procedure interval 5-7.5 hrs (n=768) a) 2L PEG at 5-7 pm day before + 2L PEG before 8 am day of colonoscopy b) 2 sachets sodium picosulphate at 1 pm and 5 pm day before + 1L PEG before 8 am day of colonoscopy NPO status group 2: Morning colonoscopies; prep to procedure interval 8.5-17 h; (n=1,017) a) 4L PEG between 2 pm and 7 pm day before colonoscopy b) 2 sachets sodium picosulphate at 9 am and 1 pm day before + 1L PEG at 4 pm All patients: low-residue diet 2 days before and only clear fluids 1 day before colonoscopy; fast for 4-6 hours before procedure Sedation: by proceduralist using fentanyl and midazolam, or with propofol sedation by anesthetist Study withdrawals (%): NA	1) Study design: retrospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears to be no missing data b. Were the characteristics of the different NPO groups similar? unclear **Risk of bias**: Moderate
Chiu 2006[20] **Location: Taiwan** **Study design: RCT** **Funding source: None** **Note: *Secondary colonoscopy***	Inclusion Criteria: patients who had colon neoplasms detected during the first screening colonoscopy Exclusion Criteria: inability to discontinue the use of antiplatelet agents or anticoagulants, presence of minute polyps that had been removed during the screening colonoscopy using biopsy forceps, invasive cancer that required surgical intervention, failure to complete total colonoscopy for any reason at the health checkup	N=121 Age (yr): 57 Gender (Male %): 68 Race (%): NR, presumed all Asian BMI: 25 Co-existing conditions (%): NR Indications for colonoscopy (%) Colorectal neoplasms 100	NPO status group 1: PEG-ELS; 2L between 5 and 6 am day of colonoscopy (6-8 hr NPO interval) (n=61) NPO status group 2: PEG-ELS 2L at 8 pm evening before colonoscopy (13-16 hr NPO interval) (n=60) Low-fiber diet advised for two days before the procedure Sedation: conscious Study withdrawals: 3 (2%) did not ingest prep and were excluded	*For RCTs* Sequence generation: not described Allocation concealment: unclear (“sealed envelopes”) Blinding: colonoscopist Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Chiu 2011[19] **Location: Taiwan** **Study design: Retrospective observational** **Funding source: In part by research grant from Department of Health of Taiwan**	Inclusion Criteria: Chinese patients age 40 to 80 years; received total colonoscopy; considered average-risk (a) no history CRC, adenoma, or IBD; b) no criteria for hereditary non-polyposis CRC, familial adenomatous polyposis, or other polyposis syndrome; c) no 1st degree relative with CRC; d) no symptoms of colorectal malignancy [bloody stool, abdominal pain, change in body weight, or documented iron deficiency anemia]; e) no history of CRC screening tests within 5 yrs; and f) no long-term use of aspirin, non-steroidal anti-inflammatory drug, or a cyclooxygenase 2 inhibitor) Exclusion Criteria: NR	N=3,079 Age (yr): 51 Gender (Male %): 53 Race (%): Asian 100 BMI: NR (abdominal girth reported) Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: PEG-ELS 2L between 3 and 4 am morning of colonoscopy (5-9 hr NPO interval) (n=1,552) NPO status group 2: PEG-ELS 2L between 8 and 9 pm evening before colonoscopy (>8 hr NPO interval) (n=1,527) 2 days before procedure, patients advised to start low-fiber diet; 1 day before procedure, patients advised to drink only clear liquids and avoid solid foods Sedation: NR Study withdrawals: None	1) Study design: retrospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears to be no missing data b. Were the characteristics of the different NPO groups similar? no, differences in abdominal girth between groups **Risk of bias**: Moderate
Church 1998[21] **Location: USA** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: ambulatory outpatient adults undergoing elective colonoscopies in the afternoon Exclusion Criteria: NR	N=317 Age (yr): 60 Gender (Male %): 57 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) Neoplasm follow-up: 48 Family history of CRC: 14 Symptoms (not specified): 14 Polyp on prior exam: 11 Other: 13	NPO status group 1: 4L PEG starting at 8 am day of procedure (n=157) NPO status group 2: 4L PEG starting at 6 pm evening before procedure (n=160) All patients; liquid diet day before; after prep allowed water by mouth only until examination Sedation: NR Study withdrawals: none	*For RCTs* Sequence generation: not described Allocation concealment: not described Blinding: yes, endoscopists Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
De Salvo 2006[22] **Location: Italy** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: patients scheduled for colonoscopy who were able to follow cleansing regimen Exclusion Criteria: pregnancy, age >75 years, previous operation on small/large bowel, renal failure, known electrolyte disorders, heart failure, liver disease with ascities	N=273 (demographic information for 265 who followed the cleansing regimen) Age (yr): 61 Gender (Male %): 53 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: Sodium phosphate 40 mL at 6 pm day prior to colonoscopy and 6 am day of colonoscopy (≥5 hours) (n=83) NPO status group 2: Magnesium sulfate 15mg and senna 12mg in 200 mL water 5 pm day prior to colonoscopy (>8 hours) (n=92) NPO status group 3: PEG 2 L at 6 pm day prior to colonoscopy plus Biscodyl 4 tablets at 10 pm day prior to colonoscopy (>8 hours) (n=98) On day before colonoscopy, patients to avoid solid food after 12 pm; colonoscopy performed after 11 am Study withdrawals: 8/273 (3%)	*For RCTs* Sequence generation: adequate Allocation concealment: NR Blinding: colonoscopists that scored bowel preparation Incomplete outcome data: yes Selective outcome reporting: **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Di Palma 2011[23] **Location: USA** **Study design: RCT** **Funding source: Industry**	Inclusion Criteria: adult outpatients undergoing colonoscopy for routine clinical indications Exclusion Criteria: ileus or suspected bowel obstruction, bowel perforation, previous alimentary tract surgery, significant gastroparesis or gastric outlet obstruction, toxic colitis or megacolon, severe ulcerative colitis or those pregnant or lactating	Study 1 (ITT population) N=364 Age (yr): 56 Gender (Male %): 46 Race (%): white 86, black 9 BMI: NR Indications for colonoscopy (%): NR Study 2 (ITT population) N=387 Age (yr): 57 Gender (Male %): 45 Race (%): white 87, black 11 BMI: NR Indications for colonoscopy (%): NR Co-existing conditions (%): Overall 356/787 subjects (45%) had a history of heart disease, renal failure, hypertension, and diabetes	Study 1 (split dose) NPO status group 1a: oral sulfate solution (16 oz + additional water) evening before colonoscopy; 2nd dose at approximately 6 am day of colonoscopy (hours unclear) (n=190) NPO status group 1b: 1L PEG-EA evening before colonoscopy and 1L approximately 6 am day of colonoscopy (hours unclear) (n=189) Study withdrawals: 16/379 (4%) Study 2 (same day) NPO status group 2a: oral sulfate solution (total of 32oz + additional water) evening before colonoscopy (hours unclear) (n=204) NPO status group 2b: 2L PEG-EA evening before colonoscopy (hours unclear) (n=204) Study withdrawals: 26/408 (6%) Sulfate preparation subjects had light breakfast and clear liquids for lunch and dinner; PEG-EA subjects had normal breakfast, light lunch, and clear soup or yogurt for dinner Sedation: NR	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: colonoscopists Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
El Sayed 2003[24] **Location: Lebanon** **Study design: RCT** **Funding source: None Reported**	Inclusion Criteria: ambulatory outpatients scheduled for elective morning colonoscopy Exclusion Criteria: age < 18, presence of serious conditions such as severe cardiac, renal or metabolic diseases, active alcoholism, drug addiction, major psychiatric illness; known allergy to PEG or bisacodyl, and refusal to consent to the study	N=187 Age (yr): 56 Gender (Male %): 56 Race (%): NR BMI: NR Co-existing conditions (%) History of surgery: None: 95 Abdominoperineal resection: 1 Left colectomy: 2 Right colectomy: 1 Segmental colectomy: 1 Indications for colonoscopy (%) Anemia: 6 Abdominal pain: 23 Rectal bleeding: 24 Follow-up after colonic resection: 5 Family history of CRC: 7 Change in bowel habits: 24 Follow-up after polypectomy: 4 Positive FOBT: 3 Screening: 18 Follow-up of IBD: 5	NPO status group 1: 2L PEG at 6 pm day before colonoscopy; no dietary restrictions except for light liquid dinner before 7 pm; 5mg of bisacodyl at 8 pm; 1L PEG at least 2 hrs before colonoscopy (n=91) NPO status group 2: 3 Sachets of PEG in 3L of water beginning 6 pm (finish within 4 hrs); start clear liquid diet on morning of day before colonoscopy; fast after midnight (n=96) Sedation: Moderate sedation (Midazolam and Mepiridine) Study withdrawals: NR	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: single-blinded (endoscopist) Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Eun 2011[25] **Location: Korea** **Study design: Prospective observational** **Funding source: Research Fund of Hanyang University**	Inclusion Criteria: Outpatients aged between 18 and 80 years scheduled for elective colonoscopy Exclusion Criteria: Age<18, presence of serious illness such as severe cardiac, renal or metabolic disease, drug addiction or major psychiatric illness; known allergy to PEG, prior history of bowel resection and refusal of consent to study	N=300 Age (yr): 52 Gender (Male %): 51 Race (%): NR BMI: 23 Co-existing conditions (%) Chronic diseases: 32 Constipation: 11 Prior Hysterectomy: 11 Indications for colonoscopy (%) Screening: 25 Family history of CRC: 2 Surveillance: 6 Hematochezia: 12 Anemia: 3 Abdominal pain: 30 Bowel habit changes: 17 Suspicion of polyp on imaging: 6	NPO status group 1: 4L PEG consumed over 3 hours starting at 5 am for morning colonoscopy (mean time from end of prep to procedure = 3.7 hrs) (n=149) NPO status group 2: Same but starting at 8 am for afternoon colonoscopy (mean time from end of prep to procedure = 4.9 hrs; P < .001 vs group 1) (n=151) Sedation: NR Study withdrawals: 7 failed to reach cecum	1) Study design: prospective 2) Population consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? none reported b. Were the characteristics of the different NPO groups similar? yes **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Flemming 2012[26] **Location: Canada** **Study design: RCT** **Funding source: University research unit**	Inclusion Criteria: age 18 and older, elective colonoscopy at 1 hospital Exclusion Criteria: ileus or bowel obstruction, significant constipation (<3 bowel movements/week with or without regular laxatives), previous colorectal surgery, ascites, previously recognized renal impairment, active IBD, pregnancy, recent (<6 mos) MI or unstable angina	N=250 enrolled; demographic data for 236 (14 randomized but never participated because target numbers reached) Age (yr): 56 Gender (Male %): 46 Race (%): NR BMI: NR Co-existing conditions (%) Hypertension: 28% Diabetes: 7% Indications (%) Family history CRC: 44% Screening: 12% History of adenoma: 18% Positive FOBT: 6.8% Bleeding: 6.9% Altered bowel habits: 6.0% Diarrhea: 3.4% Other: 3.0%	NPO status group 1: Picosulfate, magnesium oxide, & citric acid (Pico-Salax); 1st dose at 7 pm, 2nd dose 4 hrs before colonoscopy (n=119) NPO status group 2: Pico-Salax; 2 doses evening before colonoscopy (5 pm, 11 pm) (n=117) Both groups: 2 5-mg tablets bisacodyl for 2 consecutive nights before colonoscopy; only clear fluids on day before colonoscopy; encouraged to drink 3-4 L Gatorade or similar evening before colonoscopy Sedation: NR Study withdrawals: 14 (6%); 6 split dose, 8 evening before dose	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: endoscopists blinded to dosing regimen Incomplete outcome data: 6% withdrawals Selective outcome reporting: **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Frommer 1997[27] **Location: Australia** **Study design: RCT** **Funding source: In part by CB Fleet Company Inc.**	Inclusion Criteria: NR Exclusion Criteria: inability to understand instructions, heart failure, pregnancy, age above 90, raised creatinine, right hemicolectomy, use of additional agents (enemas or defoaming agents), a significant error in having performed cleansing instructions, and failure to reach cecum or IC valve	N=487 Age (yr): 63 Gender (Male %): 55 Race (%): NR BMI: NR Co-existing conditions (%): Diverticulosis:3.3 Indications for colonoscopy (%): NR	NPO status group 1: 45 ml NaP solution at 6 pm day before colonoscopy and 6 am on morning of colonoscopy (n=166) NPO status group 2: 3L PEG at 2 pm day before colonoscopy (N=160) NPO status group 3: 45ml NaP at 7 am and 7 pm on day before colonoscopy; instructed to drink minimum of 800 ml water or clear fluid within 1 hr (n=161) All patients: avoid foods with small seeds and nuts for 5 days; take 3 tablets of bisacodyl in afternoon two days before colonoscopy; day before colonoscopy no solid food/clear liquids throughout the day Sedation: NR Study withdrawals: NR	*For RCTs* Sequence generation: unclear Allocation concealment: unclear Blinding: single blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Moderate
Gupta 2007[28] **Location: India** **Study design: RCT** **Funding source: Not reported**	Inclusion Criteria: age between 18 and 80 Exclusion Criteria: prior bowel surgery, suspected bowel obstruction, contraindication to phosphate preparation (cardiovascular or renal insufficiency); inconvenienced by the timing of bowel preparation	N=201 Age (yr): NR Gender (Male %): NR Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR NOTE: reported groups were comparable in terms of demographic data and indications for colonoscopy	NPO status group 1: NaP-based fluid (90 mL with 300 mL lemonade) at 6 am on day of colonoscopy ("colonoscopy preferably scheduled" after11 am) (n=102) NPO status group 2: NaP-based fluid (same) at 5 pm day before ("timing of colonoscopy for the evening group was adjusted as indicated by the scheduled appointment list") (n=99) Both groups: allowed to consume clear liquids (as desired) in the preceding 12 hours (UNCLEAR WHAT THIS MEANS) Sedation: combination of pethidine hydrochloride (50mg) and midazolam (2mg) as an intravenous bolus unless contraindicated (1/2 dose for pts over 65 yrs) Study withdrawals: None	*For RCTs* Sequence generation: unclear Allocation concealment: adequate Blinding: investigators blinded to timing of prep Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Gurudu 2010[29] **Location: USA** **Study design: Retrospective observational** **Funding source: None**	Inclusion Criteria: consecutive afternoon colonoscopies (after 1 pm) from July 2008 to April 2009 Exclusion Criteria: None	N=1,345 Age (yr): 61 Gender (Male %): 52 Race (%): NR BMI: Overall NR, reported for poor, good prep etc. Co-existing conditions (%): NR Indications for colonoscopy (%): Screening/surveillance: 61% Anemia/bleeding: 11% Diarrhea: 8% Abdominal pain; 4% Colitis: 3% Constipation: 2% Other: 11%	NPO status group 1: Split-dose prep 1) 4L PEG am (n=226): start 4L PEG at 5 am day of procedure 2) 2L PEG am (n=39): start 2L PEG + 4 tablets bisacodyl at 5 am day of procedure 3) Split Dose: 2L PEG evening before procedure and starting at 5 am day of (n=48) NPO status group 2: 1 day prep 1) 2L PEG pm (n=656): 2L PEG + 4 tablets bisacodyl day prior to procedure 2) 4L PEG pm (n=376): 4L PEG day prior All patients allowed drink clear liquids up to 3 hrs before procedure Sedation: Conscious sedation Study withdrawals: None	1) Study design: retrospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears to be no missing data b. Were the characteristics of the different NPO groups similar? bowel preparations were not distributed equally (difference adjusted statistically) **Risk of bias**: Moderate
Gurudu 2012[30] **Location: USA** **Study design: Retrospective observational** **Funding source: None**	Inclusion Criteria: patients undergoing screening/ surveillance colonoscopy Exclusion Criteria: incomplete data, prior colon resection, and colonoscopy for indications of bleeding, anemia, IBD, repeated colonoscopy in same patient during the study after an initial colonoscopy detected adenomas was also excluded	N=5,175 Age (yr): 61 Gender (Male %): 50 Race (%): NR BMI: 28 Co-existing conditions (%): NR Indications for colonoscopy (%): Screening and surveillance included only	NPO status group 1: POST-SDP - Split prep (PEG or MoviPrep), 3L night before starting at 6 pm and 1 L at least 4 hours before scheduled procedure; NPO for at least 3 hours prior to procedure (n=1,615) NPO status group 2: Pre-SDP - All prep (PEG or MoviPrep) the night before (n=3,560) All patients instructed to be NPO for at least 3 hrs before procedure Sedation: mainly moderate, few got MAC also Study withdrawals: NR	1) Study design: retrospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? yes, all included b. Were the characteristics of the different NPO groups similar? yes **Risk of bias**: High

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Huffman 2010[31] **Location: USA** **Study design: Prospective observational** **Funding source: None**	Inclusion Criteria: scheduled for EGD and colonoscopy on same day after split-dose bowel prep Exclusion Criteria: gastric resection, known gastroparesis, or slow GE	N=301 Age (yr): 55 Gender (Male %): 41 Race (%): NR BMI: NR Co-existing conditions (%): DM: 18 Opioid use:15 Metocloporamide Use: 3 Indications for colonoscopy (%): NR	NPO status group 1: Various split-dose bowel preps (PEG, NaP); complete prep by at least 2 hrs before procedure (mean NPO = 5.1 hrs) (n=254) NPO status group 2: Various bowel preps (PEG, NaP) evening before (mean NPO = 13.5 hrs) (n=47) Sedation: NR Study withdrawals: NR	1) Study design: prospective 2) Population: not consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? NR b. Were the characteristics of the different NPO groups similar? yes, group sizes and outpatient to inpatient ratios differed between groups **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Johanson 2007[32] **Location: 10 sites, USA** **Study design: RCT** **Funding source: Pharmaceutical industry**	Inclusion Criteria: males and non-pregnant, non-lactating females ≥18 years; scheduled for colonoscopy Exclusion Criteria: renal insufficiency; serum electrolyte abnormalities at screening; uncontrolled CHF, unstable angina, untreated dysrhythmia, current use of digitalis preparations or medications known to prolong QT interval; MI, PTCA or CABG within previous 3 months; ascites; current acute exacerbation of IBD; toxic colitis or toxic mega-colon; severe chronic constipation; ileus; perforation; ileostomy; colostomy, hypomotility syndrome; gastric bypass or stapling; history of gastric retention; impaired gag reflex; history of aspiration; dysphagia; treatment with investigational drug or product; participation in drug study within past 30 days; treatment within 21 days with another NaP preparation; known allergy to NaP; or any other clinically significant disease that would expose the patient to increased risk of an adverse event	N=402 Age (yr): 56 Gender (Male %): 44 Race (%): white 86; black 10; other 3 BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: 20 NaP tablets at 6 pm evening before colonoscopy and 12 tablets next day 3-5 hrs before colonoscopy (n=200); this group was allowed light breakfast day before colonoscopy (up to 12 noon) with no solid food after noon (clear liquids only) NPO status group 2: 4 bisacodyl tablets with water at 12 noon day prior colonoscopy followed by 2L PEG taken after a bowel movement or a maximum of 6 hrs after ingestion of bisacodyl tablets (n=202); this group allowed only clear liquids entire day before colonoscpy Sedation: Patients were sedated but type of sedation not reported Study withdrawals: 1 patient withdrew; 16% excluded from final analysis	*For RCTs* Sequence generation: not described Allocation concealment: adequate Blinding: single blinded Incomplete outcome data: 16% excluded from final analysis Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Kao 2011[33] **Location: Canada** **Study design: RCT** **Funding source: None**	Inclusion Criteria: ambulatory GI clinic patients between 18-75 years who underwent elective outpatient colonoscopy Exclusion Criteria: renal insufficiency, CHF, acute coronary syndrome recent or unstable angina, liver cirrhosis or ascites, chronic furosemide therapy, previous colon resection, and known or suspected bowel obstruction, megacolon or ileus	N= 834 Age (yr): 50 Gender (Male %): 39 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: PM colonoscopy; 4 different regimens 8-10 H before colonoscopy (n=287); included PEG, NaP, Pico-Salax+magnesium citrate NPO status group 2: AM colonoscopy; 4 different prep regimens 10-14 h before colonoscopy (n=491) All patients; clear liquid diet the day before colonoscopy; hydrate liberally with water or clear electrolyte replacement solution until 2 hrs before procedure Sedation: NR Study withdrawals: None	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: single blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Kastenberg 2001, 2007[34,35] **Location: Multiple sites, USA** **Study design: RCT** **Funding source: Pharmaceutical Industry**	Inclusion Criteria: either gender, at least 18 years old, scheduled for colonoscopy, able to swallow tablets without difficulty, and gave written informed consent Exclusion Criteria: evidence of acute or chronic renal insufficiency; cardiovascular disease (uncontrolled congestive heart failure, unstable angina pectoris, or, within past 3 months, PTCA, MI, or CABG); ascites; electrolyte imbalance (hyponatremia, hyperphosphatemia, or hypocalcemia); colon disease (acute exacerbation of chronic IBD, chronic constipation [<2 bowel movements per week for >1 year], ileus and/or acute obstruction, ileostomy, right or transverse colostomy, subtotal colectomy [≥50% of colon removed] with ileosigmoidostomy [patients with right or left hemicolectomy alone were eligible], hypomotility syndrome, megacolon, or idiopathic pseudoobstruction	N=886 randomized (859 received study product) Age (yr): 56 Gender (Male %): 48 Race (%): white 87, African-American 8, Hispanic 5 BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: 20 tablets NaP at 6 pm evening before and repeat 3-5 hrs before colonoscopy (n=420) NPO status group 2: 4L PEG evening before colonoscopy (n=425) Sedation: NR Study withdrawals: 1.6% (14 patients)	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: single blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Khan 2010[36] **Location: USA** **Study design: CCT** **Funding source: Not reported**	Inclusion Criteria: adults, scheduled for outpatient colonoscopy Exclusion Criteria: NR	N=412 Age (yr): NR Gender (Male %): NR Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: NaP tablets (n=93) or 2L PEG + ascorbic acid (n=64) administered by split-dose (exact timing unknown) (total n=157) NPO status group 2: 4L PEG the evening before (exact timing unknown) (n=255) Sedation: NR Study withdrawals (%): bowel preparation scoring incomplete for 49/412 (12%)	*For RCTs and CCTs* Sequence generation: not applicable Allocation concealment: not described Blinding: unclear Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: High
Koh 2011[37] **Location: Korea** **Study design: RCT** **Funding source: University research fund**	Inclusion Criteria: NR Exclusion Criteria: diabetes mellitus, hyperthyroidism or hypothyroidism, taking prokinetic or antispasmotic medication, history of bowel resection	N=80 Age (yr): 53 Gender (Male %): 66 Race (%): NR BMI: NR Co-existing conditions (%): chronic disease 23; previous abdominal surgery 11 Indications for colonoscopy (%) Screening: 48 Altered bowel habit: 28 Bowel symptoms: 18 Anemia: 8	NPO status group 1: 4L PEG between 6 and 8 am; ate lunch between 12 and 12:30 pm (n=40) NPO status group 2: 4L PEG between 6 and 8 am; no lunch (n=40) All colonoscopies between 2 and 4 pm Sedation: conscious sedation/analgesia with IV midazolam and pethidine titrated as required	*For RCTs and CCTs* Sequence generation: inadequate (odd and even days) Allocation concealment: inadequate Blinding: endoscopists were blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: High

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Kolts 1993[38] **Location: USA** **Study design: RCT** **Funding source: University research fund**	Inclusion Criteria: consecutive outpatients requiring an elective colonoscopy Exclusion Criteria: acute diverticulitis, active IBD, unstable cardiovascular or respiratory status, allergies to all available conscious sedation medications, MI or cerebrovascular accident in last 2 months, serum creatinine > 2.0 mg/dl, massive ascites, delayed gastric emptying	N=113 Age (yr): 54 Gender (Male %): 39 (lower % male in NPO group 1) Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) GI bleed: 36 Polyps: 39 Anemia: 4 Diarrhea: 9 Constipation: 3	NPO status group 1: NaP (90ml fluid) at 6 pm and 6 am plus at least 36oz water 1 hour after 6 pm dose (n=34) NPO status group 2: 4L GoLYTELY (PEG) at 6 pm day before (n=38) NPO status group 3: Castor oil (60ml fluid) at 6 pm plus at least 36oz water 1 hour after (n=41) All patients: liquid diet day before with NPO after midnight Sedation: IV sedation	*For RCTs and CCTs* Sequence generation: unclear Allocation concealment: pharmacist distributed preparations Blinding: endoscopists were blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Moderate
Kössi 2007[39] **Location: USA** **Study design: Prospective observational** **Funding source: Not reported**	Inclusion Criteria: consecutive outpatients Exclusion Criteria: None reported	N=214 enrolled; demographic data for 204 analyzed Age (yr): 54 Gender (Male %): 45 Race (%): NR BMI: NR Co-existing conditions (%) Diverticulosis (moderate to severe): 11 Indications for colonoscopy (%): NR	*Morning colonoscopies*: 45 ml NaP at 7 am and 7 pm day before colonoscopy *Afternoon colonoscopies*: 45 ml NaP at 6 pm day before and 6 am on day of colonoscopy *Created 3 groups:* NPO status group 1: 6 hours or less between 2nd dose of prep and colonoscopy (n=53) NPO status group 2: 6 to 12 hours between 2nd dose of prep and colonoscopy (n=90) NPO status group 3: 12 hours or more between 2nd dose of prep and colonoscopy (n=61) All patients: instructed to not eat vegetables, berries, fruits, or bread containing seeds for 1 wk before colonoscopy; encouraged to drink 2-3 liters of clear liquids during bowel prep Sedation: NR Study withdrawals: 5% (10/214)	1) Study design: prospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? yes b. Were the characteristics of the different NPO groups similar? yes **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Longcroft-Wheaton 2012[40] **Location: UK** **Study design: Obsersvational (Prospective Cohort)** **Funding source: None reported**	Inclusion Criteria: receiving colonoscopy under National Bowel Cancer Screening Programme; age 59 to 70 years Exclusion Criteria: known renal impairment (CKD grade 3, Creatinine>150; eGFR<40); congestive cardiac failure; sodium <130	N=227 Age (yr): median 65 (range: 60-71) Gender (Male %): 75 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: same-day regimen, 2 sachets of sodium picosulphate at 7 and 10 am on morning of afternoon procedure; NPO <3 hours (n=132) NPO status group 2: 2-day regimen, pts used 3 sachets of sodium picosulphate at noon and 5 pm on day before and 1 at 8am on day of afternoon procedure; NPO 4-8 hours (n=95) All patients: light diet day before procedure (no vegetables/fruit); increase fluid intake for 24 hrs leading up to procedure Sedation: NPO Status 1: 1.27, NPO Status 2: 1.20 (Mean sedation level where 1=awake, 2=drowsy, 3=asleep) Study withdrawals: NR	1) Study design: prospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears all were included b. Were the characteristics of the different NPO groups similar? yes Note: endoscopist and screening nurse were blinded to the preparation regimen. **Risk of bias**: Low
Manno 2012[41] **Location: Italy** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: 18 years of age or older, either a positive FOBT or in surveillance post-polypectomy with elective colonoscopy scheduled between 9:00 am and 1:00 pm Exclusion Criteria: presence of severe cardiac, renal or hepatic impairment; known allergy or hypersensitivity to any constituent of preparation	N=336 Age (yr): 61 Gender (Male %): 71 Race (%): NR BMI: NR Co-existing conditions (%) Prior abdominal surgery: 21 Constipation: 10 Diabetes: 4 Indications for colonoscopy (%) Positive FOBT: 70 Polypectomy follow-up: 30	NPO status group 1: 3L PEG starting at 3 pm day before and 1L PEG over 1 hr starting 3 hrs before procedure (n=168) NPO status group 2: 4L PEG over 4 hrs starting at 3 pm day before colonoscopy (n=168) All patients: low fiber diet for 3 days before procedure Sedation: conscious sedation Study withdrawals: None	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: investigator Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Marmo 2010[42] **Location: Italy** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: "appropriate indication" to colonoscopy Exclusion Criteria: pregnant or lactating women; age <18 years; significant gastroparesis or gastric outlet obstruction or ileus; known or suspected bowel obstruction or perforation; phenylketonuria or glucose-6-phosphate dehydrogenase deficiency; severe chronic renal failure (creatinine clearance <30 mL/minute); severe congestive heart failure (New York Heart Association class III or IV); dehydration; severe acute inflammatory disease; compromised swallowing reflex or mental status; uncontrolled hypertension (SBP ≥170 mm Hg, DBP ≥100 mm Hg); toxic colitis; or megacolon	N=randomized 895 (ITT includes 868) Age (yr): 58 Gender (Male %): 58 Race (%): NR BMI: NR Co-existing conditions (%): Diabetes: 5 Indications for colonoscopy (%): Symptoms: 41 Screening: 13 Surveillance: 16 Polypectomy/resection: 8	NPO status group 1: High volume (4L PEG-ES) or low volume (2L PEG-ES + ascorbic acid); half taken afternoon before, half early morning on day of colonoscopy (n=435) NPO status group 2: Same as above with doses taken 2 hours apart starting around 6:30 pm evening before colonoscopy (n=433) All patients: low fiber diet for 3 days before procedure; light breakfast and lunch plus semiliquid dinner day before taking bowel prep; NPO after midnight before procedure Sedation: NR Study withdrawals (%): Type of prep unknown:18 (2) Incorrect prep 9 (1)	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: single-blind Incomplete outcome data: yes (3%) Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Mathus-Vliegen 2013[43] **Location: Netherlands** **Study design: RCT** **Funding source: NR**	Inclusion Criteria: consecutive ambulant patients referred for colonoscopy; age ≥ 18; physically able to take bowel preparation at home Exclusion Criteria: pregnant or lactating, inpatient, heart failure, severe dehydration, GI ulcers, hypersensitivity to PEG< ileus, (partial) colectomy, colostomy, phenylketonuria, glucose-6-phosphate deficiency, enrolled in population-screening program	N=200 randomized (12 did not receive allocated intervention); patients were randomized to PEG or PEG+ascorbate solution and then completed split-dose or single-dose prep based colonoscopy time Age (yr): 60 Gender (Male %): 48 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): Polyp surveillance: 37 GI bleeding: 21 Changed stool pattern: 21 Familiar screening/surveillance: 12 Anemia: 5 IBD: 4	NPO status group 1 (afternoon colonoscopies): 2L PEG or PEG+ascorbate solution starting at 6 pm day before and 2L morning of procedure (exact time not reported) (n=89) NPO status group 2 (morning colonoscopies): 4L PEG or PEG+ascorbate solution starting at 6 pm evening before (n=99) All patients: 2-day low-fiber diet recommended Sedation: NR Study withdrawals (%): Did not receive allocated intervention: 6% For efficacy outcome: a. Failed examination: 6% of those receiving intervention b. Missing data: 9% of those receiving intervention	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: endoscopists were blinded Incomplete outcome data: yes (efficacy data missing for 20%, safety data missing for 6%) Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Matro 2010[44] **Location: USA** **Study design: RCT** **Funding source: Industry**	Inclusion Criteria: age ≥ 18; scheduled for elective, outpatient afternoon (12 pm or later) colonoscopy Exclusion Criteria: pregnancy, breast feeding, known or suspected gastroparesis, chronic nausea or vomiting, bowel obstruction, hypomotility syndrome, severe constipation, >50% colon resection, known glucose-6-phosphate dehydrogenase deficiency, PEG allergy, significant psychiatric illness	N=125 randomized (9 withdrew prior to taking prep; 1 additional patient in AM group did not undergo colonoscopy) Age (yr): 52 Gender (Male %): 46 Race (%): NR BMI: NR Co-existing conditions (%): Diabetes: 8 Thyroid disease: 7 Hypertension: 30 GERD: 9 IBD: 4 Pulmonary disease: 4 Cardiovascular disease: 24 Indications for colonoscopy (%): Screening: 51 Surveillance: 17 Symptoms: 32	NPO status group 1 (AM prep): 1L PEG 7 hours before procedure and 1L 4 hours before procedure (n=65) NPO status group 2 (PM/AM prep): 1L PEG + 250 ml clear liquid at 6 pm and 1L 4 hours before procedure (n=60) All patients: low-residue breakfast before 10 am day before then clear liquids until 2.5 hours before colonoscopy (medications with sips of water allowed within 2.5 hours of procedure) Sedation: monitored anesthesia with propofol-based sedation Study withdrawals (%): 7% did not take prep	*For RCTs* Sequence generation: adequate Allocation concealment: adequate Blinding: endoscopists were blinded Incomplete outcome data: 7% Selective outcome reporting: no **Risk of bias**: Low
Paoluzi 1993[45] **Location: Italy** **Study design: RCT** **Funding source: NR**	Inclusion Criteria: NR Exclusion Criteria: presence of stenosis, suspected perforation of the gut, colonic resection, pregnancy	N=160 randomized; data for 132 Age (yr): 51 Gender (Male %): 60 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): IBD: 46 Cancer: 4 Polyps: 17 Haematochezia: 19	NPO status group 1: 2L PEG at 6 to 8 pm evening before; 1L PEG at 6 to 7 am; fast or clear liquids after starting prep (n=80) NPO status group 2: 35g castor oil at 4 pm day before; cleansing enema evening before and morning of procedure; low residual semi-liquid diet for 2 days before exam with fast from eve of exam (n=80) Colonoscopies performed 8-9:30 am Sedation: NR Study withdrawals: 24/160 (15%) did not present on day of examination; additional 4 patients in PEG group did not complete solution because of side effects and did not complete adequacy of prep outcomes	*For RCTs* Sequence generation: unclear Allocation concealment: unclear Blinding: endoscopists were blinded Incomplete outcome data: 17.5% Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Park 2007[46] **Location: Korea** **Study design: RCT** **Funding source: None reported**	Inclusion Criteria: consecutive individuals undergoing medical check−up colonoscopy at university−affiliated medical center Exclusion Criteria: age < 18 years; serious medical conditions such as severe cardiac, renal, or metabolic disease; active alcoholism, drug addiction, or major psychiatric illness; known allergy to PEG; previous surgical bowel resection or gynecologic surgery; refusal of consent to participate in study	N=303 Age (yr): 49 Gender (Male %): 81 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: 3L PEG between 8 and 11 pm evening before procedure; 1L PEG early morning (at least 2 hours prior to procedure) (n=152) NPO status group 2: 4L PEG between 8 and 11 pm evening before procedure (n=151) Colonoscopies performed 8-9:30 am Sedation: NR Study withdrawals: None	*For RCTs* Sequence generation: not described Allocation concealment: not described Blinding: Colonoscopists blinded, groups evenly allocated Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Low
Park 2010[47] **Location: Korea** **Study design: RCT** **Funding source: No funding**	Inclusion Criteria: men and women >18 years of age scheduled for colonoscopy in the morning Exclusion Criteria: serious medical conditions such as severe cardiac, renal, hepatic, or metabolic diseases; active alcoholism, drug addiction, or major psychiatric illness; known allergy to PEG; history of prior colon or rectal surgery	N=285randomized (analyzed 232) Age (yr): 52 Gender (Male %): 63 Race (%): NR BMI: 24 Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: 2L PEG 8 pm evening before procedure, 2L PEG 5 am day of procedure (n=80) NPO status group 2: 250 ml magnesium citrate 8 pm evening before procedure, 2L PEG 5 am day of procedure (n=73) NPO status group 3: 4L PEG 10 pm evening before procedure (n=79) All patients: thick liquid diet at dinner evening before procedure; NPO after 6 pm Sedation: NR Study withdrawals: 19% (postponed or canceled procedure or changed to pm)	*For RCTs* Sequence generation: adequate Allocation concealment: inadequate (an investigator managed the printed allocation schedule) Blinding: investigator Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: High

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Parra-Blanco 2006[48] **Location: Spain** **Study design: RCT** **Funding source: Government, Education**	Inclusion Criteria: consecutive outpatients, scheduled for elective colonoscopy (morning or afternoon), age 18-85 Exclusion Criteria: Pregnancy, partial or total colectomy, IBD (known or suspected)	N=197 randomized, 177 included in analysis Age (yr): 54 Gender (Male %): 48 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%) Chronic constipation: 24 Polyp surveillance: 13	NPO status group 1: 3L PEG-ELS starting at 6 am day of colonoscopy (n=43) (NOTE: 39.5% had morning colonoscopy) NPO status group 2: 45 mL NaP 8 pm evening before and 45 mL 6 am day of colonoscopy (n=45)[a] (NOTE: 53.3% had morning colonoscopy) NPO status group 3: 3L PEG-ELS starting at 8 pm evening before colonoscopy (n=45) (NOTE: 68.9% had morning colonoscopy) NPO status group 4: 45mL NaP at 3 pm and 8 pm day before colonoscopy (n=44)[a] (NOTE: 77.3% had morning colonoscopy) Colonoscopies: 9 am to 3 pm Patients NaP groups encouraged to drink fluids liberally (at least 2L) during cleansing period All patients: received Bysacodyl (15 mg) day before colonoscopy and low-fiber diet recommended; allowed clear fluids after completing bowel preparation Sedation: NR Study withdrawals: 10 (20/197 consecutive outpatients initially included in the study)	*For RCTs* Sequence generation: adequate Allocation concealment: unclear Blinding: endoscopists and attending nurse blinded to prep regimen Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Rex 2013[49] **(SEE CLEAR I study)** **Location: USA** **Study design: RCT** **Funding source: Industry**	Inclusion Criteria: men and women, 18 to 80 years, at least 3 spontaneous bowel movements/week for 1 month before colonoscopy Exclusion Criteria: acute abdominal conditions; active IBD; colon disease (including toxic megacolon, toxic colitis, idiopathic pseudo-obstruction, hypomotility syndrome); ascites; GI disorders (such as active ulcers, gastric outlet obstruction, retention, gastroparesis, and ileus); uncontrolled angina and/or MI within past 3 months; CHF or uncontrolled hypertension; known renal insufficiency with abnormal creatinine or serum potassium levels at screening; history of colorectal surgery or upper GI surgery Use of lithium, laxatives, constipating drugs, antidiarrheal agents, or oral iron preparations not allowed during the study	N=608 randomized; demographic data for 603 Age (yr): 55 (median) Gender (Male %): 41 Race (%): white 88; black/African American 11 BMI: 29.5 Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: P/MC; first dose in 5 oz water between 5 and 9 pm evening before followed by 40 oz clear liquid over next several hours; second dose in 5 oz water 5 to 9 hours before procedure followed by 24 oz clear liquid (n=305) NPO status group 2: 2 5-mg bisacodyl tablets taken in afternoon before colonoscopy; after first bowel movement or 6 hours 2L PEG-3550 (n=298) All patients limited to clear liquid diet 24 hours before procedure Sedation: NR Study withdrawals: 0.8% not treated and excluded; 0.7% did not complete study	*For RCTs* Sequence generation: unclear Allocation concealment: adequate Blinding: gastroenterologists and assistants were blinded Incomplete outcome data: yes (1%) Selective outcome reporting: no **Risk of bias**: Low

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Seo 2012[50] **Location: Korea** **Study design: Prospective observational** **Funding source: NR**	Inclusion Criteria: 18 to 85 years, outpatients Exclusion Criteria: pregnancy, breastfeeding, history of surgical large-bowel resection, severe renal failure, drug addiction or major psychiatric illness, allergy to PEG, refusal to participate in study	N=366 Age (yr): 55 Gender (Male %): 48 Race (%): NR BMI: 23 Co-existing conditions (%) Hypertension: 14 Diabetes: 7 Stroke: 1 Liver cirrhosis: 2 Constipation: 20 Indications for colonoscopy (%) Screening: 40 Surveillance: 17 Symptoms: 43	NPO status group 1: 2L PEG at 6 pm on day before, 2L PEG at least 2 hours before procedure (n=366) NPO status group 2: N/A All patients instructed to start low fiber diet 3 days before colonoscopy; regular diet for breakfast and lunch and soft diet for dinner the day before colonoscopy; allowed only clear liquids until 2 hours before colonoscopy Sedation: NR Study withdrawals: None	1) Study design: prospective 2) Population: consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears all were included b. Were the characteristics the different NPO groups similar? unclear **Risk of bias**: Moderate
Vanner 2011[51] **Location: Canada** **Study design: Prospective observational** **Funding source: Internal funding only**	Inclusion Criteria: colonoscopy for routine clinical indication Exclusion Criteria: congestive heart failure, renal insufficiency, ileus or bowel obstruction, previous colorectal surgery, ascites, active IBD, recent (<6 mo) MI or unstable angina	N=100 Age (yr): 60 Gender (Male %): 42 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): NR	NPO status group 1: PSLX, 1st dose at 7 pm, 2nd dose at 6 am before colonoscopy scheduled after 11 am (interval >5 hrs) (n=32) NPO status group 2: PSLX 1st dose at 5 pm, 2nd dose at 10 pm evening before colonoscopy scheduled before 11 am (interval >9 hrs) (n=68) All patients: 10 mg bisacodyl tablet at 6 pm days 3 and 2 before colonoscopy; low fiber diet 5 days before colonoscopy; clear fluid diet day before colonoscopy; encouraged to drink 4L of carbohydrate electrolye sports drink on day of clear fluids and until leaving home for procedure Sedation: NR Study withdrawals: unclear; 5 incomplete colonoscopies (4 abdominal discomfort, 1 poor preparation and sigmoid stricture)	1) Study design: prospective 2) Population: unclear if consecutive 3) Analysis of findings a. Was the method for handling missing data reported and appropriate? appears all were included b. Were the characteristics the different NPO groups similar? unclear **Risk of bias**: Moderate

Study/Region/ Funding Source	Inclusion/Exclusion Criteria	Patient Characteristics (expressed in means unless otherwise noted)	NPO status groups	Risk of Bias
Varughese 2010[52] **Location: USA** **Study design: RCT** **Funding source: No funding**	Inclusion Criteria: age > 19 years, elective colonoscopy scheduled from 1 pm onward Exclusion Criteria: history of colon resection, suspicion of bowel obstruction	N=136 randomized Age (yr): 52 Gender (Male %): 52 Race (%): white 45; Hispanic 49; other 6 BMI: 28.5 Co-existing conditions (%): NR Indications for colonoscopy (%): CRC screening: 54 Diagnostic/therapeutic: 46 NOTE: study terminated early - interim analysis showed larger effect size than anticipated	NPO status group 1: 1 gallon PEG between 6 am and 10 am day of colonoscopy (interval >3 hrs) (n=68) NPO status group 2: 1 gallon PEG between 5 pm and 9 pm day before colonoscopy (interval >16 hrs) (n=68) Group 1 was allowed breakfast on day before colonoscopy followed by clear liquids for lunch and dinner; Group 2 advised to take only clear liquid on day before colonoscopy *Both groups allowed clear liquids the morning of the procedure with NPO after 10 am* Sedation: Meperidine+midazolam (32%); monitored anesthesia care (68%) Study withdrawals: None	*For RCTs* Sequence generation: adequate Allocation concealment: unclear Blinding: yes, endoscopists were blinded Incomplete outcome data: no Selective outcome reporting: no **Risk of bias**: Moderate
Voiosu 2013[53] **Location: Romania** **Study design: RCT** **Funding source: NR**	Inclusion Criteria: clear indication for colonoscopy, age >18 years Exclusion Criteria: refusal to sign consent or preference for a specific bowel prep product, stenosing colorectal cancer or intestinal obstruction, previous colonic resection, severe concomitant disease (heart, renal or liver failure; pulmonary disease; electrolyte imbalance; neuropsychiatric conditions)	N=181 randomized (patient characteristics for n=165) Age (yr): 60 Gender (Male %): 54 Race (%): NR BMI: NR Co-existing conditions (%): NR Indications for colonoscopy (%): Rectal bleeding: 24 CRC screening: 18 Diarrhea: 14 Anemia: 10 Constipation: 7 Abdominal pain: 7 Referral for polypectomy: 6 Other: 16	NPO status group 1: 2L PEG at 5 to 7 pm day before and 2L PEG at 5 to 7 am day of colonoscopy (n=94 randomized, 95 analyzed) NPO status group 2: P/MC 1st dose at 1 pm, 2nd dose at 7 pm day before colonoscopy (plus 250 ml fluid/hour between1 and 11 pm) (n=87 randomized, 80 analyzed) Colonoscopies: 8 am to 2 pm Sedation: propofol at 1 center, midazolam at 1 center Study withdrawals: 9.6% of group 1, 8.0% of group 2	*For RCTs* Sequence generation: unclear Allocation concealment: adequate Blinding: endoscopists were blinded Incomplete outcome data: yes Selective outcome reporting: no **Risk of bias**: Moderate

AE = adverse event; CRC = colorectal cancer; DBP = diastolic blood pressure; FOBT = fecal occult blood test; hrs = hours; IBD = inflammatory bowel disease; L = liter(s); MI = myocardial infarction; CHF = congestive heart failure; NaP = sodium phosphate; PEG = polyethylene glycol; PEG-E or PEG-ELS = polyethylene glycol electrolyte solution; P/MC or PSLX = sodium picosulfate and magnesium citrate; SBP = systolic blood pressure

[a] Patients with co-morbid conditions (chronic renal failure, symptomatic ischemic heart disease, congestive heart failure, hypertension with poor pharmacological control) allocated to NaP groups were given PEG-ELS instead (Group 2 followed Group 1 protocol, Group 4 followed Group 3 protocol) and evaluated on an intention-to-treat analysis

Table 2. Primary Outcomes

Study NPO Status (Intervention/ Control)	Aspiration, n/N (%)		Rescheduled colonoscopies, n/N (%)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Gurudu 2010[29] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	No episodes of bronchoaspiration were recorded, including in the procedures performed in patients taking same-day bowel preparation		NR	NR
Huffman 2010[31] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	None of the patients in any group had clinical evidence of aspiration during their procedures		NR	NR
Kolts 1993[38] NPO status 1: Hours unclear (last dose 6 am) NPO status 2: > 8 hours NPO status 3: > 8 hours	NR		1/34 (3%)	Group 2: 3/38 (8%) Group 3: 10/41 (24%) (P = .011)
Manno 2012[41] NPO status 1: 2 hours NPO status 2: > 8 hours	No major complications related to sedation		NR	NR
Mathus-Vliegen 2013[43] NPO status 1: Hours unclear (Split-dose, PM exam) NPO status 2: > 8 hours	No events during 30-day period (from charts of patients and a complication database)		NR	NR
Matro 2010[44] NPO status 1: 4 hours (am prep only) NPO status 2: 4 hours (pm/am prep)	1.6 (1/62) Aspirated during procedure	0/54	NR	NR
Varughese 2010[52] NPO status 1: ≥ 3 hours NPO status 2: > 8 hours	No sedation complications		NN	NR

NPO = nil per os; NR = not reported

Bowel preparation completed the day before colonoscopy designated as NPO status > 8 hours

Table 3. Procedural Outcomes

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Abdul-Baki 2008[13] NPO status 1: ≥ 1.5 hours NPO status 2: > 8 hours	Excellent 45 (90/199) Excellent/Good 89 (177/199) (Sharma et al.)	Excellent 9 (16/183) Excellent/Good 43 (78/183); P < .001	NR	NR	NR	NR	NR	NR	NR	NR
Aoun 2005[14] NPO status 1: ≥ 1.5 hours NPO status 2: > 8 hours	Excellent 44 (30/68) Excellent/Good 76 (52/68) (Sharma et al.)	Excellent 6 (4/73) P < .001 Excellent/Good 56 (41/73) P = .01	NR	NR	NR	NR	NR	NR	NR	NR
Arya 2013[15] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	Success (Grade A+B) 91 (59/65) Grade A 57 (37/65) (Author scale)	Success (Grade A+B) 97 (66/68) P = NS Grade A 72 (49/68)	NR	NR	NR	NR	NR	NR	NR	NR
Athreya 2011[16] NPO status 1: 5-9 hours NPO status 2: > 8 hours	Satisfactory Rectum 91 (136/150) Sigmoid 87 (130/150) Descending 68 (102/150) Transverse 57 (86/150) Ascending 47 (70/150) (Author scale)	Satisfactory Rectum 92 (161/175) P = .52 Sigmoid 92 (161/175) P = .15 Descending 82 (143/175) P = .005 Transverse 73 (128/175) P = .002 Ascending 62 (108/175) P = .007	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	**NPO group 2**	**NPO group 1**	**NPO group 2**	**NPO group 1**	**NPO group 2**	**NPO group 1**	**NPO group 2**	**NPO group 1**	**NPO group 2**
Barclay 2004[17] NPO status 1: < 3 hours NPO status 2: ≥ 5 hours	Excellent/Good 89 (116/130) (Author scale)	Excellent/Good *morning* 60 (n NR) P < .0001 vs NPO status 1 Excellent/Good *afternoon (split)* 76 (n NR) P = .03 vs.NPO status 1	NR	NR	NR	NR	NR	NR	NR	NR
Bryant 2013[18] NPO status 1: 5-7.5 hours NPO status 2: > 8 hours	Satisfactory/ good preparation 89 (684/768) (Author scale)	Satisfactory/ good preparation 86 (873/1017) P = .04	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Chiu 2011[19] NPO status 1: 5-9 hours NPO status 2: > 8 hours	Excellent 13 (197/1552) Good 60 (930/1552) (Aronchick et al.)	Excellent 3 (38/1527) P < .001 Good 32 (481/1527) P < .001	NR	NR	NR	NR	Overall 17 (270/1552) proximal 11 (175/1552) Advanced overall 4 (68/1552) proximal 2 (34/1552) Nonpoly- poid overall 6 (98/1552) Proximal 5 (71/1552) Advanced 2 (25/1552)	Overall 15 (233/1527) P = .11 proximal 9 (138/1527) P = .04 Advanced overall 3 (46/1527) P = .04 proximal 2 (25/1527) Nonpoly- poid overall 4 (67/1527) P = .02 Proximal 3 (40/1527) P = .004 Advanced 1 (12/1527	NR	NR
Chiu 2006[20] NPO status 1: 6-8 hours NPO status 2: > 8 hours Note: lesions detected in first and second colonoscopies	Adequate 93 (56/60) (Sharma et al.)	Adequate 72 (42/58) P < .0001	Total lesions 2.78 (0.29) Proximal 1.52 (0.22) Advanced 0.87 (0.13)	Total lesions 1.90 (0.27) P = .028 Proximal 0.97 (0.24) P = .094 Advanced 0.55 (0.10) P = .056	100 (60/60)	100 (58/58)	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Church 1998[21] NPO status 1: 5-8 hours NPO status 2: > 8 hours	Excellent Cecum 62 (97/157) Ascending 66 (103/157) Transverse 65 (102/157) Left colon 59 (93/157) Excellent/Good Cecum 90 (142/157) Ascending 93 (148/157) Transverse 97 (152/157) Left colon 93 (148/157) (Author scale)	Excellent Cecum 9 (14/160) Ascending 9 (14/160) Transverse 9 (15/160) Left colon 11 (18/160) Excellent/Good Cecum 73 (117/160) Ascending 76 (121/160) Transverse 82 (131/160) Left colon 83 (132/160) P < .01 for all groups	NR	NR	97 (152/157)	99 (159/160) P = NS	NR	NR	NR	NR
De Salvo 2006[22] NPO status 1: 5-8 hours (NaP) NPO status 2a: > 8 hours ($MgSO_4$) NPO status 2b: > 8 hours (PEG)	Good 67 (53/79) (Author scale)	Good $MgSO_4$ 39 (35/90) P < .001 PEG 50 (48/96) P = .02	NR	NR	98 (77/79)	$MgSO_4$ 97 (86/90) PEG 96 (92/96) P = NS	NR	NR	NR	NR
Di Palma 2011[23] NPO status 1: 3-9 hours; 2 arms, sulfate and PEG-EA NPO status 2: > 8 hours; 2 arms, sulfate and PEG-EA)	Success Sulfate 97 (175/181) PEG-EA 97 (175/183) Excellent Sulfate 63 (114/181) PEG-EA 53 (96/53) (Author scale)	Success Sulfate 82 (159/194) PEG-EA 80 (155/193) P < .001 for both arms Excellent Sulfate 45 (86/194) PEG-EA 37 (72/193)	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
El Sayed 2003[24] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	Excellent 39 (35/91) Satisfactory 83 (75/91) (Church)	Excellent 19 (18/96) P = .005 Satisfactory 69 (66/96) P < .05	NR	NR	NR	NR	NR	NR	NR	NR
Eun 2011[25] NPO status 1: ≤ 4 hours NPO status 2: > 4 hours (Analysis by PC time with hourly intervals from ≤2 hours to >7 hours)	Ottawa 3.49 (2.11) (Rostom et al.)	Ottawa 4.10 (2.45) P = .02	NR	NR	NR	NR	NR	NR	NR	NR
Flemming 2012[26] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	Ottawa 4.05 (2.37) (Rostom et al.) Excellent/good 94 (107/114) (Aronchick et al.)	Ottawa 5.51 (2.74) P < .001 Excellent/good 67 (74/110) P < .001	NR	NR	96 (114/119)	95 (111/117) P = NS	NR	NR	NR	NR
Frommer 1997[27] NPO status 1: 3-9 hours NPO status 2: > 8 hours, 2 arms	Cleanliness/ Visibility Score 4.11 (0.67) (Author scale)	Arm 1: 3.34 (0.97) Arm 2: 3.22 (0.85) Both P < .0005 vs NPO 1	NR	NR	NR	NR	NR	NR	NR	NR
Gupta 2007[28] NPO status 1: ≥ 5 hours (morning) NPO status 2: > 8 hours (evening before)	Ottawa 4.7 (2.8) (Rostom et al.) Excellent/good 36 (37/102) (Aronchick et al.)	Ottawa 4.7 (2.9) P = .87 Excellent/good 35 (35/99)	NR	NR	NR	NR	NR	NR	NR	NR
Gurudu 2010[29] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	Good or excellent cleansing for same day preps (NPO status 1) compared to previous day (NPO status 2): OR 3.42 (1.81, 6.47); P < .001 (Aronchick et al., modified)		NR	NR	NR	NR	OR 1.17 [95%CI 0.94, 1.45] for same day vs prior day prep dosing		NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Gurudu 2012[30] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	Excellent/good 54 (871/1615) (Aronchick et al., modified)	Excellent/good 35 (1241/3560) P < .001	NR	NR	96 (1542/ 1615)	94 (3346/ 3560) P = .008	32 (514/ 1615)	27 (951/ 3560) P < .001	NR	NR
Huffman 2010[31] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Johanson 2007[32] NPO status 1: 2.5-4.5 hours NPO status 2: > 8 hours	Excellent 64 (132/205) Excellent/good 90 (184/205) Overall score 1.5 (0.74) (Aronchick et al.)	Excellent 39 (80/206) Excellent/good 82 (169/206) Overall score 1.8 (0.76) P < .0001	NR	NR	NR	NR	NR	NR	NR	NR
Kao 2011[33] NPO status 1: 4-8 hours NPO status 2: > 8 hours	Total Score: PEG 4L 2.59 PEG+B 3.08; NaP 3.51 PSMC+M 2.82 (Rostom et al.)	Total score- PEG 4.14 PEG+B 3.51 NaP 5.37 PSMC+M 3.84	NR	NR	NR	NR	NR	NR	NR	NR
Kastenberg 2001, 2007[34,35] NPO status 1: 2-4 hours NPO status 2: > 8 hours	Mean score 1.75 (0.75) Excellent/Good 84 (354/420) (Aronchick et al.)	Mean score 1.81 (0.82) P = .1175 Excellent/Good 77 (326/425) P = .006	NR	NR	98 (420/427)	98 (425/432)	NR	NR	NR	NR
Khan 2010[36] NPO status 1: Hours unclear (Split-dose) NPO status 2: > 8 hours	No bowel content seen or clear lavage and >50% visualization 89% (Lai et al.)	70% P < .0001	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Koh 2011[37] NPO status 1: 1.5-3.5 hours NPO status 2: 6-8 hours	Ottawa Scale (mean) 5.61 (2.54) Ottawa Fluid 0.72 (0.58)	Ottawa Scale (mean) 5.08 (2.31) P = .58 Ottawa Fluid 0.58 (0.67) P = .55	NR	NR	NR	NR	NR	NR	NR	NR
Kolts 1993[38] NPO status 1: Hours unclear (last dose 6 am) NPO status 2: > 8 hours NPO status 3: > 8 hours	Excellent or Good: 80% (Author scale)	Group 2 Excellent or Good: 64% P < .05 Group 3 Excellent or Good: 32% P < .05	NR	NR	NR	NR	NR	NR	NR	NR
Kössi 2007[39] NPO status 1: ≤ 6 hours NPO status 2: 6-12 hours NPO status 3: ≥ 12 hours	Group 1 4.00 (0.12) (Frommer)	Group 2 3.56 (0.12) P= .023 vs Gr 1 Group 3 2.64 (0.14) P = .0001 vs Gr 1 and Gr 2	NR	NR	95.8% completion; no failure was related to bowel cleansing		NR	NR	NR	NR
Longcroft-Wheaton 2012[40] NPO status 1: > 3 hours NPO status 2: > 5 hours	Excellent 46.9 (38.7-55.5) Overall better cleansing in NPO group 1 (P = .0046) (Chilton et al.)	Excellent 49.5 (39.6-59.4)	NR	NR	NR	NR	71 (94/132)	62(59/95) P = .2	NR	NR
Manno 2012[41] NPO status 1: 2 hours NPO status 2: > 8 hours	Excellent 68 (115/168) Excellent/good (Adequate) 95 (160/168) (Di Palma et al.)	Excellent 38 (63/168) P < .001 Excellent/good (Adequate) 98 (156/168)	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Marmo 2010[42] NPO status 1: ≤ 2 hours NPO status 2: > 8 hours	Excellent/ Good 75 (327/435) (Rostom et al.)	Excellent/ Good 43 (186/433) P < .001	NR	NR	Overall completion: 95% Aborted procedures 93 (402/432)	Aborted procedures 79 (339/430) P < .0001	NR	NR	NR	NR
Mathus-Vliegen 2013[43] NPO status 1: Hours unclear (Split-dose, PM exam) NPO status 2: > 8 hours	Adequate 98% (Aronchick ≤2) 93% (Ottawa ≤7)	Adequate 99%; P = NS (Aronchick ≤2) 87%; P = NS (Ottawa ≤7)	NR	NR	NR	NR	NR	NR	NR	NR
Matro 2010[44] NPO status 1: 4 hours (am prep only) NPO status 2: 4 hours (pm/am prep)	Excellent/good 92% Fair/poor 8% (Author scale)	Excellent/good 94% Fair/poor 6% P = .01 for non-inferiority	"Findings" per patient 0.70 (1.3)	"Findings" per patient 0.46 (1.0) P = .047	98 (60/61)	100 (54/54)	Low risk adenoma 23 (14/60) High risk adenoma 12 (7/60) Cancer 2 (1/60)	Low risk 15 (8/54) High risk 9 (5/54) Cancer 2 (1/54) P = .038 overall	NR	NR
Paoluzi 1993[45] NPO status 1: 1-2.5 hours NPO status 2: > 8 hours	Excellent/ adequate 84 (51/61) (Author scale)	Excellent/ adequate 63 (45/71) P < .05	NR	NR	NR	NR	NR	NR	NR	NR
Park 2007[46] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	Ottawa Scale Good 5.9 (2.6) 79 (119/151) (Rostom et al.)	Ottawa Scale Good 8.5 (2.5) 76 (116/152) P = .60	NR	NR	NR	NR	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Park 2010[47] NPO status 1: 2-5 hours (PEG) NPO status 2: 2-5 hours (Mg citrate NPO status 3: > 8 hours	Excellent PEG 25 (20/80) Mg citrate 34 (25/73) Excellent/good PEG 76 (61/80) Mg citrate 75 (55/73) (Aronchick et al.)	Excellent 18 (14/79) Excellent/good 51 (40/79 P < .01 versus both groups	NR	NR	NR	NR	NR	NR	NR	NR
Parra-Blanco 2006[48] NPO status 1: 1.5-7 hours (PEG) NPO status 2: 1.5-7 hours (NaP) NPO status 3: > 8 hours (PEG) NPO status 4: > 8 hours (NaP)	Excellent/Good PEG 79 (33/43) NaP 80 (36/45) (Author scale)	Excellent/Good PEG 27 (12/45) P < .001 NaP 7 (3/44) P < .001	Groups 1 & 2 Any polyp 52 (46/88) Flat lesions 22 (19/88) Protruding polyps 40 (35/88)	Groups 3 & 4 Any polyp 45 (40/89) Flat lesions 9 (8/89) P = .02 Protruding polyps 42 (37/89)	NR	NR	Histological confirmation for 83 (152/183) polyps 70 (107/152) were adenomas		NR	NR
Rex 2013[49] NPO status 1: 5-9 hours NPO status 2: > 8 hours	Successful 84 (256/304) (Aronchick et al., modified) Ottawa scale 87 (264/304) (Rostom et al.)	Successful 74 (221/297) P = .003 Ottawa scale 75 (224/297) P < .01	NR	NR	Overall completion rate was 98.7%		NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Quality of bowel preparation[a] % (n/N) or Mean (±SD)		Diagnostic yield % (n/N) or Mean (±SD)		Completion rate % (n/N)		Adenoma detection rate % (n/N)		False negative colonoscopies % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Seo 2012[50] NPO status 1: ≤ 3 hours / NPO status 2: > 3 hours Analysis by PC time with hourly intervals from ≤3 hours to >8 hours	Ottawa Scale 5.08 (2.17) (0 = perfect, 14 = solid stool and fluid) (Rostom et al.)	Ottawa Scale NPO status 3-4 hrs: 4.25 (1.85) 4-5 hrs: 4.70 (2.12) 5-6 hrs: 5.11 (2.34) 6-7 hrs: 4.86 (1.85) 7-8 hrs 5.20* (1.79) >8 hrs 5.92 (2.01) P < .05 vs 3-4 hour mean	NR	NR	NR	NR	NR	NR	NR	NR
Vanner 2011[51] NPO status 1: > 5 hours NPO status 2: > 8 hours	Ottawa Scale 5.03 (2.8) (Rostom et al.) Aronchick no significant differences between groups (Aronchick et al.)	Ottawa Scale 5.22 (3.1) P = .77	NR	NR	Overall completion rate 95% (95/100)		NR	NR	NR	NR
Varughese 2010[52] NPO status 1: ≥ 3 hours NPO status 2: > 8 hours	Ottawa Scale 4.7 (2.4) (Rostom et al.)	Ottawa Scale 7.1 (2.7) P < .01	NR	NR	NR	NR	24 (16/68)	24(15/68) P = NS	NR	NR
Voiosu 2013[53] NPO status 1: 1-7 hours NPO status 2: > 8 hours	Excellent (4) 30 (25/85) (Rex et al.)	Excellent (4) 21 (17/80) P = .23	NR	NR	NR	NR	NR	NR	NR	NR

NaP = sodium phosphate; NPO = nil per os; NR = not reported; NS = not statistically significant; PC = preparation-to-colonoscopy; PEG = polyethylene glycol; P/MC = sodium picosulfate and magnesium citrate; SD = standard deviation

Bowel preparation completed the day before colonoscopy designated as NPO status > 8 hours

[a] Rating system references ("Author scale" indicates scale was developed by study authors and is described in the study reference)
Sharma VK et al. *Gastrointest Endosc*. 1998;47:167-71.
Arya V et al. *Dig Dis Sci*. 2013;58:2156-66.
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Frommer D. *Dis Colon Rectum*. 1997;40:100-4.
Chilton A et al. Quality assurance guidelines for colonoscopy. Sheffield: NHS Cancer Screening Programmes; 2010.
Di Palma JA et al. *Gastrointest Endosc*. 1990;36:285-9.
Rex DK et al. *Am J Gastroenterol*. 2006;101:873-85.

Table 4. Time and Patient Outcomes

Study NPO Status (Intervention/ Control)	Total procedure time, mean (SD)		Cecal intubation time, mean (SD)		Withdrawal time, mean (SD) [a]		Patient adherence to preparation or colonoscopy, % (n/N)		Patient satisfaction, preparation or colonoscopy, % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Abdul-Baki 2008[13] NPO status 1: ≥ 1.5 hours NPO status 2: > 8 hours)	NR	NR	NR	NR	NR	NR	Adherence 91%	Adherence 69% P < .001	Work/school missed 10 (20/199) Sleep disturbed 15 (30/199)	Work/school missed 13 (23/183) P = NS Sleep disturbed 21 (38/183) P = NS
Aoun 2005[14] NPO status 1: ≥ 1.5 hours NPO status 2: > 8 hours)	NR	NR	NR	NR	NR	NR	Drank as instructed 90 (61/68)	Drank as instructed 78 (57/73) P = .06	Work/school missed 12 (8/68) Sleep disturbed 20 (29/68) Willingness to take again 84 (57/68)	Work/school missed 21 (15/73) P = NS Sleep disturbed 24 (33/73) P = NS Willingness to take again 75 (55/73) P = .21
Athreya 2011[16] NPO status 1: 5-9 hours NPO status 2: > 8 hours	*n=150* 11.40 min (SD NR)	*n=175* 11.16 min (SD NR) P=0.40	*n=150* 6.58 min (SD NR)	*n=175* 7.05 min (SD NR) P=0.78	*n=150* 4.42 min (SD NR)	*n=175* 4.11 min (SD NR) P=0.10	NR	NR	NR	NR
Barclay 2004[17] NPO status 1: < 3 hours NPO status 2: ≥ 5 hours	NR	NR	NR	NR	NR	NR	Completed 95 (117/123)[a]	Completed 88 (114/130)[a] P = .04	Prefer alternative in future 34 (44/130)[a]	Prefer alternative in future 15 (19/123)[a] P < .001
Church 1998[21] NPO status 1: 5-8 hours NPO status 2: >8 hours	NR	NR	*n=157* 19.5 min (2.2)	*n=160* 20.0 min (1.6)	*n=157* 11.9 min (0.8)	*n=160* 13.1 min (0.7)	NR	NR	NR	NR

Study NPO Status (Intervention/ Control)	Total procedure time, mean (SD)		Cecal intubation time, mean (SD)		Withdrawal time, mean (SD) [a]		Patient adherence to preparation or colonoscopy, % (n/N)		Patient satisfaction, preparation or colonoscopy, % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Eun 2011[25] NPO status 1: ≤ 4 hours NPO status 2: > 4 hours (Analysis by PC time; hourly intervals from ≤ 2 hours to > 7 hours)	NR	NR	NR	NR	NR	NR	Completed 81 (120/149)	Completed 85 (129/151) P = .51	NR	NR
Gupta, 2007[28] NPO status 1: ≥ 5 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	NR	NR	Work hrs lost 8.0 (2.1) hrs Sleep disturbed 15 (15/102)	Work hrs lost 10.2 (3.9) hrs P < .001 Sleep disturbed 42 (42/99) P < .001
Gurudu 2012[30] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	NR	NR	NR	NR	11.6 (7.7)	15.3 (11.1) (p=<.001)	NR	NR	NR	NR
Kössi 2007[38] NPO status 1: ≤ 6 hours NPO status 2: 6-12 hours NPO status 3: ≥ 12 hours	NR	NR	NR	NR	NR	NR	NR	NR	Difficulty traveling to colonoscopy ≤ 6 hours: 3.8% 6-12 hours: 5.6% ≥ 12 hours: 4.9% P = NS	

Study NPO Status (Intervention/ Control)	Total procedure time, mean (SD)		Cecal intubation time, mean (SD)		Withdrawal time, mean (SD) [a]		Patient adherence to preparation or colonoscopy, % (n/N)		Patient satisfaction, preparation or colonoscopy, % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Longcroft-Wheaton 2012[40] NPO status 1: > 3 hours NPO status 2: > 5 hours	NR	NR	NR	NR	NR	NR	N=47 Completed 98%	N=58 Completed 95% P = NS	Interruption of work 0 (median)[b] Sleep disturbed 11 (5/47) Preferred same prep for future 81% (N=NR)	Interruption of work 4 (median)[b] Sleep disturbed 29 (17/58) P = .03 Preferred same prep for future 40% (N=NR)
Manno 2012[41] NPO status 1: 2 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	Completed ≥ 75% of prep 96 (162/168)	Completed ≥ 75% of prep 95 (159/168) P = .70	Preferred same prep for future 69 (116/168)	Preferred same prep for future 31 (52/168) P < .001
Matro 2010[44] NPO status 1: 4 hours (am prep only) NPO status 2: 4 hours (pm/am prep)	Median 12.8 min	Median 12.4 min P = .147	NR	NR	Median 8.0 min	Median 7.3 min P = .637	Completed > 90% of prep 84 (52/62)	Completed > 90% of prep 72 (39/54) P = .175	No interference with work day before procedure (only if went to work) 85 (23/27) Slept > 80% of usual hours 71 (44/62) Repeat same prep in future 82 (51/62)	No interference with work day before procedure 55 (12/22) P = .019 Slept > 80% of usual hours 76 (41/54) P = .675 Repeat same prep in future 80 (43/54) P = .814

Study NPO Status (Intervention/ Control)	Total procedure time, mean (SD)		Cecal intubation time, mean (SD)		Withdrawal time, mean (SD) [a]		Patient adherence to preparation or colonoscopy, % (n/N)		Patient satisfaction, preparation or colonoscopy, % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Park 2007[46] NPO status 1: 2 hours NPO status 2: > 8 hours	NR	NR	Good compliance[c] 8.0 (5.6) min n=119 Poor Compliance 9.4 (5.8) min n=32	Good compliance[c] 13.0 (7.8) min n=116 P < .01 Poor Compliance 12.7 (5.1) min n=36 P < .05	NR	NR	Good compliance with prep 79 (119/151)	Good compliance with prep 76 (116/152) P > .05	Sleep disturbed 11 (16/151) Overall tolerance of prep 1.01 (1.03)[d]	Sleep disturbed 12 (18/152) P = NS Overall tolerance of prep 1.05 (0.86)[d] P = NS
Park 2010[47] NPO status 1: 2-5 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	Compliance > 80% 91 (73/80)	Compliance > 80% 92 (73/79)	Sleep disturbed 28 (22/80) Willing to repeat prep 48 (38/80)	Sleep disturbed 32 (25/79) Willing to repeat prep 62 (49/79) P = .08
Rex 2013[49] NPO status 1: 5-9 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	Treatment-emergent adverse event leading to discontinua-tion 0 (0/305)	Treatment-emergent adverse event leading to discontinua-tion 0.7 (2/298)	NR	NR
Varughese 2010[52] NPO status 1: ≥ 3 hours NPO status 2: > 8 hours	*n=68* 19.2 (7.2) min	*n=68* 18.7 (7.2) min P = .73	*n=68* 8.5 (5.5) min	*n=68* 7.4 (4.5) min P = .27	*n=68* 10.6 (5.0) min	*n=68* 11.3 (4.8) min P = .49	Quantity consumed 3.7 (0.5) L (of 4L regimen)	Quantity consumed 3.7 (0.6) L (of 4L regimen) P = .61	Sleep loss 16 (11/68)	Sleep loss 31 (21/68) P = .04

NPO = nil per os; NR = not reported; PC = preparation to colonoscopy; SD = standard deviation
Bowel preparation completed the day before colonoscopy designated as NPO status > 8 hours
[a] Group with shorter NPO status was required to take 3 doses while group with longer NPO status took 2 doses
[b] 5-point Likert scale with 0 = completely unimpaired, 4 = major impact effectively preventing an activity
[c] Study reports time to cecal intubation in minutes (SD) by compliance with preparation (good versus poor)
[d] 4-point scale with 0 = not at all distressing, 3 = severely distressing

Table 5. Hospitalizations, Costs, and Adverse Events

Study NPO Status (Intervention/ Control)	Hospitalizations % (n/N)		Costs		Bowel perforation % (n/N)		Other adverse events[a] (*describe*) % (n/N)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Barclay 2004[17] NPO status 1: < 3 hours NPO status 2: ≥ 5 hours	NR	NR	NR	NR	NR	NR	Interview 2 days after colonoscopy – no patient in either group developed clinically significant neurologic, cardiac, or other adverse events that were thought to be attributable to colonic purgation	
Church 1998[21] NPO status 1: 5-8 hours NPO status 2: >8 hours	NR	NR	NR	NR	NR	NR	No complications of colonoscopy in either group	
Flemming 2012[26] NPO status 1: ≥ 4 hours NPO status 2: > 8 hours	NR	NR	NR	NR	No documented complications of perforation on discharge from endoscopy unit		No documented complications of bleeding on discharge from endoscopy unit	
Johanson 2007[32] NPO status 1: 2.5-4.5 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	0/207	0.5 (1/208) Lower GI bleeding post-colonoscopy
Mathus-Vliegen 2013[43] NPO status 1: Hours unclear (Split-dose, PM exam) NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	None reported	1 (1/99) Severe retrosternal pain 3 hours after colonoscopy; anteroseptal infarction diagnosed
Rex 2013[49] NPO status 1: 5-9 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	Acute pancreatitis[b] 0.3 (1/305)	Non-cardiac chest pain[b] 0.3 (1/298) Colon cancer 0.3 (1/298)
Voiosu 2013[53] NPO status 1: 1-7 hours NPO status 2: > 8 hours	NR	NR	NR	NR	NR	NR	Reported no serious adverse events throughout the study	

GI = gastrointestinal; NPO = nil per os; NR = not reported

Bowel preparation completed the day before colonoscopy designated as NPO status > 8 hours

[a] Anesthesia-related

[b] Unclear whether event occurred during preparation or colonoscopy

Table 6. Gastric Contents Outcomes

Study NPO Status (Intervention/ Control)	Volume of gastric contents, Mean (SD)		pH of gastric contents, Mean (SD)	
	NPO group 1	NPO group 2	NPO group 1	NPO group 2
Aoun 2005[14] NPO status 1: ≥ 1.5 hours NPO status 2: > 8 hours	No notable difference in the amount of residual gastric fluid between groups		NR	NR
Huffman 2010[31] NPO status 1: ≥ 2 hours NPO status 2: > 8 hours	19.7 (19.1) mL	20.2 (22.4) mL	NR	NR

NPO = nil per os; NR = not reported; SD = standard deviation
Bowel preparation completed the day before colonoscopy designated as NPO status > 8 hours

APPENDIX D. STRENGTH OF EVIDENCE

Outcome Category	Outcome (# of Studies Reporting)	Results, Shorter NPO status vs Longer NPO status	Risk of Bias	Consistency	Directness	Precision	Strength of Evidence
Primary	Aspiration, RCTs (3)	Three moderate sized trials (n=672)[a] reported no aspiration events or no major complications related to sedation	moderate	consistent	direct	imprecise	Low
	Aspiration, Obs. (2)	Two studies (n=1,646), one large and one moderately sized, reported no episodes of aspiration were observed	moderate	consistent	direct	imprecise	Insufficient
	Rescheduled colonoscopies (1)	One moderate sized RCT reported fewer rescheduled colonoscopies with shorter NPO status	moderate	unknown	direct	imprecise	Insufficient
Secondary	Completion rate, RCTs (6)	Pooled results from 5 trials[a,b] (n=1,795) found no difference between NPO status groups (RR 1.00 [95%CI 0.98, 1.01])	moderate	consistent	direct	precise	Moderate
	Completion rate, Obs. (1)	One large retrospective study (n=5175) reported a greater completion rate with a shorter NPO status (OR 1.35 [95%CI 1.03, 1.77])	high	unknown	direct	precise	Insufficient
	Adenoma detection rate, RCTs (1)	A single small trial (n=136)[a] found no difference between NPO status groups	moderate	unknown	direct	imprecise	Insufficient
	Adenoma detection rate, Obs. (3)	Pooled results from 3 studies (n=8,481) found improved adenoma detection rates with a shorter NPO status (OR 1.25 [95%CI 1.13, 1.39])	moderate	consistent	direct	precise	Low
	Diagnostic yield, RCTs (2)	Two moderate sized trials[a,b] (n=254) reported inconsistent results in diagnostic yield of all polyps or lesions	moderate	inconsistent	direct	imprecise	Insufficient
	Bowel perforation, RCT (1)	A single moderate sized trial (n=250) reported no documented complications of perforation	moderate	unknown	direct	imprecise	Insufficient
	False negative colonoscopy (0)	No eligible studies					Insufficient

Obs. = observational studies; RCTs = randomized controlled trials; OR = odds ratio; RR = risk ratio

[a] One additional RCT (n=125) (Matro 2010)[44] of morning-only versus evening before/morning of colonoscopy bowel preparation (all patients NPO for 4 hours with clear liquids allowed until 2.5 hours before colonoscopy) reported one aspiration event requiring 24 hour hospitalization for observations, no significant difference in completion rate, and significantly better adenoma detection rate and diagnostic yield in the morning-only preparation group.

[b] One study (Chiu 2006)[20] was of patients getting follow-up colonoscopy