ABSTRACT

INTRODUCTION: Endoscopy with sedation is a common inpatient procedure. “NPO after midnight” remains the prevailing fasting practice despite ASA guidelines indicating specific fasting times. This quality improvement project aims to assess patient discomfort with the “NPO after midnight” order versus implementation of specific NPO times.

METHODS: Patients in the inpatient wards scheduled for endoscopy after 1 pm the following day were recruited. The gastroenterology services designated specific NPO times per ASA guidelines for the post-intervention group. Each participant completed a survey qualifying hunger, thirst, and discomfort levels. Pearson’s chi-squared analysis was performed.

RESULTS: NPO duration was reduced in the post-intervention group with significant improvement in thirst, hunger, and discomfort levels. A shortened preoperative fasting period did not lead to increase in procedural complications.

CONCLUSION: Despite ASA guidelines, the practice of keeping patients NPO after midnight remains pervasive, resulting in unnecessarily prolonged fasting and patient discomfort. Implementing specific diet recommendations reduces duration of NPO and improves patient comfort and overall satisfaction.

KEYWORDS: endoscopy, quality improvement, NPO, procedure

INTRODUCTION

Background

Endoscopy is a frequently performed procedure in the inpatient setting in the United States. Data from the National Hospital Discharge Survey revealed that endoscopy accounted for 1.5 million (or 27%) of the 5.4 million operations on the digestive system performed inpatient nationwide in 2007. Since endoscopy is inherently an invasive and unpleasant procedure, most endoscopic procedures in the United States are performed with sedation to relieve patient anxiety and discomfort, and to improve quality of examination. Multiple studies have confirmed that both moderate sedation and deep sedation during endoscopy is safe. A recent retrospective study of over 73,000 cases showed a combined incidence of all adverse events, including both life-threatening and non-life-threatening events, to be less than 0.23%. Only one instance of aspiration pneumonia was reported in one study. Although there are no official guidelines in the gastroenterology literature regarding the optimal duration of preoperative fasting to reduce the risk of aspiration, the American Society for Gastrointestinal Endoscopy (ASGE) guidelines on Sedation and Anesthesia in GI Endoscopy made references to the American Society of Anesthesiologists (ASA) guidelines. The ASA recommends a minimum fasting period of 2 hours for clear liquids and 6 hours for light meals prior to induction of sedation.

Problem Description

Although the current ASA guidelines regarding preoperative fasting have been adopted since 1999, the established dogma of nil per os (NPO) after midnight remains pervasive among physicians in our institution, as epitomized by the presence of “NPO after midnight” as a default option in our electronic medical record (EMR) system. Some hospitalists may err towards keeping patients NPO for extended periods to minimize the risk of a delayed discharge caused by procedure cancellation. Since most non-urgent endoscopic procedures performed by the inpatient gastroenterology consult service do not start until 1 pm, most patients are kept under an NPO order for 13 to 19 hours on average. This ultimately results in unnecessary prolonged preoperative fasting and increased patient discomfort.

Prolonged preoperative fasting time is also a global challenge. A nursing-initiated retrospective study conducted in 2002 on patients undergoing elective surgery revealed an average fasting time for solids and liquids of 14 and 12 hours, respectively. Some patients in this study were fasting up to 37 hours from solids and 20 hours from liquids. Slightly improved results were obtained in a British study conducted in 2011 which revealed that patients undergoing elective procedures have a median fasting time of 10 hours for solids and 6.25 hours for clear liquids; but these results were still significantly longer than the current ASA recommendations.
It has been shown that prolonged preoperative fasting is associated with a wide range of adverse effects including patient discomfort, dehydration, and hypoglycemia.\(^\text{10}\) A cross-sectional study conducted by nurses in 2011 in Turkey on patients undergoing laparoscopic cholecystectomy revealed that patients fasting for more than 12 hours preoperatively reported significantly higher hunger, thirst, nausea, and pain scores.\(^\text{11}\) In fact, a randomized controlled study conducted in 2013 in India showed that preoperative consumption of a carbohydrate-rich drink reduced postoperative nausea, vomiting, and pain in patients undergoing elective cholecystectomy.\(^\text{12}\) In the field of gastroenterology, an investigator-blinded randomized controlled study conducted in 2011 in patients undergoing elective upper endoscopy showed that patients assigned to a shorter 2-hour fasting period experienced less anxiety, general discomfort, hunger, and weakness compared to those assigned to the conventional fasting period of 8 hours or more.\(^\text{13}\) More importantly, there were no differences in the safety parameters between the groups, including regurgitation after endoscopic intubation, food stasis in the stomach, or risk of aspiration. In addition, there were no differences in the length of procedures or the visibility of gastric mucosa as reported by the endoscopists.

**Specific Aims**

Based on previous studies and the ASA guidelines, a fasting period of 2 hours for clear liquids and 6 hours for light meals is sufficient to reduce the risk of aspiration in patients undergoing elective procedures requiring sedation. Thus, our primary goal is to reinforce compliance to ASA guidelines regarding preoperative fasting among ordering providers in Rhode Island Hospital. Our secondary goal is to assess the association between prolonged preoperative fasting and patient discomfort among those undergoing non-urgent inpatient endoscopic procedures.

The first specific aim of the current study is to evaluate if proactive education and written instructions by the endoscopists can lead to a change in behaviors among the ordering providers, and ultimately result in a reduction in preoperative fasting time among patients undergoing non-urgent inpatient endoscopic procedures. The second specific aim of the current study is to evaluate if a reduction in preoperative fasting time is associated with an improvement in a patient’s preoperative experience, as measured by thirst, hunger, and overall discomfort. The third specific aim of the current study is to assess the quality and safety parameters of the endoscopic procedures performed. We anticipate that proactive education and written instructions by the endoscopists will lead to behavioral changes among the primary team providers, shortening fasting periods and thereby reducing overall patient discomfort.

**METHODS**

This study follows the conventional Plan-Do-Study-Act (PDSA) design and was approved by the Institutional Review Board (IRB) at the institution. Patients undergoing inpatient endoscopy at Rhode Island Hospital were recruited from 10/2018 to 12/2018 for the pre-intervention group. The inclusion criteria were patients ages 18 and older who were admitted to the inpatient service of Rhode Island Hospital, able to read and understand English and/or Spanish and scheduled for an inpatient upper endoscopy and/or colonoscopy with a procedure start time after 1 pm. Table 1 lists the specific inclusion and exclusion criteria for participant recruitment. A total of 57 participants were identified (See Supplement, Figure 1a) and completed an IRB-approved consent form. The average age of the pre-intervention participants was 67 years, with 37 males and 20 females. 25 participants were scheduled to undergo colonoscopy, 30 were scheduled for upper endoscopy, and 2 were scheduled for both. A survey was given to the patients to be completed prior to their scheduled endoscopy time assessing subjective measures of hunger, thirst, and discomfort on a 10-point Likert scale (See Supplement, Figure 2). Participants were also asked to note the last time they had any liquid or solid food. The survey was provided in both English and Spanish, depending upon participants’ proficiency with each language.

For the post-intervention group, the same guidelines were utilized to recruit participants between 3/2019 and 6/2019. A total of 26 participants were identified (See Supplement, Figure 1b). A SmartPhrase on the hospital EMR (Epic) was

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<th><strong>INCLUSION CRITERIA</strong></th>
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<tr>
<td>Adult patients aged ≥ 18 years of age at the time of presentation</td>
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<tr>
<td>Admitted to the Rhode Island Hospital inpatient wards</td>
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<tr>
<td>Able to read and understand English and/or Spanish</td>
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<tr>
<td>Scheduled for an upper endoscopy and/or colonoscopy by the gastroenterology consult service</td>
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<td>Procedure is scheduled to start after 13:00 the following day</td>
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<th><strong>EXCLUSION CRITERIA</strong></th>
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<tr>
<td>Procedures requiring monitored anesthesia care</td>
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<td>Procedures performed outside of the main endoscopy suite</td>
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<td>Upper endoscopy for any of the following indications: hemorrhage control, banding of varices, foreign body removal, percutaneous gastrostomy tube placement, esophageal balloon dilation, pyloric dilation, guidewire dilation, stent insertion, stent fixation, post-bariatric leak repair, Roux-en-Y revision</td>
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<tr>
<td>Colonoscopy for any of the following indications: hemorrhage control, banding, foreign body removal, balloon dilation, decompression</td>
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<td>Pregnancy</td>
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Table 1. Inclusion and Exclusion Criteria for Recruiting Participants
created giving specific instructions to allow light meals before 6 am the day of the procedure and to allow clear liquids before 10 am the day of the procedure. The SmartPhrase “NPOCOLON” was used for patients undergoing colonoscopy and “NPOEGD” for patients undergoing upper endoscopy. The respective SmartPhrase was included in the consultation notes for 13 participants in the post-intervention group along with verbal communication; the other 13 participants received only verbal communication between the consulting team and the ordering provider. The average age of the participants in both subgroups was 64 years. The group that received only verbal communication consisted of 8 men and 5 women, with 3 undergoing colonoscopy, 7 undergoing upper endoscopy, and 3 undergoing both procedures. The group that received both verbal and SmartPhrase communication consisted of 5 men and 6 women, with 6 undergoing colonoscopy, 5 undergoing upper endoscopy, and 2 undergoing both. Verbal communication was informal without a specific script but was expected to include the same information as the SmartPhrase. Nursing staff was also made aware of these recommendations in both post-intervention subgroups. Figure 3 [See Supplement], shows the specific instructions included in the SmartPhrase for upper endoscopy and colonoscopy. The same survey was distributed to this set of participants prior to their scheduled endoscopy.

Data Analysis

Based on the assumption that most patients are kept “NPO after midnight” before the start of the current study, and that most endoscopic procedures performed by the gastroenterology consult service occur between 1 pm and 7 pm, the mean preoperative fasting time is estimated to be around 16 ± 3 hours. To detect a 25% reduction in preoperative fasting time with an alpha of 5% and a power of 80%, an estimated 18 participants were needed for the entire study. Since the current study is implemented as a quality improvement project instead of a randomized sham-controlled clinical trial, data collected during the pre-intervention period was considered the control group while data collected during the post-intervention period was considered the intervention group.

Comparisons between the pre-intervention and post-intervention parameters were performed with the Pearson’s chi-squared test for categorical variables, 1-way analysis of variance, or 2-sample t tests with unequal variance for continuous variables. A p-value < 0.05 was considered statistically significant.

Outcome Measurement

The primary outcome was the duration of preoperative fasting for liquids and solids as reported by the patients. The intended NPO start time was reflected in the primary team’s progress notes. The actual NPO order start times as entered in the EMR system were monitored as secondary outcomes. The primary measured outcome was patient subjective experience quantified using three 10-point Likert scales for hunger, thirst, and overall discomfort. The composite score is considered the primary outcome while the individual component score is considered the secondary outcome.

RESULTS

Prior to the interventions, patients admitted to Rhode Island Hospital were kept NPO for longer periods of time than recommended by the ASA guidelines in anticipation of the procedure. As a result, the patients reported a high degree of hunger (6.8), thirst (7.1), and discomfort (5.8). Following implementation of specific diet recommendations by consultants, there was a significant decline in preoperative fasting durations, the duration of NPO order placed by physicians dropped from 19 hours to 6 hours. The duration of self-reported solid NPO decreased from 42 hours to 16 hours, and the duration of self-reported liquid NPO reduced from 18 hours to 4 hours. Compared to the pre-intervention group, patients in the post-intervention group also reported decreased sensations of hunger (2.8), thirst (1.4), and discomfort (1.6). The differences between the pre-intervention and post-intervention group were statistically significant (p<0.05). Utilization of the SmartPhrase further reduced NPO duration, leading to a statistically significant decrease in patient’s perceived hunger, thirst, and overall discomfort as compared to post-intervention participants who only received verbal communication regarding specific NPO times. No “NPO at midnight” orders were placed for the group who had both verbal communication and the respective SmartPhrase included in the consultation note. Endoscopists reported good visibility for all participants in the post-intervention group. Figures 4a, b [See Supplement] summarize these results.

DISCUSSION

Endoscopy is a frequently performed procedure in the inpatient setting, both urgently for acute hemorrhage or food impaction as well as non-urgently as an elective procedure. Given the inherent invasiveness and unpleasant nature of the procedure, it is often performed with sedation. To minimize the risk of aspiration associated with sedation, preoperative fasting is generally recommended. The current ASA guidelines recommend a fasting period of 2 hours for clear liquids and 6 hours for light meals,6 but the established dogma of “NPO after midnight” remains a common practice, particularly in the inpatient setting. Several studies have documented that prolonged preoperative fasting is associated with increased patient discomfort manifesting as thirst, hunger, irritability.16-18

The implementation of specific diet recommendations
by gastroenterology consultants reduced unnecessary preoperative fasting, resulting in significant improvement in patient comfort. Communicating the exact timing for NPO orders to both the primary team physicians and the nursing staff responsible for patient care is vital to the application of this practice. Including a SmartPhrase in consultation notes along with verbal communication between the provider teams can effectively facilitate this process and close any gaps in communication between the consulting and ordering providers. Through this study we aim to promote and reinforce the latest ASA guidelines among physicians responsible for placing NPO orders prior to upper endoscopy and/or colonoscopy. It is anticipated that this study would result in a significant reduction in prolonged preoperative fasting among patients undergoing non-urgent inpatient endoscopic procedures and, most importantly, an improvement in patient comfort. Improvement in patient comfort as related to hunger, thirst, and discomfort can translate to a better hospitalization experience and promote healing.

The main strength of this study is that it was conducted at a large, academic medical center with a diverse patient population; thus, the results are more likely to be representative of the general patient population. A weakness of this study is that it assumes the “NPO at midnight” is the mainstay practice at other hospitals. Additionally, the study utilizes SmartPhrase, a function specific to the Epic EMR; the application of this study will have to be adapted to other EMRs at other institutions.

Evidence for shortened preoperative fasting has emerged over the last century. Clinical practice, however, is slow to follow, resulting in excessive fasting time. Implementing a hospital-wide preoperative fasting policy that adheres to ASA guidelines, along with provider education, may allow for faster and sustained improvement on this front. Further studies will need to evaluate the safety and quality parameters associated with the shortened preoperative fasting time. Results from this study may help convince the ordering providers to liberalize preoperative fasting for other inpatient procedures in the future.

References

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This study was approved by the Lifespan IRB.
Consent was obtained from each participant in the study.

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