Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures

*An Updated Report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration**

PRACTICE guidelines are systematically developed recommendations that assist the practitioner and patient in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints, and are not intended to replace local institutional policies. In addition, practice guidelines developed by the American Society of Anesthesiologists (ASA) are not intended as standards or absolute requirements, and their use cannot guarantee any specific outcome. Practice guidelines are subject to revision as warranted by the evolution of medical knowledge, technology, and practice. They provide basic recommendations that are supported by a synthesis and analysis of the current literature, expert and practitioner opinion, open forum commentary, and clinical feasibility data.

This document updates the "Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: An Updated Report" adopted by the ASA in 2010 and published in 2011.†

Methodology

Definition of Preoperative Fasting and Pulmonary Aspiration

For these guidelines, *preoperative fasting* is defined as a prescribed period of time before a procedure when patients are not allowed the oral intake of liquids or solids. *Perioperative pulmonary aspiration* is defined as aspiration of gastric contents occurring after induction of anesthesia, during a procedure, or in the immediate postoperative period. Throughout these guidelines, the term "preoperative" should be considered synonymous with "preprocedural," as the latter term is often used to describe procedures that are not considered to be operations. Anesthesia care during procedures refers to general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Purposes of the Guidelines

The purposes of these guidelines are to provide direction for clinical practice related to preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration and to reduce the severity of complications related to perioperative pulmonary aspiration. Clinical practice includes, but is not limited to, withholding of liquids and solids for specified time periods before surgery and prescribing pharmacologic agents to reduce gastric volume and acidity. Enhancements in the quality and efficiency of anesthesia care include, but are not limited to, the utilization of perioperative preventive medication, increased patient satisfaction, avoidance of delays and cancellations, decreased risk of dehydration or hypoglycemia from prolonged fasting, and the minimization of perioperative morbidity. Complications of aspiration include, but are not limited to, aspiration pneumonia, respiratory compromise, and related morbidities.

Focus

Prevention of perioperative pulmonary aspiration is part of the process of preoperative evaluation and preparation of the patient. The guidelines specifically focus on preoperative fasting recommendations, as well as recommendations regarding

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† American Society of Anesthesiologists: Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: An updated report. ANESTHESIOLOGY 2011; 114:495–511

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the administration of pharmacologic agents to modify the volume and acidity of gastric contents during procedures in which upper airway protective reflexes may be impaired.

Airway management techniques that are intended to reduce the occurrence of pulmonary aspiration are not the focus of these guidelines. For example, a rapid-sequence induction/endotracheal intubation technique or awake endotracheal intubation technique may be useful to prevent this problem during the delivery of anesthesia care. The guidelines do not address the selection of anesthetic technique, nor do they address enhanced recovery protocols not designed to reduce the perioperative risk of pulmonary aspiration.

The intended patient population is limited to healthy patients of all ages undergoing elective procedures. The guidelines do not apply to patients who undergo procedures with no anesthesia or only local anesthesia when upper airway protective reflexes are not impaired and when no risk factors for pulmonary aspiration are apparent.

The guidelines may not apply to or may need to be modified for patients with coexisting diseases or conditions that can affect gastric emptying or fluid volume (*e.g.,* pregnancy, obesity, diabetes, hiatal hernia, gastroesophageal reflux disease, ileus or bowel obstruction, emergency care, or enteral tube feeding) and patients in whom airway management might be difficult. Anesthesiologists and other anesthesia providers should recognize that these conditions can increase the likelihood of regurgitation and pulmonary aspiration, and that additional or alternative preventive strategies may be appropriate.

Application

These guidelines are intended for use by anesthesiologists and other anesthesia providers. They also may serve as a resource for other health care professionals who advise or care for patients who receive anesthesia care during procedures.

Task Force Members and Consultants

In 2015, the ASA Committee on Standards and Practice Parameters requested that the updated guidelines published in 2011 be re-evaluated. This current update consists of a literature evaluation and an update of the evidence-based guideline nomenclature. A summary of recommendations is found in appendix 1 (table 1).

The previous update was developed by an ASA-appointed Task Force of ten members, including anesthesiologists in both private and academic practice from various geographic areas of the United States and consulting methodologists from the ASA Committee on Standards and Practice Parameters.

The original guidelines and the previous update in 2011 was developed by means of a seven-step process. First, the Task Force reached consensus on the criteria for evidence. Second, original published research studies from peer-reviewed journals relevant to preoperative fasting and pulmonary aspiration were reviewed and evaluated. Third, expert consultants were asked to: (1) participate in opinion surveys on the effectiveness of various preoperative fasting strategies and pharmacologic agents and (2) review and comment on a draft of the guidelines developed by the Task Force. Fourth, opinions about the guideline recommendations were solicited from a random sample of active members of the ASA. Fifth, the Task Force held an open forum at a major national meeting‡ to solicit input on its draft recommendations. Sixth, the consultants were surveyed to assess their opinions on the feasibility of implementing the updated guidelines. Seventh, all available information was used to build consensus within the Task Force to finalize the updated guidelines.

Availability and Strength of Evidence

Preparation of these guidelines followed a rigorous methodological process. Evidence was obtained from two principal sources: scientific evidence and opinion-based evidence (appendix 2).

Scientific Evidence. Scientific evidence used in the development of these updated guidelines is based on cumulative findings from literature published in peer-reviewed journals. Literature citations are obtained from healthcare databases, direct internet searches, Task Force members, liaisons with other organizations, and from manual searches of references located in reviewed articles.

Findings from the aggregated literature are reported in the text of the guidelines by evidence category, level, and direction and in appendix 2 (table 2). Evidence categories refer specifically to the strength and quality of the *research design* of the studies. Category A evidence represents results obtained from randomized controlled trials (RCTs) and Category B evidence represents observational results obtained from nonrandomized study designs or RCTs without pertinent comparison groups. When available, Category A evidence is given precedence over Category B evidence for any particular outcome. These evidence categories are further divided into evidence levels. Evidence levels refer specifically to the strength and quality of the summarized study *findings* (*i.e.,* statistical findings, type of data, and the number of studies reporting/replicating the findings). In this document, only the highest level of evidence is included in the summary report for each intervention-outcome pair, including a directional designation of benefit, harm, or equivocality.

Category A. RCTs report comparative findings between clinical interventions for specified outcomes. Statistically significant ($P < 0.01$) outcomes are designated as either beneficial (B) or harmful (H) for the patient; statistically nonsignificant findings are designated as equivocal (E).

Level 1: The literature contains a sufficient number of RCTs to conduct meta-analysis,§ and meta-analytic findings from these aggregated studies are reported as evidence.

‡ Society for Ambulatory Anesthesia 12th Annual Meeting, Orlando, Florida, 1997.

§ All meta-analyses are conducted by the ASA methodology group. Meta-analyses from other sources are reviewed but not included as evidence in this document.

Level 2: The literature contains multiple RCTs, but the number of RCTs is not sufficient to conduct a viable meta-analysis for the purpose of these updated guidelines. Findings from these RCTs are reported separately as evidence.

Level 3: The literature contains a single RCT and findings are reported as evidence.

Category B. Observational studies or RCTs without pertinent comparison groups may permit *inference* of beneficial or harmful relationships among clinical interventions and clinical outcomes. Inferred findings are given a directional designation of beneficial (B), harmful (H), or equivocal (E). For studies that report statistical findings, the threshold for significance is $P < 0.01$.

Level 1: The literature contains observational comparisons (*e.g.,* cohort, case-control research designs) with comparative statistics between clinical interventions for a specified clinical outcome.

Level 2: The literature contains noncomparative observational studies with associative statistics (*e.g.,* relative risk, correlation, sensitivity and specificity).

Level 3: The literature contains noncomparative observational studies with descriptive statistics (*e.g.,* frequencies, percentages).

Level 4: The literature contains case reports.

Insufficient Literature. The *lack* of sufficient scientific evidence in the literature may occur when the evidence is either unavailable (*i.e.,* no pertinent studies found) or inadequate. Inadequate literature cannot be used to assess relationships among clinical interventions and outcomes because a clear interpretation of findings is not obtained due to methodological concerns (*e.g.,* confounding of study design or implementation) or the study does not meet the criteria for content as defined in the "Focus" of the guidelines.

Opinion-based Evidence. All opinion-based evidence (*e.g.,* survey data, open forum testimony, internet-based comments, letters, and editorials) relevant to each topic was considered in the development of these updated guidelines. However, only the findings obtained from formal surveys are reported in the current update.

Opinion surveys were developed by the Task Force to address each clinical intervention identified in the document. Identical surveys were distributed to expert consultants and a random sample of ASA members.

Category A: Expert Opinion. Survey responses from Task Force–appointed expert consultants are reported in summary form in the text, with a complete listing of consultant survey responses reported in appendix 2 (table 3).

Category B: Membership Opinion. Survey responses from active ASA members are reported in summary form in the text, with a complete listing of ASA member survey responses reported in appendix 2 (table 4).

Survey responses from expert and membership sources are recorded using a 5-point scale and summarized based on median values.**

Strongly Agree: Median score of 5 (at least 50% of the responses are 5)

Agree: Median score of 4 (at least 50% of the responses are 4 or 4 and 5)

Equivocal: Median score of 3 (at least 50% of the responses are 3, or no other response category or combination of similar categories contain at least 50% of the responses)

Disagree: Median score of 2 (at least 50% of responses are 2 or 1 and 2)

Strongly Disagree: Median score of 1 (at least 50% of responses are 1)

Category C: Informal Opinion. Open forum testimony obtained during development of these guidelines, Internet-based comments, letters, and editorials are all informally evaluated and discussed during the formulation of guideline recommendations. When warranted, the Task Force may add educational information or cautionary notes based on this information.

Guidelines

Preoperative Assessment

A preoperative assessment includes a review of medical records, a physical examination, and a patient survey or interview. No controlled trials were found that address the impact of conducting a review of medical records, physical examination, or survey/interview on the frequency or severity of perioperative pulmonary aspiration of gastric contents. Observational studies indicate that some predisposing patient conditions (*e.g.,* age, sex, ASA physical status, emergency surgery) may be associated with the risk of perioperative aspiration *(Category B2-H evidence).*[1–5] Observational studies addressing other predisposing conditions (*e.g.,* obesity, diabetes, esophageal reflux, smoking history) report inconsistent findings regarding risk of aspiration *(Category B1-E evidence).*[6–11]

The consultants and ASA members strongly agree that a review of pertinent medical records, a physical examination, and patient survey or interview should be performed as part of the preoperative evaluation. They also strongly agree that patients should be informed of fasting requirements and the reasons for them sufficiently in advance of their procedures. In addition, both the consultants and ASA members strongly agree that verification of their compliance with the fasting requirements should be assessed at the time of the procedure.

** When an equal number of categorically distinct responses are obtained, the median value is determined by calculating the arithmetic mean of the two middle values. Ties are calculated by a predetermined formula.

Recommendations for Preoperative Assessment

- Perform a review of pertinent medical records, a physical examination, and patient survey or interview as part of the preoperative evaluation.
  - The history, examination, and interview should include assessment of ASA physical status, age, sex, type of surgery, and potential for difficult airway management as well as consideration of gastroesophageal reflux disease,[††] dysphagia symptoms, other gastrointestinal motility and metabolic disorders (*e.g.,* diabetes mellitus) that may increase the risk of regurgitation and pulmonary aspiration.
- Inform patients of fasting requirements and the reasons for them sufficiently in advance of their procedures.
- Verify patient compliance with fasting requirements at the time of their procedure.
- When these fasting guidelines are not followed, compare the risks and benefits of proceeding, with consideration given to the amount and type of liquids or solids ingested.

Preoperative Fasting of Clear Liquids. Meta-analysis of RCTs comparing fasting times of 2 to 4 h *versus* more than 4 h report equivocal findings for gastric volume and gastric pH values in *adult patients* given clear liquids 2 to 4 h before a procedure *(Category A1-E evidence)*.[12–21] RCTs reported less thirst and hunger for fasting times of 2 to 4 h *versus* more than 4 h *(Category A2-B evidence)*.[12,13,19,22–24] Similarly, RCTs comparing nutritional or carbohydrate drinks at 2 to 4 h *versus* more than 4 h of fasting report equivocal findings for gastric volume, gastric pH, blood glucose values, hunger, and thirst *(Category A2-E evidence)*.[15,21,24–32] A meta-analysis of RCTs reports a lower risk of aspiration (*i.e.,* gastric volume < 25 mL and pH > 2.5) when clear liquids are given 2 to 4 h before a procedure *(Category A1-B evidence)*.[12,13,16,17,19,20]

Meta-analysis of RCTs report higher gastric pH values *(Category A1-B evidence)* and equivocal findings regarding differences in gastric volume *(Category A1-E evidence)* for *children* given clear liquids 2 to 4 h *versus* fasting for more than 4 h before a procedure.[33–42] Ingested volumes of clear liquids in the above studies range from 100 ml to unrestricted amounts for adults, and 2 ml/kg to unrestricted amounts for children. One randomized controlled trial comparing 2 h fasting with fasting from midnight reported equivocal findings for blood glucose and insulin values *(Category A3-E evidence)*.[43]

Both the consultants and ASA members strongly agree that for otherwise healthy infants (< 2 yr of age), children (2 to 16 yr of age) and adults, fasting from the intake of clear liquids for 2 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained.

Recommendations for Clear Liquids

- Clear liquids[‡‡] may be ingested for up to 2 h before procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.
  - These liquids should not include alcohol.

Preoperative Fasting of Breast Milk. The literature is insufficient to evaluate the effect of timing of the ingestion of breast milk and the perioperative incidence of pulmonary aspiration, gastric volume, pH, or emesis/reflux. Nonrandomized comparative studies assessing the impact of ingesting breast milk before a procedure are equivocal for gastric volume or pH when compared with the ingestion or clear liquids or infant formula *(Category B1-E evidence)*.[44–46]

The consultants agree and the ASA members strongly agree that for otherwise healthy neonates (< 44 gestational weeks) and infants, fasting from the intake of breast milk for 4 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained.

Recommendations for Breast Milk

- Breast milk may be ingested for up to 4 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Preoperative Fasting of Infant Formula. The literature is insufficient to evaluate the effect of timing of the ingestion of infant formula on the perioperative incidence of pulmonary aspiration, gastric volume, pH or emesis/reflux.

Both the consultants and ASA members agree that for neonates and infants, fasting from the intake of infant formula for 6 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained. The consultants agree and the ASA members strongly agree that for children, fasting from the intake of infant formula for 6 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained.

Recommendations for Infant Formula

- Infant formula may be ingested for up to 6 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Preoperative Fasting of Solids and Nonhuman Milk. An RCT comparing a light breakfast consumed less than 4 h before a procedure with overnight fasting reports equivocal findings for gastric volume and pH levels for adults *(Category A3-E evidence)*.[47] A second RCT reports equivocal findings when a light breakfast is allowed at 4 h compared with 6 h before a cesarean section *(Category A3-E evidence),* although a significant reduction in maternal and neonatal blood glucose levels

†† The term "gastroesophageal reflux disease" refers to positional reflux and its consequent symptomology, rather than food intolerances (*e.g.,* "tomatoes do not agree with me").

‡‡ Examples of clear liquids include, but are not limited to, water, and fruit juices without pulp, carbonated beverages, carbohydrate-rich nutritional drinks, clear tea, and black coffee.

was reported when fasting was extended beyond 6 h *(Category A3-H evidence)*.[48] Nonrandomized comparative studies for children given nonhuman milk 4 h or less before a procedure *versus* children fasted for more than 4 h report equivocal findings for gastric volume and pH *(Category B1-E evidence)*.[49–51] One nonrandomized study indicated that fasting for more than 8 h may be associated with significantly lower blood glucose levels *(Category B1-H evidence)*.[51] The literature is insufficient to evaluate the effect of the timing of ingestion of solids and nonhuman milk and the perioperative incidence of pulmonary aspiration or emesis/reflux. Although the literature is insufficient to evaluate the influence of *preoperatively* adding milk or milk products to clear liquids (*e.g.,* tea or coffee) on either pulmonary aspiration, gastric volume, pH, or gastric emptying, some studies with healthy volunteer subjects have reported equivocal findings for gastric volume and gastric emptying when these products are added to clear liquids.[52–54]

The consultants agree and the ASA members strongly agree that fasting from the intake of a light meal (*e.g.*, toast and a clear liquid) of 6 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained. Both the consultants and ASA members strongly agree that fasting from the intake of a meal that includes fried or fatty foods for 8 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained.

Both the consultants and ASA members agree that for infants, fasting from the intake of nonhuman milk for 6 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained. The consultants agree and the ASA members strongly agree that for children and adults, fasting from the intake of nonhuman milk for 6 or more hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained.

Recommendations for Solids and Nonhuman Milk

- A light meal or nonhuman milk may be ingested for up to 6 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.[§§]
  - Additional fasting time (*e.g.,* 8 or more hours) may be needed in cases of patient intake of fried foods, fatty foods, or meat.
- Consider both the amount and type of foods ingested when determining an appropriate fasting period.
- Since nonhuman milk is similar to solids in gastric emptying time, consider the amount ingested when determining an appropriate fasting period.

Preoperative Gastrointestinal Stimulants. Meta-analysis of placebo-controlled RCTs indicate that metoclopramide is effective in reducing gastric volume and pH during the perioperative period *(Category A1-B evidence)*.[55–60] The literature is insufficient to evaluate the effect of metoclopramide on the perioperative incidence of pulmonary aspiration.[***]

Both the consultants and ASA members disagree that gastrointestinal stimulants should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Gastrointestinal Stimulants

- Gastrointestinal stimulants may be preoperatively administered to patients at increased risk of pulmonary aspiration.
- Do not routinely administer preoperative gastrointestinal stimulants for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Preoperative Pharmacologic Blockade of Gastric Acid Secretion. *Histamine-2 receptor antagonists:* Meta-analysis of blinded placebo-controlled RCTs indicate that orally-administered ranitidine is effective in reducing gastric volume and acidity; the frequency of gastric volume > 25 mL; the frequency of gastric pH levels < 2.5; and the risk of aspiration (*i.e.,* gastric volume > 25 mL and pH < 2.5) during the perioperative period *(Category A1-B evidence)*.[56,61–70] Placebo-controlled RCTs of *intravenous* ranitidine report similar results for gastric pH *(Category A2-B evidence)* and equivocal findings for gastric volume *(Category A2-E evidence)*.[66,71–74]

Meta-analysis of placebo-controlled RCTs indicate that orally-administered cimetidine is effective in reducing gastric volume and acidity; the frequency of gastric volume > 25 mL; the frequency of gastric pH levels < 2.5; and the risk of aspiration (*i.e.,* gastric volume > 25 mL and pH < 2.5) during the perioperative period *(Category A1-B evidence)*.[58,59,66,75–87] Placebo-controlled RCTs of *intravenous* cimetidine report similar results for gastric pH *(Category A2-B evidence)*, but equivocal findings for gastric volume *(Category A2-E evidence)*.[60,66,71,78,88]

Placebo-controlled RCTs indicate that orally-administered famotidine is effective in reducing gastric volume and acidity during the perioperative period *(Category A2-B evidence)*.[64,89–91] One placebo-controlled RCT reports similar findings for intramuscular famotidine *(Category A3-B evidence)*.[92] The literature is insufficient to evaluate the effect of administering histamine-2 receptor antagonists on perioperative pulmonary aspiration or emesis/reflux.

§§ The Task Force notes that intake of fried or fatty foods or meat may prolong gastric emptying time.

*** Evidentiary information and recommendations regarding the administration of preoperative gastrointestinal stimulants and postoperative nausea and vomiting findings may be found in: Practice guidelines for postanesthetic care: An updated report by the American Society of Anesthesiologists Task Force on Postanesthetic Care. Anesthesiology 2013; 118:291–307.

Proton pump inhibitors: Meta-analysis of placebo-controlled RCTs indicate that omeprazole is effective in reducing gastric volume and acidity *(Category A1-B evidence)*.[63,67,93–95] RCTs report similar findings for lansoprazole *(Category A2-B evidence)*,[67,68,96,97] pantoprazole *(Category A2-B evidence)*,[63,73,98] and rabeprazole *(Category A3-B evidence)*.[68] The literature is insufficient to evaluate the effect of administering proton pump inhibitors on perioperative pulmonary aspiration or emesis/reflux.

Both the consultants and ASA members disagree that histamine-2 receptor antagonists should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent increased risk for pulmonary aspiration. ASA members disagree and the consultants strongly disagree that proton pump inhibitors should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent increased risk for pulmonary aspiration

Recommendations for Pharmacologic Blockade of Gastric Acid Secretion

- Medications that block gastric acid secretion may be preoperatively administered to patients at increased risk of pulmonary aspiration.
- Do not routinely administer preoperative medications that block gastric acid secretion for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Preoperative Antacids. Placebo-controlled RCTs indicate that preoperative antacids (*e.g.,* sodium citrate or magnesium trisilicate) increase gastric pH during the perioperative period[57,79,99–101] *(Category A2-B evidence)*, with inconsistent (*i.e.,* equivocal) findings regarding gastric volume *(Category A2-E evidence)*.[57,79,99–101] The literature is insufficient to examine the effect of administering preoperative antacids on aspiration or emesis/reflux.

The consultants and ASA members both disagree that preoperative antacids should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent increased risk for pulmonary aspiration. The consultants and ASA members both strongly agree that, when antacids are indicated for selected patients, only nonparticulate antacids should be used.

Recommendations for Antacids

- Antacids may be preoperatively administered to patients at increased risk of pulmonary aspiration.
  - Only administer nonparticulate antacids.
- Do not routinely administer preoperative antacids for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Preoperative Antiemetics. The literature is insufficient to evaluate the effect of preoperative antiemetics on the perioperative incidence of pulmonary aspiration, gastric volume, or pH.[†††]

The consultants and ASA members both disagree that preoperative antiemetics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Antiemetics[‡‡‡]

- Antiemetics may be preoperatively administered to patients at increased risk of postoperative nausea and vomiting.
- The routine preoperative administration of antiemetics to reduce the risk of nausea and vomiting is not recommended for patients with no apparent increased risk for pulmonary aspiration.

Preoperative Anticholinergics. Placebo-controlled RCTs are equivocal regarding the efficacy of glycopyrrolate to reduce gastric volume or acidity *(Category A2-E evidence)*,[83,102] and two nonrandomized placebo-controlled comparative studies report equivocal findings the efficacy of atropine on gastric volume and acidity *(Category B1-E evidence)*.[103,104]

The ASA members disagree and the consultants strongly disagree that preoperative anticholinergics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia to decrease the risk of pulmonary aspiration.

Recommendations for Anticholinergics

- The administration of preoperative anticholinergics to reduce the risk of pulmonary aspiration is not recommended.

Preoperative Multiple Agents. RCTs report equivocal findings for gastric volume and acidity when histamine-2 receptor antagonists (*i.e.,* cimetidine, ranitidine) are combined with gastrointestinal stimulants (*i.e.,* metoclopramide) compared with either drug alone *(Category A2-E evidence)*.[56,58–60,105–107] RCTs comparing histamine-2 receptor antagonists or metoclopramide with sodium citrate report equivocal findings for gastric volume and acidity *(Category A2-E evidence)*.[57,106]

The ASA members disagree and the consultants strongly disagree that preoperative multiple agents should be

[†††] Evidentiary information and recommendations regarding the administration of preoperative antiemetics and postoperative nausea and vomiting may be found in: Practice guidelines for postanesthetic care: An updated report by the American Society of Anesthesiologists Task Force on Postanesthetic Care. Anesthesiology 2013; 118:291–307.

[‡‡‡] These guidelines do not address the use of antiemetics during the extended postoperative period after upper airway protective reflexes are no longer impaired.

routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with no apparent risk for pulmonary aspiration.

Recommendations for Multiple Agents

- The routine administration of preoperative multiple agents is not recommended for patients with no apparent increased risk for pulmonary aspiration.

Appendix 1: Summary of Recommendations

Recommendations for Preoperative Assessment

- Perform a review of pertinent medical records, a physical examination, and patient survey or interview as part of the preoperative evaluation.
  - The history, examination, and interview should include assessment of ASA physical status, age, sex, type of surgery, and potential for difficult airway management as well as consideration of gastroesophageal reflux disease,* dysphagia symptoms, other gastrointestinal motility and metabolic disorders (*e.g.,* diabetes mellitus) that may increase the risk of regurgitation and pulmonary aspiration.
- Inform patients of fasting requirements and the reasons for them sufficiently in advance of their procedures.
- Verify patient compliance with fasting requirements at the time of their procedure.
- When these fasting guidelines are not followed, compare the risks and benefits of proceeding, with consideration given to the amount and type of liquids or solids ingested.

Recommendations for Clear Liquids

- Clear liquids† may be ingested for up to 2 h before procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.
  - These liquids should not include alcohol.

Recommendations for Breast Milk

- Breast milk may be ingested for up to 4 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Recommendations for Infant Formula

- Infant formula may be ingested for up to 6 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Recommendations for Solids and Nonhuman Milk

- A light meal or nonhuman milk may be ingested for up to 6 h before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.‡
  - Additional fasting time (*e.g.,* 8 or more hours) may be needed in cases of patient intake of fried foods, fatty foods, or meat.
- Consider both the amount and type of foods ingested when determining an appropriate fasting period.
- Since nonhuman milk is similar to solids in gastric emptying time, consider the amount ingested when determining an appropriate fasting period.

Recommendations for Gastrointestinal Stimulants

- Gastrointestinal stimulants may be preoperatively administered to patients at increased risk of pulmonary aspiration.
- Do not routinely administer preoperative gastrointestinal stimulants for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Pharmacologic Blockade of Gastric Acid Secretion

- Medications that block gastric acid secretion may be preoperatively administered to patients at increased risk of pulmonary aspiration.
- Do not routinely administer preoperative medications that block gastric acid secretion for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Antacids

- Antacids may be preoperatively administered to patients at increased risk of pulmonary aspiration.
  - Only administer nonparticulate antacids.
- Do not routinely administer preoperative antacids for the purpose of reducing the risk of pulmonary aspiration in patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Antiemetics§

- Antiemetics may be preoperatively administered to patients at increased risk of postoperative nausea and vomiting.
- The routine preoperative administration of antiemetics to reduce the risk of nausea and vomiting is not

* The term "gastroesophageal reflux disease" refers to positional reflux and its consequent symptomology, rather than food intolerances (*e.g.,* "tomatoes do not agree with me").

† Examples of clear liquids include, but are not limited to, water, and fruit juices without pulp, carbonated beverages, carbohydrate-rich nutritional drinks, clear tea, and black coffee.

‡ The Task Force notes that intake of fried or fatty foods or meat may prolong gastric emptying time.

§ These guidelines do not address the use of antiemetics during the extended postoperative period after upper airway protective reflexes are no longer impaired.

recommended for patients with no apparent increased risk for pulmonary aspiration.

Recommendations for Anticholinergics

- The administration of preoperative anticholinergics to reduce the risk of pulmonary aspiration is not recommended.

Recommendations for Multiple Agents

- The routine administration of preoperative multiple agents is not recommended for patients with no apparent increased risk for pulmonary aspiration.

Appendix 2: Methods and Analyses

For these updated guidelines, systematically-reviewed studies used in the development of the previous update were combined with a systematic review of studies published subsequent to ASA approval in 2010. Both the systematic literature review and opinion data are based on *evidence linkages*, or statements regarding potential relationships between preoperative fasting interventions and pulmonary aspiration or associated complications.* The interventions listed in the evidence model below were examined to assess their impact on outcomes related to perioperative pulmonary aspiration.

Evidence Model

Patients

Inclusion criteria:

- Healthy patients.
- Patients of all ages.

Exclusion criteria:

- Patients with coexisting diseases.
- Patients with conditions that can affect gastric emptying or fluid volume.
- Patients in whom airway management might be difficult.

Procedures

Inclusion criteria:

- Elective procedures.
- Procedures in which upper airway protective reflexes may be impaired.

Exclusion criteria:

- Procedures with no anesthesia
- Procedures with local anesthesia
- Procedures whereby upper airway protective reflexes are not impaired
- Procedures whereby no risk factors for pulmonary aspiration are apparent

Interventions

Identification of patients at increased risk of pulmonary aspiration (*e.g.*, obesity, diabetes, smoking history):

- Medical records review (focused history).
- Physical examination.
- Patient questionnaire.

Preoperative fasting interventions:

- Clear liquids.
  - For adults, clear liquids between 2 and 4 h *versus* more than 4 h
  - For children, clear liquids between 2 and 4 h *versus* more than 4 h
  - Breast milk between 2 and 4 h *versus* more than 4 h
  - Formula between 2 and 4 h *versus* more than 4 h
- Solids and nonhuman milk.
  - Solids less than 4 h *versus* more than 4 h
  - Solids between 4 and 8 h *versus* more than 8 h

Preoperative pharmacologic interventions:

- Gastrointestinal stimulants.
  - Metoclopramide
  - Cisapride
- Gastric acid secretion blockers.
  - H_2 receptor antagonists
  - Cimetidine
  - Ranitidine
  - Famotidine
  - Other H_2 receptor antagonists (*e.g.,* roxatidin, nazatidine, gastrozepin)
- Proton pump inhibitors.
  - Omeprazole
  - Lanzoprazole
  - Other proton pump inhibitors (*e.g.,* pantoprazole, rabeprazole)
- Antacids (preoperative).
  - Sodium citrate
  - Sodium bicarbonate
  - Magnesium trisilicate
- Antiemetics.
  - Ondansetron
- Anticholinergics.
  - Atropine
  - Glycopyrrolate
- Multiple *versus* single pharmacologic agents.

Outcomes

Expected benefits:

- Prevention or reduction of perioperative pulmonary aspiration.
- Reduction of complications associated with pulmonary aspiration.
  - Pneumonia
  - Respiratory disabilities
  - Perioperative morbidity

* Unless otherwise specified, outcomes for the listed interventions refer to the occurrence of pulmonary aspiration complications associated with aspiration, gastric contents, or nausea/vomiting.

- Decreased risk of dehydration or hypoglycemia from prolonged fasting.
- Increased patient satisfaction.
- Avoidance of delays and cancellations.

Evidence Collection

Inclusion criteria:

- Randomized controlled trials.
- Prospective nonrandomized comparative studies (*e.g.*, quasi-experimental, cohort).
- Retrospective comparative studies (*e.g.*, case-control).
- Observational (*e.g.*, correlational or descriptive statistics).
- Case reports, case series.

Exclusion criteria (except to obtain new citations):

- Editorials.
- Literature reviews.
- Meta-analyses.
- Abstracts greater than 5 yr old.
- Unpublished studies.
- Studies in non-peer-reviewed journals.
- Newspaper articles.

Survey evidence:

- Expert consultant survey.
- ASA membership survey.
- Literature reliability survey.
- Feasibility of implementation survey.

State of the Literature. For the systematic review, potentially relevant clinical studies were identified *via* electronic and manual searches of the literature. Healthcare database searches included PubMed, Web of Science, Google Books, and the Cochrane Central Register of Controlled Trials. The updated searches covered a 6.5-yr period from January 1, 2010, through May 31, 2016. Search terms consisted of the interventions indicated above guided by the appropriate inclusion/exclusion criteria as stated in the "Focus" section of these updated guidelines. Only studies containing original findings from peer-reviewed journals were acceptable. Editorials, letters, and other articles without data were excluded.

Two hundred ninety-eight new citations were identified and reviewed, with 42 new studies meeting the above stated criteria. These studies were combined with 133 pre-2010 articles used in the previous update, resulting in a total of 175 articles found acceptable as evidence for these guidelines. A complete bibliography of articles used to develop these updated guidelines, organized by section, is available as Supplemental Digital Content 2, http://links.lww.com/ALN/B348.

For these guidelines, the *primary* outcomes of interest are pulmonary aspiration and the frequency or severity of adverse consequences associated with aspiration (*e.g.,* pneumonitis). Although controlled studies do not sufficiently evaluate such relationships, the reported evidence does focus on intermediate outcomes, including gastric contents (*e.g.,* volume or pH) and nausea and vomiting, typically considered by the authors to be representative of a predicted "risk" of pulmonary aspiration.

Results for each pertinent outcome are summarized and, when sufficient numbers of RCTs are found, formal meta-analyses are conducted. The literature relating to seven evidence linkages contained enough studies with well-defined experimental designs and statistical information to conduct formal meta-analyses. These seven evidence linkages are: (1) preoperative fasting of liquids between 2 and 4 h for adults, (2) preoperative fasting of liquids between 2 and 4 h for children, (3) preoperative metoclopramide, (4) preoperative ranitidine (orally administered), (5) preoperative cimetidine (orally administered), (6) preoperative omeprazole (orally administered), and (7) perioperative ondansetron (intravenously administered). Outcomes assessed were limited to gastric volume, gastric acidity, nausea, and vomiting (table 2).

General variance-based effect-size estimates or combined probability tests were obtained for continuous outcome measures, and Mantel-Haenszel odds ratios were obtained for dichotomous outcome measures. Two combined probability tests were employed as follows: (1) the Fisher combined test, producing chi-square values based on logarithmic transformations of the reported P values from the independent studies, and (2) the Stouffer combined test, providing weighted representation of the studies by weighting each of the standard normal deviates by the size of the sample. An odds ratio procedure based on the Mantel-Haenszel method for combining study results using 2 x 2 tables was used with outcome frequency data. An acceptable significance level was set at $P < 0.01$ (one-tailed). Tests for heterogeneity of the independent studies were conducted to assure consistency among the study results. When significant heterogeneity was found among the studies ($P < 0.01$), DerSimonian-Laird random-effects odds ratios were obtained. To evaluate potential publishing bias, a "fail-safe n" value was calculated. No search for unpublished studies was conducted, and no reliability tests for locating research results were done. For findings to be accepted as significant, odds ratios must agree with combined test results whenever both types of data were assessed. In addition, findings from both the Fisher and weighted Stouffer combined tests must agree with each other.

Consensus-based Evidence. For the previous update, consensus was obtained from multiple sources, including: (1) survey opinion from consultants who were selected based on their knowledge or expertise in preoperative fasting and prevention of pulmonary aspiration, (2) survey opinions solicited from active members of the ASA membership, (3) testimony from attendees of a publicly-held open forum for the original guidelines held at a national anesthesia meeting, (4) Internet commentary, and (5) Task Force opinion and interpretation. The survey rate of return is 59.7% (n = 37 of 62) for the consultants (table 3), and 471 responses were received from active ASA members (table 4).

For the previous update, an additional survey was sent to the consultants asking them to indicate which, if any, of the evidence linkages would change their clinical practices if the guidelines were instituted. The percent of consultants expecting no change associated with each linkage were as follows: preoperative assessment 95%; preoperative fasting of solids 75%; preoperative fasting of liquids 67%; preoperative fasting of breast milk 78%; gastrointestinal stimulants 95%; pharmacologic blockage of gastric secretion 91%; antacids 100%; antiemetics 98%, anticholinergics 100%, and multiple agents 98%. Ninety-six percent of the respondents indicated that the guidelines would have no effect on the amount of time spent on a typical case.

Table 1. Fasting and Pharmacologic Recommendations

*A. Fasting Recommendations**	
Ingested Material	Minimum Fasting Period†
• Clear liquids‡	2h
• Breast milk	4h
• Infant formula	6h
• Nonhuman milk§	6h
• Light meal**	6h
• Fried foods, fatty foods, or meat	Additional fasting time (*e.g.,* 8 or more hours) may be needed
B. Pharmacologic Recommendations	
Medication Type and Common Examples	Recommendation
Gastrointestinal stimulants:	
• Metoclopramide	May be used/no routine use
Gastric acid secretion blockers:	
• Cimetidine	May be used/no routine use
• Famotidine	May be used/no routine use
• Ranitidine	May be used/no routine use
• Omeprazole	May be used/no routine use
• Lansoprazole	May be used/no routine use
Antacids:	
• Sodium citrate	May be used/no routine use
• Sodium bicarbonate	May be used/no routine use
• Magnesium trisilicate	May be used/no routine use
Antiemetics:	
• Ondansetron	May be used/no routine use
Anticholinergics:	
• Atropine	No use
• Scopolamine	No use
• Glycopyrrolate	No use
Combinations of the medications above:	No routine use

*These recommendations apply to healthy patients who are undergoing elective procedures. They are not intended for women in labor. Following the guidelines does not guarantee complete gastric emptying.

†The fasting periods noted above apply to all ages.

‡Examples of clear liquids include water, fruit juices without pulp, carbonated beverages, clear tea, and black coffee.

§Since nonhuman milk is similar to solids in gastric emptying time, the amount ingested must be considered when determining an appropriate fasting period.

**A light meal typically consists of toast and clear liquids. Meals that include fried or fatty foods or meat may prolong gastric emptying time. Additional fasting time (*e.g.,* 8 or more hours) may be needed in these cases. Both the amount and type of foods ingested must be considered when determining an appropriate fasting period.

Table 2. Meta-Analysis Summary

Evidence Linkages	N†	Odds Ratio‡	Confidence Interval§	Fisher Chi-Square	*P* Value	Stouffer Z_c	*P* Value	Effect Size††	Heterogeneity: Significance‡‡	Heterogeneity: Effect Size§§
Preoperative fasting for clear liquids: Adults; 2–4 h vs. *> 4 h*										
Gastric volume [12–18,20,21]	9			43.95	0.001	–1.85	0.032	–0.07	0.074	0.049
Gastric volume < 25 mL [12,13,16–20]	7	1.61	0.97–2.66							0.238
Gastric pH [12–18,20,21]	9			36.65	0.006	1.10	0.136	0.06	0.543	0.319
Gastric pH > 2.5 [12,13,16–20]	7	1.75	0.88–3.48							0.910
Low risk*** [12,13,16,17,19,20]	6	1.87	1.10–3.18							0.452
Preoperative fasting for clear liquids: Children; 2–4 h vs. *> 4 h*										
Gastric volume [34–42]	9			39.07	0.006	–1.37	0.085	–0.05	0.132	0.136
Gastric volume < 0.04 mL/kg [33–35,37,38,41,42]	7	1.31	0.81–2.10							0.368
Gastric pH [34–37,39–42]	8			32.98	0.007	2.86	0.002	0.11	0.744	0.833
Gastric pH > 2.5 [33–35,37,38]	5	0.81	0.37–1.75							0.558
Low risk [33,35,37–42]	8	1.06	0.71–1.57							0.384
Metoclopramide vs. *placebo:*										
Gastric volume [55–60]	6*			49.61	0.001	–5.06	0.001	–0.34	0.599	0.681
Gastric pH [56–60]	5			37.06	0.001	3.56	0.001	0.28	0.303	0.096
Ranitidine vs. *placebo:* †††										
Gastric volume [61,64–68]	6**			62.72	0.001	–9.27	0.001	–0.66	0.001	0.001
Gastric volume < 25 mL [56,62–64,69–70]	6*	7.60	3.53–16.39							0.046
Gastric pH [61,64–68]	6**			91.21	0.001	14.13	0.001	0.21	0.285	0.001
Gastric pH > 2.5 [61,62–66,69]	6**	31.06	10.17–94.86							0.593
Low risk [62,64,67–69]	5**	29.93	6.35–141.03							0.949
Cimetidine vs. *placebo:* †††										
Gastric volume [58,59,66,76,77,80,81,83–86]	11			87.28	0.001	–6.20	0.001	–0.30	0.048	0.021
Gastric volume < 25 mL [58,79,82–86]	7	5.27	2.55–10.88							0.700
Gastric pH [58,59,66,76,79,80,83,85,87]	9			120.75	0.001	14.07	0.001	0.74	0.001	0.001
Gastric pH > 2.5 [58,66,75–78,81–85]	11	20.47	11.03–37.99							0.458
Low risk [58,79,83–85]	5**	8.76	2.87–26.69							0.577
Omeprazole vs. *placebo:* †††										
Gastric volume [63,67,93–95]	5**			46.22	0.001	–5.56	0.001	–0.39	0.041	0.001
Gastric pH [63,67,93–95]	5**			53.25	0.001	5.50	0.001	0.37	0.448	0.080

†Number of studies included in the meta-analysis. If followed by * all study designs are blinded. If followed by ** all study designs are double-blind.

‡Mantel-Haenszel fixed-effect analysis (estimate of common effect size); random effect size analyses were not required.

§99% CIs.

††Stouffer weighted effect-size estimate.

‡‡Statistical significance values for homogeneity/heterogeneity of statistical tests; $P < 0.01$ indicates that the studies are significantly heterogeneous.

§§Statistical significance values for homogeneity/heterogeneity of effect size; $P < 0.01$ indicates that the studies are significantly heterogeneous.

***Low risk = gastric volume < 25 ml and pH > 2.5.

†††Oral administration.

Table 3. Consultant Survey Responses*

	N	Percent Responding to Each Item: Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
Preoperative Assessment						
1. A review of pertinent records, a physical examination, and patient survey or interview should be performed as part of the preoperative evaluation	37	86.5*	13.5	0.0	0.0	0.0
2. Patients should be informed of fasting requirements and the reasons for them sufficiently in advance of their procedures	37	97.3*	2.7	0.0	0.0	0.0
3. Verification of patient compliance with the fasting requirements should be assessed immediately prior to the time of the procedure	36	94.4*	5.6	0.0	0.0	0.0
Preoperative Fasting Status						
Clear Liquids:						
4a. For otherwise healthy *infants* (< 2 yr of age), fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	59.5*	27.0	10.8	0.0	2.7
4b. For otherwise healthy *children* (2 to 16 yr of age), fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	54.1*	32.4	10.8	2.7	0.0
4c. For otherwise healthy *adults*, fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	56.8*	40.5	2.7	0.0	0.0
Breast Milk:						
5a. For otherwise healthy *neonates* (< 44 gestational weeks), fasting from the intake of breast milk for *4 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	37.8	35.1*	18.9	8.1	0.0
5b. For otherwise healthy *infants*, fasting from the intake of breast milk for *4 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	43.2	37.8*	18.9	0.0	0.0
Infant Formula:						
6a. For *neonates*, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	27.0	32.4*	24.3	13.5	2.7
6b. For infants, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	36	36.1	30.6*	16.7	13.9	2.8
6c. For children, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	32.4	40.5*	21.6	5.4	0.0
Nonhuman Milk:						
7a. For infants, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	35	31.4	34.3*	22.9	11.4	0.0
7b. For children, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	29.7	46.0*	18.9	5.4	0.0
7c. For adults, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	37	43.2	46.0*	5.4	5.4	0.0

(*Continued*)

Table 3. (Continued)

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
Solids:						
8. Fasting from the intake of a *light meal* (*e.g.*, toast and a clear liquid) for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	36	41.7	44.4*	0.0	13.9	0.0
9. Fasting from the intake of a meal that includes *fried or fatty foods* for *8 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	36	63.9*	27.8	2.8	2.8	2.8
Preoperative Gastrointestinal Stimulants						
10. Gastrointestinal stimulants should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	36	0.0	0.0	5.6	47.2*	47.2
Preoperative Pharmacologic Blockade of Gastric Acid Secretion						
11. Histamine-2 receptor antagonists should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	36	0.0	2.8	5.6	44.4*	47.2
12. Proton pump inhibitors should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	37	0.0	2.7	8.1	37.8	51.4*
Preoperative Antacids						
13a. Preoperative antacids should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	36	0.0	2.8	2.8	47.2*	47.2
13b. When antacids are indicated for selected patients, only nonparticulate antacids should be used	36	55.6*	27.8	11.1	0.0	5.6
Preoperative Antiemetics						
14. Preoperative antiemetics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	37	0.0	5.4	0.0	51.4*	43.2
Preoperative Anticholinergics						
15. Preoperative anticholinergics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia to decrease the risk of pulmonary aspiration	37	0.0	2.7	2.7	40.5	54.1*
Preoperative Multiple Agents						
16. Preoperative multiple agents should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	37	0.0	2.7	0.0	43.2	54.1*

*An asterisk beside an agreement value represents the median.

N = number of consultants who responded to each item.

Table 4. ASA Members Survey Responses*

	N	Percent Responding to Each Item: Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
***Preoperative Assessment*:**						
1. A review of pertinent records, a physical examination, and patient survey or interview should be performed as part of the preoperative evaluation	470	93.2*	6.0	0.4	0.2	0.2
2. Patients should be informed of fasting requirements and the reasons for them sufficiently in advance of their procedures	470	93.4*	6.4	0.0	0.0	0.2
3. Verification of patient compliance with the fasting requirements should be assessed immediately prior to the time of the procedure	468	88.5*	9.6	1.3	0.2	0.4
Preoperative Fasting Status						
Clear Liquids:						
4a. For otherwise healthy *infants* (< 2 yr of age), fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	471	66.9*	25.1	5.7	2.1	0.2
4b. For otherwise healthy *children* (2 to 16 yr of age), fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	467	67.0*	23.3	5.6	3.6	0.4
4c. For otherwise healthy *adults*, fasting from the intake of clear liquids for *2 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	465	64.5*	21.5	6.0	6.5	1.5
Breast Milk:						
5a. For otherwise healthy *neonates* (< 44 gestational weeks), fasting from the intake of breast milk for *4 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	465	53.6*	29.5	13.1	3.0	0.9
5b. For otherwise healthy *infants*, fasting from the intake of breast milk for *4 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	466	55.6*	32.4	8.6	2.8	0.6
Infant Formula:						
6a. For *neonates*, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	455	45.7	30.1*	16.9	5.9	1.3
6b. For infants, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	459	47.9	33.8*	12.4	4.8	1.1
6c. For children, fasting from the intake of infant formula for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	456	52.6*	32.5	10.5	3.3	1.1
Nonhuman Milk:						
7a. For infants, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	458	47.6	33.4*	12.5	5.0	1.5
7b. For children, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	460	51.1*	34.4	8.4	4.8	1.3
7c. For adults, fasting from the intake of nonhuman milk for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	462	55.6*	33.3	5.0	4.8	1.3

(*Continued*)

Table 4. (Continued)

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
Solids:						
8. Fasting from the intake of a *light meal* (*e.g.*, toast and a clear liquid) for *6 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	468	59.0*	29.7	4.1	6.2	1.1
9. Fasting from the intake of a meal that includes *fried or fatty foods* for *8 or more hours* before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia should be maintained	470	68.5*	22.6	4.7	3.6	0.6
Preoperative Gastrointestinal Stimulants						
10. Gastrointestinal stimulants should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	468	1.9	4.5	8.3	48.8*	36.5
Preoperative Pharmacologic Blockade of Gastric Acid Secretion						
11. Histamine-2 receptor antagonists should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	470	4.0	7.9	9.2	44.7*	34.2
12. Proton pump inhibitors should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	470	1.3	3.6	11.9	46.8*	36.4
Preoperative Antacids						
13a. Preoperative antacids should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* risk for pulmonary aspiration	467	0.6	2.8	6.6	52.0*	37.9
13b. When antacids are indicated for selected patients, only nonparticulate antacids should be used	466	65.2*	28.5	4.5	1.5	0.2
Preoperative Antiemetics						
14. Preoperative antiemetics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	461	4.3	11.9	8.5	49.9*	25.4
Preoperative Anticholinergics						
15. Preoperative anticholinergics should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation to decrease the risk of pulmonary aspiration	466	1.3	1.7	7.6	53.4*	36.1
Preoperative Multiple Agents						
16. Preoperative multiple agents should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with *no apparent* increased risk for pulmonary aspiration	470	2.3	4.7	7.9	44.3*	40.9

*An asterisk beside an agreement value represents the median.

N = number of American Society of Anesthesiologists (ASA) members who responded to each item.

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Competing Interests

The authors declare no competing interests.

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Address correspondence to the American Society of Anesthesiologists: 1061 American Lane, Schaumburg, Illinois 60173. guidelines@asahq.org. These updated Practice Guidelines, and all ASA Practice Parameters, may be obtained at no cost through the Journal Web site, www.anesthesiology.org.

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