Practice Guidelines for Postanesthetic Care

An Updated Report by the American Society of Anesthesiologists Task Force on Postanesthetic Care

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 Postanesthetic Care: A Report by the American Society of Anesthesiologists Task Force on Postanesthetic Care," adopted by the ASA in 2001 and published in 2002.*

- What other guideline statements are available on this topic?
  - These Practice Guidelines update the "Practice Guidelines for Postanesthetic Care," adopted by the American Society of Anesthesiologists in 2001 and published in 2002*
- Why was this Guideline developed?
  - In October 2011, the Committee on Standards and Practice Parameters elected to collect new evidence to determine whether recommendations in the existing Practice Guideline were supported by current evidence
- How does this statement differ from existing Guidelines?
  - New evidence presented includes an updated evaluation of scientific literature. The new findings did not necessitate a change in recommendations
- Why does this statement differ from existing Guidelines?
  - The American Society of Anesthesiologists Guidelines differ from the existing Guidelines because it provides updated evidence obtained from recent scientific literature

Methodology

A. Definition of Postanesthetic Care

A standard definition for postanesthetic care cannot be identified in the available literature. For these Practice Guidelines, postanesthetic care refers to those activities undertaken to manage the patient after completion of a surgical procedure and the concomitant primary anesthetic.

B. Purpose of the Guidelines for Postanesthetic Care

The purpose of these Guidelines is to improve postanesthetic care outcomes for patients who have just had anesthesia or sedation and analgesia care. This is accomplished by evaluating available evidence and providing recommendations for patient assessment, monitoring, and management with the goal of optimizing patient safety. It is expected that the recommendations will be individualized according to patient needs.

C. Focus

These Guidelines focus on the perioperative management of patients, with the goals of reducing postoperative adverse events, providing a uniform assessment of recovery, improving postanesthetic quality of life, and streamlining postoperative care and discharge criteria.

These Guidelines apply to patients of all ages who have just received general anesthesia, regional anesthesia, or moderate or deep sedation. The Guidelines may need to be modified to meet the needs of certain patient populations, such as children or the elderly. The Guidelines do not apply to

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Updated by the Committee on Standards and Practice Parameters: Jeffrey L. Apfelbaum, M.D. (Chair), Chicago, Illinois; and the Task Force on Postanesthetic Care: Jeffrey H. Silverstein, M.D. (Task Force Chair), New York, New York; Frances F. Chung, M.D., Toronto, Ontario; Richard T. Connis, Ph.D., Woodinville, Washington; Ralph B. Fillmore, M.D., Dothan, Alabama; Sean E. Hunt, M.D., Manchester, New Hampshire; David G. Nickinovich, Ph.D., Bellevue, Washington; and Mark S. Schreiner, M.D., Philadelphia, The original Guidelines were developed by the American Society of Anesthesiologists Task Force on Postanesthetic Care: Jeffrey H. Silverstein, M.D. (Chair), New York, New York; Jeffrey L. Apfelbaum, M.D., Northbrook, Illinois; Jared C. Barlow, M.D., Grand Island, New York; Frances F. Chung, M.D., Toronto, Ontario; Richard T. Connis, Ph.D., Woodinville, Washington; Ralph B. Fillmore, M.D., Dothan, Alabama; Sean E. Hunt, M.D., Manchester, New Hampshire; Thomas A. Joas, M.D., San Diego, California; David G. Nickinovich, Ph.D., Bellevue, Washington; and Mark S. Schreiner, M.D., Philadelphia, Pennsylvania. Pennsylvania.

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Address reprint requests to the American Society of Anesthesiologists: 520 North Northwest Highway, Park Ridge, Illinois 60068. 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 postanesthetic care. ANESTHESIOLOGY 2002; 96:742–752.

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patients receiving infiltration local anesthesia without sedation, patients receiving minimal sedation (anxiolysis), or patients receiving intensive care.

D. Application

The Guidelines are intended for use by anesthesiologists and may also serve as a resource for other physicians and healthcare professionals who direct anesthesia or sedation and analgesia care. General medical supervision and coordination of patient care in the postanesthesia care unit should be the responsibility of an anesthesiologist.

E. Task Force Members and Consultants

The original Guidelines were developed by an ASA appointed Task Force of ten members, consisting of anesthesiologists in private and academic practices from various geographic areas of the United States, and two consulting methodologists from the ASA Committee on Standards and Practice Parameters.

The Task Force developed the original Guidelines by means of a seven-step process. First, they reached consensus on the criteria for evidence. Second, original published research studies from peer-reviewed journals relevant to postanesthetic care were reviewed and evaluated. Third, expert consultants were asked to: (1) participate in opinion surveys on the effectiveness of various postanesthetic care-management recommendations and (2) review and comment on a draft of the Guidelines. Fourth, opinions about the Guideline recommendations were solicited from a sample of active members of the ASA. Fifth, opinion-based information obtained during an open forum for the original Guidelines, held at a major national meeting,† was evaluated. Sixth, the consultants were surveyed to assess their opinions on the feasibility of implementing the Guidelines. Seventh, all available information was used to build consensus to finalize the Guidelines. In 2011, the ASA Committee on Standards and Practice Parameters requested the updating of the scientific evidence for this Guideline. This update consists of an evaluation of literature published after completion of the original Guidelines. A summary of recommendations is provided in appendix 1.

F. Availability and Strength of Evidence

Preparation of these updated 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 Guidelines is based on findings from literature published in peer-reviewed journals. Literature citations are obtained from PubMed and other healthcare databases, direct internet searches, task force members, liaisons with other organizations, and from hand 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. 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 controls. When available, Category A evidence is given precedence over Category B evidence in the reporting of results. 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) within the two evidence categories. For this document, only the highest level of evidence is included in the summary report for each intervention, including a directional designation of benefit, harm, or equivocality for each outcome.

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.

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 Guidelines. Findings from these RCTs are reported as evidence.

Level 3: The literature contains a single RCT, and findings from this study 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 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) between clinical interventions for a specified outcome.

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

† Society for Ambulatory Anesthesia 16th Annual Meeting, Indian Wells, CA, May 5, 2001.

‡ 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.

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Level 3: The literature contains noncomparative observational studies with descriptive statistics (*e.g.*, frequencies, percentages).
Level 4: The literature contains case reports.

Insufficient Evidence

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, since such literature does not permit a clear interpretation of findings due to methodological concerns (*e.g.*, confounding in study design or implementation) or does not meet the criteria for content as defined in the "Focus" of the Guidelines.

Opinion-based Evidence

The original Guidelines contained formal survey information collected from expert consultants and a random sample of active members of the ASA. Additional information was obtained from open-forum presentations and other invited and public sources. All opinion-based evidence relevant to each topic (*e.g.*, survey data, open-forum testimony, internet-based comments, letters, and editorials) was considered in the development of the original Guidelines. However, only the findings obtained from formal surveys are reported.

Survey responses from the consultants and ASA members obtained during development of the original Guidelines are summarized in the text of this update and reported in appendix 2. No new surveys were conducted for this update.

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.

Category B: Membership Opinion

Survey responses from a random sample of active ASA members are reported in summary form in the text, with a complete listing of ASA member survey responses reported in appendix 2.

Survey responses from expert and membership sources are recorded using a three-point scale and summarized based on weighted values. The following terms describe *survey responses* for any specified issue. Responses are assigned a numeric value of agree = +1, undecided = 0, or disagree = −1. The average weighted response represents the mean value for each survey item.

Agree: The average weighted response must be equal to or greater than +0.30 (on a scale of −1 to 1) to indicate agreement.

Equivocal: The average weighted response must be between −0.30 and +0.30 (on a scale of −1 to 1) to indicate an equivocal response.

Disagree: The average weighted response must be equal to or less than −0.30 (on a scale of −1 to 1) to indicate disagreement.

Category C: Informal Opinion

Open-forum testimony during development of the previous 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

I. Patient Assessment and Monitoring

Perioperative and postanesthetic management of the patient includes periodic assessment and monitoring of respiratory function, cardiovascular function, neuromuscular function, mental status, temperature, pain, nausea and vomiting, fluid assessment, urine output and voiding, and drainage and bleeding.

Respiratory Function. The original literature indicated that assessment and monitoring of respiratory function during recovery is associated with early detection of hypoxemia *(Category A2-B evidence)*; new literature is insufficient to further evaluate these findings.

The consultants and ASA members agree that periodic assessment and monitoring of airway patency, respiratory rate, and oxygen saturation (SpO_2) should be done during emergence and recovery.

Cardiovascular Function. The literature continues to be insufficient to evaluate the impact of cardiovascular assessment and monitoring or routine electrocardiographic monitoring of perioperative complications.

The Consultants and ASA members agree that routine pulse, blood pressure, and electrocardiographic monitoring detect cardiovascular complications, reduce adverse outcomes, and should be done during emergence and recovery. The Task Force notes that there are certain categories of patients or procedures for which routine electrocardiographic monitoring may not be necessary.

Neuromuscular Function. Assessment of neuromuscular function primarily includes physical examination and, on occasion, may include neuromuscular blockade monitoring. The original literature indicated that neuromuscular blockade monitoring is effective in detecting neuromuscular dysfunction (*Category B2-B evidence*); new literature is insufficient to further evaluate these findings.

The consultants and ASA members agree that assessment of neuromuscular function identifies potential complications, reduces adverse outcomes, and should be done during emergence and recovery.

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Mental Status. The literature continues to be insufficient to evaluate the impact of the assessment of mental status and behavior on reducing postoperative complications.

The consultants and ASA members agree that assessment of mental status detects complications, reduces adverse outcomes, and should be done during emergence and recovery. Several scoring systems are available for such assessments.

Temperature. The literature continues to be insufficient regarding whether routine assessment of patient temperature is associated with fewer postoperative complications.

The consultants and ASA members agree that routine assessment of patient temperature detects complications, reduces adverse outcomes, and should be done during emergence and recovery.

Pain. The literature continues to be insufficient regarding whether routine assessment and monitoring of pain is associated with fewer postoperative complications.

The consultants and ASA members agree that routine assessment and monitoring of pain detects complications, reduces adverse outcomes, and should be done during emergence and recovery.

Nausea and Vomiting. The literature continues to be insufficient regarding whether the routine periodic assessment of nausea and vomiting is associated with fewer postoperative complications.

The consultants are equivocal, but the ASA members agree that routine assessment and monitoring of nausea and vomiting detects complications and reduces adverse outcomes. Both the consultants and ASA members agree that routine assessment and monitoring of nausea and vomiting should be done during emergence and recovery.

Fluids. The literature continues to be insufficient to evaluate the benefits of assessing the hydration status of patients in the postanesthesia care unit.

The consultants and ASA members agree that routine perioperative assessment of patients' hydration status and fluid management reduces adverse outcomes and improves patient comfort and satisfaction.

Urine Output and Voiding. The original Guidelines indicated that assessment of *urine output* is effective in identifying patients with urinary retention (*Category B3-B evidence*); new literature is insufficient to further evaluate these findings. The literature is insufficient regarding whether assessment of urine output is associated with other postoperative complications. The literature is insufficient regarding whether assessment and monitoring of *urinary voiding* is associated with fewer postoperative complications.

The consultants and ASA members agree that assessment of *urine output* detects complications and reduces adverse outcomes. They agree that assessment of urine output during emergence and recovery need not be routine but should be done for selected patients. The consultants agree and ASA members are equivocal that assessment and monitoring of *urinary voiding* detects complications. Both the consultants and ASA members are equivocal regarding whether assessment of urinary voiding reduces adverse outcomes, but they agree that urinary voiding should be assessed routinely during recovery.

Drainage and Bleeding. The literature continues to be insufficient regarding whether assessment of drainage and bleeding is associated with fewer postoperative complications.

The consultants and ASA members agree that assessment and monitoring of drainage and bleeding detects complications, reduces adverse outcomes, and should be a routine component of emergence and recovery care.

Recommendations for Patient Assessment and Monitoring.

Periodic assessment of airway patency, respiratory rate, and oxygen saturation should be done during emergence and recovery. Particular attention should be given to monitoring oxygenation and ventilation.§

Routine monitoring of pulse and blood pressure should be done during emergence and recovery, and electrocardiographic monitors should be immediately available.

Assessment of neuromuscular function should be performed during emergence and recovery for patients who have received nondepolarizing neuromuscular blocking agents or who have medical conditions associated with neuromuscular dysfunction.

> Mental status should be periodically assessed during emergence and recovery.
>
> Patient temperature should be periodically assessed during emergence and recovery.
>
> Pain should be periodically assessed during emergence and recovery.
>
> Periodic assessment of nausea and vomiting should be performed routinely during emergence and recovery.
>
> Postoperative hydration status should be assessed in the postanesthesia care unit and managed accordingly.
>
> Certain procedures involving significant loss of blood or fluids may require additional fluid management.
>
> Assessment of urine output and of urinary voiding should be done on a case-by-case basis for selected patients or selected procedures during emergence and recovery.
>
> Assessment of drainage and bleeding should be performed.

II. Prophylaxis and Treatment of Nausea and Vomiting

Prophylaxis of Nausea and Vomiting. Drugs evaluated by these Guidelines for the prophylaxis of nausea and vomiting include: (1) antihistamines, (2) 5-HT3 antiemetics, (3) tranquilizers/neuroleptics, (4) metoclopramide, (5) scopolamine, and (6) dexamethasone.

Antihistamines. One new RCT comparing promethazine with placebo corroborates findings of reduced nausea and vomiting reported in the original Guidelines (*Category A3-B evidence*).[1]

§ For respiratory function monitoring, other ASA Practice Guidelines can be valuable resources (*e.g.,* Practice Guidelines for sedation and analgesia by nonanesthesiologists. Anesthesiology 2002; 96:1004–17; Practice Guidelines for the perioperative management of patients with obstructive sleep apnea. Anesthesiology 2006; 104:1081–93; or Practice Guidelines for management of the difficult airway. Anesthesiology 2003; 98:1269–77).

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5-HT3 Antiemetics. Meta-analysis of new double-blind RCTs corroborate findings reported in the original Guidelines indicating that 5-HT3 antiemetics compared with placebo are effective in the prophylaxis of postoperative nausea and vomiting, and reduced use of rescue antiemetics (*Category A1-B evidence*). Findings for specific 5-HT3 antiemetics are: dolasetron (reduced vomiting),[2–6] granisetron (reduced vomiting),[7–11] ondansetron (reduced vomiting and rescue antiemetics),[7–9,12–24] and tropisetron (reduced vomiting and rescue antiemetics).[14,25–29] New RCTs are equivocal regarding the effect of palonosetron on postoperative nausea and vomiting (*Category A2-E evidence*).[30,31] Two new double-blind RCTs indicate that ramosetron is effective in the prophylaxis of postoperative nausea, vomiting, and use of rescue antiemetics when compared with placebo controls (*Category A2-B evidence*).[32,33]

Tranquilizers. Meta-analysis of new double-blind RCTs corroborate findings reported in the original Guidelines that inapsine (droperidol) effectively reduces postoperative nausea, vomiting, and use of rescue antiemetics when compared with placebo‖ (*Category A1-B evidence*).[19,34–38] New double-blind RCTs also indicate that haloperidol is effective in the reduction of postoperative nausea, vomiting, and rescue antiemetic use (*Category A2-B evidence*).[13,35,37,39] One new RCT indicates that dixrazine is effective in the prophylaxis of postoperative nausea when compared with placebo (*Category A3-B evidence*), with equivocal findings reported for postoperative vomiting, headache, dizziness, and anxiety (*Category A3-E evidence*).[40] New literature is insufficient to further evaluate postoperative nausea and vomiting findings, as reported in the original Guidelines, for the following drugs: hydroxizine (*Category A3-B evidence*), perphenazine (*Category A3-B evidence*), and prochlorperazine (*Category A1-E evidence*).

Metoclopramide. Meta-analysis of new double-blind RCTs comparing metoclopramide (10 mg) with placebo controls report no statistically significant differences in nausea and vomiting in the immediate postoperative period (*Category A1-E evidence*), but indicate efficacy in the reduction of vomiting during the first 24-h postoperative period (*Category A1-B evidence*).[14,18,23,41–44] Statistically significant differences were reported in the original Guidelines for nausea and vomiting without indicating time of measurement (*Category A1-B evidence*).

Scopolamine. New double-blind RCTs comparing transdermal scopolamine with placebo patch corroborates findings of reduced nausea and vomiting reported by the original Guidelines (*Category A3-B evidence*), with no differences reported in dizziness, drowsiness, fatigue, blurred vision, or dry mouth (*Category A3-E evidence*).[45,46]

‖ In December, 2001 the U.S. Food and Drug Administration posted a Box Warning from Acorn Pharmaceuticals (Lake Forest, IL) regarding inapsine (droperidol) and cases of QT prolongation and/or torsades de pointes.

Dexamethasone. Meta-analyses of new double-blind RCTs comparing dexamethasone with placebo controls corroborate findings reported in the original Guidelines indicating that this antiemetic is effective in the prophylaxis of postoperative vomiting and reduced use of rescue antiemetics, and for the prophylaxis of nausea when higher doses are administered (*Category A1-B evidence*).[8,12,24,26,29,36,37,39,41,43,44,47–56]

The consultants and ASA members agree that the pharmacologic prophylaxis of nausea and vomiting improves patient comfort and satisfaction, reduces time to discharge, and should be done selectively.

Multiple Pharmacologic Agents for Prophylaxis of Nausea and Vomiting. New RCTs comparing two antiemetic drugs with single antiemetic drug controls corroborate findings reported in the original Guidelines indicating that antiemetic combinations are effective in the prophylaxis of postoperative nausea and vomiting (*Category A2-B evidence*) with no differences in headache, dizziness, drowsiness, anxiety, or akathisia/restlessness reported[3,10,11,26,36,42,57–66] (*Category A2-E evidence*). These RCTs consisted of comparisons among a variety of drug combinations, and the number of studies evaluating similar drug combinations was insufficient for meta-analysis.

The consultants and ASA members are equivocal regarding whether multiple pharmacologic agents should be used for the prophylaxis of nausea and vomiting.

Treatment of Nausea and Vomiting. The original Guidelines indicated that the use of ondansetron is effective for treating vomiting during recovery (*Category A1-B evidence*); new literature is insufficient to further evaluate this finding. Although the original Guidelines did not report findings for other specific antiemetic treatments for nausea and vomiting, evidence collected at that time indicated that dolasetron and tropisetron were effective (*Category A2-B evidence*).

The consultants and ASA members agree that the pharmacologic treatment of nausea and vomiting improves patient comfort and satisfaction, reduces time to discharge, and should be done.

Multiple Pharmacologic Agents for Treatment of Nausea and Vomiting. The literature continues to be insufficient to evaluate the impact of multiple pharmacologic agents compared with single agents for the treatment of nausea and vomiting.

The consultants and ASA members are equivocal regarding whether multiple agents should be used for postoperative treatment of nausea and vomiting.

Recommendations for Prophylaxis and Treatment of Nausea and Vomiting. Antiemetic agents should be used for the prevention and treatment of nausea and vomiting when indicated. Multiple antiemetic agents may be used for the prevention or treatment of nausea and vomiting when indicated.

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III. Treatment during Emergence and Recovery

Administration of Supplemental Oxygen. One new RCT corroborates findings published in the original Guidelines indicating that the administration of supplemental oxygen during patient transportation or in the recovery room reduces the incidence of hypoxemia (*Category A3-B evidence*).[67]

The consultants and ASA members are equivocal regarding whether administration of supplemental oxygen during patient transportation or in the postanesthesia care unit should be routine.

Normalizing Patient Temperature. The original Guidelines indicated that active patient warming is associated with normalizing patient temperature (*Category A2-B evidence*); new literature is insufficient to further evaluate these findings. The original Guidelines indicated that the use of a forced-air warming device normalizes patient temperature and reduces shivering (*Category A1-B evidence*); one new RCT corroborates these findings for the normalization of patient temperature (*Category A3-B evidence*) but is equivocal for the reduction of shivering (*Category A3-E evidence*).[68]

The consultants and ASA members agree that: (1) the perioperative maintenance of normothermia and (2) the use of forced-air warming reduce shivering and improve patient comfort and satisfaction.

Pharmacologic Agents for the Reduction of Shivering. The original Guidelines indicated that meperidine is effective in reducing patient shivering during emergence and recovery when compared with placebo or other opioid agonists or agonist-antagonists (*Category A1-B evidence*); new literature is insufficient to further evaluate these findings. One new RCT corroborates findings reported in the original Guidelines regarding the efficacy of meperidine in reducing shivering when compared with nonopioid pharmacologic agents (*Category A3-B evidence*).[69]

The consultants and ASA members agree that meperidine is more effective in the treatment of patient shivering than other opioid agonists or agonist–antagonists.

Recommendations for Treatment during Emergence and Recovery

Administering supplemental oxygen during transportation or in the recovery room should be done for patients at risk of hypoxemia.

Normothermia should be a goal during emergence and recovery.# When available, forced air warming systems should be used for treating hypothermia.

Meperidine should be used for the treatment of patients shivering during emergence and recovery, when clinically indicated. The Task Force cautions that hypothermia, a common cause of shivering, should be treated by rewarming. Practitioners may consider other opioid agonists or agonist–antagonists when meperidine is contraindicated or not available.

IV. Antagonism of the Effects of Sedatives, Analgesics, and Neuromuscular Blocking Agents

Antagonism of Benzodiazepines. One new RCT corroborates findings reported in the original Guidelines regarding the efficacy of flumazenil to antagonize (*i.e.*, reduced time to emergence) the residual effects of benzodiazepines after general anesthesia (*Category A3-B evidence*),[70] when compared with placebo. The original Guidelines also indicated that flumazenil reduces time to emergence after sedation (*Category A1-B evidence*); new literature is insufficient to further evaluate these findings. The original Guidelines reported equivocal findings for selected complications (*i.e.*, nausea, blood pressure variations, agitation/restlessness, dizziness, and resedation/drowsiness) after the use of flumazenil after sedation (*Category A1-E evidence*); new literature is insufficient to further evaluate these findings.

The consultants and ASA members disagree that routine use of flumazenil reduces adverse outcomes or improves patient comfort and satisfaction.

Antagonism of Opioids. The original Guidelines indicated that naloxone reduces time to emergence and recovery of spontaneous respiration after general anesthesia (*Category A3-B evidence*); new literature is insufficient to further evaluate these findings.

The consultants and ASA members disagree that routine use of naloxone reduces adverse outcomes or improves patient comfort and satisfaction.

Reversal of Neuromuscular Blockade. One new RCT corroborates findings reported in the original Guidelines regarding the efficacy of edrophonium to antagonize the effects of neuromuscular blocking agents (*e.g.*, rocuronium, cisatracurium, rapacuronium) when compared with spontaneous recovery (*Category A3-B evidence*).[71] The original Guidelines indicated that neostigmine is effective for the antagonism of residual neuromuscular blockade (*Category A1-B evidence*); new literature is insufficient to further evaluate these findings. The original Guidelines reported an increased frequency of postoperative emetic episodes with the use of neostigmine (*Category A1-H evidence*); new literature is insufficient to further evaluate this finding. The literature continues to be insufficient to evaluate the occurrence of other complications associated with either edrophonium or neostigmine.

The consultants and ASA members are equivocal regarding whether anesthetic regimens designed to avoid the need for antagonism of neuromuscular blockade reduce adverse outcomes or improve patient comfort and satisfaction.

Recommendations for Antagonism of the Effects of Sedatives, Analgesics, and Neuromuscular Blocking Agents

Antagonism of Benzodiazepines. Specific antagonists should be available whenever benzodiazepines are administered. Flumazenil should not be used routinely, but may be administered to antagonize respiratory depression and sedation in

Documentation of postoperative patient temperature is a performance measure by the Centers for Medicare and Medicaid Services and the Joint Commission: NQF-endorsed voluntary consensus standards for hospital care SCIP-Inf-10–5; in Specifications Manual for National Hospital Inpatient Quality Measures, version 3.2: http://www.jointcommission.org/assets/1/6/HIQR_SpecsManual_1.1.13_v.4.2.1_EXE.zip. Accessed December 5, 2012.

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selected patients. After pharmacologic antagonism, patients should be observed long enough to ensure that cardiorespiratory depression does not recur.

Antagonism of Opioids. Specific antagonists should be available whenever opioids are administered. Opioid antagonists (*e.g.*, naloxone) should not be used routinely but may be administered to antagonize respiratory depression in selected patients. After pharmacologic antagonism, patients should be observed long enough to ensure that cardiorespiratory depression does not recur. The Task Force reminds practitioners that acute antagonism of the effects of opioids may result in pain, hypertension, tachycardia, or pulmonary edema.

Reversal of Neuromuscular Blockade. Specific antagonists should be administered for reversal of residual neuromuscular blockade when indicated.

V. Protocol for Discharge

Requirement that Patients Urinate Before Discharge. The literature is insufficient to evaluate the benefits of requiring patients to urinate before discharge.

The consultants and ASA members disagree that such a requirement reduces adverse outcomes or increases patient satisfaction. They agree that it increases the length of recovery stay and agree that urination before discharge should only be mandatory for selected day-surgery patients.

Requirement that Patients Drink Clear Fluids Without Vomiting Before Discharge. Literature findings reported during development of the original Guidelines were equivocal regarding whether a requirement that patients drink clear fluids before discharge is associated with the frequency of vomiting or time to discharge (*Category A2-E evidence*);** new literature is insufficient to further evaluate this finding.

The consultants and ASA members disagree that the drinking of clear fluids by the patient before his/her discharge reduces adverse outcomes or increases patient satisfaction. They agree that it increases the length of recovery stay. The consultants disagree and the ASA members are equivocal regarding whether drinking clear fluids before discharge should be mandatory.

Requirement That Patients Have a Responsible Individual to Accompany Them Home After Discharge. The literature is insufficient regarding whether a decrease in postdischarge complications or other adverse outcomes is associated with the requirement that patients be accompanied home by a responsible individual.

The consultants and ASA members agree that requiring patients to have a responsible individual to accompany them home after discharge reduces adverse outcomes, increases patient comfort and satisfaction, and should be mandatory.

Requirement of a Minimum Mandatory Stay in Recovery. The literature is insufficient to evaluate the effects of a mandatory minimum stay in recovery.

The consultants disagree and the ASA members are equivocal regarding whether a minimum stay in a recovery facility improves patient comfort and satisfaction or should be required. The consultants and ASA members are equivocal regarding whether a minimum stay reduces adverse outcomes. The Task Force consensus is that a mandatory minimum stay is not necessary and that the length of stay should be determined on a case-by-case basis.

Recommendations for Discharge Protocol. The routine requirement for urination before discharge should not be part of a discharge protocol and may only be necessary for selected patients.

The requirement of drinking clear fluids should not be part of a discharge protocol and may only be necessary for selected patients, determined on a case-by-case basis (*e.g.*, diabetic patients).

As part of a recovery room discharge protocol, all patients should be required to have a responsible individual accompany them home.

Patients should be observed until they are no longer at increased risk for cardiorespiratory depression. A mandatory minimum stay should not be required. Discharge criteria should be designed to minimize the risk of central nervous system or cardiorespiratory depression after discharge.

Appendix 1: Summary of Recommendations

I. Patient Assessment and Monitoring

- Periodic assessment of airway patency, respiratory rate, and oxygen saturation should be done during emergence and recovery.
  - Particular attention should be given to monitoring oxygenation and ventilation.
- Routine monitoring of pulse and blood pressure should be done during emergence and recovery, and electrocardiographic monitors should be immediately available.
- Assessment of neuromuscular function should be performed during emergence and recovery for patients who have received nondepolarizing neuromuscular blocking agents or who have medical conditions associated with neuromuscular dysfunction.
- Mental status should be periodically assessed during emergence and recovery.
- Patient temperature should be periodically assessed during emergence and recovery.
- Pain should be periodically assessed during emergence and recovery.
- Periodic assessment of nausea and vomiting should be performed routinely during emergence and recovery.
- Postoperative hydration status should be assessed in the postanesthesia care unit and managed accordingly.
  - Certain procedures involving significant loss of blood or fluids may require additional fluid management.
- Assessment of urine output and of urinary voiding should be done on a case-by-case basis for selected patients or selected procedures during emergence and recovery.
- Assessment of drainage and bleeding should be performed.

** RCT findings for pediatric patients reported increased vomiting in the day surgery unit, whereas RCT findings for adults were equivocal.

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II. Prophylaxis and Treatment of Nausea and Vomiting

- Antiemetic agents should be used for the prevention and treatment of nausea and vomiting when indicated.
- Multiple antiemetic agents may be used for the prevention or treatment of nausea and vomiting when indicated.

III. Treatment during Emergence and Recovery

- Administering supplemental oxygen during transportation or in the recovery room should be done for patients at risk of hypoxemia.
- Normothermia should be a goal during emergence and recovery.
  - When available, forced air warming systems should be used for treating hypothermia.
- Meperidine should be used for the treatment of patient shivering during emergence and recovery when clinically indicated.
  - Hypothermia, a common cause of shivering, should be treated by rewarming.
  - Practitioners may consider other opioid agonists or agonist–antagonists when meperidine is contraindicated or not available.

IV. Antagonism of the Effects of Sedatives, Analgesics, and Neuromuscular Blocking Agents

- Specific antagonists should be available whenever benzodiazepines are administered.
  - Flumazenil should not be used routinely, but may be administered to antagonize respiratory depression and sedation in selected patients.
  - After pharmacologic antagonism, patients should be observed long enough to ensure that cardiorespiratory depression does not recur.
- Specific antagonists should be available whenever opioids are administered.
  - Opioid antagonists (*e.g.*, naloxone) should not be used routinely but may be administered to antagonize respiratory depression in selected patients.
  - After pharmacologic antagonism, patients should be observed long enough to ensure that cardiorespiratory depression does not recur.
  - The Task Force reminds practitioners that acute antagonism of the effects of opioids may result in pain, hypertension, tachycardia, or pulmonary edema.
- Specific antagonists should be administered for reversal of residual neuromuscular blockade when indicated.

V. Protocol for Discharge

- The routine requirement for urination before discharge should not be part of a discharge protocol and may only be necessary for selected patients.
- The requirement of drinking clear fluids should not be part of a discharge protocol and may only be necessary for selected patients, determined on a case-by-case basis (*e.g.*, diabetic patients).
- As part of a recovery room discharge protocol, all patients should be required to have a responsible individual accompany them home.
- Patients should be observed until they are no longer at increased risk for cardiorespiratory depression.
  - A *mandatory* minimum stay should not be required.
  - Discharge criteria should be designed to minimize the risk of central nervous system or cardiorespiratory depression after discharge.

Appendix 2: Methods and Analyses

A. State of the Literature.

For these updated Guidelines, a review of studies used in the development of the original Guidelines in 2002 was combined with studies published after approval of the original Guidelines. The scientific assessment of these Guidelines was based on evidence linkages or statements regarding potential relationships between clinical interventions and outcomes. The interventions listed below were examined to assess their relationship to a variety of outcomes related to postanesthetic care management.

Patient Assessment and Monitoring

Respiratory function
Cardiovascular function
Neuromuscular function
Mental status
Temperature
Pain
Nausea and vomiting
Fluids
Urine output and voiding
Drainage and bleeding

Prophylaxis and Treatment of Nausea and Vomiting

Single drugs for the prophylaxis of nausea and vomiting
Multiple medications (*vs.* single medications) for the prophylaxis of nausea and vomiting
Single drugs for the treatment of nausea and vomiting
Multiple medications (*vs.* single medications) for the treatment of nausea and vomiting

Treatment during Emergence and Recovery

Administration of supplemental oxygen
Normalizing patient temperature
Forced-air warming systems
Meperidine for shivering
Flumazenil, naloxone, neostigmine, and edrophonium

Protocol for Discharge from Postanesthesia Care Unit

Requiring that patients urinate before discharge
Requiring that patients drink clear fluids without vomiting before discharge
Requiring that patients have a responsible individual to accompany them home after discharge
Requiring a mandatory minimum stay in recovery

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For the literature review, potentially relevant clinical studies were identified *via* electronic and manual searches of the literature. The updated electronic and manual searches covered a 11-yr period from 2002 through 2012. Citations obtained during the updated search were combined with literature reviewed during development of the original Guidelines, resulting in more than 1300 citations that addressed topics related to the evidence linkages. Eighty-two new articles were accepted as evidence, and findings were compared with the original Guidelines, resulting in a total of 619 articles used as postanesthetic care evidence. For reporting purposes in this updated document, only new citations are referenced. A complete bibliography used to develop these Guidelines, organized by section, is available as Supplemental Digital Content 2, http://links.lww.com/ALN/A907.

Initially, each pertinent study finding was classified and summarized to determine meta-analysis potential. The original Guidelines reported literature pertaining to seven clinical interventions that contained enough studies with well-defined experimental designs and statistical information to conduct formal meta-analyses (table 1). These seven interventions were as follows: (1) prophylaxis of nausea and vomiting, (2) treatment of nausea and vomiting (*i.e.,* ondansetron only), (3) multiple medications for the prophylaxis of nausea and vomiting, (4) supplemental oxygen, (5) forced-air warming systems, (6) meperidine for shivering, and (7) reversal agents to antagonize the effects of sedatives, analgesics, or neuromuscular blocking agents. Review of new literature published after completion of the original Guidelines in 2001 contained a sufficient number of studies to conduct meta-analyses addressing the prophylaxis of 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 used 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 2×2 tables was used with outcome frequency information. An acceptable significance level was set at *P* value less than 0.01 (one-tailed). Tests for heterogeneity of the independent studies were conducted to assure consistency among the study results. DerSimonian-Laird random-effects odds ratios were obtained when significant heterogeneity was found ($P < 0.01$). 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. When available, odds ratio and combined-test findings must all agree for them to be considered significant.

Meta-analysis of new literature reported significant odds ratios for the prevention of nausea and vomiting for the following interventions: dolasetron, granisetron, ondansetron, and dexamethasone (8 mg); findings for metoclopramide and dexamethasone (4–5 mg only) were equivocal. No new combined tests were conducted due to an insufficient number of studies with continuous or interval level data.

In the original 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 were as follows: type of study design, $\kappa = 0.80–1.00$; (2) type of analysis, $\kappa = 0.55–1.00$; (3) evidence linkage assignment, $\kappa = 0.91–1.00$; and (4) literature inclusion for database, $\kappa = 0.78–1.00$. Three-rater chance-corrected agreement values were as follows: (1) study design, Sav = 0.86, Var (Sav) = 0.011; (2) type of analysis, Sav = 0.65, Var (Sav) = 0.026; (3) linkage assignment, Sav = 0.81, Var (Sav) = 0.005; and (4) literature database inclusion, Sav = 0.84, Var (Sav) = 0.045. These values represent moderate to high levels of agreement. For the updated Guidelines, the same two methodologists involved in the original Guidelines conducted the literature review.

B. Consensus-Based Evidence

The original Guidelines obtained consensus from multiple sources, including: (1) survey opinion from consultants who were selected based on their knowledge or expertise in difficult airway management, (2) survey opinions solicited from active members of the ASA, (3) testimony for the previous update from attendees of a publicly held open forum at a major national anesthesia meeting,†† (4) internet commentary, and (5) task force opinion and interpretation. The rate of return was 50% (n = 56/112) for the consultants and 21% (n = 211/1,000) for the membership (table 3). Consultants and ASA members were supportive of all of the interventions, with the following exceptions: (1) routine assessment of urinary output and voiding, (2) routine pharmacologic prophylaxis of nausea and vomiting, (3) nonpharmacologic treatment of nausea and vomiting, (4) supplemental oxygen during transport or in the postanesthesia care unit, (5) routine use of flumazenil and naloxone, (6) requiring that patients urinate before discharge, (7) requiring that patients drink water before discharge, and (8) requiring a minimum stay in recovery. The original Guidelines also included an additional survey sent to the expert consultants asking them to indicate which, if any, of the evidence linkages would change their clinical practices if the Guideline update was instituted. The rate of return was 35% (N = 39/112). The percent of responding Consultants

†† American Society of Anesthesiologists Annual Meeting, October, 1999, Dallas, TX.

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Table 1. Meta-Analysis Summary—Original Guidelines

Interventions/ Outcomes	No. Studies	Fisher Chi-square	*P* Value	Weighted Stouffer Zc	*P* Value	Effect Size	Mantel-Haenszel Chi-Square	*P* Value	Odds Ratio	Heterogeneity Significance	Heterogeneity Effect Size
Nausea/vomiting prophylaxis											
Antihistamines											
Nausea	6	—	—	—	—	—	0.31	> 0.10 (NS)	0.86	—	> 0.02 (NS)
Vomiting	8	—	—	—	—	—	7.78	< 0.01	1.77	—	> 0.10 (NS)
5-HT3 Antiemetics											
Dolasetron											
Vomiting	5	—	—	—	—	—	56.03	< 0.001	2.56§	—	< 0.001
Granisetron											
Nausea*	5	—	—	—	—	—	27.60	< 0.001	3.97	—	> 0.02 (NS)
Vomiting*	5	—	—	—	—	—	38.29	< 0.001	4.88	—	> 0.02 (NS)
Ondansetron											
Nausea†	6	—	—	—	—	—	13.83	< 0.001	1.61	—	> 0.20 (NS)
Vomiting†	11	—	—	—	—	—	75.18	< 0.001	2.04	—	> 0.20 (NS)
Headache†	5	—	—	—	—	—	3.90	> 0.02 (NS)	0.77	—	> 0.80 (NS)
Dizziness	5	—	—	—	—	—	3.51	> 0.05 (NS)	1.27	—	> 0.10 (NS)
Drowsiness	8	—	—	—	—	—	0.01	> 0.90 (NS)	1.01	—	> 0.20 (NS)
Time to discharge	5	19.81	> 0.02 (NS)	0.94	> 0.10 (NS)	0.05	—	—	—	> 0.30 (NS)	> 0.30 (NS)
Tropisetron											
Vomiting	5	—	—	—	—	—	5.80	> 0.01 (NS)	1.46	—	> 0.50 (NS)
Droperidol											
Nausea‡	9	—	—	—	—	—	52.68	< 0.001	2.02	—	> 0.10 (NS)
Vomiting‡	12	—	—	—	—	—	61.77	< 0.001	2.95	—	> 0.01 (NS)
Headache	7	—	—	—	—	—	8.41	< 0.01	1.44	—	> 0.10 (NS)
Agitation and restlessness	6	—	—	—	—	—	15.45	< 0.001	0.40	—	> 0.70 (NS)
Dizziness	5	—	—	—	—	—	1.09	> 0.20 (NS)	1.17	—	> 0.10 (NS)
Drowsiness	7	—	—	—	—	—	6.96	< 0.01	0.73	—	> 0.02 (NS)
Time to discharge	6	26.64	< 0.01	0.07	> 0.40 (NS)	0.01	—	—	—	> 0.20 (NS)	> 0.20 (NS)
Prochlorperazine											
Nausea	5	—	—	—	—	—	0.81	> 0.30 (NS)	0.78	—	> 0.02 (NS)
Vomiting	6	—	—	—	—	—	4.15	> 0.02 (NS)	1.58	—	> 0.30 (NS)
Metoclopramide											
Nausea	10	—	—	—	—	—	14.43	< 0.001	1.79	—	> 0.10 (NS)
Vomiting ‡	10	—	—	—	—	—	11.86	< 0.001	1.67	—	> 0.30 (NS)
Time to discharge	5	35.46	< 0.001	3.18	< 0.001	0.22	—	—	—	> 0.02 (NS)	< 0.01
Scopolamine											
Vomiting	5	—	—	—	—	—	21.14	< 0.001	2.36	—	> 0.30 (NS)
Dexamethasone											
Nausea	6	—	—	—	—	—	8.00	< 0.01	1.88	—	> 0.70 (NS)
Vomiting	11	—	—	—	—	—	25.59	< 0.001	2.46§	—	< 0.01
Multiple antiemetics											
Nausea	10	—	—	—	—	—	15.87	< 0.001	2.17	—	> 0.30 (NS)
Vomiting‡	12	—	—	—	—	—	7.87	< 0.01	1.69	—	> 0.50 (NS)
Headache*	7	—	—	—	—	—	0.00	> 0.50 (NS)	1.00	—	> 0.99 (NS)
Drowsiness*	5	—	—	—	—	—	0.04	> 0.90 (NS)	1.08	—	> 0.90 (NS)
Nausea/vomiting treatment											
Ondansetron											
Vomiting	7	—	—	—	—	—	174.83	< 0.001	5.66§	—	< 0.01
Supplemental oxygen											
Hypoxemia	5	—	—	—	—	—	46.77	< 0.001	6.18	—	> 0.80 (NS)
Forced-air warming											
Temperature	8	107.43	< 0.001	17.67	< 0.001	0.99	—	—	—	< 0.001	< 0.001
Shivering	5	—	—	—	—	—	14.11	< 0.001	3.75	—	> 0.70 (NS)
Meperidine for shivering											
vs. placebo for shivering	8	—	—	—	—	—	107.56	< 0.001	10.17	—	> 0.20 (NS)
vs. opioids for shivering	5	—	—	—	—	—	22.00	< 0.001	4.47	—	> 0.02 (NS)
Reversal agents											
Flumazenil (general anesthesia)											
Recovery time	6	50.17	< 0.001	2.94	< 0.002	0.32	—	—	—	> 0.90 (NS)	> 0.80 (NS)
Flumazenil (sedation)											
Nausea	6	—	—	—	—	—	0.48	> 0.30 (NS)	0.82	—	> 0.80 (NS)
Blood pressure	5	30.98	< 0.010	2.22	> 0.01 (NS)	0.24	—	—	—	> 0.30 (NS)	> 0.20 (NS)
Dizziness	6	—	—	—	—	—	0.42	> 0.50 (NS)	0.85	—	> 0.10 (NS)
Drowsiness	5	—	—	—	—	—	2.64	> 0.10 (NS)	0.56	—	> 0.20 (NS)
Recovery time	7	78.62	< 0.001	5.51	< 0.001	0.54	—	—	—	< 0.001	< 0.001
Edrophonium											
Recovery time	6	73.24	< 0.001	8.50	< 0.001	0.99	—	—	—	> 0.02 (NS)	< 0.001
Neostigmine											
Vomiting	5	—	—	—	—	—	9.40	< 0.01	0.44	—	> 0.10 (NS)
Recovery time	10	115.26	< 0.001	9.72	< 0.001	0.79	—	—	—	< 0.001	< 0.001___

CI = 99% confidence interval; N = number of studies; NS = not statistically significant, $P < 0.01$.

* Caution: Same authors for > 50% of studies; † Inclusion criteria include an N over 100, study date 1995 and later; no abstracts;
‡ Inclusion criteria include study date 1995 and later; no abstracts; § DerSimonian-Laird random-effects odds ratio. CI = 99% confidence interval; N = number of studies; NS = not statistically significant, $P < 0.01$.

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Table 2. Meta-Analysis Summary—Updated Literature 2001–2012

Interventions/Outcomes	N	Odds Ratio	CI	Heterogeneity (Effect Size)
5-HT3 Antiemetics				
Dolasetron 12.5 mg or 0.5 mg/kg				
Vomiting 0–24 h or to discharge	5	0.27	0.16–0.48	0.993
Granisetron 1–3 mg				
Nausea 0–24 h or to discharge	5	0.58	0.29–1.13	0.954
Vomiting 0–24 h or to discharge	5	0.34	0.18–0.68	0.255
Ondansetron 4 mg				
Nausea immediate postoperative period	7	0.73	0.45–1.19	0.084
Nausea 0–24 h or to discharge	12	0.68*	0.30–1.34	0.002
Vomiting immediate postoperative period	10	0.29	0.18–0.46	0.924
Vomiting 0–24 h or to discharge	14	0.33	0.23–0.49	0.111
Rescue antiemetics immediate postop period	7	0.53	0.30–0.94	0.074
Rescue antiemetics 0–24 h or to discharge	11	0.36	0.23–0.56	0.033
Tropisetron 2–5 mg				
Vomiting 0–24 h or discharge	6	0.31	0.18–0.52	0.303
Rescue antiemetics 0–24 h or discharge	6	0.27	0.16–0.45	0.790
Tranquilizers (antipsychotics, neuroleptics)				
Droperidol 0.625–1.25 mg				
Nausea 0–24 h or to discharge	5	0.60	0.47–0.76	0.246
Vomiting 0–24 h or to discharge	6	0.62	0.46–0.84	0.445
Rescue antiemetics 0–24 hr or discharge	5	0.41	0.26–0.63	0.747
Gastric emptying agents				
Metoclopramide 10 mg				
Nausea immediate postoperative period	6	0.63	0.36–1.08	0.998
Vomiting immediate postoperative period	5	0.57	0.29–1.14	0.481
Corticosteriods with antiinflammitory effects				
Dexamethasone				
Nausea immediate postop period (4–5 mg)	5	0.47	0.22–1.00	0.836
Nausea immediate postop period (8 mg)	6	0.42	0.22–0.82	0.279
Nausea 0–24 h or to discharge (8 mg)	9	0.51	0.32–0.80	0.179
Vomiting immediate postop period (4–5 mg)	5	0.37	0.17–0.81	0.979
Vomiting immediate postop period (8 mg)	8	0.37	0.21–0.64	0.721
Vomiting 0–24 h or to discharge (5 mg)	5	0.32	0.18–0.58	0.980
Vomiting 0–24 h or to discharge (8 mg)	10	0.40	0.26–0.62	0.645
Rescue antiemetics immediate postop (5–8 mg)	7	0.28	0.16–0.49	0.858
Rescue antiemetics 0–24 h (8 mg)	6	0.50	0.30–0.84	0.089

*DerSimonian-Laird random-effects odds ratio.
CI = 99% confidence interval; N = number of studies.

expecting *no change* associated with each linkage were as follows: assessment and monitoring of respiratory function—100%; cardiovascular assessment/monitoring—95%; assessment of neuromuscular function—95%; assessment of mental status— 97%; assessment of temperature—95%; assessment and monitoring of pain—100%; assessment of nausea and vomiting—97%; fluid assessment and management—100%; assessment and monitoring of urine output and voiding—95%; assessment of draining and bleeding—100%; prophylaxis of nausea and vomiting—95%; treatment of nausea and vomiting—97%; multiple medications for the prophylaxis of nausea and vomiting—95%; multiple medications for the treatment of nausea and vomiting—97%; administration of supplemental oxygen—100%; normalizing patient temperature—100%; forced-air warming systems—85%; meperidine for shivering—92%; flumazenil for reversal of general anesthesia—95%; flumazenil for reversal of sedation—97%; naloxone for opioid reversal—100%; edrophonium for reversal of neuromuscular blockade—97%; neostigmine for reversal of neuromuscular blockade—100%; not requiring that patients urinate before discharge—92%; not requiring patients to drink water without vomiting before discharge—85%; requiring that patients have a responsible individual accompany them home—95%; and not requiring a mandatory minimum stay in recovery—85%. Eighty-two percent of the respondents indicated that the Guidelines

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Table 3. Consultant American Society of Anesthesiologists Membership Survey Summary

		Consultants *Percentage Response*				Membership *Percentage Response*			
Intervention or Linkage	Outcome	N	Agree (%)	Disagree (%)	Don't Know (%)	N	Agree (%)	Disagree (%)	Don't Know (%)
Continual assessment of airway patency, respiratory rate and SpO_2	Should be done	55	98.2	1.8	0.0	211	100.0	0.0	0.0
	Detects respiratory complications	55	98.2	1.8	0.0	211	98.1	0.0	1.9
	Reduces adverse outcomes	55	87.3	1.8	10.9	211	92.4	1.0	6.7
Routine monitoring of pulse rate and blood pressure	Should be done	56	100.0	0.0	0.0	211	100.0	0.0	0.0
	Detects C/V complications	56	94.6	0.0	5.4	211	90.5	4.8	4.8
	Reduces adverse outcomes	56	76.8	1.8	21.4	211	77.1	2.9	20.0
Routine electrocardiographic monitoring	Should be done	55	70.9	27.3	1.8	211	89.5	7.6	2.9
	Detects C/V complications	55	83.6	9.1	7.3	211	82.9	6.7	10.5
	Reduces adverse outcomes	55	47.3	16.4	36.4	211	64.8	8.6	26.7
Assessment of neuromuscular function	Should be done	55	70.9	20.0	9.1	211	78.1	16.2	5.7
	Detects complications	55	63.6	21.8	14.5	211	69.5	12.4	18.1
	Reduces adverse outcomes	55	54.5	14.5	30.9	211	59.0	12.4	28.6
Assessment of mental status	Should be done	56	96.4	3.6	0.0	211	98.1	1.9	0.0
	Detects complications	56	75.0	12.5	12.5	209	81.0	4.8	14.3
	Reduces adverse outcomes	56	62.5	5.4	32.1	209	65.7	8.6	25.7
Assessment of temperature	Should be done	55	74.5	18.2	7.3	211	86.7	10.5	2.9
	Detects complications	55	60.0	20.0	20.0	211	58.1	21.9	20.0
	Reduces adverse outcomes	55	49.1	16.4	34.5	211	58.1	18.1	23.8
Assessment of pain	Should be done	56	98.2	0.0	1.8	211	98.1	0.0	1.9
	Detects complications	55	69.1	18.2	12.7	211	67.9	20.8	11.3
	Reduces adverse outcomes	55	61.8	14.5	23.6	211	71.7	10.4	17.9
Assessment of nausea and vomiting	Should be done	56	89.3	5.4	5.4	211	84.8	10.5	4.8
	Detects complications	56	57.1	33.9	8.9	211	55.2	23.8	21.0
	Reduces adverse outcomes	56	51.8	26.8	21.4	211	53.3	21.0	25.7
Assessment of hydration status and fluid management	Reduces adverse outcomes	55	81.8	3.6	14.5	211	88.7	2.8	8.5
	Improves comfort/ satisfaction	55	65.5	12.7	21.8	211	75.5	5.7	18.9
Assessment of urine output	Routinely	56	1.8	96.4	1.8	211	5.7	91.5	2.8
	Selectively	56	98.2	1.8	0.0	211	94.3	4.7	0.9
	Detects complications	54	72.2	9.3	18.5	210	68.9	10.4	20.8
	Reduces adverse outcomes	54	55.6	13.0	31.5	210	54.7	14.2	31.1

(continued)

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Table 3. (*Continued*)

Intervention or Linkage	Outcome	Consultants *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)	Membership *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)
Assessment of urinary voiding	Routinely	56	12.5	83.9	3.6	211	21.7	72.6	5.7
	Selectively	56	66.1	26.8	7.1	211	67.0	25.5	7.5
	Detects complications	55	52.7	20.0	27.3	209	48.1	18.9	33.0
	Reduces adverse outcomes	55	43.6	20.0	36.4	209	43.4	20.8	35.8
Assessment of drainage and bleeding	Should be done	56	100.0	0.0	0.0	211	99.1	0.9	0.0
	Detects complications	56	100.0	0.0	0.0	211	96.2	1.9	1.9
	Reduces adverse outcomes	56	89.3	0.0	10.7	211	87.7	3.8	8.5
Pharmacological prophylaxis of nausea and vomiting	Routinely	56	8.9	85.7	5.4	211	16.0	79.2	4.7
	Selectively	55	89.1	10.9	0.0	211	84.0	12.3	3.8
	Improves comfort/ satisfaction	56	80.4	7.1	12.5	210	85.8	5.7	8.5
	Reduces time to discharge	56	66.1	14.3	19.6	210	64.2	13.2	22.6
Pharmacological treatment of nausea and vomiting	Should be done	56	100.0	0.0	0.0	211	100.0	0.0	0.0
	Improves comfort/ satisfaction	56	96.4	1.8	1.8	211	98.1	0.0	1.9
	Reduces time to discharge	56	71.4	10.7	17.9	211	76.4	2.8	20.8
Nonpharmacological treatment of nausea andvomiting	Should be done	56	50.0	21.4	28.6	210	44.3	14.2	41.5
	Improves comfort/ satisfaction	56	37.5	21.4	41.1	210	38.7	13.2	48.1
	Reduces time to discharge	56	26.8	26.8	46.4	210	27.4	14.2	58.5
Single or multiple meds for nausea and vomiting prophylaxis	Single agents should be used	53	52.8	37.7	9.4	210	57.1	30.5	12.4
	Multiple agents should be used	53	54.7	34.0	11.3	210	53.3	33.3	13.3
Single or multiple meds for nausea and vomiting treatment	Single agents should be used	55	60.0	32.7	7.3	209	55.7	30.2	14.2
	Multiple agents should be used	55	56.4	27.3	16.4	209	55.7	29.2	15.1
Supplemental oxygen during transport	Should be done	56	48.2	46.4	5.4	210	38.7	53.8	7.5
	Reduces adverse outcomes	55	29.1	27.3	43.6	210	28.3	36.8	34.9
Supplemental oxygen in postanesthesia care unit	Should be done	56	50.0	46.4	3.6	211	57.5	37.7	4.7
	Reduces adverse outcomes	55	36.4	23.6	40.0	211	41.5	28.3	30.2
Normothermia management	Reduces adverse outcomes	56	82.1	7.1	10.7	211	85.8	3.8	10.4
	Reduces shivering	56	83.9	3.6	12.5	211	79.2	8.5	12.3
	Improves comfort/ satisfaction	56	98.2	0.0	1.8	211	92.5	0.0	7.5
Forced-air warming *vs*. other warming	Reduces adverse outcomes	56	55.4	8.9	35.7	211	68.9	6.6	24.5
	Reduces shivering	56	71.4	5.4	23.2	211	77.4	2.8	19.8
	Improves comfort/ satisfaction	56	85.7	3.6	10.7	211	84.9	0.9	14.2

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Table 3. (*Continued*)

Intervention or Linkage	Outcome	Consultants *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)	Membership *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)
Meperidine *vs*. no treatment	Reduces adverse outcomes	56	23.2	17.9	58.9	211	26.4	23.6	50.0
	Reduces shivering	56	92.9	0.0	7.1	211	88.7	4.7	6.6
	Improves comfort/ satisfaction	56	82.1	3.6	14.3	211	82.1	5.7	12.3
Meperidine *vs*. other opioid agonists	Reduces adverse outcomes	56	17.9	21.4	60.7	211	25.5	25.5	49.1
	Reduces shivering	56	75.0	0.0	25.0	211	78.3	6.6	15.1
	Improves comfort/ satisfaction	56	62.5	3.6	33.9	211	67.9	7.5	24.5
Routine use of flumazenil and naloxone	Reduces adverse outcomes	56	3.6	80.4	16.1	211	5.7	77.4	17.0
	Improves comfort/ satisfaction	56	1.8	80.4	17.9	211	4.7	80.2	15.1
Regimens for avoiding neuromuscular blockade reversal	Reduces adverse outcomes	56	32.1	32.1	35.7	211	40.6	33.0	26.4
	Improves comfort/ satisfaction	56	30.4	35.7	33.9	211	40.6	31.1	28.3
Requiring urination before discharge	Reduces adverse outcomes	56	14.3	58.9	26.8	210	13.2	56.6	30.2
	Increases recovery stay	56	94.6	3.6	1.8	210	91.5	5.7	2.8
	Increases comfort/ satisfaction	56	10.7	71.4	17.9	210	11.3	64.2	24.5
	Mandatory for all day surgery	56	3.6	89.3	7.1	210	9.4	83.0	7.5
	Mandatory for select day surg	56	76.8	16.1	7.1	210	71.7	19.8	8.5
Requiring drinking before discharge	Reduces adverse outcomes	56	10.7	67.9	21.4	211	19.0	51.4	29.5
	Increases recovery stay	56	76.8	14.3	8.9	211	60.0	26.7	13.3
	Increases comfort/ satisfaction	56	17.9	67.9	14.3	211	34.3	40.0	25.7
	Mandatory for all day surgery	56	12.5	78.7	8.9	211	24.8	64.8	10.5
	Mandatory for select day surg	54	25.9	64.8	9.3	211	29.8	52.9	17.3
Responsible individual for escort	Should be mandatory	56	98.2	1.8	0.0	211	98.1	1.9	0.0
	Reduces adverse outcomes	56	76.8	1.8	21.4	211	69.8	2.8	27.4
	Increases comfort/ satisfaction	56	50.0	17.9	32.1	211	54.7	10.4	34.9
Responsible individual to stay for 24 h	Should be mandatory	56	30.4	44.6	25.0	211	36.8	46.2	17.0
	Reduces adverse outcomes	56	28.6	19.6	51.8	211	33.0	21.7	45.3
	Increases comfort/ satisfaction	56	32.1	21.4	46.4	211	33.0	23.6	43.4
Early discharge for regional extremity block patients	Improves comfort/ satisfaction	55	61.8	14.5	23.6	210	52.8	18.9	28.3
	Is acceptable clinical practice	55	83.6	9.1	7.3	210	69.8	25.5	4.7

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Table 3. (*Continued*)

Intervention or Linkage	Outcome	Consultants *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)	Membership *Percentage Response* N	Agree (%)	Disagree (%)	Don't Know (%)
Early discharge for spinal or epidural patients	Improves comfort/ satisfaction	56	51.8	16.1	32.1	210	50.9	18.9	30.2
	Is acceptable clinical practice	56	78.6	10.7	10.7	210	73.6	17.9	8.5
Minimum stay after intravenous narcotic	Should be required	56	73.2	23.2	3.6	211	72.6	22.6	4.7
	Reduces adverse outcomes	56	46.4	12.5	41.1	211	48.1	20.8	31.1
Minimum stay after vasoactive agents	Should be required	56	80.4	12.5	7.1	211	89.6	10.4	0.0
	Reduces adverse outcomes	56	53.6	8.9	37.5	211	58.5	7.5	34.0
Minimum stay in recovery facility	Should be required	56	30.4	67.9	1.8	210	38.7	54.7	6.6
	Reduces adverse outcomes	55	25.5	52.7	21.8	209	32.1	38.7	29.2
	Improves comfort/ satisfaction	55	16.4	61.8	21.8	209	25.5	42.5	32.1
Requiring separate phase 1 and 2 facilities	Should be required	56	21.4	64.3	14.3	210	19.8	55.7	24.5
	Reduces adverse outcomes	56	10.7	53.6	35.7	210	10.4	47.2	42.5
	Improves comfort/ satisfaction	56	41.1	33.9	25.0	210	23.6	41.5	34.9

would have *no effect* on the amount of time spent on a typical case.

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