PRACTICE GUIDELINES FOR POSTANESTHETIC CARE

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

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Abbreviated Title: Practice Guidelines

Introduction

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.

Practice guidelines are not intended as standards or absolute requirements. The use of practice guidelines cannot guarantee any specific outcome. Practice guidelines are subject to periodic revision as warranted by the evolution of medical knowledge, technology, and practice. The guidelines provide basic recommendations that are supported by analysis of the current literature and by a synthesis of expert opinion, open forum commentary, and clinical feasibility data *(Appendix)*.

A. Definition of Postanesthetic Care

The literature does not provide a standard definition for postanesthetic care. For these Practice Guidelines, postanesthetic care refers to those activities undertaken to manage the patient following 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 postanesthesia 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 each recommendation will be individualized according to the needs of each patient.

C. Focus

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

These Guidelines apply to patients of all ages who have just received general anesthesia, regional anesthesia, 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 patients receiving infiltration local anesthesia, 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 health care professionals who direct anesthesia or sedation and analgesia care. General medical supervision and coordination of patient care in the postanesthesia care unit (PACU) should be the responsibility of an anesthesiologist.[1]

E. Task Force Members and Consultants

The ASA appointed a Task Force of 10 members to review the published evidence and obtain consultant opinion from a representative body of anesthesiologists. The Task Force members consisted of anesthesiologists in both private and academic practices from various geographic areas of the United States.

The Task Force met its objective in a six-step process. First, original published research studies relevant to recovery care were reviewed and analyzed. Second, Consultants with expertise in recovery care and who practice or work in various settings (e.g., academic and private practice) were asked to (1) participate in opinion surveys and (2) review and comment on

drafts of the Guidelines. Third, a random sample of active members of the American Society of Anesthesiologists was surveyed regarding various elements of the Guidelines. Fourth, the Task Force held an open forum at a major national meeting to solicit input from attendees on the draft Guidelines. Fifth, all available information was used by the Task Force in developing the Guideline recommendations. Sixth, the Consultants were surveyed to assess their opinions on the feasibility and financial implications of implementing the Guidelines.

F. Availability and Strength of Evidence

Evidence-based guidelines are developed by a rigorous analytic process. To assist the reader, the Guidelines make use of several descriptive terms that are easier to understand than the technical terms and data that are used in the actual analyses. These descriptive terms are defined below:

The following terms describe the strength of scientific data obtained from the scientific literature:

Supportive: There is sufficient quantitative information from adequately designed studies to describe a statistically significant relationship ($P<0.01$) between a clinical intervention and a clinical outcome, using the technique of meta-analysis.

Suggestive: There is enough information from case reports and descriptive studies to provide a directional assessment of the relationship between a clinical intervention and a clinical outcome. This type of qualitative information does not permit a statistical assessment of significance.

Equivocal: Qualitative data have not provided a clear direction for clinical outcomes related to a clinical intervention and (1) there is insufficient quantitative information or (2) aggregated comparative studies have found no quantitatively significant differences among groups or conditions.

The following terms describe the lack of available scientific evidence in the literature.

Inconclusive: Published studies are available, but they cannot be used to assess the relationship between a clinical intervention and a clinical outcome because the studies either do not meet predefined criteria for content as defined in the "Focus of the Guidelines," or do not provide a clear causal interpretation of findings due to research design or analytic concerns.

Insufficient: There are too few published studies to investigate a relationship between a clinical intervention and clinical outcome.

Silent: No studies that address a relationship of interest were found in the available published literature.

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.

GUIDELINES

I. Perioperative Patient Assessment and Monitoring. *(Table 1)*

Perioperative and postanesthetic management of the patient includes periodic assessment and monitoring of respiratory and cardiovascular function, neuromuscular function, mental status,

temperature, pain, nausea and vomiting, drainage and bleeding, and urine output. Where specific monitoring is recommended, the duration of the intervention will be dependent upon the patient's clinical status. Specific criteria may be useful for clinical documentation.

1. Respiratory function (e.g., respiratory rate, SpO_2, $ETCO_2$)

The literature *suggests* that assessment and monitoring of respiratory function during recovery, in particular with pulse oximetry, is associated with early detection of hypoxemia. The Consultants and ASA members agree that periodic assessment and monitoring of airway patency, respiratory rate and SpO_2 should be done during emergence and recovery.

Recommendations:

Periodic assessment of airway patency, respiratory rate and SpO_2 should be done during emergence and recovery. Particular attention should be given to monitoring oxygenation and ventilation.[1]

2. Cardiovascular function (e.g., pulse, BP, ECG)

The literature is *insufficient* to evaluate the impact of cardiovascular assessment and monitoring on perioperative complications, and the literature is *silent* regarding routine ECG monitoring. The Consultants and ASA members agree that routine monitoring of pulse, blood pressure, and ECG 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 where routine ECG monitoring may not be necessary.

Recommendations:

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

3. Neuromuscular function

Assessment of neuromuscular function primarily includes physical examination and, on occasion, may include neuromuscular blockade monitoring. The literature *suggests* that neuromuscular blockade monitors are effective in detecting neuromuscular dysfunction, but is *silent* regarding whether such assessment is associated with fewer postoperative complications. 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.

Recommendations:

Assessment of neuromuscular function should be done during emergence and recovery for patients who have been administered neuromuscular blocking agents, or who have a medical condition that places them at risk.

4. Mental status

The literature is *silent* regarding whether assessment of mental status and behavior is associated with fewer postoperative complications. Several scoring systems are available for such assessment The Consultants and ASA members agree that assessment of mental status detects complications, reduces adverse outcomes, and should be done during emergence and recovery.

Recommendations:

Mental status should be periodically assessed during emergence and recovery.

5. Temperature

The literature is *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.

Recommendations:

The ability to measure patient temperature should be readily available, and patient temperature should be periodically assessed during emergence and recovery.

6. Pain

The literature is *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.

Recommendations:

Pain should be periodically assessed during emergence and recovery.

7. Nausea and vomiting

The literature is *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. However, the Consultants and ASA members agree that routine assessment and monitoring of nausea and vomiting should be done during emergence and recovery.

Recommendations:

Periodic assessment of nausea and vomiting should be done routinely during emergence and recovery.

8. Fluids

The literature is *insufficient* to evaluate the benefits of assessing the hydration status patients in the PACU. The Consultants and ASA members agree that routine perioperative assessment and management of fluids for patients reduces adverse outcomes and improves patient comfort/satisfaction.

Recommendations:

Postoperative fluids should be assessed in the PACU, and managed accordingly. Certain procedures involving significant loss of blood/fluids may require additional fluid management.

9. Urine output and voiding

The literature is *insufficient* regarding whether assessment of *urine output* 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 should be done for selected patients.

The literature is *insufficient* regarding whether assessment and monitoring of *urinary voiding* is associated with fewer postoperative complications. 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.

Recommendations:

Assessment of urine output and of urinary voiding should be done on a case-by-case

basis for selected patients or procedures during emergence and recovery.

10. Drainage and bleeding

The literature is *silent* 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 done during emergence and recovery.

Recommendations:

Assessment of drainage and bleeding should be done when indicated during emergence and recovery.

II. Treatment During Emergence and recovery. *(Table 2)*

1. Prophylaxis and treatment of nausea and vomiting

Published evidence *supports* the preoperative and intraoperative use of antiemetics (i.e., 5-HT-3 antagonists, droperidol, dexamethasone) or metoclopramide for the prevention of nausea and vomiting without encountering significant complications or other adverse events during emergence and recovery. The literature is *equivocal* regarding the efficacy of antiemetics in the antihistamine class or other pharmacologic agents for the prevention of nausea and vomiting. 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.

Published evidence *supports* the use of antiemetics (i.e., 5-HT-3 antagonists) during recovery for treating nausea and vomiting without encountering significant complications or other adverse events. Although they may be useful, there is *insufficient* evidence to evaluate the efficacy of other antiemetic agents. 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. However, the Consultants and ASA members are equivocal regarding whether non-pharmacological treatment of nausea and vomiting improves patient comfort, reduces time to discharge, or should be done.

The literature *supports* the efficacy of preoperative or intraoperative use of multiple agents in the prophylaxis of nausea compared to single agents, and is *equivocal* regarding the efficacy of multiple agents in preventing vomiting when compared to single agents. In addition, the literature is *equivocal* regarding whether additional complications or other adverse events occur during emergence and recovery when multiple agents are used. The Consultants and ASA members are equivocal regarding whether multiple agents should be used for the prophylaxis of nausea and vomiting.

The literature is *silent* regarding the use of multiple pharmacological agents compared to single agents in 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:

Antiemetic agents should be used for the prevention and treatment of nausea and vomiting when indicated. Metoclopramide may be used for the prevention of nausea and vomiting. Multiple agents may be used for the prevention or treatment of nausea and vomiting when indicated. Nonpharmacological treatments may be used on a case-by-case basis.

2. Administration of supplemental oxygen

Published evidence *supports* the use of supplemental oxygen during patient transportation

or in the recovery room to reduce the incidence of hypoxemia. The Consultants and ASA members are equivocal regarding whether routine administration of supplemental oxygen during patient transportation or in the PACU should be done.

Recommendations:

Administration of supplemental oxygen is effective in preventing and treating hypoxemia. Administering supplemental oxygen during transportation or in the recovery room should be done on for patients at risk of hypoxemia.

3. Normalizing patient temperature

The literature *supports* the use of active patient warming for normalizing patient temperature, but is *insufficient* in determining whether adverse outcomes are reduced. The literature also *supports* the use of forced-air warming devices for normalizing patient temperature and reducing time in recovery. The Consultants and ASA members agree that both the perioperative maintenance of normothermia and the use of forced-air warming reduces shivering and improves patient comfort/satisfaction.

Recommendations:

Normothermia should be a goal during emergence and recovery. Forced-air warming systems should be used for treating hypothermia when available.

4. Pharmacologic agents for the reduction of shivering

The literature *supports* the use of meperidine for reducing patient shivering during emergence and recovery. The literature also *supports* the effectiveness of meperidine compared to other opioid agonists or agonist-antagonists for the reduction of shivering. 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:

Meperidine should be used for the treatment of patient shivering during emergence and recovery. Practitioners may consider other opioid agonists or agonist-antagonists when meperidine is contraindicated or not available.

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

1. Antagonism of Benzodiazepines

Published evidence *supports* the efficacy of flumazenil for the antagonism of the residual effects of benzodiazepines after general anesthesia or sedation. The literature is *equivocal* regarding whether flumazenil is associated with adverse general anesthesia outcomes. The literature does not indicate that significant side-effects or other adverse outcomes are associated with the use of flumazenil when antagonizing benzodiazepine sedatives. The Consultants and ASA members disagree that *routine* use of flumazenil reduces adverse outcomes or improves patient comfort/satisfaction.

Recommendations:

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. Following pharmacological antagonism, patients should be observed long enough to ensure that cardiorespiratory depression does not recur.

2. Antagonism of Opioids

The literature *suggests* that naloxone effectively antagonizes respiratory depression, but is *insufficient* regarding the effect of naloxone on other patient outcomes. The Consultants and ASA members disagree that *routine* use of naloxone reduces adverse outcomes or improves patient comfort/satisfaction.

Recommendations:

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. Following pharmacological 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.

3. Reversal of neuromuscular blockade

The literature *supports* the efficacy of edrophonium and neostigmine for the antagonism of neuromuscular blockade. A higher frequency of postoperative emetic episodes were found to occur with the use of neostigmine; however, the literature is *insufficient* to evaluate the occurrence of complications or other adverse outcomes associated with edrophonium. 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:

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

IV. Protocol For Discharge. *(Tables 3 and 4)*

1. Requiring that patients pass urine prior to discharge

The literature is *insufficient* to evaluate the benefits of passing urine prior to discharge. The Consultants and ASA members disagree that the requirement that patients pass urine prior to discharge reduces adverse outcomes or increases patient satisfaction. They agree that it increases length of recovery stay, and agree that passing urine prior to discharge should only be mandatory for selected day surgery patients.

Recommendations:

The routine requirement for passing urine prior to discharge should not be part of a discharge protocol, and may only be necessary for selected patients.

2. Requiring that patients drink clear fluids without vomiting prior to discharge

The literature is *insufficient* to evaluate the benefits of drinking clear fluids prior to discharge. The Consultants and ASA members disagree that the requirement that patients drink clear fluids prior to discharge reduces adverse outcomes or increases patient satisfaction. They agree that it increases length of recovery stay. The Consultants disagree, and the ASA members are equivocal, regarding whether drinking clear fluids prior to discharge should be mandatory for any patient.

Recommendations:

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

or nauseated patients).

3. Requiring that patients have a responsible individual to accompany them home following discharge

The literature is *silent* regarding whether the presence of a responsible individual to accompany patients home following discharge is associated with a decrease in post-discharge complications or other adverse outcomes. The Consultants and ASA members agree that requiring patients to have a responsible individual to accompany them home following discharge reduces adverse outcomes, increases patient comfort/satisfaction, and should be mandatory.

Recommendations:

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

4. Requiring a minimum mandatory stay in recovery

The literature is *insufficient* to evaluate the benefits of requiring a minimum mandatory 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:

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 following discharge.

Reference:

[1] "Standards for Postanesthesia Care." In ASA Standards, Guidelines and Statements, American Society of Anesthesiologists, October, 2000.

Table 1:

Summary of Recommendations for Assessment and Monitoring

Routine	Selected Patients
Respiratory	
Respiratory Rate Airway Patency Oxygen Saturation	
Cardiovascular	
Pulse Rate Blood Pressure	Electrocardiogram
Neuromuscular	
Physical Examination	Neuromuscular Blockade Nerve Stimulator
Mental Status	
	Temperature
Pain	
Nausea and Vomiting	
	Urine Voiding Output
	Bleeding and Drainage

Table 2:

Summary of Treatment Recommendations

Prophylaxis and Treatment of Nausea and Vomiting

Antiemetic agents (e.g., 5-HT-3 antagonists, droperidol or dexamethasone) may be used for prophylaxis or treatment when indicated
Gastric emptying agents may be used for prophylaxis when indicated
Multiple agents may be used for prophylaxis or treatment when indicated
Other antiemetics or non-pharmacological agents may be used for treatment when indicated

Supplemental Oxygen

Supplemental oxygen for patients at risk of hypoxemia is recommended

Fluid Administration and Management

Postoperative fluids should be managed in the PACU
Certain procedures may require additional fluid management

Normalizing Patient Temperature

Normothermia should be maintained
Forced-air warming systems are most effective for treating hypothermia

Pharmacological Agents for the Reduction of Shivering

Meperidine is recommended

Antagonism of the Effects of Sedatives, Analgesics and Neuromuscular Block

Antagonism of Benzodiazepines
Antagonists should be available
Flumazenil should not be used routinely
Flumazenil may be administered to antagonize respiratory depression and sedation
Following pharmacological reversal, patients should be observed long enough to ensure that cardiorespiratory depression does not recur

Antagonism of Opioids
Antagonists should be available
Naloxone should not be used routinely
Naloxone may be administered to antagonize respiratory depression and sedation
Following pharmacological reversal, patients should be observed long enough to ensure that cardiorespiratory depression does not recur

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

Table 3:

Summary of Recommendations for Discharge

Requiring that Patients Pass Urine Prior to Discharge

The requirement for passing urine prior to discharge should not be part of a discharge protocol

The requirement for passing urine prior to discharge may only be necessary for selected patients

Requiring that Patients Drink Clear Fluids Without Vomiting Prior to Discharge

The requirement of drinking clear fluids should not be part of a discharge protocol

The requirement of drinking clear fluids may only be necessary for selected patients

Requiring that Patients have a Responsible Individual Accompany them Home

As part of a discharge protocol, patients should routinely be required to have a responsible individual accompany them home

Requiring a Minimum Mandatory Stay in Recovery

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 following discharge

Table 4:

Summary of Recovery and Discharge Criteria

Each patient-care facility should develop suitable recovery and discharge criteria. Some of the basic principles which might be incorporated in these criteria are enumerated below.

A. General Principles

1. Medical supervision of recovery and discharge is the responsibility of the supervising practitioner.
2. The recovery area should be equipped with appropriate monitoring and resuscitation equipment.
3. Patients should be monitored until appropriate discharge criteria are satisfied.
4. Level of consciousness, vital signs and oxygenation (when indicated) should be recorded at regular intervals.
5. A nurse or other individual trained to monitor patients and recognize complications should be in attendance until discharge criteria are fulfilled.
6. An individual capable of managing complications should be immediately available until discharge criteria are fulfilled.

B. Guidelines for Discharge

1. Patients should be alert and oriented. Patients whose mental status was initially abnormal should have returned to their baseline.
2. Vital signs should be stable and within acceptable limits.
3. Discharge should take place after patients have meet specified criteria. Use of scoring systems may assist in documentation of fitness for discharge.
4. Outpatients should be discharged to a responsible adult who will accompany them home and be able to report any post-procedure complications.
5. Outpatients should be provided with written instructions regarding post-procedure diet, medications, activities, and a phone number to be called in case of emergency.