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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**

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

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

* Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are available in both the HTML and PDF versions of this article. Links to the digital files are provided in the HTML text of this article on the Journal's Web site (www.anesthesiology.org.) a complete bibliography used to develop these updated Guidelines, arranged alphabetically by author, is available as Supplemental Digital Content, <http://links.lww.com/ALN>

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Address reprint requests to the American Society of Anesthesiologists: 1061 American Lane, Schaumburg, Illinois 60173-4973. These Practice Guidelines, as well as all ASA Practice Parameters, may be obtained at no cost through the Journal Web site, www.anesthesiology.org.

[†] 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

13 **Methodology**

14 *A. Definition of Preoperative Fasting and Pulmonary Aspiration*

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

23 *B. Purposes of the Guidelines*

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

34 *C. Focus*

35 Prevention of perioperative pulmonary aspiration is part of the process of preoperative
36 evaluation and preparation of the patient. The Guidelines specifically focus on preoperative fasting

37 recommendations, as well as recommendations regarding the administration of pharmacologic
38 agents to modify the volume and acidity of gastric contents during procedures in which upper
39 airway protective reflexes may be impaired.

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

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

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

57 *D. Application*

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

61 *E. Task Force Members and Consultants*

62 In 2015, the ASA Committee on Standards and Practice Parameters requested that the updated
63 Guidelines published in 2011 be re-evaluated. This current update consists of a literature evaluation
64 and an update of the evidence-based guideline nomenclature. A summary of recommendations is
65 found in Appendix 1 (*Table 1*).

66 The previous update was developed by an ASA appointed task force of 10 members, including
67 anesthesiologists in both private and academic practice from various geographic areas of the United
68 States and consulting methodologists from the ASA Committee on Standards and Practice
69 Parameters.

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

81 *F. Availability and Strength of Evidence*

82 Preparation of these Guidelines followed a rigorous methodological process. Evidence was
83 obtained from two principal sources: scientific evidence and opinion-based evidence (*Appendix 2*).

[‡] Society for Ambulatory Anesthesia 12th Annual Meeting, Orlando, FL, 1997.

84 Scientific Evidence:

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

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

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

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

[§] 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.

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

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

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

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

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

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

120 Level 4: The literature contains case reports.

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

127 **Opinion-Based Evidence:**

128 All opinion-based evidence (*e.g.*, survey data, open-forum testimony, internet-based comments,
129 letters, and editorials) relevant to each topic was considered in the development of these updated

130 Guidelines. However, only the findings obtained from formal surveys are reported in the current
131 update.

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

135 *Category A: Expert Opinion.* Survey responses from Task Force-appointed expert consultants
136 are reported in summary form in the text, with a complete listing of consultant survey responses
137 reported in Appendix 2 (*Table 3*).

138 *Category B: Membership Opinion.* Survey responses from active ASA members are reported in
139 summary form in the text, with a complete listing of ASA member survey responses reported in
140 Appendix 2 (*Table 4*).

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

143	<i>Strongly Agree:</i>	Median score of 5 (At least 50% of the responses are 5)
144	<i>Agree:</i>	Median score of 4 (At least 50% of the responses are 4 or 4 and 5)
145	<i>Equivocal:</i>	Median score of 3 (At least 50% of the responses are 3, or no other
146		response category or combination of similar categories contain at least
147		50% of the responses)
148	<i>Disagree:</i>	Median score of 2 (At least 50% of responses are 2 or 1 and 2)
149	<i>Strongly Disagree:</i>	Median score of 1 (At least 50% of responses are 1)

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

** 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.

154 **Guidelines:**

155 *Preoperative Assessment*

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

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

170 ***Recommendations for preoperative assessment:***

- 171 • Perform a review of pertinent medical records, a physical examination, and patient
172 survey or interview as part of the preoperative evaluation.
- 173 ○ The history, examination, and interview should include assessment of ASA
174 physical status, age, gender, type of surgery, and potential for difficult airway
175 management as well as consideration of gastroesophageal reflux disease,
176 dysphagia symptoms, other gastrointestinal motility and metabolic disorders
177 (*e.g.*, diabetes mellitus) that may increase the risk of regurgitation and

178 pulmonary aspiration.

- 179 • Inform patients of fasting requirements and the reasons for them sufficiently in advance
- 180 of their procedures.
- 181 • Verify patient compliance with fasting requirements at the time of their procedure.
- 182 • When these fasting guidelines are not followed, compare the risks and benefits of
- 183 proceeding, with consideration given to the amount and type of liquids or solids
- 184 ingested.

185 *II. Preoperative Fasting of Clear Liquids*

186 Meta-analysis of RCTs comparing fasting times of 2-4 hours *versus* more than 4 hours report

187 equivocal findings for gastric volume and gastric pH values in *adult patients* given clear liquids 2-4

188 hours before a procedure (*Category A1-E evidence*).¹²⁻²¹ RCTs reported less thirst and hunger for

189 fasting times of 2-4 hours versus more than 4 hours (*Category A2-B evidence*).^{12,13,19,22-24} Similarly,

190 RCTs comparing nutritional or carbohydrate drinks at 2-4 hours versus more than 4 hours of fasting

191 report equivocal findings for gastric volume, gastric pH, blood glucose values, hunger and thirst

192 (*Category A2-E evidence*).^{15, 21,24-32} A meta-analysis of RCTs reports a lower risk of aspiration (*i.e.*,

193 gastric volume < 25 mL and pH > 2.5) when clear liquids are given 2-4 hours before a procedure

194 (*Category A1-B evidence*).^{12,13,16,17,19,20}

195 Meta-analysis of RCTs report higher gastric pH values (*Category A1-B evidence*) and equivocal

196 findings regarding differences in gastric volume (*Category A1-E evidence*) for *children* given clear

197 liquids 2-4 hours *versus* fasting for more than four hours before a procedure.³³⁻⁴² Ingested volumes

198 of clear liquids in the above studies range from 100 ml to unrestricted amounts for adults, and 2

199 ml/kg to unrestricted amounts for children. One randomized controlled trial comparing 2 hour

200 fasting with fasting from midnight reported equivocal findings for blood glucose and insulin values
201 (*Category A3-E evidence*).⁴³

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

206 ***Recommendations for clear liquids:***

- 207 • Clear liquids^{††} may be ingested for up to 2 hours before procedures requiring general
208 anesthesia, regional anesthesia, or procedural sedation and analgesia.
 - 209 ○ These liquids should not include alcohol.

210 ***III. Preoperative Fasting of Breast Milk***

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

216 The consultants agree and the ASA members strongly agree that for otherwise healthy neonates
217 (< 44 gestational weeks) and infants, fasting from the intake of breast milk for 4 or more hours
218 before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation
219 and analgesia should be maintained.

^{††} 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.

220 ***Recommendations for breast milk:***

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

223 ***IV. Preoperative Fasting of Infant Formula***

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

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

232 ***Recommendations for infant formula:***

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

235 ***V. Preoperative Fasting of Solids and Non-Human Milk***

236 An RCT comparing a light breakfast consumed less than 4 hours before a procedure with
237 overnight fasting reports equivocal findings for gastric volume and pH levels for adults (*Category*
238 *A3-E evidence*).⁴⁷ A second RCT reports equivocal findings when a light breakfast is allowed at 4
239 hours compared with 6 hours before a cesarean section (*Category A3-E evidence*), although a
240 significant reduction in maternal and neonatal blood glucose levels was reported when fasting was
241 extended beyond 6 hours (*Category A3-H evidence*).⁴⁸ Nonrandomized comparative studies for
242 children given non-human milk 4 hours or less before a procedure *versus* children fasted for more

243 than 4 hours report equivocal findings for gastric volume and pH (*Category B1-E evidence*).⁴⁹⁻⁵¹
244 One non-randomized study indicated that fasting for more than 8 hours may be associated with
245 significantly lower blood glucose levels (*Category B1-H evidence*).⁵¹ The literature is insufficient
246 to evaluate the effect of the timing of ingestion of solids and non-human milk and the perioperative
247 incidence of pulmonary aspiration or emesis/reflux. Although the literature is insufficient to
248 evaluate the influence of *preoperatively* adding milk or milk products to clear liquids (*e.g.*, tea or
249 coffee) on either pulmonary aspiration, gastric volume, pH, or gastric emptying, some studies with
250 healthy volunteer subjects have reported equivocal findings for gastric volume and gastric emptying
251 when these products are added to clear liquids.⁵²⁻⁵⁴

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

258 Both the consultants and ASA members agree that for infants, fasting from the intake of non-
259 human milk for 6 or more hours before elective procedures requiring general anesthesia, regional
260 anesthesia, or procedural sedation and analgesia should be maintained. The consultants agree and
261 the ASA members strongly agree that for children and adults, fasting from the intake of non-human
262 milk for 6 or more hours before elective procedures requiring general anesthesia, regional
263 anesthesia, or procedural sedation and analgesia should be maintained.

264 ***Recommendations for solids and non-human milk:***

- 265 • A light meal or non-human milk may be ingested for up to 6 hours before elective
266 procedures requiring general anesthesia, regional anesthesia, or procedural sedation and
267 analgesia.^{‡‡}
- 268 ○ Additional fasting time (*e.g.*, 8 or more hours) may be needed in cases of patient
269 intake of fried foods, fatty foods or meat.
- 270 • Consider both the amount and type of foods ingested when determining an appropriate
271 fasting period.
- 272 • Since non-human milk is similar to solids in gastric emptying time, consider the amount
273 ingested when determining an appropriate fasting period.

274 ***VI. Preoperative gastrointestinal stimulants***

275 Meta-analysis of placebo-controlled RCTs indicate that metoclopramide is effective in reducing
276 gastric volume and pH during the perioperative period (*Category A1-B evidence*).⁵⁵⁻⁶⁰ The
277 literature is insufficient to evaluate the effect of metoclopramide on the perioperative incidence of
278 pulmonary aspiration.^{§§}

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

^{‡‡} 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.”

283 ***Recommendations for gastrointestinal stimulants:***

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

289 ***VII. Preoperative Pharmacologic Blockade of Gastric Acid Secretion***

290 ***Histamine-2 receptor antagonists:*** Meta-analysis of blinded placebo-controlled RCTs indicate
291 that orally-administered ranitidine is effective in reducing gastric volume and acidity; the frequency
292 of gastric volume > 25 mL; the frequency of gastric pH levels < 2.5; and the risk of aspiration (*i.e.*,
293 gastric volume > 25 mL and pH < 2.5) during the perioperative period (*Category A1-B*
294 *evidence*),^{56,61-70} Placebo-controlled RCTs of *intravenous* ranitidine report similar results for
295 gastric pH (*Category A2-B evidence*) and equivocal findings for gastric volume (*Category A2-E*
296 *evidence*).^{66,71-74}

297 Meta-analysis of placebo-controlled RCTs indicate that orally-administered cimetidine is
298 effective in reducing gastric volume and acidity; the frequency of gastric volume > 25 mL; the
299 frequency of gastric pH levels < 2.5; and the risk of aspiration (*i.e.*, gastric volume > 25 mL and pH
300 < 2.5) during the perioperative period (*Category A1-B evidence*).^{58,59,66,75-87} Placebo-controlled
301 RCTs of *intravenous* cimetidine report similar results for gastric pH (*Category A2-B evidence*), but
302 equivocal findings for gastric volume (*Category A2-E evidence*).^{60,66,71,78,88}

303 Placebo-controlled RCTs indicate that orally-administered famotidine is effective in reducing
304 gastric volume and acidity during the perioperative period (*Category A2-B evidence*).^{64,89-91} One
305 placebo-controlled RCT reports similar findings for intramuscular famotidine (*Category A3-B*

306 *evidence*).⁹² The literature is insufficient to evaluate the effect of administering histamine-2
307 receptor antagonists on perioperative pulmonary aspiration or emesis/reflux.

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

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

321 ***Recommendations for pharmacologic blockade of gastric acid secretion:***

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

327 ***VIII. Preoperative antacids***

328 Placebo-controlled RCTs indicate that preoperative antacids (*e.g.*, sodium citrate or magnesium
329 trisilicate) increase gastric pH during the perioperative period^{57,79,99-101} (*Category A2-B evidence*);

330 with inconsistent (*i.e.*, equivocal) findings regarding gastric volume (*Category A2-E evidence*).

331 ^{57,79,99-101} The literature is insufficient to examine the effect of administering preoperative antacids
332 on aspiration or emesis/reflux.

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

338 ***Recommendations for antacids:***

- 339 • Antacids may be preoperatively administered to patients at increased risk of pulmonary
340 aspiration.
 - 341 ○ Only administer nonparticulate antacids.
- 342 • Do not routinely administer preoperative antacids for the purpose of reducing the risk
343 of pulmonary aspiration in patients with no apparent increased risk for pulmonary
344 aspiration.

345 ***IX. Preoperative antiemetics***

346 The literature is insufficient to evaluate the effect of preoperative antiemetics on the
347 perioperative incidence of pulmonary aspiration, gastric volume, or pH. ***

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

*** 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."

352 ***Recommendations for antiemetics:^{†††}***

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

358 ***X. Preoperative anticholinergics***

359 Placebo-controlled RCTs are equivocal regarding the efficacy of glycopyrrolate to reduce
360 gastric volume or acidity (*Category A2-E evidence*),^{83,102} and two nonrandomized placebo-
361 controlled comparative studies report equivocal findings the efficacy of atropine on gastric volume
362 and acidity (*Category B1-E evidence*).^{103,104}

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

367 ***Recommendations for anticholinergics:***

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

370 ***XI. Preoperative multiple agents***

371 RCTs report equivocal findings for gastric volume and acidity when histamine-2 receptor
372 antagonists (*i.e.*, cimetidine, ranitidine) are combined with gastrointestinal stimulants (*i.e.*,

^{†††} These Guidelines do not address the use of antiemetics during the extended postoperative period after upper airway protective reflexes are no longer impaired.

373 metoclopramide) compared with either drug alone (*Category A2-E evidence*).^{56,58-60,105-107} RCTs
374 comparing histamine-2 receptor antagonists or metoclopramide with sodium citrate report equivocal
375 findings for gastric volume and acidity (*Category A2-E evidence*).^{57,106}

376 The ASA members disagree and the consultants strongly disagree that preoperative multiple
377 agents should be routinely administered before elective procedures requiring general anesthesia,
378 regional anesthesia, or procedural sedation and analgesia in patients with no apparent risk for
379 pulmonary aspiration.

380 ***Recommendations for multiple agents:***

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

DRAFT

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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, gender, 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 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 hours 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 hours 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 hours before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia.

Recommendations for solids and non-human milk:

- A light meal or non-human milk may be ingested for up to 6 hours 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 non-human 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.

^{§§§} 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.

- 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 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.

^{††††} These Guidelines do not address the use of antiemetics during the extended postoperative period after upper airway protective reflexes are no longer impaired.

Table 1: Fasting and Pharmacologic Recommendations

A. Fasting Recommendations^{††††}

<u>Ingested Material</u>	<u>Minimum Fasting Period^{§§§§}</u>
• Clear liquids ^{*****}	2 h
• Breast milk	4 h
• Infant formula	6 h
• Non-human 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

<u>Medication Type and Common Examples</u>	<u>Recommendation</u>
<i>Gastrointestinal stimulants:</i>	
• Metoclopramide	May be used/no routine use
<i>Gastric acid secretion blockers:</i>	
• 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
<i>Antacids:</i>	
• Sodium citrate	May be used/no routine use
• Sodium bicarbonate	May be used/no routine use
• Magnesium trisilicate	May be used/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 non-human 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.

Antiemetics:

- Ondansetron

May be used/no routine use

Anticholinergics:

- Atropine
- Scopolamine
- Glycopyrrolate

No use

No use

No use

Combinations of the medications above:

No routine use

DRAFT

Appendix 3: 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 co-existing 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.

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

- Patient questionnaire.

Preoperative fasting interventions:

- Clear liquids.
 - For adults, clear liquids between 2 and 4 versus more than 4 hours
 - For children, clear liquids between 2 and 4 hours versus more than 4 hours
 - Breast milk between 2 and 4 hours versus more than 4 hours
 - Formula between 2 and 4 hours versus more than 4 hours
- Solids and non-human milk.
 - Solids less than 4 versus more than 4 hours
 - Solids between 4 and 8 hours versus more than 8 hours

Preoperative pharmacologic interventions:

- Gastrointestinal stimulants.
 - Metoclopramide
 - Cisapride
- Gastric acid secretion blockers.
 - H₂ receptor antagonists
 - Cimetidine
 - Ranitidine
 - Famotidine
 - Other H₂ 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
- 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 years 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.

A. *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-year 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 this Advisory. Only studies containing original findings from peer-review 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/___.

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 five evidence linkages contained enough studies with well-defined experimental designs and statistical information to conduct formal meta-analyses. These five evidence linkages are: (1) preoperative fasting of liquids between 2 and 4 hours for adults, (2) preoperative fasting of liquids between 2 and 4 hours for children, (3) preoperative metoclopramide, (4) preoperative ranitidine (orally administered), (5) preoperative cimetidine (orally administered), (6) preoperative omeprazole (orally administered), and (7) perioperative ondansetron (IV 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 control for 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.

For the previous updated Guidelines, interobserver agreement among Task Force members and two methodologists was established by interrater reliability testing. Agreement levels using a kappa (κ) statistic for two-rater agreement pairs are as follows: (1) type of study design, $k = 0.75$ to 0.95 ; (2) type of analysis, $k = 0.54$ to 0.85 ; (3) evidence linkage assignment, $k = 0.68$ to 0.82 ; and (4) literature inclusion for database, $k = 0.64$ to 0.78 . Three-rater chance-corrected agreement values are: (1) design, $Sav = 0.81$, $Var(Sav) = 0.006$; (2) analysis, $Sav = 0.66$, $Var(Sav) = 0.014$; (3) linkage identification, $Sav = 0.75$, $Var(Sav) = 0.005$; (4) literature database inclusion, $Sav = 0.67$, $Var(Sav) = 0.050$. These values represent moderate to high levels of agreement.

B. 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.

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Table 2. Meta-Analysis Summary

Evidence Linkages*****	N†††††	Odds Ratio†††††	Confidence Interval§§§§§	Fisher Chi-Square	p	Stouffer Zc	p	Effect Size*****	Heterogeneity	
									Significance†††††	Effect Size*****
<i>Preoperative fasting for clear liquids:</i>										
<i>Adults; 2-4 hours versus > 4 hours</i>										
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	1.73	0.89-3.36						0.910	
Low risk§§§§§§§ ^{12,13,16,17,19,20}	6	1.86	1.10-3.14						0.452	
<i>Preoperative fasting for clear liquids:</i>										
<i>Children; 2-4 hours versus > 4 hours</i>										
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	1.30	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	0.37-1.74						0.558	
Low risk ^{33,35,37-42}	8	1.06	0.71-1.57						0.384	
<i>Metoclopramide versus placebo:</i>										
Gastric volume ⁵²⁻⁵⁷	6*			49.61	0.001	-5.06	0.001	-0.34	0.599	0.681
Gastric pH ⁵³⁻⁵⁷	5			37.06	0.001	3.56	0.001	0.28	0.303	0.096
<i>Ranitidine versus placebo: *****</i>										
Gastric volume ^{66,69-73}	6**			62.72	0.001	-9.27	0.001	-0.66	0.001	0.001
Gastric volume < 25 mL ^{53,67-69,74,75}	6*	6.02	3.28-11.04						0.046	
Gastric pH ^{66,69-73}	6**			91.21	0.001	14.13	0.001	0.21	0.285	0.001
Gastric pH > 2.5 ^{66,67,69-71,74}	7**	14.98	8.03-27.90						0.072	
Low risk ^{67,69,72-74}	5**	8.97	4.38-18.35						0.949	

***** Evidence linkage with references for included studies.

††††† 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); DerSimonian-Laird (random-effect analysis) available when required.

§§§§§ 99% confidence intervals.

***** Stouffer weighted effect-size estimate.

††††††† Statistical significance values for homogeneity/heterogeneity of statistical tests; a p value of < 0.01 indicates that the studies are significantly heterogeneous.

††††††† Statistical significance values for homogeneity/heterogeneity of effect size; a p value of < 0.01 indicates that the studies are significantly heterogeneous.

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

***** Oral administration.

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Cimetidine versus placebo: ††††††††

Gastric volume	^{55,56,71,82,83,86,87,89-92}	11			87.28	0.001	-6.20	0.001	-0.30	0.048	0.021
Gastric volume < 25 mL	^{55,85,88-92}	7	4.43	2.39-8.20						0.700	
Gastric pH	^{55,56,71,82,85,89,91,93}	9			120.75	0.001	14.07	0.001	0.74	0.001	0.001
Gastric pH > 2.5	^{55,71,81-84,87-91}	11	13.06	8.23-20.71						0.458	
Low risk	^{55,85,89-91}	5**	5.69	2.63-12.35						0.577	

Omeprazole versus placebo: ††††††††

Gastric volume	^{68,72,98-100}	5**			46.22	0.001	-5.56	0.001	-0.39	0.041	0.001
Gastric pH	^{68,72,98-100}	5**			53.25	0.001	5.50	0.001	0.37	0.448	0.080

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†††††††† Oral administration
 †††††††† Oral administration

Table 3. Consultant Survey Responses §§§§§§§§

	N	<u>Percent Responding to Each Item</u>				
		<u>Strongly Agree</u>	<u>Agree</u>	<u>Equivocal</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
<i>Preoperative Assessment</i>						
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
<i>Preoperative NPO Status</i>						
Clear Liquids:						
4a. For otherwise healthy <u>infants</u> (< 2 years of age), fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>children</u> (2 to 16 years of age), fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>adults</u> , fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>neonates</u> (< 44 gestational weeks), fasting from the intake of breast milk for <u>4 or more hours</u> 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

§§§§§§§§ N = number of consultants who responded to each item; * = median.

5b. For otherwise healthy <u>infants</u> , fasting from the intake of breast milk for <u>4 or more hours</u> 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
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Infant Formula:

6a. For <u>neonates</u> , fasting from the intake of infant formula for <u>6 or more hours</u> 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
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6b. For infants, fasting from the intake of infant formula for <u>6 or more hours</u> 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
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6c. For children, fasting from the intake of infant formula for <u>6 or more hours</u> 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
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Non-Human Milk:

7a. For infants, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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7b. For children, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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7c. For adults, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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Solids:

8. Fasting from the intake of a <u>light meal</u> (e.g., toast and a clear liquid) for <u>6 or more hours</u> 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
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9. Fasting from the intake of a meal that includes <u>fried or fatty foods</u> for <u>8 or more hours</u> 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
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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 <u>no apparent</u> increased risk for pulmonary aspiration	36	0.0	0.0	5.6	47.2*	47.2
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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 <u>no apparent</u> increased risk for pulmonary aspiration	36	0.0	2.8	5.6	44.4*	47.2
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12. Proton pump inhibitors should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with <u>no apparent</u> increased risk for pulmonary aspiration	37	0.0	2.7	8.1	37.8	51.4*
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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 <u>no apparent</u> increased risk for pulmonary aspiration	36	0.0	2.8	2.8	47.2*	47.2
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13b. When antacids are indicated for selected patients, only non-particulate antacids should be used	36	55.6*	27.8	11.1	0.0	5.6
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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 <u>no apparent</u> increased risk for pulmonary aspiration	37	0.0	5.4	0.0	51.4*	43.2
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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*
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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 <u>no apparent</u> increased risk for pulmonary aspiration	37	0.0	2.7	0.0	43.2	54.1*
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Table 4. ASA Members Survey Responses*****

	N	<u>Percent Responding to Each Item</u>				
		<u>Strongly Agree</u>	<u>Agree</u>	<u>Equivocal</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
<i>Preoperative Assessment:</i>						
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
<i>Preoperative NPO Status</i>						
Clear Liquids:						
4a. For otherwise healthy <u>infants</u> (< 2 years of age), fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>children</u> (2 to 16 years of age), fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>adults</u> , fasting from the intake of clear liquids for <u>2 or more hours</u> 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 <u>neonates</u> (< 44 gestational weeks), fasting from the intake of breast milk for <u>4 or more hours</u> 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

***** N = number of ASA members who responded to each item; * = median.

5b. For otherwise healthy <u>infants</u> , fasting from the intake of breast milk for <u>4 or more hours</u> 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
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Infant Formula:

6a. For <u>neonates</u> , fasting from the intake of infant formula for <u>6 or more hours</u> 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
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6b. For infants, fasting from the intake of infant formula for <u>6 or more hours</u> 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
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6c. For children, fasting from the intake of infant formula for <u>6 or more hours</u> 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
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Non-Human Milk:

7a. For infants, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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7b. For children, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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7c. For adults, fasting from the intake of non-human milk for <u>6 or more hours</u> 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
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Solids:

8. Fasting from the intake of a <u>light meal</u> (e.g., toast and a clear liquid) for <u>6 or more hours</u> 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
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9. Fasting from the intake of a meal that includes <u>fried or fatty foods</u> for <u>8 or more hours</u> 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
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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 <u>no apparent</u> increased risk for pulmonary aspiration	468	1.9	4.5	8.3	48.8*	36.5
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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 <u>no apparent</u> increased risk for pulmonary aspiration	470	4.0	7.9	9.2	44.7*	34.2
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12. Proton pump inhibitors should be routinely administered before elective procedures requiring general anesthesia, regional anesthesia, or procedural sedation and analgesia in patients with <u>no apparent</u> increased risk for pulmonary aspiration	470	1.3	3.6	11.9	46.8*	36.4
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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 <u>no apparent</u> risk for pulmonary aspiration	467	0.6	2.8	6.6	52.0*	37.9
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13b. When antacids are indicated for selected patients, only non-particulate antacids should be used	466	65.2*	28.5	4.5	1.5	0.2
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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 <u>no apparent</u> increased risk for pulmonary aspiration	461	4.3	11.9	8.5	49.9*	25.4
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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
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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 <u>no apparent</u> increased risk for pulmonary aspiration	470	2.3	4.7	7.9	44.3*	40.9
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