Pain Physician 2026; 29:E591-E613 • ISSN 2150-1149

Analytical Review of Guidelines

Perioperative Management of Antiplatelet and Anticoagulant Therapy in Patients Undergoing Interventional Techniques: A Critical and Analytical Summary of the 2024 Guidelines of the American Society of Interventional Pain Physicians (ASIPP)

Laxmaiah Manchikanti, MD[1], Mahendra R. Sanapati, MD[2], Devi E. Nampiaparampil, MD[3], Nebojsa Nick Knezevic, MD, PhD[4], Alan D. Kaye, MD, PhD[5], Alexander Bautista, MD[6], Kenneth D. Candido, MD[7], and Paul J. Christo, MD, MBA[8]

From: [1]Pain Management Centers of America, Paducah, KY; [2]Pain Management Centers of America, Evansville, IN, University of Louisville; [3]Metropolis Pain Medicine PLLC and NYU Grossman School of Medicine, New York, NY; [4]Advocate Illinois Masonic Medical Center and College of Medicine, University of Illinois, Chicago, IL; [5]Louisiana State University Health Sciences Center at Shreveport, Shreveport, LA, Tulane School of Medicine, and LSU School of Medicine, New Orleans, LA; [6]Duke University, Durham, NC; [7]Thorek Memorial Hospital and University of Illinois College of Medicine-Chicago, Chicago, IL and Ponce School of Medicine, Ponce, PR; [8]Johns Hopkins University School of Medicine, Baltimore, MD

Address Correspondence:
Laxmaiah Manchikanti, MD
Pain Management Centers of America
67 Lakeview Drive
Paducah, Kentucky 42001
E-mail: drlm@thepainmd.com

Disclaimer: This article is a summary of previously published guidelines. The recommendations reproduced here are crafted from the available evidence and are not intended as rigid treatment mandates. Given the evolving nature of scientific evidence, neither the original guidelines nor this summary aims to establish a definitive standard of care. There was no external funding in the preparation of this article.

Background: The frequency of performance of interventional techniques in chronic pain patients receiving anticoagulant and antiplatelet therapy continues to increase. Understanding the importance of continuing chronic anticoagulant therapy, the need for interventional techniques, and determining the duration and discontinuation or temporary suspension of anticoagulation also when bridging therapy is appropriate is crucial to avoiding devastating complications, primarily when neuraxial procedures are performed. In 2024, the American Society of Interventional Pain Physicians (ASIPP) published updated guidelines for the perioperative management of antiplatelet and anticoagulant therapy in patients undergoing interventional techniques.

Study Design: A critical and analytical review and structured synthesis of a consensus clinical practice guideline developed by review of the literature, best evidence synthesis, and modified Delphi consensus.

Objectives: The present investigation summarizes the 2024 updated guidelines of the American Society of Interventional Pain Physicians (ASIPP) on the perioperative management of antiplatelet and anticoagulant therapy in patients undergoing interventional techniques. The summary is organized around the recommendations, presenting for each the underlying evidence, the assigned evidence level and strength of recommendation, and the practical consequences for risk stratification, drug cessation, bridging, resumption, and documentation.

Methods: A multidisciplinary panel convened by ASIPP reviewed the literature on bleeding risk during interventional pain procedures, practice patterns, thrombotic risk, and perioperative management of antithrombotic therapy. Relevant literature was identified through searches of PubMed, the Cochrane Library, and Google Scholar from 1966 through 2023, supplemented by review of contemporary guidelines. Evidence and recommendations were graded using the modified ASIPP approach, Grading of Recommendations, Assessment, Development and Evaluation (GRADE), considerations of clinical relevance and pragmatism, and the Agency for Healthcare Research and Quality (AHRQ) strength-of-recommendation methods, with the rating scheme derived from the National Guideline Clearinghouse Extent Adherence to Trustworthy Standards (NEATS) instrument. Institute of Medicine (IOM) standards were followed. Consensus required at least 80% agreement among eligible panelists without a primary conflict of interest.

Results: Thirty-four authors participated, and 29 voted. Twenty recommendations were initially developed, of which 16 achieved 100% acceptance; the set was consolidated to 18 through second and third rounds of voting, with 16 of 18 achieving unanimous acceptance and the remaining two reaching 94% and 89%. The dissent concerned the risk classification of transforaminal epidural injections and is reported by name in the source document. One hundred nineteen relevant

Conflict of interest: Dr Christo is part of The Alliance for Patient Advocacy. No compensation. All other authors certify that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.

Article received: 08-05-2026
Accepted for publication: 09-04-2026

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publications were identified, of which 80 met the criteria for inclusion; meta-analysis was not feasible. Interventional techniques were stratified into low, moderate or intermediate, and high risk using a composite score summing five domains, each rated 1 to 4: anatomical, procedural, bleeding, antithrombotic, and medical or physiologic risk. Scores ranged from 5 to 18 across 50 procedures, yielding 19 low-risk, 7 moderate-risk, and 24 high-risk procedures. Of the 18 recommendations, 12 rested on moderate evidence, 5 on low evidence, and one on low to moderate evidence; 13 carried a moderate strength of recommendation, one moderate to strong, one high, one low to moderate, and two weak. On several occasions in the low and moderate categories, the panel recommended explicitly against cessation of antithrombotic therapy.

Limitations: The continued paucity of literature, with discordant recommendations across societies.

Conclusion: Suggested revision: The 2024 ASIPP guidelines place greater emphasis on the thromboembolic consequences of antithrombotic interruption and therefore favor selective rather than routine cessation, particularly for low-risk procedures. However, important uncertainty remains regarding several procedural classifications, optimal interruption and resumption intervals, and the comparative magnitude of bleeding and thromboembolic risk. Patient-specific assessment and shared decision-making remain essential.

Key words: Perioperative bleeding, bleeding risk, practice patterns, anticoagulant therapy, antiplatelet therapy, interventional techniques, safety precautions, epidural hematoma, thromboembolism, risk stratification, shared decision-making, anticoagulant bridging therapy

Pain Physician 2026: 29:E591-E613

1.0 Introduction

Chronic pain management using interventional techniques in patients receiving anticoagulant and antiplatelet therapy is increasingly common, and the frequency of these combinations continues to rise (1-9). Anticoagulants and antiplatelets are commonly prescribed to reduce thromboembolic risk in patients with a history of angina, atherosclerosis, atrial fibrillation, cerebrovascular accident, ischemic heart disease, myocardial infarction, pulmonary embolism, and peripheral vascular disease (10-34). While the growth of some interventional techniques has reversed, major procedures such as spinal cord stimulator and intrathecal implant insertion continue to increase, and interventional pain physicians increasingly perform endoscopic disc decompression, minimally invasive spinal canal decompression, and vertebral augmentation (3-9). The clinician is therefore asked with growing frequency to make a decision that has consequences in two directions at once.

A survey of interventional pain physicians reported discontinuation rates of 100% for warfarin, 97% for clopidogrel, 96% for ticlopidine, 95% for tirofiban, 93% for cilostazol, 85% for dipyridamole, 60% for aspirin 325 mg, and 39% for both aspirin 81 mg and other nonsteroidal anti-inflammatory drugs (35). A separate survey found that 55% of respondents stopped aspirin before spinal cord stimulation trials and implants and 32% before epidural steroid injections, that only 36% were aware that selective serotonin reuptake inhibitors may contribute to perioperative bleeding, and that 88% saw a need for pain physicians to communicate with other treating physicians (36). An updated 2021 assessment found that 23% of physicians had changed their practice patterns, with all still discontinuing warfarin and the majority accepting an international normalized ratio of 1.5 as safe. Low-dose aspirin was discontinued for 3 to 7 days by 76% of physicians for high-risk procedures; platelet aggregation inhibitors were discontinued for 3 to 5 days by 97%; dabigatran was discontinued by 92% for moderate-risk and 99% for high-risk procedures; and factor Xa inhibitors were discontinued in 99% for high-risk, 90% for moderate-risk, and 25% for low-risk procedures (37).

The countervailing evidence is that cessation is not free. Discontinuation or interruption of antiplatelet therapy may produce hypercoagulability through a rebound effect with increased platelet adhesiveness, compounded by the systemic inflammatory response and acute phase reaction to intervention (38-53). Death and infarction rates in acute coronary syndrome have been reported to double in the setting of drug withdrawal. During re-endothelialization after coronary stent implantation, myocardial infarction rates as high as 85% have been described, with a five- to ten-fold

increase in perioperative mortality; average stent thrombosis has been reported at 35% with mortality from stent thrombosis of 20% to 40% (54-56). A systematic review demonstrated a threefold increased risk of major adverse cardiac events on discontinuation, magnified in patients with coronary stents (38).

Against this, maintaining antiplatelet therapy through surgery is associated with an increase in blood loss of 2.5% to 20% with aspirin and 30% to 50% with combined aspirin and clopidogrel (48,57). That increased blood loss has not been shown to correlate with increased mortality except in intracranial surgery (42,48). The transfusion rate rises by an average of 30%, with a complication rate from red cell transfusion of 0.4% and mortality directly attributable to massive surgical blood loss in fewer than 3% of reported cases (58,59).

Direct comparison within interventional pain management is scarce but pointed. One survey reported a substantially higher prevalence of thromboembolic complications than of epidural hematoma formation (35). A prospective evaluation of 3,179 patients, 12,000 encounters, and 18,472 procedures found that among the quarter of patients on antithrombotic therapy, therapy was continued in 55% of encounters and discontinued in 45%; intravascular penetration and oozing were higher when therapy was continued, while bruising and local bleeding were higher when it was discontinued, with no statistical or clinical difference in any other intraoperative, recovery-room, or postoperative outcome (60). A separate series reported 9 serious thromboembolic events among 1,626 spinal procedures in which anticoagulants were discontinued, comprising five strokes, one pulmonary embolism, and one myocardial infarction, with two fatalities, and no bleeding complications when anticoagulants were continued (61,62).

This asymmetry is the organizing premise of the guidelines summarized here. A large subset of clinicians stops antithrombotic therapy on the basis of guidelines and personal judgement, treating cessation as the standard of care. The available evidence on thromboembolic and cardiovascular complications following discontinuation is, in the panel's words, very concerning. With appropriate care, the morbidity of epidural hematoma can be controlled and its mortality is rare; with cessation, cardiac and cerebrovascular morbidity and mortality are significant and, in the majority of cases, irreversible (35,60-64).

This article summarizes the resulting recommendations. Consistent with the purpose of a summary article, the emphasis falls on the recommendations themselves. Each is presented in full, accompanied by a condensed account of the evidence from which it was derived, its assigned evidence level and strength of recommendation, and a statement of what it means at the point of care. Readers requiring the complete evidence tables and the individual study appraisals are referred to the primary guideline document (1).

2.0 Methods

2.1 Rationale, Objectives, and Scope

The National Uniform Claims Committee (NUCC) defines interventional pain management as the discipline of medicine devoted to the diagnosis and treatment of pain-related disorders principally through the application of interventional techniques, and the Medicare Payment Advisory Commission (MedPAC) defines the associated techniques as minimally invasive procedures including percutaneous precision needle placement with delivery of drugs to targeted areas or ablation of targeted nerves, together with certain surgical techniques and the placement of intrathecal infusion pumps and spinal cord stimulators (65,66).

The stated objectives are to synthesize available evidence on the effectiveness and safety of continuing or discontinuing antiplatelet and anticoagulant therapy in the perioperative period, and to describe adverse events of anticoagulant therapy and bleeding complications. The panel was specifically tasked with five determinations: the patient's thromboembolic risk; the patient's bleeding risk, encompassing both the procedure-related risk arising from anatomical and technical factors and the pharmacological profile including elimination half-life, renal and hepatic function, and co-medication; the timing of stopping therapy before a procedure; the role of bridging therapy; and the timing of resumption afterwards (67). Although applicable to any specialty, the guidelines are intended specifically for interventional pain physicians.

The panel notes the gap it was addressing. Multiple guidelines exist for the perioperative period generally, but specific guidance for interventional techniques is limited. Since the 2019 American Society of Interventional Pain Physicians (ASIPP) antithrombotic guidelines, ASIPP had updated its epidural intervention guidelines in 2021 and its facet joint guidelines in 2020, each incorporating antithrombotic guidance, but no other body had published in the interval (1,2,36,68,69).

2.2 Panel Composition and Conflicts of Interest

Of the 34 members involved in preparing the guidelines, there were 20 anesthesiologists, 7 physiatrists, one radiologist, one psychiatrist, one general surgeon, 3 scientists or researchers, 2 ethicists, one pharmacist, one medical student, and 2 statisticians, in academic or private practice. Methodologists with experience in systematic review conduct were represented, including epidemiologists, statisticians, ethicists, and health services researchers.

Potential conflicts of interest over the preceding 5 years were compiled and distributed at the introductory panel meeting. After reviewing, the panel concluded that individuals with potential conflicts could remain, but those members were recused from related discussion or preparation and agreed not to discuss any aspect of the guidelines with industry before publication. Conflicts were defined broadly, extending beyond financial relationships to personal experience, practice patterns, academic interests, and promotions. The guidelines were commissioned, prepared, edited, and endorsed by ASIPP without external funding sought or obtained, and were developed without industry support; no remuneration or travel was provided to participants.

2.3 Evidence Review, Grading, and Consensus

The panel reviewed randomized controlled trials not included in existing systematic reviews, together with meta-analyses, narrative reviews, and clinical practice guidelines concerning the safety of antiplatelet and anticoagulant therapy in the perioperative period. Searches used PubMed, the Cochrane Library, and Google Scholar, targeting antithrombotic medications, anticoagulants, antiplatelet agents, thrombotic and cardiovascular and cerebrovascular events, interventional techniques, bleeding complications, and epidural hematoma following interventional procedures. Relevant literature was identified from 1966 through 2023.

Grading was based on the modified ASIPP approach, Grading of Recommendations, Assessment, Development and Evaluation (GRADE), considerations of clinical relevance and pragmatism, and the Agency for Healthcare Research and Quality (AHRQ) strength-of-recommendation methods (70-76). The rating scheme for the strength of each recommendation derived from the National Guideline Clearinghouse Extent Adherence to Trustworthy Standards (NEATS) instrument, a validated 15-item tool, as modified by the panel and reproduced in Table 1 (70). Institute of Medicine (IOM) standards were followed throughout (77).

A modified Delphi technique was used to reach consensus, minimizing bias from group interaction and preserving anonymity (78,79). Panelists without primary conflict voted on each statement through an online survey and could propose edits or add qualifying remarks. Inclusion required at least 80% agreement. The guidelines were subjected to external peer review under the policies of the publishing journal and were additionally posted on the ASIPP website and newsletter for comments from stakeholders, scientific and clinical experts, organizations, patients, and public representatives. They are scheduled for updating within 5 years, by 2028.

3.0 Results

3.1 Overview of the Recommendations

The literature search identified 119 relevant publications, of which 80 articles reporting bleeding complications met the criteria for inclusion. Because of the small number of studies and persistent high variability, neither conventional nor single-arm meta-analysis was undertaken (1).

Thirty-four authors participated, and 29 voted. Twenty recommendations were initially developed, of which 16 achieved 100% acceptance. The set was consolidated to 18 through second and third rounds of voting, after which 16 of 18 achieved unanimous acceptance and the remaining two reached 94% and 89%. The guidelines are unusual in recording the dissent explicitly and by name. Both disagreements concerned the risk classification of transforaminal epidural injections: one panelist argued that all transforaminal injections should be classified low risk, a second that all should be intermediate risk, and a third that cervical and thoracic transforaminal injections should be high risk. That three experienced panelists reached three different conclusions on the same procedure is itself a finding, and it is one this summary returns to in the Discussion.

Table 2 presents all 18 recommendations with their assigned evidence level and strength, and Fig. 1 shows the distribution. Twelve rest on moderate evidence, five on low evidence, and one on low to moderate evidence. Thirteen carry a moderate strength of recommendation, one moderate to strong, one strong, one low to moderate, and two weak. No recommendation

Table 1. *Guide for strength of recommendations as modified for ASIPP guidelines.*

Rating	Basis	ASIPP adaptation
Strong	High confidence that the recommendation reflects best practice, based on strong evidence for a true net effect, consistent results with no or minor exceptions, minor or no concerns about study quality, and the extent of panel agreement	Consensus achieved that there is high certainty that the net benefit is substantial
Moderate	Moderate confidence, based on good evidence for a true net effect, consistent results with minor or few exceptions, and minor or few concerns about study quality	Consensus achieved that there is high certainty that the net benefit is moderate, or moderate certainty that the net benefit is moderate to substantial
Weak	Some confidence that the recommendation offers the best current guidance, based on limited evidence, consistent results with important exceptions, or concerns about study quality	Consensus achieved that there is potential improvement in certain individuals or groups based on individual professional judgement and shared decision-making

Adapted and modified from the National Guideline Clearinghouse Extent Adherence to Trustworthy Standards (NEATS) instrument.

Table 2. *The 18 recommendations of the 2024 ASIPP antithrombotic guidelines.*

No.	Recommendation (condensed)	Evidence level	Strength
1	The risk of thromboembolic events and associated morbidity and mortality is higher than that of epidural hematoma formation and associated morbidity and mortality with critical management, with interruption of antiplatelet and anticoagulant therapy preceding interventional techniques, though both risks are significant.	Moderate	Moderate
2	Risk stratification categorized multiple interventional techniques into low-risk, moderate or intermediate risk, and high-risk.	Low to moderate	Moderate to strong
3	Risk stratification based on anatomical, procedural, bleeding, anticoagulant, and medical or physiological factors provides a physiologic and clinically appropriate basis for the guidelines.	Moderate	Moderate
4	Severe degenerative arthritis with or without spinal stenosis, ankylosing spondylitis, osteoporosis, older age, frailty, previous stroke, intracranial bleed, hypertension, diabetes, thrombocytopenia, chronic renal failure, chronic NSAID or steroid therapy, multiple attempts, epidural fibrosis, and previous surgery may increase procedural bleeding and the risk of epidural hematoma.	Moderate	Moderate
5	Risk stratification should be upgraded from low to moderate or intermediate, and from moderate or intermediate to high, based on other risk factors.	Low	Low to moderate
6	Fifteen categories of procedure are classified as high risk, including all cervical, thoracic, and lumbar interlaminar epidurals above L5; trigeminal ganglion, ophthalmic division, and sphenopalatine ganglion blocks; PNS trial and implantation of thoracic and cervical medial branches; discography and intradiscal procedures; dorsal column and dorsal root ganglion stimulator trial and implantation; intrathecal catheter and pump implant; vertebral augmentation; percutaneous and endoscopic disc decompression; MILD; trigeminal and cranial nerve blocks and stimulation; sympathetic blocks; percutaneous adhesiolysis by interlaminar or transforaminal approach; intervertebral spinous prosthesis including lateral fusion; sacroiliac joint fusion; and the Intracept procedure.	Moderate	Moderate
7	Five categories are classified as moderate or intermediate risk: caudal epidural injections; caudal epidural adhesiolysis; lumbar interlaminar epidural injection at L5-S1; cervical, thoracic, and lumbar transforaminal injection at L1 and L2; and PNS trial and implantation of lumbar medial branches.	Moderate	Moderate
8	Eleven categories are classified as low risk: trigger point and intramuscular injections; peripheral nerve blocks including mandibular and maxillary; sacroiliac joint and ligament injections and nerve blocks; all facet joint interventions; intraarticular injections of extremity joints; pocket revision and pulse generator or pump replacement; PNS trial and implantation; lumbar transforaminal injections at L3, L4, L5, and S1; ganglion impar blocks; sacroiliac joint nerve radiofrequency; and trigeminal branch nerve blocks.	Moderate	Moderate
9	Discontinue aspirin (81 or 325 mg) for 6 days for high-risk procedures. The clinician may continue aspirin without interruption for low and moderate or intermediate risk procedures, or discontinue for 3 days. Additional factors may increase risk and necessitate a change in guidance.	Moderate	Moderate
10	Discontinuation of most NSAIDs, excluding aspirin, for 1 to 2 days, and some for 4 to 10 days, may be considered for moderate and high-risk procedures.	Low	Weak
11	On warfarin: low-risk procedures may be performed with INR ≤ 3.0 with 1 to 2 days of cessation if warranted; moderate or intermediate risk with INR ≤ 2.0 and 2 to 3 days of cessation; high risk with INR < 1.5 and 3 to 5 days of cessation.	Moderate	Moderate
12	Direct oral anticoagulants are discontinued for 2 days for high-risk and one day for moderate or intermediate risk procedures, with CrCl <50 mL/min, dabigatran should be withheld for 2 days before moderate-risk procedures and 3–4 days before high-risk procedures. For low-risk procedures they may be continued. A shared decision may be made to continue for moderate or intermediate risk procedures with normal renal function.	Moderate	Moderate

Table 2 cont. *The 18 recommendations of the 2024 ASIPP antithrombotic guidelines.*

No.	Recommendation (condensed)	Evidence level	Strength
13	Dipyridamole, cilostazol, and Aggrenox may be continued for low and moderate or intermediate risk procedures. For high-risk procedures dipyridamole and cilostazol may be continued or stopped for 2 days, with Aggrenox stopped for 6 days.	Low	Moderate
14	Clopidogrel and prasugrel are discontinued for 6 days for high-risk procedures and continued in low-risk procedures. Ticagrelor is discontinued for 5 days in high risk. Ticlopidine is discontinued for 7 days for high and moderate or intermediate risk procedures and may be continued in low-risk procedures.	Moderate	Moderate
15	Restoration of therapy is recommended at 12 to 24 hours for moderate or intermediate risk procedures, and for low-risk procedures if therapy was held, and at 24 to 48 hours for major risk procedures, based on postoperative bleeding status. Where thromboembolic risk is high, therapy may resume 12 hours after the procedure with appropriate assessment and monitoring.	Low	Moderate
16	Diagnosis of epidural hematoma is clinically based on unexpected pain at the injection site with rapid neurological deterioration, confirmed by MRI. Neurosurgical consultation is necessary to avoid neurological sequelae.	Moderate	Moderate
17	If thromboembolic risk is high, low molecular weight heparin bridge therapy can be instituted during cessation of the anticoagulant and discontinued 24 hours before the pain procedure.	Low	Weak
18	Shared decision-making between the patient, the pain specialist, and the treating physicians is recommended where cessation is contemplated, for consideration of all appropriate risks associated with continuation or discontinuation.	Moderate	Strong

INR = international normalized ratio; MILD = minimally invasive lumbar decompression; MRI = magnetic resonance imaging; NSAID = nonsteroidal anti-inflammatory drug; PNS = peripheral nerve stimulation.

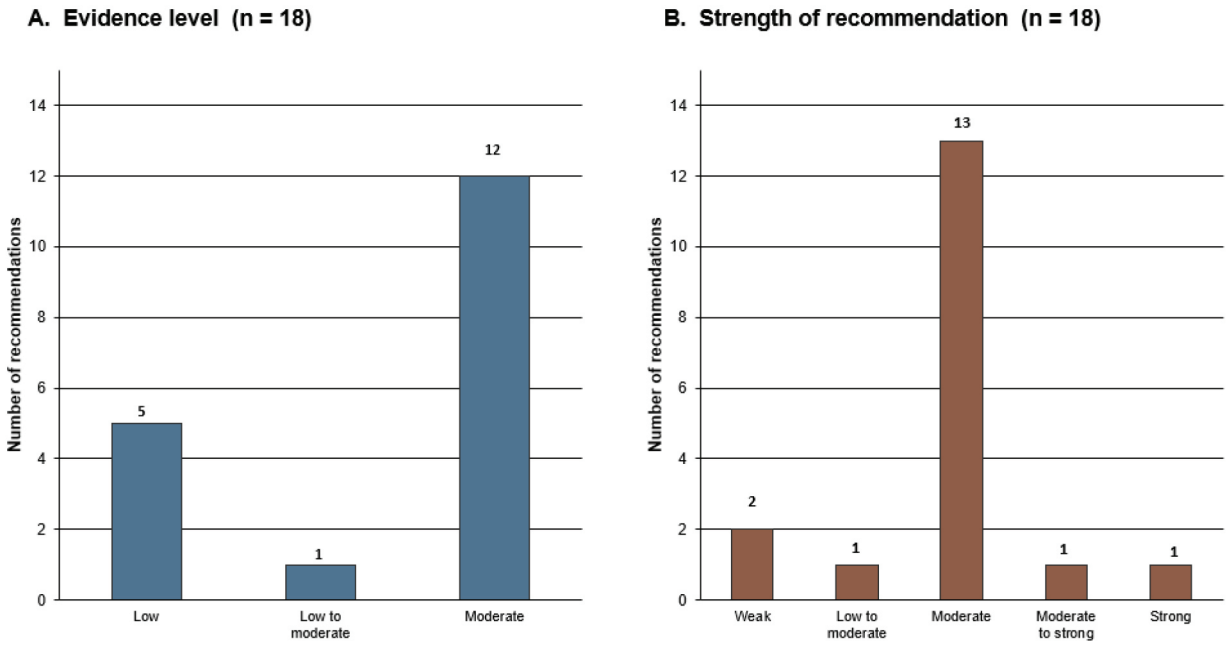


Fig. 1. *Distribution of the assigned evidence level (A) and strength of recommendation (B) across the 18 recommendations. No recommendation rests on strong evidence. The single recommendation carrying a strong strength of recommendation concerns shared decision-making; the two weak recommendations concern nonsteroidal anti-inflammatory drug cessation and bridging therapy.*

rests on strong evidence. The two weak recommendations concern nonsteroidal anti-inflammatory drug cessation and bridging therapy, and the single recommendation graded high in strength concerns shared decision-making rather than any specific drug interval.

3.2 The Central Premise: Thromboembolic Risk Against Bleeding Risk (Recommendation 1)

Recommendation 1 is the premise from which the remainder follows, and it is stated as a comparison rather than as an absolute. The risk of thromboembolic events, and the morbidity and mortality attending them, is higher than the risk of epidural hematoma and its attendant morbidity and mortality where the hematoma is managed critically. The qualification that both risks are significant is not decorative; the panel is not asserting that bleeding is unimportant.

The supporting evidence has three strands. The first is that the regional anesthesia and interventional pain literature has concentrated on epidural hematoma while paying scant attention to thromboembolic events, so the apparent balance of risk in that literature is an artefact of what has been studied. Wider evidence from other specialties, including peripheral vascular surgery, endoscopy, dental procedures, arthrocentesis, cataract surgery, and ophthalmic surgery, consistently describes continuation of antiplatelet therapy without increased bleeding (42-49,55,57-59,80-97). The second is the direct comparative data described in the introduction, in which thromboembolic complications outnumbered epidural hematoma formations in survey data, and in which discontinuation produced nine devastating complications with two deaths across 1,626 spinal procedures while continuation produced no bleeding complications. The third is asymmetry of reversibility: with appropriate care, the morbidity of epidural hematoma can be controlled and mortality is rare, whereas the cardiac and cerebrovascular consequences of cessation are frequently irreversible.

An additional consideration complicates any simple attribution of hematoma to antithrombotic therapy. Spontaneous spinal hematoma occurs without instrumentation. In a systematic review, the prevalence of idiopathic, non-traumatic spontaneous spinal hematoma was 74% with concomitant anticoagulation against 27% with antiplatelet therapy, with the lumbar spine the most common site at 41.7% (98). A separate systematic review of neurological outcome after spinal epidural hematoma found that antithrombotic medication was associated with increased risk of persistent neurological deficit (odds ratio 2.00, 95% CI 1.24 to 3.23, $P < 0.01$), though this did not persist after adjustment for American Spinal Injury Association (ASIA) classification and age, and the size of the hematoma was not significantly associated with persistent deficit (99). Reviews of published case reports have concluded that complications continue to occur despite strict adherence to guidelines (100-102).

Recommendation 1. Relative magnitude of thromboembolic and bleeding risk

The risk of thromboembolic events and associated morbidity and mortality is higher than that of epidural hematoma formation and associated morbidity and mortality with critical management, with the interruption of antiplatelet and anticoagulant therapy preceding interventional techniques, though both risks are significant.

Level of evidence: Moderate

Strength of recommendation: Moderate

3.3 The Risk Stratification System (Recommendations 2 to 8)

3.3.1 How the composite score is constructed

The stratification is the methodological core of the document and is more transparent than the categorical schemes it replaces. Each procedure is scored across five domains, each rated 1 to 4. Anatomical risk relates to the location of needle placement, structural abnormalities, vasculature, adjacent structures, and whether the procedure enters a closed cavity (103). Procedural risk is based on the historical presentation of bleeding and hematoma, multiple attempts, and traumatic entry, particularly into closed cavities. Bleeding risk is based on reports of epidural hematoma and other bleeding occurring spontaneously, traumatically, without antithrombotic therapy, and after cessation. Antiplatelet and anticoagulant risk reflects the pharmacology of the drug, the presence of dual therapy, variation in metabolism, and dependence on renal and hepatic function (104,105). Medical or physiologic risk encompasses the disorders leading to antithrombotic therapy in the first place, together with age, diabetes, obesity, hypertension, vascular abnormalities, and renal and hepatic status.

Separate recommendations on bleeding and coagulation management for neurostimulation devices, including bleeding risk stratification specific to neuromodulation procedures, informed the scores assigned to implantable systems (106). The five domain scores are summed. A total of 8 or less is low risk, 9 to 12 is moderate or intermediate, and 13 or above is high. Across the 50 procedures scored, totals ranged from

5 to 18, producing 19 low-risk, 7 moderate-risk, and 24 high-risk procedures. Figure 2 shows the distribution, and Table 3 reproduces representative scores by domain.

3.3.2 What changed, and why it matters

Two reclassifications carry practical weight. All facet joint interventions, at every spinal level and including intraarticular injections, medial branch and L5 dorsal ramus blocks, and radiofrequency neurotomy, are stratified as low risk with a composite score of 7. This follows evidence that non-epidural interventions can be performed safely without discontinuation and aligns ASIPP with the second edition of the multisociety guidelines, which likewise moved thoracic and lumbar facet interventions to the low-risk category (36,61,62,107). The panel appends a qualification that deserves attention: because of the proximity of the spinal cord during intraarticular facet injection, capsular penetration may enter the epidural space, so in the presence of extensive arthritis, bleeding diathesis, or an inexperienced operator, the risk may be considered intermediate to high on individual consideration.

Lumbar transforaminal epidural injections at L3 through S1 are also classified as low risk, with a score of 8, while the same procedure at L1 and L2, and all thoracic and cervical transforaminal injections, score 12 and fall into the moderate category. Caudal epidural injections and caudal adhesiolysis were moved from their 2019 classification and are flagged as changes in the source document (1,68,69).

The dissent recorded in the voting concerned exactly this boundary, and the disagreement is instructive rather than embarrassing. Under a composite scoring system, a procedure scoring 8 is low risk and one scoring 12 is moderate, yet the two differ by a single point in three domains. Where the underlying evidence is sparse, reasonable experts will assign those points differently. The value of publishing the score by domain, rather than the category alone, is that a reader who disagrees can see precisely where the disagreement lies.

Recommendation 2. Categorical risk stratification of interventional techniques

Risk stratification categorized multiple interventional techniques into low-risk, moderate or intermediate risk, and high-risk.

Level of evidence: Low to moderate

Strength of recommendation: Moderate to strong

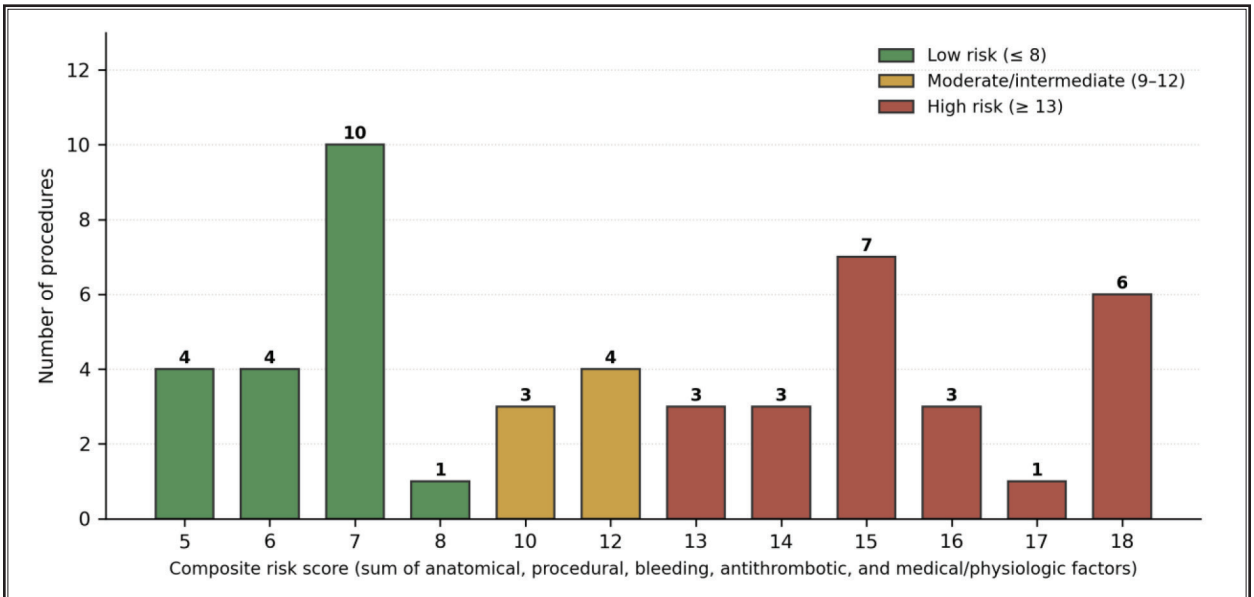


Fig. 2. *Distribution of composite risk scores across the 50 interventional techniques scored in the guidelines. Each procedure is rated 1 to 4 in five domains — anatomical, procedural, bleeding, antithrombotic, and medical or physiologic risk — and the domain scores are summed. Totals of 8 or less denote low risk, 9 to 12 moderate or intermediate risk, and 13 or above high risk. Note the empty interval at 9 and 11, and the concentration of facet joint interventions at a score of 7.*

Table 3. *Representative composite risk scores by domain.*

Procedure	Anat.	Proc.	Bleed.	Antithr.	Med./ phys.	Total	Category
Trigger point and intramuscular injections	1	1	1	1	1	5	Low
Peripheral nerve blocks (mandibular, maxillary)	1	1	1	1	1	5	Low
Intraarticular injections of extremity joints	1	1	1	1	1	5	Low
PNS trial and implantation, extremities	1	1	1	1	1	5	Low
Sacroiliac joint injections and nerve blocks	1	1	2	1	1	6	Low
Ganglion impar blocks	1	1	1	1	2	6	Low
All facet joint interventions (all levels, IA, MBB, RFN)	2	2	1	1	1	7	Low
Pocket revision / IPG or pump replacement	1	1	1	2	2	7	Low
Lumbar transforaminal epidural at L3, L4, L5, S1	2	2	1	1	2	8	Low
Caudal epidural injection	3	2	2	1	2	10	Moderate
Lumbar interlaminar epidural at L5-S1	3	3	1	1	2	10	Moderate
PNS trial and implantation, lumbar medial branches	2	2	2	2	2	10	Moderate
Lumbar transforaminal at L1-L2; thoracic and cervical transforaminal	3	3	2	2	2	12	Moderate
Caudal epidural adhesiolysis	3	3	2	2	2	12	Moderate
Vertebral augmentation	4	4	1	2	2	13	High
Celiac, splanchnic, lumbar sympathetic, hypogastric plexus blocks	3	4	2	2	2	13	High
Sacroiliac joint fusion; Intracept	4	4	1	3	2	14	High
Percutaneous adhesiolysis, transforaminal approach	4	4	2	2	2	14	High
Lumbar interlaminar epidural above L5	4	3	3	3	2	15	High
Discography and intradiscal procedures (all levels)	4	4	1	4	2	15	High
PNS trial and implantation, thoracic medial branches	4	3	3	3	2	15	High
Stellate ganglion and thoracic sympathetic blocks	4	4	3	3	2	16	High
Trigeminal and cranial nerve blocks and stimulation	4	4	2	4	2	16	High
Trigeminal ganglion, ophthalmic division, sphenopalatine ganglion blocks	4	4	3	4	2	17	High
Cervical and thoracic interlaminar epidural injection	4	4	4	4	2	18	High
Percutaneous adhesiolysis, interlaminar approach	4	4	4	4	2	18	High
Dorsal column and dorsal root ganglion stimulator trial and implant	4	4	4	4	2	18	High
Intrathecal catheter and pump implant	4	4	4	4	2	18	High
Minimally invasive lumbar decompression (MILD)	4	4	4	4	2	18	High

Anat. = anatomical risk; Antithr. = antiplatelet/anticoagulant risk; Bleed. = bleeding risk; IA = intraarticular; IPG = implantable pulse generator; MBB = medial branch block; Med./phys. = medical or physiologic risk; PNS = peripheral nerve stimulation; Proc. = procedural risk; RFN = radiofrequency neurotomy. Each domain is scored 1 to 4.

Recommendation 3. Five-domain basis for risk stratification

Risk stratification of patients undergoing interventional techniques on antiplatelet or anticoagulant therapy based on anatomical risk factors, procedural risk factors, bleeding risk factors, anticoagulant risk factors, and medical or physiological status provides a physiologic and clinically appropriate basis in developing the guidelines.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 4. Patient-level factors increasing bleeding and hematoma risk

Risk factors with severe degenerative arthritis with or without spinal stenosis, ankylosing spondylitis, osteoporosis, older age, frailty, previous stroke, intracranial bleed, hypertension, diabetes, thrombocytopenia, chronic renal failure, chronic NSAID or steroid therapy, multiple attempts, epidural fibrosis, and previous surgery may increase bleeding observed during the procedure and risk of epidural hematoma.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 5. Upgrading the risk category

Risk stratification should be upgraded to low to moderate or intermediate and moderate or intermediate to high based on other risk factors.

Level of evidence: Low

Strength of recommendation: Low to moderate

Recommendations 4 and 5 operate as a pair and are the mechanism by which a population-level classification becomes a patient-level judgement. Recommendation 4 enumerates the modifiers; Recommendation 5 licenses the upgrade. It is notable that Recommendation 5 carries the weakest evidence and the weakest strength in the entire risk-stratification group, low and low to moderate respectively. The panel is candid that the decision to upgrade rests on clinical judgement rather than on data quantifying how much any given comorbidity shifts the composite score. Supporting evidence for the individual modifiers is nonetheless real: a meta-analysis of 29 cohort studies encompassing 150,252 patients undergoing spinal surgery found that age above 60 years (odds ratio 1.35, 95% CI 1.03 to 1.70) carried higher risk on high-quality evidence, with moderate-quality evidence for body mass index of 25 or above (odds ratio 1.39, 95% CI 1.10 to 1.76), diabetes (odds ratio 1.25, 95% CI 1.01 to 1.55), revision surgery (odds ratio 1.92, 95% CI 1.15 to 3.25), and multilevel procedures (odds ratio 5.20, 95% CI 2.89 to 9.37). That same meta-analysis found no association between spinal epidural hematoma and tobacco use, operative time, anticoagulant use, or American Society of Anesthesiologists (ASA) classification, a negative finding worth holding alongside the rest (105).

Bleeding risk may also be quantified with the HAS-BLED score, which assigns points for hypertension, abnormal renal and liver function, stroke, bleeding tendency or predisposition, labile international normalized ratios, age above 65 years, and concomitant drugs or excess alcohol, to a maximum of 9. Observed bleeding rates rise from 1.13 per 100 patient-years at a score of 0 to 8.70 at a score of 4, with insufficient data above 4. The panel notes the important caveat that HAS-BLED has been validated only in patients with atrial fibrillation receiving warfarin, even though it has been applied across the spectrum (67).

Recommendation 6. Procedures classified as high risk

All procedures categorized as high-risk include: cervical, thoracic, and lumbar (above L5) interlaminar epidurals; trigeminal ganglion, ophthalmic division, and sphenopalatine ganglion blocks; peripheral nerve stimulation trial and implantation of thoracic and cervical medial branches; discography and intradiscal procedures (lumbosacral, cervical, and thoracic); dorsal column and dorsal root ganglion stimulator trial and implantation; intrathecal catheter and pump implant; vertebral augmentation (sacral, lumbar, thoracic, and cervical); percutaneous and endoscopic disc decompression procedures; minimally invasive lumbar decompression (MILD); trigeminal and cranial nerve blocks and stimulation; sympathetic blocks (stellate ganglion, thoracic sympathetic, splanchnic, celiac plexus, lumbar sympathetic, hypogastric plexus); percutaneous adhesiolysis with interlaminar or transforaminal approach (cervical, thoracic, and lumbar); intervertebral spinous prosthesis including lateral fusion; sacroiliac joint fusion; and the Intracept procedure.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 7. Procedures classified as moderate or intermediate risk

Procedures categorized as moderate or intermediate-risk include: caudal epidural injections; caudal epidural adhesiolysis; lumbar interlaminar epidural injection at L5, S1; cervical, thoracic, and lumbar transforaminal at L1 and L2; and peripheral nerve stimulation trial and implantation of lumbar medial branches.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 8. Procedures classified as low risk

Procedures categorized as low-risk include: trigger point and intramuscular injections (including piriformis injection); peripheral nerve blocks including mandibular and maxillary nerve blocks; sacroiliac joint and ligament injections and nerve blocks; facet joint interventions (intra-articular injections, medial branch and L5 dorsal ramus nerve blocks and radiofrequency neurotomy); intraarticular injections of extremity joints; pocket revision and implantable pulse generator/intrathecal pump replacement; peripheral nerve stimulation trial and implantation; lumbar transforaminal epidural injections at L3, L4, L5, and S1; ganglion impar blocks; sacroiliac joint nerve radiofrequency; and trigeminal branch nerve

blocks (mandibular, maxillary, and other branches).
Level of evidence: Moderate
Strength of recommendation: Moderate

3.4 Drug-Specific Recommendations (Recommendations 9 to 14)

Six recommendations address individual drug classes. They share a structure: continuation is permitted or encouraged for low-risk procedures, an intermediate interval applies at moderate risk, and a defined cessation interval applies at high risk. Table 4 consolidates the schedule and Fig. 3 compares the ASIPP intervals with those of the multisociety guidelines for high-risk procedures.

The rationale for the divergence is set out explicitly and is a matter of principle rather than of data interpretation alone. The general convention, followed in the multisociety guidelines, is to discontinue drugs for five half-lives, which is the interval required for essentially complete elimination of a drug following first-order kinetics. The ASIPP panel argues that complete elimination is not the appropriate target for interventional techniques in the perioperative period, and that applying it exposes patients to avoidable thromboembolic risk. For the direct oral anticoagulants, the panel therefore adopted the intervals of the 2022 CHEST clinical practice guidelines, which recommend one day of cessation for low and moderate risk and two days for high risk, varying where creatinine clearance falls below 50 mL per minute. The panel further observes that the multisociety document described three case reports of spinal hematoma related to direct oral anticoagulants, all of them following subarachnoid or intrathecal injection rather than the epidural procedures to which the longer intervals are commonly applied (36,78).

Table 4. *ASIPP guidelines for antithrombotic medication management by procedural risk category.*

Medication	Low risk	Moderate or intermediate risk	High risk	Restart
NSAIDs (COX-1 and COX-2)	May continue, or stop 1–10 days	May continue, or stop 1–10 days	May continue, or stop 1–10 days	24 h
THC/CBD	May continue, or stop 1–10 days	May continue, or stop 1–10 days	Stop 6 days	24 h
Garlic; vitamin E; fish oil	Continue, or may stop 3 days	Continue, or may stop 3 days	Stop 6 days	24 h
Low-dose aspirin	Continue, or may stop 3 days	Continue, or may stop 3 days	Stop 6 days	24 h
High-dose aspirin	Continue, or may stop 3 days	Continue, or may stop 3 days	Stop 6 days	24 h
Dipyridamole	May continue	May continue	May continue, or stop 2 days	12 h
Cilostazol	May continue	May continue	May continue, or stop 2 days	12 h
Aggrenox (dipyridamole plus aspirin)	May continue	May continue	Stop 6 days	24 h
Clopidogrel	May continue	May continue, or stop 5 days	Stop 6 days	12 h
Prasugrel	May continue	May continue, or stop 5 days	Stop 6 days	24 h
Ticagrelor	May continue	May continue, or stop 3 days	Stop 5 days	24 h
Warfarin	May continue, or stop 1–2 days; INR ≤ 3.0	May continue, or stop 2–3 days; INR ≤ 2.0	Stop 3–5 days; INR ≤ 1.5	12–24 h
Dabigatran	May continue, or stop 1 day	Stop 2 days	Stop 2 days	24 h
Dabigatran (CrCl ≤ 50 mL/min)	May continue, or stop 1 day	Stop 3–4 days	Stop 3–4 days	24 h
Apixaban	May continue, or stop 1 day	Stop 1 day	Stop 2 days	24 h
Rivaroxaban	May continue, or stop 1 day	Stop 1 day	Stop 2 days	24 h
Edoxaban	May continue, or stop 1 day	Stop 1 day	Stop 2 days	24 h
Heparin, intravenous	Discontinue 4 h	Discontinue 4 h	Discontinue 4 h	24 h
Heparin, subcutaneous	Discontinue 6 h	Discontinue 6 h	Discontinue 24 h	24 h
Low molecular weight heparin	Discontinue 24 h	Discontinue 24 h	Discontinue 24 h	24 h

CBD = cannabidiol; COX = cyclooxygenase; CrCl = creatinine clearance; INR = international normalized ratio; NSAIDs = nonsteroidal anti-inflammatory drugs; THC = tetrahydrocannabinol. Full procedure lists for each category appear in Table 2, Recommendations 6 to 8.

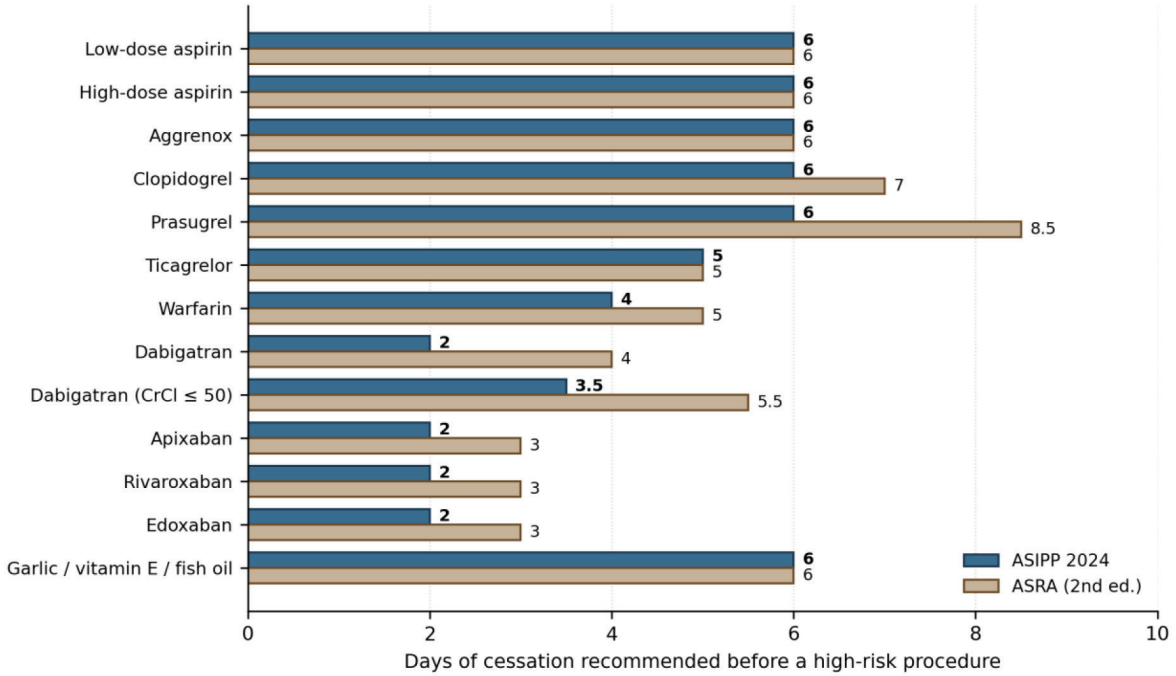


Fig. 3. *Cessation intervals recommended before a high-risk procedure, comparing the 2024 ASIPP guidelines with the second edition of the multisociety (ASRA) guidelines. The largest divergences concern the direct oral anticoagulants and the platelet aggregation inhibitors, where ASIPP recommends shorter interruption. Dabigatran with creatinine clearance ≤ 50 mL/min is shown at the midpoint of the recommended range. ASRA = American Society of Regional Anesthesia and Pain Medicine.*

Recommendation 9. Aspirin

Discontinuation of aspirin (81 or 325 mg) for 6 days for high-risk procedures. The clinician may choose to continue aspirin (81 or 325 mg) without interruption for low and moderate or intermediate risk procedures or discontinue (81 or 325 mg) for 3 days. Similarly, additional factors may increase the risk and necessitate change in the guidance for low and moderate or intermediate risk patients.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 10. Nonsteroidal anti-inflammatory drugs other than aspirin

Discontinuation of most NSAIDs, excluding aspirin, for 1 to 2 days and some 4 to 10 days may be considered of moderate and high-risk procedures.

Level of evidence: Low

Strength of recommendation: Weak

Recommendation 11. Warfarin

In patients on anticoagulant therapy with Warfarin, low risk procedures may be performed with INR of ≤ 3.0 with 1 to 2 days of cessation if warranted, for moderate or intermediate risk procedures an INR of ≤ 2.0 is recommended with 2 to 3 days of cessation of Warfarin therapy if warranted, and for high-risk procedures an INR of < 1.5 is recommended with cessation of Warfarin therapy for 3 to 5 days if warranted.

Level of evidence: Moderate

Strength of recommendation: Moderate

Recommendation 12. Direct oral anticoagulants

Anticoagulant therapy with direct acting anticoagulants dabigatran (Pradaxa), apixaban (Eliquis), rivaroxaban (Xarelto), and edoxaban (Savaysa, Lixiana) is discontinued for 2 days for high-risk procedures and one day for moderate or intermediate risk procedures. Discontinuation is adjusted to 2 days and 3–4 days for dabigatran (Pradaxa) with creatinine clearance below 50 mL/minute. For low-risk procedures, direct acting oral anticoagulants may be continued. Based on clinical condition and importance, a shared decision may be made to continue for moderate or intermediate risk procedures

with normal renal function.
Level of evidence: Moderate
Strength of recommendation: Moderate

Recommendation 13. Phosphodiesterase inhibitors
Antiplatelet agents such as dipyridamole, cilostazol, and Aggrenox (dipyridamole plus aspirin) may be continued for low and moderate or intermediate risk procedures. For high-risk procedures dipyridamole and cilostazol may be continued or stopped for 2 days with Aggrenox (dipyridamole plus aspirin) to be stopped for 6 days.
Level of evidence: Low
Strength of recommendation: Moderate

Recommendation 14. Platelet aggregation inhibitors
Antiplatelet therapy with clopidogrel (Plavix) and prasugrel (Effient) are discontinued for 6 days for high-risk procedures and intermediate or moderate risk procedures. They are continued in low-risk procedures. Ticagrelor (Brilinta) is discontinued for 5 days in high risk. Ticlopidine (Ticlid) (discontinued in the U.S.) is discontinued for 7 days for high and moderate or intermediate risk procedures and 3 days in moderate risk procedures and may be continued in low-risk procedures.
Level of evidence: Moderate
Strength of recommendation: Moderate

Two features of this group merit attention. First, Recommendation 10 is the weakest in the document alongside Recommendation 17, resting on low evidence with weak strength, and its wording is correspondingly permissive: cessation of non-aspirin nonsteroidal anti-inflammatory drugs "may be considered." The tabulated guidance goes further, permitting continuation even for high-risk procedures on the explicit ground that cessation lacks a protective effect. Second, the text of Recommendation 14 as published contains an internal inconsistency: it states that clopidogrel and prasugrel are discontinued for 6 days for high-risk and for intermediate or moderate risk procedures, whereas the accompanying guideline table specifies that both may be continued or stopped for 5 days at moderate risk and stopped for 6 days at high risk. The table is the operative guidance and is what Table 4 above reproduces. Clinicians and reviewers should be aware of the discrepancy.

3.5 Resumption, Diagnosis of Hematoma, Bridging, and Shared Decision-Making (Recommendations 15 to 18)

3.5.1 Resumption

Restoration of therapy is recommended at 12 to 24 hours after moderate or intermediate risk procedures, and after low-risk procedures where the decision had been made to hold, and at 24 to 48 hours after major-risk procedures, in each case guided by postoperative bleeding status. Where thromboembolic risk is high, therapy may be resumed at 12 hours with appropriate assessment and monitoring for clinically significant bleeding. The recommendation rests on low evidence with moderate strength, an honest reflection of how little comparative data exist on resumption timing specifically.

Recommendation 15. Timing of resumption of antithrombotic therapy
Timing of therapy of restoration or restarting is recommended during 12 to 24-hour period for moderate or intermediate risk procedures, and low risk procedures if the decision was made to hold based on risk factors, and 24-48 hours for major risk procedures, based on postoperative bleeding status. If thromboembolic risk is high, antithrombotic therapy may be resumed 12 hours after the interventional procedure is performed, with appropriate assessment and monitoring for clinically significant bleeding.
Level of evidence: Low
Strength of recommendation: Moderate

3.5.2 Recognition of epidural hematoma

Recommendation 16 is the shortest in the document and arguably the most consequential at the bedside (99). New severe or disproportionate spinal pain accompanied by progressive neurologic deficit after an interventional procedure should prompt urgent MRI and immediate neurosurgical evaluation. The emphasis on unexpected pain is deliberate, since post-procedural soreness is common and the distinguishing features are the disproportion of the pain and the accompanying neurological change. The evidence bearing on outcome underscores the urgency: in the systematic review cited earlier, time to intervention was significantly associated with persistent neurological deficit, while the size of the hematoma was not.

Recommendation 16. Diagnosis and management of epidural hematoma
Diagnosis of epidural hematoma is clinically based on unexpected pain at the site of the injection with rapid neurological deterioration and MRI confirmation. Neurosurgical consult is necessary to avoid neurological sequelae.
Level of evidence: Moderate
Strength of recommendation: Moderate

3.5.3 Bridging therapy

Where thromboembolic risk is high and cessation is unavoidable, low molecular weight heparin bridge therapy may be instituted during the interruption and discontinued 24 hours before the procedure. This carries low evidence and weak strength, the joint weakest grading in the document, and the wording is permissive rather than directive. The caution is consistent with the broader perioperative literature, in which bridging has repeatedly failed to demonstrate net benefit and has been associated with increased bleeding (67,78).

Recommendation 17. Low molecular weight heparin bridging
If thromboembolic risk is high, low molecular weight heparin bridge therapy can be instituted during cessation of the anticoagulant, and the low molecular weight heparin can be discontinued 24 hours before the pain procedure.
Level of evidence: Low
Strength of recommendation: Weak

3.5.4 Shared decision-making

Recommendation 18 carries the highest strength of recommendation in the document. It is not a statement about any drug or interval but about the process by which the decision is reached: where cessation is contemplated, the patient, the pain specialist, and the treating physicians should jointly consider all the risks associated with continuation or discontinuation. That the panel reserved its strongest language for this statement is coherent with everything preceding it. If the central premise is that both risks are significant and that their relative magnitude varies by patient, then no table can determine the decision, and the process by which the trade-off is made becomes the thing that can most reliably be got right.

Recommendation 18. Shared decision-making
Shared decision making between the patient, the pain specialist, and the treating physicians if cessation is contemplated is recommended for consideration of all the appropriate risks associated with continuation or discontinuation of antiplatelet or anticoagulant therapy.
Level of evidence: Moderate
Strength of recommendation: High

3.6 The Perioperative Pathway and Documentation

The recommendations assemble into a four-step pathway, presented in Fig. 4. The composite risk score establishes the procedural category; patient-level thromboembolic and bleeding risk is estimated separately and may upgrade that category; the drug schedule for the resulting category is applied; and shared decision-making governs any departure. Bridging is considered only where thromboembolic risk is high and cessation unavoidable. Resumption follows the schedule in Recommendation 15, with surveillance for the presentation described in Recommendation 16.

The guidelines reproduce a procedural checklist intended to be worked through for each patient, summarized in Table 5. Its structure is worth noting: identification of the antithrombotic agent is not confined to prescription anticoagulants and antiplatelets but extends to over-the-counter agents influencing thrombolysis, to selective serotonin reuptake inhibitors, and to nonsteroidal anti-inflammatory drugs. The inclusion of selective serotonin reuptake inhibitors is pointed, given the survey finding that only 36% of interventional pain physicians were aware of their contribution to perioperative bleeding. The checklist also distinguishes primary from secondary prophylaxis for aspirin and fish oil, a distinction that bears directly on how much the thromboembolic side of the balance weighs.

4.0 DISCUSSION

4.1 What the Recommendations Establish

The 18 recommendations make three claims. The first is that the thromboembolic risk of interrupting antithrombotic therapy exceeds the risk of epidural hematoma from continuing it, though both are significant. The second is that procedural bleeding risk can be estimated by a reproducible composite score summing five domains, and that this score assigns 19 of 50 interventional techniques to a low-risk category in which antithrombotic therapy may generally be continued. The third is that where the categories leave genuine

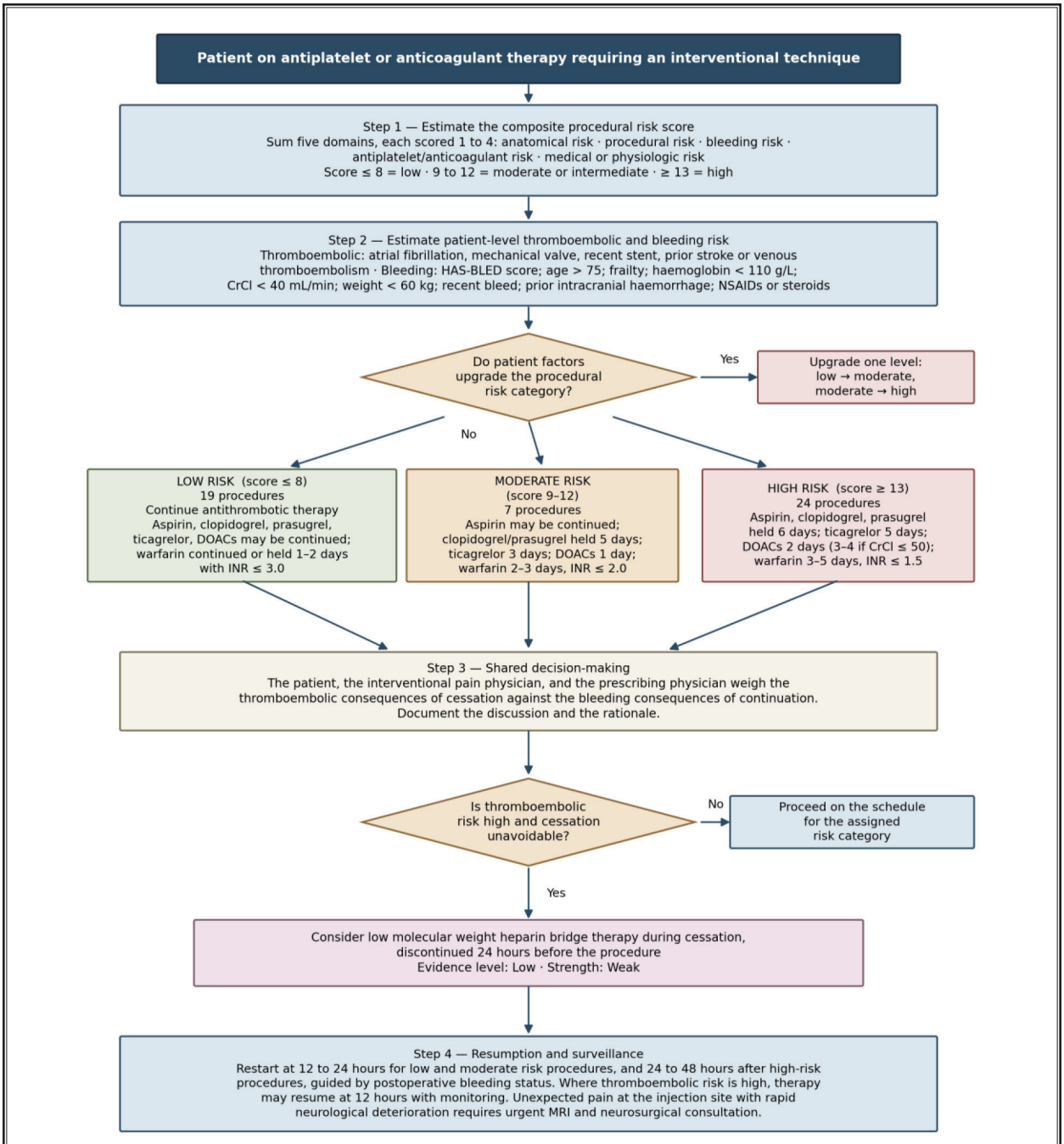


Fig. 4. *Perioperative decision pathway for patients on antiplatelet or anticoagulant therapy undergoing an interventional technique, assembling the composite risk score, the patient-level risk assessment, the drug schedule by category, shared decision-making, bridging, and resumption. CrCl = creatinine clearance; DOACs = direct oral anticoagulants; INR = international normalized ratio; MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs.*

uncertainty, the resolution is shared decision-making rather than a default to cessation.

What follows practically is a substantial reduction in the number of patients who should be asked to stop therapy at all. Facet joint interventions at every level, sacroiliac joint procedures, peripheral nerve blocks,

Table 5. *Procedural checklist for managing anticoagulant and antiplatelet therapy.*

Step	Elements
1.0 Patient evaluation and identification of risk factors	Age · diabetes · bleeding disorders · hypertension · obesity · low body weight · renal disease · low creatinine clearance
2.1 Aspirin use	Primary prophylaxis (absence of established cardiovascular disease or risk factor) versus secondary prophylaxis (presence of cardiovascular or cerebrovascular disease)
2.2 Antiplatelets	Clopidogrel (Plavix) · prasugrel (Effient) · ticagrelor (Brilinta)
2.3 Direct oral anticoagulants	Dabigatran (Pradaxa) · apixaban (Eliquis) · rivaroxaban (Xarelto) · edoxaban (Savaysa, Lixiana)
2.4 Vitamin K antagonist	Warfarin (Coumadin)
2.5 Over-the-counter agents influencing thrombolysis	Garlic · vitamin E
2.6 Fish oil	Distinguished by primary versus secondary prophylaxis, as for aspirin
2.7 Selective serotonin reuptake inhibitors	Citalopram · fluoxetine · escitalopram · paroxetine · sertraline
2.8 NSAIDs	Identify agent and duration of use
3.0 Risk stratification and recommendations	Assign low, moderate or intermediate, or high risk and apply the corresponding schedule
4.0 Informed decision-making	Document the shared decision between patient, pain specialist, and treating physicians
5.0 Restarting of drugs	Apply the resumption schedule based on procedural category and postoperative bleeding status
6.0 Postoperative monitoring	Surveillance for unexpected site pain with rapid neurological deterioration

NSAIDs = nonsteroidal anti-inflammatory drugs.

extremity joint injections, trigger point injections, peripheral nerve stimulation of the extremities, generator and pump replacement, ganglion impar blocks, trigeminal branch blocks, and lumbar transforaminal injections at L3 through S1 are all low risk. Set against the surveyed practice patterns, in which warfarin was discontinued by 100% of respondents and clopidogrel by 97% irrespective of procedure, the gap between the recommendations and prevailing practice is wide.

4.2 Where the Guidelines Diverge from Other Guidance, and Why

The divergence from the multisociety guidelines is concentrated in the direct oral anticoagulants and the platelet aggregation inhibitors, and it is a disagreement about the appropriate pharmacological target rather than about the underlying trial data. Five half-lives is the interval for essentially complete drug elimination. The ASIPP position is that complete elimination is the wrong objective for a percutaneous procedure of short duration, since it purchases a marginal reduction in bleeding risk at the cost of several additional days of unprotected thromboembolic exposure. Adopting the CHEST intervals for direct oral anticoagulants reduces cessation from three to four days to one to two, and the platelet aggregation inhibitor intervals are correspondingly shortened. Table 6 sets out the principal points of concordance and divergence.

The classification of cervical facet interventions is the sharpest single disagreement. ASIPP assigns all facet joint interventions a composite score of 7 regardless of level, placing cervical medial branch blocks and radiofrequency neurotomy in the low-risk category, whereas the multisociety document places cervical facet procedures in the high-risk category. Both positions are defensible on the published evidence, which is thin at the cervical level specifically. A clinician following one document will continue clopidogrel for a cervical medial branch block; a clinician following the other will stop it for a week. This summary does not adjudicate, but notes that the ASIPP score is at least transparent about where the judgement was made, and that the panel's own qualification about capsular penetration during intraarticular facet injection applies with particular force in the cervical spine.

4.3 The Recorded Dissent

The decision to publish the dissent by name, and to identify the specific procedures at issue, is unusual and is a strength. Three panelists reached three incompatible conclusions about the risk category of transforaminal epidural injections: universally low, universally intermediate, or high in the cervical and thoracic spine. The final classification, splitting lumbar L3 through S1 into low risk and the remainder into moderate, satisfied none of them fully and achieved 94% and 89% acceptance rather than unanimity.

This is more informative than a unanimous vote

Table 6. *Concordance and divergence between ASIPP 2024 and other contemporary guidance.*

Issue	ASIPP 2024	Other guidance
Governing principle for cessation interval	Sufficient reduction in drug effect for a short percutaneous procedure; CHEST intervals adopted for DOACs	Multisociety guidelines apply five half-lives for drugs following first-order metabolism
Dabigatran, high-risk procedure	Stop 2 days (3–4 days if CrCl ≤ 50 mL/min)	Multisociety: stop 4 days (5–6 days if CrCl ≤ 50 mL/min)
Apixaban, rivaroxaban, edoxaban, high risk	Stop 2 days	Multisociety: stop 3 days
Clopidogrel, high risk	Stop 6 days	Multisociety: stop 7 days
Prasugrel, high risk	Stop 6 days	Multisociety: stop 7–10 days
Warfarin, high risk	Stop 3–5 days, INR ≤ 1.5	Multisociety: stop 5 days, INR normalized
Facet joint interventions	Low risk at all spinal levels, including cervical	Multisociety: thoracic and lumbar facet interventions low risk; cervical facet procedures high risk
Transforaminal epidural injections	Lumbar L3–S1 low risk; L1–L2 and cervical/thoracic moderate	Multisociety: all transforaminal epidural injections high risk
Aggrenox, low and moderate risk	May continue	Multisociety: stop 4 days (low) and 3 days (moderate)
Heparin, intravenous	Discontinue 4 hours	Multisociety: discontinue 6 hours
Emphasis of the framework	Thromboembolic risk given explicit weight against bleeding risk	Predominant emphasis on avoidance of epidural hematoma

CrCl = creatinine clearance; DOACs = direct oral anticoagulants; INR = international normalized ratio. Multisociety guidance refers to the second edition of the joint guidelines of the American Society of Regional Anesthesia and Pain Medicine and collaborating societies.

would have been. It locates the boundary of what the evidence can settle. A reader can see that the transforaminal classification is the least secure element of the stratification, weigh it accordingly for an individual patient, and recognize that a colleague classifying it differently is not departing from the guideline so much as occupying a position the guideline itself records as tenable.

4.4 Implications for Practice

For the interventionalist the recommendations reduce to a sequence. Score the procedure across the five domains or read the category from the published tables. Assess the patient separately for thromboembolic risk and for bleeding risk, using HAS-BLED where the patient has atrial fibrillation on warfarin and clinical judgement otherwise. Upgrade the category where patient-level factors warrant, recognizing that this step rests on the weakest evidence in the stratification group. Apply the drug schedule for the resulting category, and in the low-risk category expect that continuation will usually be appropriate. Where cessation is contemplated, conduct and document a shared decision with the patient and the prescribing physician. Consider bridging only where thromboembolic risk is high and cessation is unavoidable. Restart at 12 to 24 hours for low and moderate risk procedures and 24 to 48 hours after high-risk procedures. Instruct the patient that unexpected pain at the injection site with any neurological change requires immediate contact and treat that presentation as requiring urgent imaging and neurosurgical consultation.

For the patient, the framing that follows from these guidelines differs from what many will have been told previously. Stopping a blood thinner before a pain procedure is not a neutral safety measure; it is a trade of one risk for another, and for most low-risk procedures the trade is unfavorable. The conversation that Recommendation 18 requires is the mechanism by which that is communicated.

4.5 Research Priorities

The guideline identifies its own principal limitation as the continued paucity of literature with discordant recommendations, and the specific gaps follow from the structure of the document.

First, the composite scoring system has not been validated against outcomes. Its five domains and its thresholds at 8 and 13 are constructed rather than derived, and no study has tested whether procedures scoring 12 in fact bleed more than those scoring 8. A prospective registry recording composite score, antithrombotic status, and bleeding and thromboembolic outcomes would convert the framework from a reasoned construction into an empirical instrument.

Second, the transforaminal and cervical facet clas-

sifications require level-specific data. These are the two points at which ASIPP and the multisociety guidelines diverge most sharply, and both divergences persist because the level-specific evidence is absent rather than contested.

Third, resumption timing rests on low evidence throughout. No study has compared 12-hour against 24-hour against 48-hour resumption for any procedural category. Fourth, bridging remains weakly supported and would benefit from the randomized evaluation that has been conducted in surgical populations but not in interventional pain management. Fifth, the thromboembolic side of the balance is quantified largely by extrapolation from surgical and cardiology cohorts; procedure-specific thromboembolic event rates after cessation for interventional pain procedures are not available and would materially sharpen every recommendation in the document.

5.0 Limitations

First, and as the guideline states, the primary limitation is the continued paucity of literature, with discordant recommendations across societies. Eighty included articles on bleeding complications is a modest base for a framework classifying 50 procedures.

Second, no meta-analysis was possible. Neither conventional nor single-arm quantitative synthesis was undertaken, owing to the small number of studies and persistent high variability. Every recommendation therefore rests on qualitative synthesis and consensus.

Third, the composite risk scores are consensus constructions. The assignment of 1 to 4 within each domain, and the thresholds separating the categories, were determined by panel judgement rather than derived from outcome data and have not been externally validated.

Fourth, two of the 18 recommendations did not achieve unanimity, and the disagreement concerned a procedure category, transforaminal epidural injection, that is among the most commonly performed in the field.

Fifth, the panel was convened by a professional society whose members perform the procedures under consideration, and whose position on cessation intervals is systematically less restrictive than that of the comparator guidelines. The conflict procedures are documented in detail, the guidelines were developed without industry support, and the reasoning for each divergence is stated openly; but the direction of the divergence is consistent, and readers should weigh it.

Sixth, the panel composition, while multidisciplinary, was heavily weighted toward anesthesiology, and did not include a cardiologist or hematologist, notwithstanding that the central premise of the document is a comparison of thromboembolic against bleeding risk.

Seventh, one internal inconsistency exists between the text of Recommendation 14 and the corresponding guideline table, as noted in Section 3.4.

Eighth, this article is a summary. Individual study appraisals, the full evidence tables, and the complete procedure-by-procedure scoring are not reproduced. Where a clinical decision turns on the details of a particular study, the primary guideline document should be consulted (108).

6.0 Conclusion

Managing chronic pain in patients receiving antithrombotic therapy requires balancing two genuine harms. The 2024 ASIPP guidelines summarized here take the position that the balance has commonly been struck in the wrong place: that the interventional pain literature has concentrated on epidural hematoma while the thromboembolic consequences of cessation, which are more frequent and less reversible, have received scant attention.

Eighteen recommendations were developed by a 34-member panel through literature review, best evidence synthesis, and modified Delphi consensus, with 16 achieving unanimous acceptance among 29 voting panelists. Interventional techniques are stratified by a composite score summing anatomical, procedural, bleeding, antithrombotic, and medical or physiologic risk, yielding 19 low-risk, 7 moderate-risk, and 24 high-risk procedures. In the low-risk category, which includes all facet joint interventions, sacroiliac procedures, peripheral nerve blocks, extremity injections, and lumbar transforaminal injections at L3 through S1, antithrombotic therapy may generally be continued. Cessation intervals for high-risk procedures are shorter than those of the comparator multisociety guidelines, reflecting a deliberate rejection of complete drug elimination as the appropriate target for short percutaneous procedures.

The document's methodological strengths are its transparency and its candor. Publishing the composite score by domain allows a reader who disagrees to locate the disagreement precisely. Publishing the dissent by name and identifying transforaminal epidural injection as the procedure at issue, marks the boundary of

what the evidence can currently settle. Reserving the strongest recommendation in the document for shared decision-making rather than for any drug interval is consistent with a framework in which the relative magnitude of two significant risks varies from patient to patient.

The corresponding weakness is that the scoring system, for all its transparency, has not been validated against outcomes, and that no meta-analysis was possible from the available literature. Priority should be given to a prospective registry linking composite score and antithrombotic status to bleeding and thromboembolic outcomes, to level-specific data on transforaminal and cervical facet procedures, and to procedure-specific thromboembolic event rates after cessation. Until such evidence exists, these recommendations represent the most explicit graded framework available for a decision that interventional pain physicians make many times each week.

Author Contributions and Acknowledgments

All authors contributed to the conception of the summary, the extraction and verification of the recommendations and supporting evidence, drafting and critical revision of the article, and approval of the final version.

The authors wish to thank Melinda "Mindy" D. Adams, transcriptionist for her assistance in the preparation of this article. We would like to thank the editorial board of Pain Physician for review and criticism in improving the article.

This article was prepared with the assistance of Claude, an AI assistant developed by Anthropic. The authors have verified all materials, figures, and tables generated by Claude.

ORCID IDS

Laxmaiah Manchikanti, MD
0000-0002-4201-9063
Alan D. Kaye, MD PhD
0000-0003-2464-0187
Nebojsa Nick Knezevic, MD, PhD
0000-0001-8028-1495

About the Authors

Laxmaiah Manchikanti, MD[1]
Dr. Manchikanti is Director, Pain Management Centers of America, Paducah, KY; Clinical Professor, Anesthesiology and Perioperative Medicine, University of Louisville, Louisville, KY; and Professor of Anesthesiology-Research, Department of Anesthesiology, School of Medicine, LSU Health Sciences Center, Shreveport, LA, USA
drlm@thepainmd.com

Mahendra R. Sanapati, MD[2]
Dr. Sanapati is Director, Pain Management Centers of America, Evansville, IN; Assistant Professor of Anesthesiology and Clinical Research, Department of Anesthesiology and Perioperative Medicine, University of Louisville School of Medicine, Louisville, KY; and Volunteer Faculty, Mentor, Indiana University School of Medicine, Evansville, IN, USA
msanapati@gmail.com

Devi E. Nampiaparampil, MD[3]
Dr. Nampiaparampil is Medical Director, Metropolis Pain Medicine PLLC, and Clinical Associate Professor, Department of Rehabilitation Medicine, NYU Grossman School of Medicine, New York, NY, USA
devichechi@gmail.com

Nebojsa Nick Knezevic, MD, PhD[4]
Dr. Knezevic is Vice Chair for Research, Department of Anesthesiology, Advocate Illinois Masonic Medical Center, Chicago, IL, and Clinical Professor, Department of Anesthesiology and Department of Surgery, College of Medicine, University of Illinois, Chicago, IL, USA
nick.knezevic@gmail.com

Alan D. Kaye, MD, PhD[5]
Dr. Kaye is Professor, Interventional Pain Fellowship Director, Vice Chair of Research, Department of Anesthesiology; Professor, Department of Pharmacology, Toxicology, and Neurosciences, Louisiana State University Health Sciences Center at Shreveport, Shreveport, LA; Professor, Department of Anesthesiology, Tulane School of Medicine, and Professor, Department of Anesthesiology and Pharmacology, LSU School of Medicine, New Orleans, LA, USA
alan.kaye@lsuhs.edu

Alexander Bautista, MD[6]
Dr. Bautista is Professor of Anesthesiology, Duke University, Durham, NC, USA
Alexbmdusmle@yahoo.com

Kenneth D. Candido, MD[7]
Dr. Candido is Chief, Division of Pain Medicine, Thorek Memorial Hospital, Clinical Professor of Surgery and Anesthesia, University of Illinois College of Medicine-Chicago, Chicago, IL, and Professor of Surgery, Ponce School of Medicine, Ponce, PR, USA
kdcandido1@gmail.com; kdcandido2@gmail.com

Paul J. Christo, MD, MBA[8]
Dr. Christo is Chief, Division of Pain Medicine, Associate Professor, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA
pchristo@jhmi.edu

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