Practice Guidelines for Acute Pain Management in the Perioperative Setting

An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management

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.

- What other guideline statements are available on this topic?
  - These Practice Guidelines update the "Practice Guidelines for Acute Pain Management in the Perioperative Setting," adopted by the ASA in 2003 and published in 2004.*
- Why was this guideline developed?
  - In October 2010, 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 and findings from surveys of experts and randomly selected ASA members. The new findings did not necessitate a change in recommendations.
- Why does this statement differ from existing guidelines?
  - The ASA guidelines differ from the existing guidelines because they provide new evidence obtained from recent scientific literature as well as findings from new surveys of expert consultants and randomly selected ASA members.

This document updates the "Practice Guidelines for Acute Pain Management in the Perioperative Setting: An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management," adopted by the ASA in 2003 and published in 2004.*

Methodology

A. Definition of Acute Pain Management in the Perioperative Setting

For these Guidelines, acute pain is defined as pain that is present in a surgical patient after a procedure. Such pain may be the result of trauma from the procedure or procedure-related complications. Pain management in the perioperative setting refers to actions before, during, and after a procedure

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* American Society of Anesthesiologists Task Force on Acute Pain Management: Practice guidelines for acute pain management in the perioperative setting: An updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. ANESTHESIOLOGY 2004; 100:1573–81.

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that are intended to reduce or eliminate postoperative pain before discharge.

B. Purpose of the Guidelines

The purpose of these Guidelines is to (1) facilitate the safety and effectiveness of acute pain management in the perioperative setting; (2) reduce the risk of adverse outcomes; (3) maintain the patient's functional abilities, as well as physical and psychologic well-being; and (4) enhance the quality of life for patients with acute pain during the perioperative period. Adverse outcomes that may result from the *undertreatment* of perioperative pain include (but are not limited to) thromboembolic and pulmonary complications, additional time spent in an intensive care unit or hospital, hospital readmission for further pain management, needless suffering, impairment of health-related quality of life, and development of chronic pain. Adverse outcomes associated with the *management* of perioperative pain include (but are not limited to) respiratory depression, brain or other neurologic injury, sedation, circulatory depression, nausea, vomiting, pruritus, urinary retention, impairment of bowel function, and sleep disruption. Health-related quality of life includes (but is not limited to) physical, emotional, social, and spiritual well-being.

C. Focus

These Guidelines focus on acute pain management in the perioperative setting for adult (including geriatric) and pediatric patients undergoing either inpatient or outpatient surgery. Modalities for perioperative pain management addressed in these Guidelines require a higher level of professional expertise and organizational structure than "as needed" intramuscular or intravenous injections of opioid analgesics. These Guidelines are not intended as an exhaustive compendium of specific techniques.

Patients with severe or concurrent medical illness such as sickle cell crisis, pancreatitis, or acute pain related to cancer or cancer treatment may also benefit from aggressive pain control. Labor pain is another condition of interest to anesthesiologists. However, the complex interactions of concurrent medical therapies and physiologic alterations make it impractical to address pain management for these populations within the context of this document.

Although patients undergoing painful procedures may benefit from the appropriate use of anxiolytics and sedatives in combination with analgesics and local anesthetics when indicated, these Guidelines do not specifically address the use of anxiolysis or sedation during such procedures.

D. Application

These Guidelines are intended for use by anesthesiologists and individuals who deliver care under the supervision of anesthesiologists. The Guidelines may also serve as a resource for other physicians and healthcare professionals who manage perioperative pain. In addition, these Guidelines may be used by policymakers to promote effective and patient-centered care.

Anesthesiologists bring an exceptional level of interest and expertise to the area of perioperative pain management. Anesthesiologists are uniquely qualified and positioned to provide leadership in integrating pain management within perioperative care. In this leadership role, anesthesiologists improve quality of care by developing and directing institution-wide, interdisciplinary perioperative analgesia programs.

E. Task Force Members and Consultants

The original Guidelines were developed by an ASA appointed task force of 11 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 updated the 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 acute pain management were reviewed and evaluated. Third, expert consultants were asked to: (1) participate in opinion surveys on the effectiveness of various acute pain management recommendations and (2) review and comment on a draft of the updated Guidelines. Fourth, opinions about the updated 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 reexamined. Sixth, the consultants were surveyed to assess their opinions on the feasibility of implementing the updated Guidelines. Seventh, all available information was used to build consensus to finalize the updated Guidelines. A summary of recommendations may be found in appendix 1.

F. Availability and Strength of Evidence

Preparation of these Guidelines followed a rigorous methodological process. Evidence was obtained from two principal sources: scientific evidence and opinion-based evidence.

Scientific Evidence

Study findings from published scientific literature were aggregated and are reported in summary form by evidence category, as described below. All literature (*e.g.*, randomized controlled trials [RCTs], observational studies, case reports) relevant to each topic was considered when evaluating the findings. However, for reporting purposes in this document, only the highest level of evidence (*i.e.*, level 1, 2, or 3 within

† International Anesthesia Research Society, 68th Clinical and Scientific Congress, Orlando, Florida, March 6, 1994.

category A, B, or C, as identified below) is included in the summary.

Category A: Supportive Literature

Randomized controlled trials report statistically significant ($P < 0.01$) differences between clinical interventions for a specified clinical outcome.

Level 1: The literature contains multiple RCTs, and aggregated findings are supported by meta-analysis.‡
Level 2: The literature contains multiple RCTs, but the number of studies is insufficient to conduct a viable meta-analysis for the purpose of these Guidelines.
Level 3: The literature contains a single randomized controlled trial.

Category B: Suggestive Literature

Information from observational studies permits inference of beneficial or harmful relationships among clinical interventions and clinical outcomes.

Level 1: The literature contains observational comparisons (*e.g.*, cohort, case-control research designs) of clinical interventions or conditions and indicates statistically significant differences between clinical interventions for a specified clinical outcome.
Level 2: The literature contains noncomparative observational studies with associative (*e.g.*, relative risk, correlation) or descriptive statistics.
Level 3: The literature contains case reports.

Category C: Equivocal Literature

The literature cannot determine whether there are beneficial or harmful relationships among clinical interventions and clinical outcomes.

Level 1: Meta-analysis did not find significant differences ($P > 0.01$) among groups or conditions.
Level 2: The number of studies is insufficient to conduct meta-analysis, and (1) RCTs have not found significant differences among groups or conditions or (2) RCTs report inconsistent findings.
Level 3: Observational studies report inconsistent findings or do *not* permit inference of beneficial or harmful relationships.

Category D: Insufficient Evidence from Literature

The *lack* of scientific evidence in the literature is described by the following terms.

Inadequate: The available literature cannot be used to assess relationships among clinical interventions and clinical outcomes. The literature either does not meet the criteria for content as defined in the "Focus" of the Guidelines or does not permit a clear interpretation of findings due to methodological concerns (*e.g.*, confounding in study design or implementation).

Silent: No identified studies address the specified relationships among interventions and outcomes.

Opinion-based Evidence

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

Opinion surveys were developed for this update by the Task Force to address each clinical intervention identified in the document. Identical surveys were distributed to expert consultants and ASA members.

Category A: Expert Opinion

Survey responses from Task Force-appointed expert consultants are reported in summary form in the text, with a complete listing of consultant survey responses reported in appendix 2.

Category B: Membership Opinion

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

Opinion survey responses are recorded using a 5-point scale and summarized based on median values.§

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

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

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

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

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

Category C: Informal Opinion

Open-forum testimony from the previous update, Internet-based comments, letters, and editorials are all informally evaluated and discussed during the development of Guideline recommendations. When warranted, the Task Force may add educational information or cautionary notes based on this information.

‡ All meta-analyses are conducted by the American Society of Anesthesiologists methodology group. Meta-analyses from other sources are reviewed but not included as evidence in this document.

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

Guidelines

I. Institutional Policies and Procedures for Providing Perioperative Pain Management

Institutional policies and procedures include (but are not limited to) (1) education and training for healthcare providers, (2) monitoring of patient outcomes, (3) documentation of monitoring activities, (4) monitoring of outcomes at an institutional level, (5) 24-h availability of anesthesiologists providing perioperative pain management, and (6) use of a dedicated acute pain service.

Observational studies report that education and training programs for healthcare providers are associated with decreased pain levels,[1–4] decreased nausea and vomiting,[2] and improved patient satisfaction[1] (*Category B2 evidence*), although the type of education and training provided varied across the studies. Published evidence is insufficient to evaluate the impact of monitoring patient outcomes at either the individual patient or institutional level, and the 24-h availability of anesthesiologists (*Category D evidence*). Observational studies assessing documentation activities suggest that pain outcomes are not fully documented in patient records (*Category B2 evidence*).[5–11] Observational studies indicate that acute pain services are associated with reductions in perioperative pain (*Category B2 evidence*),[12–20] although treatment components of the acute pain services varied across the studies.

The consultants and ASA members strongly agree that anesthesiologists offering perioperative analgesia services should provide, in collaboration with other healthcare professionals as appropriate, ongoing education and training of hospital personnel regarding the effective and safe use of the available treatment options within the institution. The consultants and ASA members also strongly agree that anesthesiologists and other healthcare providers should use standardized, validated instruments to facilitate the regular evaluation and documentation of pain intensity, the effects of pain therapy, and side effects caused by the therapy. The ASA members agree and the consultants strongly agree that: (1) anesthesiologists responsible for perioperative analgesia should be available *at all times* to consult with ward nurses, surgeons, or other involved physicians, and should assist in evaluating patients who are experiencing problems with any aspect of perioperative pain relief; (2) anesthesiologists should provide analgesia services within the framework of an Acute Pain Service and participate in developing standardized institutional policies and procedures; and (3) an integrated approach to perioperative pain management (*e.g.*, ordering, administering, and transitioning therapies, transferring responsibility for pain therapy, outcomes assessment, continuous quality improvement) should be used to minimize analgesic gaps.

Recommendations for Institutional Policies and Procedures. Anesthesiologists offering perioperative analgesia services should provide, in collaboration with other healthcare professionals as appropriate, ongoing education and training to ensure that hospital personnel are knowledgeable and skilled with regard to the effective and safe use of the available treatment options within the institution. Educational content should range from basic bedside pain assessment to sophisticated pain management techniques (*e.g.*, epidural analgesia, patient controlled analgesia, and various regional anesthesia techniques) and nonpharmacologic techniques (*e.g.*, relaxation, imagery, hypnotic methods). For optimal pain management, ongoing education and training are essential for new personnel, to maintain skills, and whenever therapeutic approaches are modified.

Anesthesiologists and other healthcare providers should use standardized, validated instruments to facilitate the regular evaluation and documentation of pain intensity, the effects of pain therapy, and side effects caused by the therapy.

Analgesic techniques involve risk for adverse effects that may require prompt medical evaluation. Anesthesiologists responsible for perioperative analgesia should be available *at all times* to consult with ward nurses, surgeons, or other involved physicians, and should assist in evaluating patients who are experiencing problems with any aspect of perioperative pain relief.

Anesthesiologists providing perioperative analgesia services should do so within the framework of an Acute Pain Service and participate in developing standardized institutional policies and procedures. An integrated approach to perioperative pain management that minimizes analgesic gaps includes ordering, administering, and transitioning therapies, and transferring responsibility for perioperative pain therapy, as well as outcomes assessment and continuous quality improvement.

II. Preoperative Evaluation of the Patient

Preoperative patient evaluation and planning is integral to perioperative pain management. Proactive individualized planning is an anticipatory strategy for postoperative analgesia that integrates pain management into the perioperative care of patients. Patient factors to consider in formulating a plan include type of surgery, expected severity of postoperative pain, underlying medical conditions (*e.g.*, presence of respiratory or cardiac disease, allergies), the risk–benefit ratio for the available techniques, and a patient's preferences or previous experience with pain.

Although the literature is insufficient regarding the efficacy of a preoperative directed pain history, a directed physical examination, or consultations with other healthcare providers (*Category D evidence*), the Task Force points out the obvious value of these activities. One observational study in a neonatal intensive care unit suggests that the implementation of a pain management protocol may be associated with reduced analgesic use, shorter time to extubation, and shorter times to discharge (*Category B2 evidence*).[21]

The ASA members agree and the consultants strongly agree that a directed history, a directed physical examination,

and a pain control plan should be included in the anesthetic preoperative evaluation.

Recommendations for Preoperative Evaluation of the Patient. A directed pain history, a directed physical examination, and a pain control plan should be included in the anesthetic preoperative evaluation.

III. Preoperative Preparation of the Patient

Preoperative patient preparation includes (1) adjustment or continuation of medications whose sudden cessation may provoke a withdrawal syndrome, (2) treatments to reduce preexisting pain and anxiety, (3) premedications before surgery as part of a multimodal analgesic pain management program, and (4) patient and family education, including behavioral pain control techniques.

There is insufficient literature to evaluate the impact of preoperative adjustment or continuation of medications whose sudden cessation may provoke an abstinence syndrome (*Category D evidence*). Similarly, there is insufficient literature to evaluate the efficacy of the preoperative initiation of treatment either to reduce preexisting pain or as part of a multimodal analgesic pain management program (*Category D evidence*). RCTs are equivocal regarding the impact of patient and family education on patient pain, analgesic use, anxiety, and time to discharge, although features of patient and family education varied across the studies (*Category C2 evidence*).[22–35]

The consultants and ASA members strongly agree that patient preparation for perioperative pain management should include appropriate adjustments or continuation of medications to avert an abstinence syndrome, treatment of preexistent pain, or preoperative initiation of therapy for postoperative pain management. The ASA members agree and the consultants strongly agree that anesthesiologists offering perioperative analgesia services should provide, in collaboration with others as appropriate, patient and family education. The consultants and ASA members agree that perioperative patient education should include instruction in behavioral modalities for control of pain and anxiety.

Recommendations for Preoperative Preparation of the Patient. Patient preparation for perioperative pain management should include appropriate adjustments or continuation of medications to avert an abstinence syndrome, treatment of preexistent pain, or preoperative initiation of therapy for postoperative pain management.

Anesthesiologists offering perioperative analgesia services should provide, in collaboration with others as appropriate, patient and family education regarding their important roles in achieving comfort, reporting pain, and in proper use of the recommended analgesic methods. Common misconceptions that overestimate the risk of adverse effects and addiction should be dispelled. Patient education for optimal use of patient-controlled analgesia (PCA) and other sophisticated methods, such as patient-controlled epidural analgesia, might include discussion of these analgesic methods at the time of the preanesthetic evaluation, brochures and videotapes to educate patients about therapeutic options, and discussion at the bedside during postoperative visits. Such education may also include instruction in behavioral modalities for control of pain and anxiety.

IV. Perioperative Techniques for Pain Management

Perioperative techniques for postoperative pain management include but are not limited to the following single modalities: (1) central regional (*i.e.*, neuraxial) opioid analgesia; (2) PCA with systemic opioids; and (3) peripheral regional analgesic techniques, including but not limited to intercostal blocks, plexus blocks, and local anesthetic infiltration of incisions.

Central regional opioid analgesia: Randomized controlled trials report improved pain relief when use of preincisional epidural or intrathecal morphine is compared with preincisional oral, intravenous, or intramuscular morphine (*Category A2 evidence*).[36–39] RCTs comparing preoperative or preincisional intrathecal morphine or epidural sufentanil with saline placebo report inconsistent findings regarding pain relief (*Category C2 evidence*).[40–43] RCTs comparing preoperative or preincisional epidural morphine or fentanyl with postoperative epidural morphine or fentanyl are equivocal regarding postoperative pain scores (*Category C2 evidence*).[44,45]

Meta-analyses of RCTs[46–54] report improved pain relief and increased frequency of pruritus in comparisons of postincisional epidural morphine and saline placebo (*Category A1 evidence*); findings for the frequency of nausea or vomiting were equivocal (*Category C1 evidence*). Meta-analyses of RCTs comparing postincisional epidural morphine with intramuscular morphine report improved pain relief and an increased frequency of pruritus (*Category A1 evidence*).[49,55–59] One RCT reports improved pain scores and less analgesic use when postincisional intrathecal fentanyl is compared with no postincisional spinal treatment (*Category A3 evidence*).[60]

One RCT reports improved pain scores when postoperative epidural morphine is compared with postoperative epidural saline (*Category A3 evidence*).[61] Meta-analyses of RCTs[62–70] report improved pain scores and a higher frequency of pruritus and urinary retention when postoperative epidural morphine is compared with intramuscular morphine (*Category A3 evidence*); findings for nausea and vomiting are equivocal (*Category C2 evidence*). Findings from RCTs are equivocal regarding the analgesic efficacy of postoperative epidural fentanyl compared with postoperative IV fentanyl (*Category C2 evidence*)[71–74]; meta-analytic findings are equivocal for nausea and vomiting and pruritus (*Category C1 evidence*).[72–76]

PCA with systemic opioids: Randomized controlled trials report equivocal findings regarding the analgesic efficacy of IV PCA techniques compared with nurse or staff-administered intravenous analgesia (*Category C2 evidence*).[77–80]

Meta-analysis of RCTs reports improved pain scores when IV PCA morphine is compared with intramuscular morphine (*Category A1 evidence*).[81–90] Findings from meta-analysis of RCTs comparing epidural PCA and IV PCA opioids are equivocal regarding analgesic efficacy (*Category C1 evidence*).[89–93] Findings from meta-analyses of RCTs[94–103] indicate more analgesic use when IV PCA with a background infusion of morphine is compared with IV PCA without a background infusion (*Category A1 evidence*); findings were equivocal regarding pain relief, nausea and vomiting, pruritus, and sedation (*Category C1 evidence*).

Peripheral regional techniques: For these Guidelines, peripheral regional techniques include peripheral nerve blocks (*e.g.*, intercostal, ilioinguinal, interpleural, or plexus blocks), intraarticular blocks, and infiltration of incisions. RCTs indicate that preincisional intercostal or interpleural bupivacaine compared with saline is associated with improved pain relief (*Category A2 evidence*).[104,105] RCTs report improved pain relief and reduced analgesic consumption when postincisional intercostal or interpleural bupivacaine is compared with saline (*Category A2 evidence*).[104–109] Meta-analyses of RCTs report equivocal findings for pain relief and analgesic used when postoperative intercostal or interpleural blocks are compared with saline (*Category C1 evidence*).[110–117]

Randomized controlled trials report equivocal pain relief findings when preincisional plexus blocks with bupivacaine are compared with saline (*Category C2 evidence*).[118–121] Meta-analyses of RCTs[118–122] report less analgesic use when preincisional plexus blocks with bupivacaine are compared with saline (*Category A1 evidence*); findings are equivocal for nausea and vomiting (*Category C1 evidence*). Meta-analysis of RCTs reports lower pain scores when preincisional plexus and other blocks are compared with no block (*Category A1 evidence*).[123–127] RCTs report equivocal findings for pain scores and analgesic use when postincisional plexus and other blocks are compared with saline or no block (*Category C2 evidence*).[124,128–132] RCTs report equivocal findings for pain scores and analgesic use when postincisional intraarticular opioids or local anesthetics are compared with saline (*Category C2 evidence*).[133–139]

Meta-analysis of RCTs reports improved pain scores when preincisional infiltration of bupivacaine is compared with saline (*Category A1 evidence*)[140–148]; findings for analgesic use are equivocal (*Category C1 evidence*).[140,145,147,148–150] Meta-analyses of RCTs are equivocal for pain scores and analgesic use when postincisional infiltration of bupivacaine is compared with saline (*Category C1 evidence*).[140,151–160] Meta-analysis of RCTs reports equivocal pain score findings when preincisional infiltration of bupivacaine is compared with postincisional infiltration of bupivacaine (*Category C1 evidence*).[140,145,161–164] Meta-analysis of RCTs reports improved pain scores and reduced analgesic use when preincisional infiltration of ropivacaine is compared with saline (*Category A1 evidence*).[164–171]

The consultants and ASA members strongly agree that anesthesiologists who manage perioperative pain should use therapeutic options such as epidural or intrathecal opioids, systemic opioid PCA, and regional techniques after thoughtfully considering the risks and benefits for the individual patient; they also strongly agree that these modalities should be used in preference to intramuscular opioids ordered "as needed." The consultants and ASA members also strongly agree that the therapy selected should reflect the individual anesthesiologist's expertise, as well as the capacity for safe application of the modality in each practice setting. Moreover, the consultants and ASA members strongly agree that special caution should be taken when continuous infusion modalities are used, as drug accumulation may contribute to adverse events.

Recommendations for Perioperative Techniques for Pain Management. Anesthesiologists who manage perioperative pain should use therapeutic options such as central regional (*i.e.*, neuraxial) opioids, systemic opioid PCA, and peripheral regional techniques after thoughtfully considering the risks and benefits for the individual patient. These modalities should be used in preference to intramuscular opioids ordered "as needed." The therapy selected should reflect the individual anesthesiologist's expertise, as well as the capacity for safe application of the modality in each practice setting. This capacity includes the ability to recognize and treat adverse effects that emerge after initiation of therapy. Special caution should be taken when continuous infusion modalities are used, as drug accumulation may contribute to adverse events.

V. Multimodal Techniques for Pain Management

Multimodal techniques for pain management include the administration of two or more drugs that act by different mechanisms for providing analgesia. These drugs may be administered *via* the same route or by different routes.

Multimodal techniques with central regional analgesics: Meta-analyses of RCTs[46,49,172–176] report improved pain scores (*Category A1 evidence*) and equivocal findings for nausea and vomiting and pruritus (*Category C1 evidence*) when epidural morphine combined with local anesthetics is compared with epidural morphine alone. Meta-analyses of RCTs[177–188] report improved pain scores and more motor weakness when epidural fentanyl combined with local anesthetics is compared with epidural fentanyl alone (*Category A1 evidence*); equivocal findings are reported for nausea and vomiting and pruritus (*Category C1 evidence*). Meta-analyses of RCTs[49,172,176,189–194] report improved pain scores, greater pain relief, and a higher frequency of pruritus (*Category A1 evidence*) when epidural morphine combined with bupivacaine is compared with epidural bupivacaine alone; equivocal findings are reported for nausea and vomiting (*Category C1 evidence*). RCTs report equivocal findings when epidural fentanyl combined with bupivacaine is compared with epidural bupivacaine alone (*Category C2 evidence*).[179–181,188] Meta-analysis of RCTs for the above comparison reports higher frequency of

pruritus (*Category A1 evidence*)[180,181,188,195,196] with equivocal findings for nausea and vomiting (*Category C1 evidence*).[179–181,188,195–197] RCTs report equivocal findings for pain scores, nausea and vomiting, pruritus, and motor weakness when epidural fentanyl with ropivacaine is compared with epidural ropivacaine (*Category C2 evidence*).[198–201] Meta-analyses of RCTs[200,202–206] are equivocal for pain scores (*Category C2 evidence*) and a higher frequency of pruritus when epidural sufentanil combined with ropivacaine is compared with epidural ropivacaine (*Category A1 evidence*). Meta-analysis of RCTs is equivocal for pain scores when epidural opioids combined with clonidine is compared with epidural opioids (*Category C1 evidence*).[207–212]

Multimodal techniques with systemic analgesics: Meta-analyses of RCTs[213–220] report improved pain scores and reduced analgesic use (*Category A1 evidence*) when intravenous morphine combined with ketorolac is compared with intravenous morphine; equivocal findings are reported for nausea and vomiting (*Category C1 evidence*). Meta-analyses of RCTs[221–226] report equivocal findings for pain scores, analgesic use, or nausea scores when intravenous morphine combined with ketamine is compared with intravenous morphine (*Category C1 evidence*). RCTs report inconsistent findings for pain scores and morphine use when intravenous patient-controlled opioid analgesia (IV PCA) combined with oral cyclooxygenase-2 (COX-2) selective nonsteroidal antiinflammatory drugs (NSAIDs)[227] or nonselective NSAIDs[228,229] are compared with IV PCA opioids alone; findings for acetaminophen are equivocal (*Category C2 evidence*).[230] Meta-analyses of RCTs report lower pain scores and reduced opioid use when IV opioids combined with calcium channel blockers (*i.e.*, gabapentin, pregabalin) is compared with IV opioids alone (*Category A1 evidence*)[231–240]; no differences in nausea or vomiting are reported (*Category C1 evidence*).[233–236,238,241]

The consultants and ASA members strongly agree that whenever possible, anesthesiologists should use multimodal pain management therapy. The ASA members agree and the consultants strongly agree that acetaminophen should be considered as part of a postoperative multimodal pain management regimen; both the consultants and ASA members agree that COX-2 selective NSAIDs (COXIBs), nonselective NSAIDs, and calcium channel α-2-δ antagonists (gabapentin and pregabalin) should be considered as part of a postoperative multimodal pain management regimen. Moreover, the ASA members agree and the consultants strongly agree that, unless contraindicated, patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen. Both the consultants and ASA members strongly agree that (1) regional blockade with local anesthetics should be considered as part of a multimodal approach for pain management; (2) dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events; and (3) the choice of medication, dose, route, and duration of therapy should be individualized.

Recommendations for Multimodal Techniques. Whenever possible, anesthesiologists should use multimodal pain management therapy. Central regional blockade with local anesthetics should be considered. Unless contraindicated, patients should receive an around-the-clock regimen of COXIBs, NSAIDs, or acetaminophen. Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events. The choice of medication, dose, route, and duration of therapy should be individualized.

VI. Patient Subpopulations

Some patient groups are at special risk for inadequate pain control and require additional analgesic considerations. Patient populations at risk include (1) pediatric patients, (2) geriatric patients, and (3) critically ill or cognitively impaired patients, or other patients who may have difficulty communicating. The Task Force believes that genetics and gender modify the pain experience and response to analgesic therapies. In addition, the Task Force believes that patient race, ethnicity, culture, gender, and socioeconomic status influence access to treatment as well as pain assessment by healthcare providers.

Pediatric Patients. The Task Force believes that optimal care for infants and children (including adolescents) requires special attention to the biopsychosocial nature of pain. This specific patient population presents developmental differences in their experience and expression of pain and suffering, and their response to analgesic pharmacotherapy. Caregivers in both the home and hospital may have misperceptions regarding the importance of analgesia as well as its risks and benefits. In the absence of a clear source of pain or obvious pain behavior, caregivers may assume that pain is not present and defer treatment. Safe methods for providing analgesia are underused in pediatric patients for fear of opioid-induced respiratory depression.

The emotional component of pain is particularly strong in infants and children. Absence of parents, security objects, and familiar surroundings may cause as much suffering as the surgical incision. Children's fear of injections makes intramuscular or other invasive routes of drug delivery aversive. Even the valuable technique of topical analgesia before injections may not lessen this fear.

A variety of techniques may be effective in providing analgesia in pediatric patients. Many are the same as for adults, although some (*e.g.*, caudal analgesia) are more commonly used in children. The Task Force believes that it is important for caregivers to recognize that pediatric patients require special consideration to ensure optimal perioperative analgesia.

The ASA members and consultants strongly agree that (1) perioperative care for children undergoing painful procedures or surgery requires developmentally appropriate pain assessment and therapy; (2) analgesic therapy should depend upon age, weight, and comorbidity, and unless contraindi-

cated should involve a multimodal approach; and (3) because many analgesic medications are synergistic with sedating agents, it is imperative that appropriate monitoring be used during the procedure and recovery. The ASA members agree and the consultants strongly agree that behavioral techniques, especially important in addressing the emotional component of pain, should be applied whenever feasible.

Recommendations for Pediatric Patients. Aggressive and proactive pain management is necessary to overcome the historic undertreatment of pain in children. Perioperative care for children undergoing painful procedures or surgery requires developmentally appropriate pain assessment and therapy. Analgesic therapy should depend upon age, weight, and comorbidity, and unless contraindicated should involve a multimodal approach. Behavioral techniques, especially important in addressing the emotional component of pain, should be applied whenever feasible.

Sedative, analgesic, and local anesthetics are all important components of appropriate analgesic regimens for painful procedures. Because many analgesic medications are synergistic with sedating agents, it is imperative that appropriate monitoring be used during the procedure and recovery.

Geriatric Patients. Elderly patients suffer from conditions such as arthritis or cancer that render them more likely to undergo surgery. The Task Force believes that pain is often undertreated, and elderly individuals may be more vulnerable to the detrimental effects of such undertreatment. The physical, social, emotional, and cognitive changes associated with aging have an impact on perioperative pain management. These patients may have different attitudes than younger adult patients in expressing pain and seeking appropriate therapy. Altered physiology changes the way analgesic drugs and local anesthetics are distributed and metabolized and frequently requires dose alterations. Techniques effective in younger adults may also benefit geriatric patients without an age-related increase in adverse effects. One observational study suggests that perioperative analgesics are provided in lower dosages to older adults than to younger adults (*Category B2 evidence*).[242] The Task Force believes that, although the reasons for lower perioperative analgesic doses in the elderly are unclear, undertreatment of pain in elderly persons is widespread.

The ASA members and consultants strongly agree that (1) pain assessment and therapy should be integrated into the perioperative care of geriatric patients; (2) pain assessment tools appropriate to a patient's cognitive abilities should be used; and (3) dose titration should be done to ensure adequate treatment while avoiding adverse effects such as somnolence in this vulnerable group, who may be taking other medications. The ASA members agree and the consultants strongly agree that extensive and proactive evaluation and questioning should be conducted to overcome barriers that hinder communication regarding unrelieved pain.

Recommendations for Geriatric Patients. Pain assessment and therapy should be integrated into the perioperative care of geriatric patients. Pain assessment tools appropriate to a patient's cognitive abilities should be used. Extensive and proactive evaluation and questioning may be necessary to overcome barriers that hinder communication regarding unrelieved pain. Anesthesiologists should recognize that geriatric patients may respond differently than younger patients to pain and analgesic medications, often because of comorbidity. Vigilant dose titration is necessary to ensure adequate treatment while avoiding adverse effects such as somnolence in this vulnerable group, who are often taking other medications (including alternative and complementary agents).

Other Subpopulations. Patients who are critically ill, cognitively impaired (*e.g.*, Alzheimer's disease), or who otherwise have difficulty communicating (*e.g.*, cultural or language barriers) present unique challenges to perioperative pain management. The Task Force believes that techniques that reduce drug dosages required to provide effective analgesia (*e.g.*, regional analgesia and multimodal analgesia) may be suitable for such patients. Behavioral modalities and techniques such as PCA that depend upon self-administration of analgesics are generally less suitable for the cognitively impaired. The literature is insufficient to evaluate the application of pain assessment methods or pain management techniques specific to these populations (*Category D evidence*).

The consultants and ASA members strongly agree that anesthesiologists should recognize that patients who are critically ill, cognitively impaired, or have communication difficulties may require additional interventions to ensure optimal perioperative pain management. Moreover, the ASA members agree and the consultants strongly agree that anesthesiologists should consider a therapeutic trial of an analgesic in patients with increased blood pressure and heart rate or agitated behavior, when causes other than pain have been excluded.

Recommendations for Other Subpopulations. Anesthesiologists should recognize that patients who are critically ill, cognitively impaired, or have communication difficulties may require additional interventions to ensure optimal perioperative pain management. Anesthesiologists should consider a therapeutic trial of an analgesic in patients with increased blood pressure and heart rate or agitated behavior when causes other than pain have been excluded.

Appendix 1: Summary of Recommendations

I. Institutional Policies and Procedures for Providing Perioperative Pain Management

- Anesthesiologists offering perioperative analgesia services should provide, in collaboration with other healthcare professionals as appropriate, ongoing education and training to ensure that hospital personnel are knowledgeable and skilled with regard to the effective and safe use of the available treatment options within the institution.
  - Educational content should range from basic bedside pain assessment to sophisticated pain management techniques (*e.g.*,

epidural analgesia, PCA, and various regional anesthesia techniques) and nonpharmacologic techniques (*e.g.*, relaxation, imagery, hypnotic methods).
  - For optimal pain management, ongoing education and training are essential for new personnel, to maintain skills, and whenever therapeutic approaches are modified.
- Anesthesiologists and other healthcare providers should use standardized, validated instruments to facilitate the regular evaluation and documentation of pain intensity, the effects of pain therapy, and side effects caused by the therapy.
- Anesthesiologists responsible for perioperative analgesia should be available *at all times* to consult with ward nurses, surgeons, or other involved physicians.
  - They should assist in evaluating patients who are experiencing problems with any aspect of perioperative pain relief.
- Anesthesiologists providing perioperative analgesia services should do so within the framework of an Acute Pain Service.
  - They should participate in developing standardized institutional policies and procedures.

II. Preoperative Evaluation of the Patient

- A directed pain history, a directed physical examination, and a pain control plan should be included in the anesthetic preoperative evaluation.

III. Preoperative Preparation of the Patient

- Patient preparation for perioperative pain management should include appropriate adjustments or continuation of medications to avert an abstinence syndrome, treatment of preexistent pain, or preoperative initiation of therapy for postoperative pain management.
- Anesthesiologists offering perioperative analgesia services should provide, in collaboration with others as appropriate, patient and family education regarding their important roles in achieving comfort, reporting pain, and in proper use of the recommended analgesic methods.
  - Common misconceptions that overestimate the risk of adverse effects and addiction should be dispelled.
  - Patient education for optimal use of PCA and other sophisticated methods, such as patient-controlled epidural analgesia, might include discussion of these analgesic methods at the time of the preanesthetic evaluation, brochures and videotapes to educate patients about therapeutic options, and discussion at the bedside during postoperative visits.
  - Such education may also include instruction in behavioral modalities for control of pain and anxiety.

IV. Perioperative Techniques for Pain Management

- Anesthesiologists who manage perioperative pain should use therapeutic options such as epidural or intrathecal opioids, systemic opioid PCA, and regional techniques after thoughtfully considering the risks and benefits for the individual patient.
  - These modalities should be used in preference to intramuscular opioids ordered "as needed."
- The therapy selected should reflect the individual anesthesiologist's expertise, as well as the capacity for safe application of the modality in each practice setting.
  - This capacity includes the ability to recognize and treat adverse effects that emerge after initiation of therapy.
- Special caution should be taken when continuous infusion modalities are used because drug accumulation may contribute to adverse events.

V. Multimodal Techniques for Pain Management

- Whenever possible, anesthesiologists should use multimodal pain management therapy.
  - Unless contraindicated, patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen.
  - Regional blockade with local anesthetics should be considered.
- Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events.
- The choice of medication, dose, route, and duration of therapy should be individualized.

VI. Patient Subpopulations

- Pediatric patients
  - Aggressive and proactive pain management is necessary to overcome the historic undertreatment of pain in children.
  - Perioperative care for children undergoing painful procedures or surgery requires developmentally appropriate pain assessment and therapy.
  - Analgesic therapy should depend upon age, weight, and comorbidity, and unless contraindicated should involve a multimodal approach.
  - Behavioral techniques, especially important in addressing the emotional component of pain, should be applied whenever feasible.
  - Sedative, analgesic, and local anesthetics are all important components of appropriate analgesic regimens for painful procedures.
  - Because many analgesic medications are synergistic with sedating agents, it is imperative that appropriate monitoring be used during the procedure and recovery.
- Geriatric patients
  - Pain assessment and therapy should be integrated into the perioperative care of geriatric patients.
  - Pain assessment tools appropriate to a patient's cognitive abilities should be used. Extensive and proactive evaluation and questioning may be necessary to overcome barriers that hinder communication regarding unrelieved pain.
  - Anesthesiologists should recognize that geriatric patients may respond differently than younger patients to pain and analgesic medications, often because of comorbidity.
  - Vigilant dose titration is necessary to ensure adequate treatment while avoiding adverse effects such as somnolence in this vulnerable group, who are often taking other medications (including alternative and complementary agents).
- Other subpopulations
  - Anesthesiologists should recognize that patients who are critically ill, cognitively impaired, or have communication difficulties may require additional interventions to ensure optimal perioperative pain management.
  - Anesthesiologists should consider a therapeutic trial of an analgesic in patients with increased blood pressure and heart rate or agitated behavior when causes other than pain have been excluded.

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 was combined with studies published subsequent to approval of the original Guidelines in 2003.* 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 the management of acute pain in the perioperative setting.

Institutional Policies and Procedures for Providing Perioperative Pain Management

Education and training of healthcare providers
Monitoring of patient outcomes
Documentation of monitoring activities
Monitoring of outcomes at an institutional level
24-h availability of anesthesiologists providing perioperative pain management
Acute pain service

Preoperative Evaluation of the Patient

A directed pain history (*e.g.*, medical record review and patient interview to include current medications, adverse effects, preexisting pain conditions, medical conditions that would influence a pain therapy, nonpharmacologic pain therapies, alternative and complementary therapies)
A directed physical examination
Consultations with other healthcare providers (*e.g.*, nurses, surgeons, pharmacists)

Preoperative Preparation of the Patient

Preoperative adjustment or continuation of medications whose sudden cessation may provoke an abstinence syndrome
Preoperative treatment(s) to reduce preexisting pain and anxiety
Premedication(s) before surgery as part of a multimodal analgesic pain management program
Patient and family education

Perioperative Techniques for Pain Management

Epidural or intrathecal analgesia with opioids (*vs.* epidural placebo, epidural local anesthetics, or IV, intramuscular, or oral opioids)
Patient-controlled analgesia with opioids:
  IV PCA *versus* nurse-controlled or continuous IV
  IV PCA *versus* intramuscular
  Epidural PCA *versus* epidural bolus or infusion
  Epidural PCA *versus* IV PCA
  IV PCA with background infusion of opioids *versus* no background infusion
Regional analgesia with local anesthetics or opioids
  Intercostal or interpleural blocks
  Plexus and other blocks
  Intraarticular opioids, local anesthetics or combinations
  Infiltration of incisions

Multimodal Techniques (Epidural, IV, or Regional Techniques)

Two or more analgesic agents, one route *versus* a single agent, one route
  Epidural or intrathecal analgesia with opioids combined with:
  Local anesthetics *versus* epidural opioids
  Local anesthetics *versus* epidural local anesthetics
  Clonidine *versus* epidural opioids
  IV opioids combined with:
  Clonidine *versus* IV opioids
  Ketorolac *versus* IV opioids
  Ketamine *versus* IV opioids
  Oral opioids combined with NSAIDs, COXIBs, or acetaminophen *versus* oral opioids

Two or more drug delivery routes *versus* a single route
  Epidural or intrathecal analgesia with opioids combined with IV, intramuscular, oral, transdermal, or subcutaneous analgesics *versus* epidural opioids
  IV opioids combined with oral NSAIDs, COXIBs, or acetaminophen *versus* IV opioids
  Nonpharmacologic, alternative, or complementary pain management combined with pharmacologic pain management *versus* pharmacologic pain management

Special Patient Populations

Pain management techniques for pediatric patients
  Pain assessment techniques
  Dose level adjustments
  Avoidance of repetitive diagnostic evaluation (heel sticks) for neonates
Pain management techniques for geriatric patients
  Pain assessment techniques
  Dose level adjustments
Pain management techniques for other special populations (*e.g.*, cognitively impaired, critically ill, patients with difficulty communicating)
  Pain assessment methods specific to special populations
  Pain management techniques specific to special populations

For the literature review, potentially relevant clinical studies were identified *via* electronic and manual searches of the literature. The electronic and manual searches covered a 49-yr period from 1963 through 2011. More than 2,000 citations were identified initially, yielding a total of 1,784 nonoverlapping articles that addressed topics related to the evidence linkages. After the articles were reviewed, 1,153 studies did not provide direct evidence and were eliminated subsequently. A total of 631 articles contained direct linkage-related evidence. A complete bibliography used to develop these Guidelines, organized by section, is available as Supplemental Digital Content 2, http://links.lww.com/ALN/A781.

Initially, each pertinent outcome reported in a study was classified as supporting an evidence linkage, refuting a linkage, or equivocal. The results were then summarized to obtain a directional assessment for each evidence linkage before conducting formal meta-analyses. Literature pertaining to four evidence linkage categories contained enough studies with well-defined experimental designs and statistical information sufficient for meta-analyses (table 1). These linkages were: (1) epidural or intrathecal opioids, (2) patient-controlled analgesia, (3) regional analgesia, and (4) two or more anesthetic drugs *versus* a single drug.

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 $P < 0.01$ (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. To be accepted as significant findings, Mantel-Haenszel odds ratios must agree with combined test results whenever both types of data are assessed. In the absence of Mantel-Haenszel odds ratios, findings from both the Fisher and weighted Stouffer combined tests must agree with each other to be acceptable as significant.

For the previous update of the Guidelines, interobserver agreement among Task Force members and two methodologists was established by interrater reliability testing. Agreement levels using a kappa (k) statistic for two-rater agreement pairs were as follows: (1) type of study design, k = 0.63–0.94; (2) type of analysis, k = 0.39–0.89; (3) evidence linkage assignment, k = 0.74–0.96; and (4) literature inclusion for database, k = 0.75–0.88. Three-rater chance-corrected agreement values were: (1) study design, Sav = 0.80, Var (Sav) = 0.007; (2) type of analysis, Sav = 0.59, Var (Sav) = 0.032; (3) linkage assignment, Sav = 0.73 Var (Sav) = 0.010; (4) literature database inclusion, Sav = 0.83 Var (Sav) = 0.015. These values represent moderate levels of agreement. For the updated Guidelines, the same two methodologists involved in the original Guidelines conducted the literature review.

The findings of the literature analyses were supplemented by the opinions of Task Force members after considering opinions derived from a variety of sources, including informal commentary and comments from postings of the draft document on the ASA web site. In addition, opinions obtained from consultant surveys, open forum commentary, and other sources used in the original Guidelines were reviewed and considered.

B. Consensus-based Evidence

Consensus was obtained from multiple sources, including (1) survey opinion from consultants who were selected based on their knowledge or expertise in acute pain management, (2) survey opinions solicited from active members of the ASA, (3) testimony from attendees of a publicly held open forum at a national anesthesia meeting (original Guidelines only), (4) Internet commentary, and (5) Task Force opinion and interpretation. The survey rate of return was 62% (n = 53 of 85) for the consultants (table 2), and 268 surveys were received from active ASA members (table 3).

For the previous update of the Guidelines, an additional survey was sent to the expert consultants asking them to indicate which, if any, of the evidence linkages would change their clinical practices if the Guidelines were instituted. The rate of return was 70.1% (n = 61 of 87). The percentages of responding consultants expecting *no change* associated with each linkage were as follows: (1) proactive planning 82.0%, (2) education and training 88.5%, (3) education or participation of patient and family 80.3%, (4) monitoring or documentation 77.0%, (5) availability of anesthesiologists 90.2%, (6) institutional protocols 86.9%, (7) use of PCA, epidural, or regional techniques 90.2%, (8) use of multimodality techniques 88.5%, (9) organizational characteristics 90.2%, (10) pediatric techniques 95.1%, (11) geriatric techniques 91.8%, and (12) ambulatory surgery techniques 85.2%.

Sixty-five percent of the respondents indicated that the Guidelines would have *no effect* on the amount of time spent on a typical case, and 24% indicated that there would be an increase of the amount of time spent on a typical case with the implementation of these Guidelines (mean time increase = 3.4 min). Eighty-nine percent indicated that new equipment, supplies, or training would *not* be needed to implement the Guidelines, and 92% indicated that implementation of the Guidelines would *not* require changes in practice that would affect costs.

Table 1. Meta-analysis Summary

Evidence Linkages	N	Fisher Chi-square	*P* Value	Weighted Stouffer Zc	*P* Value	Effect Size	Odds Ratio	Confidence Interval	Heterogeneity *P* Values	Heterogeneity Effect Size
Perioperative techniques										
Epidural/intrathecal opioids										
Postincisional										
Morphine vs. *saline*										
Pain scores or relief	6	51.50	0.001	−3.50	0.001	−0.35			0.342	0.694
Nausea or vomiting	9						1.17*	0.32–5.56		0.001
Pruritus	8						7.35	3.84–14.08		0.186
Morphine vs. *IM morphine*										
Pain scores	6	52.16	0.001	−3.79	0.001	−0.44			0.995	0.788
Pruritus	6						6.24	2.28–17.08		0.779
Postoperative										
Morphine vs. *IM morphine*										
Pain scores or relief	7	81.29	0.001	−7.52	0.001	−0.57			0.097	0.001
Nausea or vomiting	9						0.76	0.35–1.66		0.442
Pruritus	5						5.45	1.62–18.36		0.980
Urinary retention	7						3.10	1.31–7.32		0.865
Fentanyl vs. *IV fentanyl*										
Nausea or vomiting	5						0.73*	0.08–4.92		0.001
Pruritus	5						1.17	0.30–4.54		0.731
PCA										
IV PCA *vs.* IM morphine										

(*continued*)

Table 1. Continued

Evidence Linkages	N	Fisher Chi-square	*P* Value	Weighted Stouffer Zc	*P* Value	Effect Size	Odds Ratio	Confidence Interval	Heterogeneity *P* Values	Heterogeneity Effect Size
Pain scores	8	52.26	0.001	−4.01	0.001	−0.22			0.700	0.550
Epidural PCA *vs.* IV PCA opioids										
Pain scores	5	37.91	0.001	−2.17	0.015	−0.33			0.999	0.951
PCA with background morphine										
Pain scores or relief	6	25.91	0.011	−2.25	0.012	0.07			0.315	0.138
Analgesic use	10	99.78	0.001	6.12	0.001	0.35			0.001	0.001
Nausea or vomiting	9						1.01	0.57–1.78		0.666
Pruritus	7						0.99	0.43–2.29		0.522
Sedation	6	16.44	0.172	−1.62	0.053	−0.03			0.675	0.628
Regional analgesia										
Intercostal or interpleural blocks										
Postoperative vs. *saline*										
Pain scores	7	54.12	0.001	−1.79	0.037	−0.38			0.663	0.479
Analgesic use	5	36.30	0.001	−1.51	0.066	−0.34			0.263	0.381
Plexus and other blocks										
Preincisional vs. *saline*										
Analgesic use	5	52.13	0.001	−5.62	0.001	−0.37			0.146	0.057
Nausea/vomiting	5						0.51	0.15–1.73		0.769
Preincisional vs. *no block*										
Pain scores	5	45.15	0.001	−4.41	0.001	−0.32			0.061	0.174
Infiltration of incisions										
Preincisional bupivacaine vs. *saline*										
Pain scores or relief	9	84.83	0.001	−3.51	0.001	−0.32			0.002	0.001
Analgesic use	6	21.27	0.047	−2.01	0.022	−0.11			0.662	0.605
Postincisional bupivacaine vs. *saline*										
Pain scores	8	42.53	0.001	−2.10	0.018	−0.17			0.044	0.051
Analgesic use	9	53.71	0.001	−2.12	0.017	−0.20			0.039	0.024
Pre- vs. *postincisional bupivacaine*										
Pain scores	6	39.28	0.001	1.02	0.154	0.02			0.001	0.001
Preincisional ropivacaine vs. *saline*										
Pain scores or relief	5	44.14	0.001	−3.96	0.001	−0.31			0.964	0.556
Analgesic use	7	45.51	0.001	−3.90	0.001	−0.43			0.001	0.001
Multimodality techniques										
Two or more *vs.* single drug, same route										
Epidural morphine + local anesthetics vs. morphine										
Pain scores	7	42.95	0.001	−2.32	0.010	−0.22			0.466	0.167
Nausea or vomiting	6						0.80	0.40–1.57		0.829
Pruritus	6						2.02	0.93–4.36		0.176
Epidural fentanyl + local anesthetics vs. fentanyl										
Pain scores	10	67.21	0.001	−3.11	0.001	−0.29			0.006	0.001
Nausea or vomiting	11						0.77	0.46–1.27		0.304
Pruritus	12						0.93	0.55–1.56		0.266
Motor weakness	9						3.23	1.57–6.65		0.011
Epidural morphine + bupivacaine vs. bupivacaine										
Pain scores	9	52.91	0.001	−3.03	0.001	−0.25			0.470	0.245
Pain relief	5						3.41	1.31–8.92		0.352
Nausea or vomiting	8						1.25	0.62–2.48		0.858
Pruritus	6						7.35	2.82–19.15		0.584
Epidural fentanyl + bupivacaine vs. bupivacaine										
Nausea or vomiting	7						1.27	0.58–2.80		0.329
Pruritus	5						2.89	1.02–8.23		0.840
Epidural sufentanil + ropivacaine vs. ropivacaine										
Pain scores	5	28.54	0.001	−2.09	0.018	−0.17			0.730	0.425
Pruritus	6						4.32	2.31–8.07		0.705

(*continued*)

Table 1. Continued

Evidence Linkages	N	Fisher Chi-square	*P* Value	Weighted Stouffer Zc	*P* Value	Effect Size	Odds Ratio	Confidence Interval	Heterogeneity *P* Values	Heterogeneity Effect Size
Epidural opioids + clonidine vs. opioids										
Pain scores	6	45.77	0.001	−1.27	0.102	−0.12			0.001	0.001
IV morphine + ketorolac vs. IV morphine										
Pain scores	6	44.18	0.001	−3.95	0.001	−0.30			0.987	0.992
Analgesic use	6	72.42	0.001	−7.17	0.001	−0.59			0.001	0.001
Nausea or vomiting	6						1.04	0.54–2.00		0.937
IV morphine + ketamine vs. IV morphine										
Pain scores or relief	6	39.95	0.001	−0.81	0.209	−0.11			0.056	0.001
Analgesic use	6	37.12	0.001	−1.00	0.159	−0.08			0.027	0.001
Nausea	6	26.45	0.009	0.48	0.316	−0.04			0.165	0.037
Two or more routes *vs.* single route										
IV opioids combined with calcium channel blockers (gabapentin, pregabalin) vs. IV opioids										
Pain scores	7	54.03	0.001	−3.82	0.001	−0.29			0.700	0.850
Opioid use	10	111.66	0.001	−12.07	0.001	−0.48			0.001	0.001
Nausea	6						1.04	0.55–1.98		0.800
Vomiting	5						0.86	0.41–1.83		0.970

* Random effects odds ratio.

IM = intramuscular; IV = intravenous; PCA = patient-controlled analgesia.

Table 2. Consultant Survey Responses*

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
I. ***Institutional Policies and Procedures for Providing Perioperative Pain Management***						
1. Anesthesiologists offering perioperative analgesia services should provide, in collaboration with other healthcare professionals as appropriate, ongoing education and training of hospital personnel regarding the effective and safe use of the available treatment options within the institution	53	86.8*	11.3	1.9	0.0	0.0
2. Anesthesiologists and other healthcare providers should use standardized, validated instruments to facilitate the regular evaluation and documentation of pain intensity, the effects of pain therapy, and side effects caused by the therapy	53	67.9*	26.4	5.7	0.0	0.0
3. Anesthesiologists responsible for perioperative analgesia should be available *at all times* to consult with ward nurses, surgeons, or other involved physicians and should assist in evaluating patients who are experiencing problems with any aspect of perioperative pain relief	53	56.6*	26.4	17.0	0.0	0.0
4. Anesthesiologists should provide analgesia services within the framework of an Acute Pain Service and participate in developing standardized institutional policies and procedures	53	73.6*	26.4	0.0	0.0	0.0

(*continued*)

Table 2. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
5. An integrated approach to perioperative pain management (*e.g.*, ordering, administering, and transitioning therapies, transferring responsibility for pain therapy, outcomes assessment, continuous quality improvement) should be used to minimize analgesic gaps	53	73.6*	24.5	1.9	0.0	0.0
II. ***Preoperative Evaluation of the Patient***						
6. A directed pain history, a directed physical examination, and a pain control plan should be included in the anesthetic preoperative evaluation	52	57.7*	36.5	3.8	1.9	0.0
III. ***Preoperative Preparation of the Patient***						
7. Patient preparation for perioperative pain management should include appropriate adjustments or continuation of medications to avert an abstinence syndrome, treatment of preexistent pain, or preoperative initiation of therapy for postoperative pain management	53	77.4*	18.9	3.8	0.0	0.0
8. Anesthesiologists offering perioperative analgesia services should provide, in collaboration with others as appropriate, patient and family education	53	50.9*	35.8	7.5	5.7	0.0
9. Perioperative patient education should include instruction in behavioral modalities for control of pain and anxiety	53	37.7	39.6*	13.2	7.5	1.9
IV. ***Perioperative Techniques for Pain Management***						
10. Anesthesiologists who manage perioperative pain should use therapeutic options such as epidural or intrathecal opioids, systemic opioid PCA, and regional techniques after thoughtfully considering the risks and benefits for the individual patient	53	86.8*	13.2	0.0	0.0	0.0
11. These modalities should be used in preference to intramuscular opioids ordered "as needed"	53	79.2*	11.3	3.8	1.9	3.8
12. The therapy selected should reflect the individual anesthesiologist's expertise, as well as the capacity for safe application of the modality in each practice setting	53	79.2*	17.0	0.0	3.8	0.0
13. Special caution should be taken when continuous infusion modalities are used because drug accumulation may contribute to adverse events	53	69.8*	26.4	1.9	1.9	0.0
V. ***Multimodal Techniques for Pain Management***						
14. Whenever possible, anesthesiologists should use multimodal pain management therapy	53	71.7*	28.3	0.0	0.0	0.0

(*continued*)

Table 2. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
15. The following drugs should be considered as part of a postoperative multimodal pain management regimen:						
COX-2 selective NSAIDs (COXIBs)	53	49.1	34.0*	15.1	1.9	0.0
Nonselective NSAIDs	52	19.2	57.7*	23.1	0.0	0.0
Acetaminophen	53	62.3*	32.1	5.7	0.0	0.0
Calcium channel α-2-δ antagonists (*e.g.*, gabapentin, pregabalin)	53	22.6	50.9*	26.4	0.0	0.0
16. Unless contraindicated, all patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen	51	54.9*	23.5	7.8	9.8	3.9
17. Regional blockade with local anesthetics should be considered as part of a multimodal approach for pain management	52	73.1*	25.0	1.9	0.0	0.0
18. Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events	52	86.5*	13.5	0.0	0.0	0.0
19. The choice of medication, dose, route, and duration of therapy should be individualized	52	73.1*	26.9	0.0	0.0	0.0
VI. ***Patient Subpopulations***						
Pediatric patients						
20. Perioperative care for children undergoing painful procedures or surgery requires developmentally appropriate pain assessment and therapy	53	73.6*	24.5	1.9	0.0	0.0
21. Analgesic therapy should depend upon age, weight, and comorbidity and unless contraindicated should involve a multimodal approach	53	67.9*	30.2	1.9	0.0	0.0
22. Behavioral techniques, especially important in addressing the emotional component of pain, should be applied whenever feasible	53	50.9*	30.2	18.9	0.0	0.0
23. Because many analgesic medications are synergistic with sedating agents, it is imperative that appropriate monitoring be used during the procedure and recovery	53	83.0*	17.0	0.0	0.0	0.0
Geriatric patients						
24. Pain assessment and therapy should be integrated into the perioperative care of geriatric patients	53	73.6*	26.4	0.0	0.0	0.0
25. Pain assessment tools appropriate to a patient's cognitive abilities should be used	53	77.4*	22.6	0.0	0.0	0.0
26. Extensive and proactive evaluation and questioning should be conducted to overcome barriers that hinder communication regarding unrelieved pain	53	58.5*	35.8	5.7	0.0	0.0

(*continued*)

Table 2. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
27. Dose titration should be done to ensure adequate treatment while avoiding adverse effects such as somnolence in this vulnerable group, who may be taking other medications	53	77.4*	22.6	0.0	0.0	0.0
Other Subpopulations						
28. Anesthesiologists should recognize that patients who are critically ill, cognitively impaired, or have communication difficulties may require additional interventions to ensure optimal perioperative pain management	53	73.6*	24.5	1.9	0.0	0.0
29. Anesthesiologists should consider a therapeutic trial of an analgesic in patients with elevated blood pressure and heart rate or agitated behavior when causes other than pain have been excluded	53	50.9*	37.7	9.4	1.9	0.0

* Indicates the median.

COX-2 = cyclooxygenase-2; N = number of consultants who responded to each item; NSAID = nonsteroidal antiinflammatory drug; PCA = patient-controlled analgesia.

Table 3. ASA Member Survey Responses*

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
I. ***Institutional Policies and Procedures for Providing Perioperative Pain Management***						
1. Anesthesiologists offering perioperative analgesia services should provide, in collaboration with other healthcare professionals as appropriate, ongoing education and training of hospital personnel regarding the effective and safe use of the available treatment options within the Institution	268	53.0*	37.7	4.1	3.7	1.5
2. Anesthesiologists and other healthcare providers should use standardized, validated instruments to facilitate the regular evaluation and documentation of pain intensity, the effects of pain therapy, and side effects caused by the therapy	268	52.2*	35.5	7.5	3.7	1.1
3. Anesthesiologists responsible for perioperative analgesia should be available *at all times* to consult with ward nurses, surgeons, or other involved physicians and should assist in evaluating patients who are experiencing problems with any aspect of perioperative pain relief	267	38.9	36.0*	12.4	10.1	2.6

(*continued*)

Table 3. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
4. Anesthesiologists should provide analgesia services within the framework of an Acute Pain Service and participate in developing standardized institutional policies and Procedures	268	39.9	39.2*	14.9	3.4	2.6
5. An integrated approach to perioperative pain management (*e.g.*, ordering, administering, and transitioning therapies, transferring responsibility for pain therapy, outcomes assessment, continuous quality improvement) should be used to minimize analgesic gaps	269	46.5	44.6*	7.4	1.5	0.0
II. ***Preoperative Evaluation of the Patient***						
6. A directed pain history, a directed physical examination, and a pain control plan should be included in the anesthetic preoperative evaluation	267	30.3	39.7*	18.4	9.4	2.2
III. ***Preoperative Preparation of the Patient***						
7. Patient preparation for perioperative pain management should include appropriate adjustments or continuation of medications to avert an abstinence syndrome, treatment of preexistent pain, or preoperative initiation of therapy for postoperative pain management	266	51.5*	41.7	5.7	1.1	0.0
8. Anesthesiologists offering perioperative analgesia services should provide, in collaboration with others as appropriate, patient and family education	268	28.7	56.7*	10.1	3.7	0.8
9. Perioperative patient education should include instruction in behavioral modalities for control of pain and anxiety	269	22.7	42.8*	27.1	5.9	1.5
IV. ***Perioperative Techniques for Pain Management***						
10. Anesthesiologists who manage perioperative pain should use therapeutic options such as epidural or intrathecal opioids, systemic opioid PCA, and regional techniques after thoughtfully considering the risks and benefits for the individual patient	269	65.4*	31.2	1.9	1.1	0.4
11. These modalities should be used in preference to intramuscular opioids ordered "as needed"	269	65.8*	24.9	7.5	1.1	0.7
12. The therapy selected should reflect the individual anesthesiologist's expertise, as well as the capacity for safe application of the modality in each practice setting	269	70.6*	26.8	1.9	0.7	0.0
13. Special caution should be taken when continuous infusion modalities are used because drug accumulation may contribute to adverse events	268	67.6*	30.2	1.1	1.1	0.0

(*continued*)

Table 3. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
V. ***Multimodal Techniques for Pain Management***						
14. Whenever possible, anesthesiologists should use multimodal pain management therapy	267	56.2*	28.1	12.4	2.6	0.7
15. The following drugs should be considered as part of a postoperative multimodal pain management regimen:						
COX-2 selective NSAIDs (COXIBs)	268	35.8	47.4*	14.2	1.9	0.7
Nonselective NSAIDs	267	26.6	57.3*	12.7	2.6	0.8
Acetaminophen	267	41.9	44.2*	12.4	1.5	0.0
Calcium channel α-2-δ antagonists (*e.g.*, gabapentin, pregabalin)	265	15.1	38.5*	38.5	6.8	1.1
16. Unless contraindicated, all patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen	264	24.2	34.1*	25.0	14.4	2.3
17. Regional blockade with local anesthetics should be considered as part of a multimodal approach for pain management	264	58.3*	37.1	2.7	1.1	0.8
18. Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events	264	71.2*	27.3	1.1	0.4	0.0
19. The choice of medication, dose, route, and duration of therapy should be individualized	266	70.7*	27.1	1.1	1.1	0.0
VI. ***Patient Subpopulations***						
Pediatric patients						
20. Perioperative care for children undergoing painful procedures or surgery requires developmentally appropriate pain assessment and therapy	265	63.4*	35.1	1.5	0.0	0.0
21. Analgesic therapy should depend upon age, weight, and comorbidity and unless contraindicated should involve a multimodal approach	268	58.6*	34.7	4.5	2.2	0.0
22. Behavioral techniques, especially important in addressing the emotional component of pain, should be applied whenever feasible	266	34.2	42.5*	21.4	1.5	0.4
23. Because many analgesic medications are synergistic with sedating agents, it is imperative that appropriate monitoring be used during the procedure and recovery	268	69.4*	30.2	0.4	0.0	0.0
Geriatric Patients						
24. Pain assessment and therapy should be integrated into the perioperative care of geriatric patients	268	60.1*	37.7	1.8	0.4	0.0
25. Pain assessment tools appropriate to a patient's cognitive abilities should be used	268	58.6*	39.9	1.1	0.4	0.0
26. Extensive and proactive evaluation and questioning should be conducted to overcome barriers that hinder communication regarding unrelieved pain	265	35.9	41.1*	20.0	3.0	0.0

(*continued*)

Table 3. Continued

	Percent Responding to Each Item					
	N	Strongly Agree	Agree	Equivocal	Disagree	Strongly Disagree
27. Dose titration should be done to ensure adequate treatment while avoiding adverse effects such as somnolence in this vulnerable group, who may be taking other medications	269	59.5*	39.7	0.4	0.4	0.0
Other Subpopulations						
28. Anesthesiologists should recognize that patients who are critically ill, cognitively impaired, or have communication difficulties may require additional interventions to ensure optimal perioperative pain management	268	53.0*	43.3	2.6	1.1	0.0
29. Anesthesiologists should consider a therapeutic trial of an analgesic in patients with elevated blood pressure and heart rate or agitated behavior when causes other than pain have been excluded	267	32.6	56.5*	9.4	1.1	0.4

* Indicates the median.

COX-2 = cyclooxygenase-2; N = number of consultants who responded to each item; NSAID = nonsteroidal antiinflammatory drug; PCA = patient-controlled analgesia.

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