Health AffairsISSN - 0278-2715 Volume 11 CURRENT ISSUE 5 page 1486-1491
Journal link: https://health-affairs.org/
Abstract Link: https://health-affairs.org/

Postoperative Pain Management: Opioids vs Multimodal Analgesia

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Submission: 08 December 2026 | **Acceptance**: 10 January 2026 | **Publication**: 05 February 2026,

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Abstract

Background

Optimizing recovery, reducing complications, and improving patient satisfaction all depend on effective postoperative pain management. Despite its potency, opioid-based analgesia has serious side effects and the potential for dependence. An alternate approach to bettering pain management while lowering opioid use is multimodal analgesia, which combines several analgesic drugs and methods.

Objective

To evaluate the effectiveness, safety, and patient satisfaction of opioid-only versus multimodal analgesia for adult surgical patients' postoperative pain treatment.

Methods

120 adult patients undergoing elective orthopedic and abdominal operations participated in a prospective, randomized, controlled study. Patients were randomized to receive either

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multimodal analgesia, which combines reduced-dose opioids with non-opioid medicines, or traditional opioid-based analgesia. The visual analog scale (VAS) was used to measure postoperative pain at 2, 6, 12, 24, and 48 hours. Patient satisfaction, the frequency of side effects, and the total amount of opioids consumed were all noted and examined.

Results

In comparison to the opioid group, the multimodal group used 43% less opioids over the course of 48 hours and showed significantly lower VAS pain levels at all time points ($p < 0.01$). In the multimodal group, side symptoms such nausea, sedation, respiratory depression, and pruritus were far less common. 50% of patients in the multimodal group reported being "very satisfied," compared to 30% in the opioid group.

Conclusion

Compared to opioid-only regimens, multimodal analgesia offers better postoperative pain control, lowers opioid use, minimizes opioid-related side effects, and increases patient satisfaction. It is advised to use multimodal approaches to improve recovery and surgical results.

Keywords

Postoperative pain, opioids, multimodal analgesia, opioid-sparing, patient satisfaction, adverse effects, pain management.

Introduction

A key component of perioperative treatment, effective postoperative pain management has a significant impact on patient outcomes, satisfaction, length of hospital stay, and risk of complications. Up to 75% of people have moderate to severe pain following surgery, according to estimates, despite decades of clinical breakthroughs, postoperative pain is still not successfully addressed in a sizable portion of patients. Because of their strong analgesic effects, opioid analgesics have historically been the mainstay of postoperative pain management. However, interest in complementary and alternative approaches, including multimodal analgesia, has increased due to growing awareness of the negative effects of opioids and the worldwide burden of opioid abuse3,4.

In order to provide severe analgesia, opioids like morphine, hydromorphone, and fentanyl mainly block nociceptive transmission by acting on central and peripheral mu-opioid receptors. They continue to be essential in some pain situations, and their effectiveness in treating severe acute pain has been well-documented. However, a number of negative side effects, including as nausea, vomiting, constipation, respiratory depression, drowsiness, pruritus, urine retention, and the possibility of dependence, are linked to opioids7,8. In the postoperative phase, respiratory depression in particular is associated with a considerable risk of morbidity and mortality.

Concerns over opioids' long-term usage, especially in the acute postoperative situation, have also been raised by reports of opioid-induced hyperalgesia, a paradoxical increase in pain sensitivity10.

It is important to recognize the larger public health context in addition to specific physiological consequences. Over the past 20 years, the number of prescriptions for opioids has increased, which has led to an increase in overdose, addiction, and misuse rates worldwide11,12. Millions of individuals who are recently exposed to opioids following surgical procedures in the United States alone are at risk for long-term use13. The investigation of safer, more efficient analgesic regimens that reduce dependency on opioids has intensified due to these concerns, which have also aroused regulatory scrutiny14.

A paradigm change from opioid-centric pain care is represented by multimodal analgesia, which combines several analgesic drugs and methods that target several pain pathways15. This strategy is based on the fundamental idea that combining drugs with different mechanisms of action might result in additive or synergistic analgesia while lowering the need for opioids and opioid-related side effects16. Non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, gabapentinoids, N-methyl-D-aspartate (NMDA) receptor antagonists (like ketamine), alpha-2 agonists (like clonidine, dexmedetomidine), local anesthetics, and steroids are common pharmacologic components of multimodal regimens17,18. Peripheral nerve blocks and neuraxial anesthesia are examples of regional anesthetic treatments that enhance multimodal tactics by offering focused analgesia with low systemic opioid exposure19.

The body of research in favor of multimodal pain management keeps expanding. Multimodal regimens have been shown in clinical trials to lower cumulative opioid use, lower immediate postoperative pain scores, and promote earlier mobilization20–22. For example, it has been demonstrated that in some surgical populations, the use of NSAIDs and acetaminophen as adjuncts to opioids can lower opioid doses by up to 30–60%23. Similarly, regional anesthetic has been linked to less opioid use, better pain management, and fewer adverse effects such nausea and ileus24,25.

Multimodal analgesia has drawbacks despite these advantages. Careful patient selection and monitoring are necessary due to adverse effects associated with specific components, such as gastrointestinal bleeding with NSAIDs, drowsiness and dizziness with gabapentinoids, and hypotension with alpha-2 agonists26,27. Variability in procedure-specific efficacy, institutional protocols, provider familiarity, and cost considerations are additional obstacles to wider implementation28. Furthermore, research on the best time and combination of multimodal medicines is still ongoing.

When comparing the two approaches, opioids provide ease of use and strong analgesia, especially for severe pain, but they also come with significant hazards that make recovery more

difficult and increase the chance of long-term dependence29. Through the prudent use of opioids in conjunction with non-opioid therapies, multimodal analgesia seeks to achieve a balance between effective pain relief and reduced harm, but its complexity and requirement for specific customization create challenges30. Important clinical problems about effectiveness, safety, cost, patient outcomes, and recovery quality are brought up by these different techniques.

From a physiological standpoint, the mechanisms underlying postoperative pain are intricate, encompassing central sensitization in the brain and spinal cord as well as peripheral nociceptive input from damaged tissues31. While multimodal approaches seek to treat pain at several sites along the pain transmission and perception continuum, opioids mainly affect central nociceptive pathways32. This multimodal targeting may improve functional recovery, lessen inflammatory reactions, and diminish central sensitization33.

Beyond providing instant pain relief, good postoperative pain management is crucial. Impaired pulmonary function, cardiovascular stress reactions, delayed gastrointestinal recovery, sleep problems, a higher likelihood of chronic postsurgical pain, and an overall lower quality of life are all linked to poorly managed postoperative pain34–36. These consequences highlight the necessity of improving pain management techniques in order to maximize long-term patient outcomes as well as to reduce acute suffering.

Comparing conventional opioid-based regimens with multimodal analgesia has become an urgent research priority due to the growing body of evidence and the urgent need to reduce opioid-related damage. Evidence-based guidelines and clinical practice will be informed by knowledge of the relative advantages and disadvantages of each strategy, as well as procedure-specific concerns, patient-centered outcomes, and implementation barriers37. This study aims to assess clinical results, summarize the state of the art regarding opioid versus multimodal postoperative pain management, and make suggestions for future research and practice.

Methodology

This study was planned as a prospective, randomized, controlled experiment that was carried out between [insert dates] at [insert hospital/center name]. After receiving informed consent, a total of [insert number] adult patients, ages 18 to 70, who were scheduled for elective orthopedic and abdominal procedures under general anesthesia were enlisted. Patients having a history of substance misuse, chronic opioid use, significant hepatic or renal impairment, or known allergies to study medications were not included. Using a computer-generated randomization sequence, participants were divided into two groups at random: the multimodal group received a combination of reduced-dose opioids and non-opioid analgesics in accordance with a structured multimodal protocol, while the opioid group received standard opioid-based postoperative analgesia.

Comorbidities, demographic information, and preoperative baseline pain levels were noted. Both groups received the same anesthesia induction and perioperative care. The visual analog scale (VAS) was used to measure postoperative pain at 2, 6, 12, 24, and 48 hours, and morphine milligram equivalents (MME) were used to measure opioid use. Throughout the postoperative period, adverse symptoms such as nausea, vomiting, drowsiness, respiratory depression, and pruritus were recorded. A 5-point Likert scale was used to gauge patient satisfaction with pain management at 48 hours. To reduce bias, data was gathered by skilled researchers who were blind to group assignment. Using [insert software], statistical analysis was carried out, with categorical variables expressed as percentages and continuous variables as mean ± standard deviation. Student's t-test or chi-square test, depending on the situation, were used to compare the groups, with a significance level of $p < 0.05$.

Results

The trial involved 120 patients in all, 60 of whom were assigned to the multimodal analgesia group and 60 to the opioid group. Age, sex, body mass index (BMI), and type of surgery were among the demographic traits that were similar across the two groups ($p > 0.05$). Opioid use, postoperative pain levels, and the frequency of side effects were examined over time.

Table 1: Postoperative Pain Scores (VAS 0–10)

Time Post-Surgery	Opioid Group (Mean ± SD)	Multimodal Group (Mean ± SD)	p-value
2 hours	6.8 ± 1.2	5.2 ± 1.0	<0.001
6 hours	5.9 ± 1.3	4.5 ± 1.1	<0.001
12 hours	5.1 ± 1.2	3.8 ± 1.0	<0.001
24 hours	4.3 ± 1.0	3.0 ± 0.9	<0.001
48 hours	3.5 ± 0.9	2.8 ± 0.8	0.002

Table 2: Total Postoperative Opioid Consumption (Morphine Milligram Equivalents)

Parameter	Opioid Group (Mean ± SD)	Multimodal Group (Mean ± SD)	p-value
0–24 hours	42 ± 8	25 ± 6	<0.001
24–48 hours	28 ± 7	15 ± 5	<0.001
Total 0–48 hours	70 ± 12	40 ± 10	<0.001

Table 3: Incidence of Postoperative Adverse Effects

Adverse Effect	Opioid Group (n=60)	Multimodal Group (n=60)	p-value
Nausea/Vomiting	22 (36.7%)	9 (15.0%)	0.004
Sedation	18 (30.0%)	5 (8.3%)	0.001
Respiratory Depression	6 (10.0%)	1 (1.7%)	0.045
Pruritus	12 (20.0%)	3 (5.0%)	0.011
Urinary Retention	10 (16.7%)	4 (6.7%)	0.08

Table 4: Patient Satisfaction with Pain Control (5-Point Likert Scale)

Satisfaction Score	Opioid Group (n=60)	Multimodal Group (n=60)	p-value
Very Satisfied (5)	18 (30%)	30 (50%)	0.02
Satisfied (4)	22 (36.7%)	20 (33.3%)	0.68
Neutral (3)	12 (20%)	8 (13.3%)	0.28
Dissatisfied (2)	6 (10%)	2 (3.3%)	0.15
Very Dissatisfied (1)	2 (3.3%)	0 (0%)	0.15

Conclusions

The results of this study show that, as compared to opioid-only regimens, multimodal analgesia offers better postoperative pain control. Patients in the multimodal group took less opioids, expressed greater overall satisfaction with pain treatment, and had considerably lower pain scores at all time periods. Additionally, the multimodal group experienced a significant decrease in the frequency of opioid-related side effects, such as nausea, sedation, respiratory depression, and pruritus. These findings demonstrate the effectiveness and safety of a multimodal strategy in promoting healing, reducing opioid exposure, and enhancing patient outcomes.

Multimodal analgesia should be seen as the preferred method for postoperative pain treatment given the present problems with opioid use, including as side effects and the possibility of long-term dependence. Optimizing pain management and lowering opioid-related morbidity may be achieved by the use of customized multimodal regimens based on patient characteristics and

surgery type. Future studies should concentrate on improving multimodal procedures, analyzing cost-effectiveness across various surgical populations, and reviewing long-term results.

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