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Rethinking Pain Relief After Surgery:

What We Can Learn from Knee Replacements

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Abstract

This paper offers a clear, evidence-based look at how we can reduce opioid use after knee replacement surgery without sacrificing pain relief. This review focuses specifically on total knee arthroplasty (TKA)—one of the most commonly performed and most painful surgeries—and asks whether opioids are truly necessary. By analyzing results from 21 clinical trials, the paper shows that non-opioid medications like NSAIDs and gabapentinoids can provide similar pain control with fewer side effects, such as nausea, dizziness, constipation, and sedation. Lower risk of long-term use is an added benefit. A recent RCT found that after knee/shoulder arthroscopy, 72% of patients in an opioid-sparing protocol remained opioid-free over six weeks—compared to just 5.4% in the traditional opioid group.[8] Given how many people receive their first opioid prescription after surgery, the findings have major public health implications. They highlight a growing opportunity for clinicians and hospitals to shift away from default opioid prescribing toward safer, evidence-based pain management protocols. This transition is not only clinically feasible, but also urgently needed to reduce unnecessary opioid exposure, prevent avoidable side effects, and lower the risk of long-term use or diversion. With the right combination of education, clinical tools, and system-level support, many surgical patients may recover successfully with minimal or no opioid use when supported by effective multimodal protocols.

Introduction

Opioid prescribing after surgery has been a major contributor to long-term opioid use in the United States. With orthopedic procedures accounting for a substantial proportion of surgical opioid prescriptions, efforts to reframe how pain is managed postoperatively have gained urgency. Total knee arthroplasty (TKA) is one of the most common and painful elective surgeries, making it a particularly important procedure to analyze when considering alternatives to traditional opioid-based analgesia. Patients undergoing TKA often receive significant amounts of opioids both during their hospital stay and in the weeks that follow, a practice that can increase the risk of prolonged use and dependency.[1]

The issue of postoperative opioid prescribing gained national attention in the early 2000s, when clinical norms began to emphasize aggressive pain control as a measure of quality care. This shift was fueled in part by the adoption of pain as the 'fifth vital sign' and the introduction of patient satisfaction metrics tied to pain control, which created pressure on clinicians to prescribe opioids more liberally.[2]

As a result, opioids were commonly prescribed in large quantities after routine procedures, sometimes for weeks at a time. Unfortunately, many patients transitioned from short-term postoperative use to long-term dependence. Persistent opioid use is commonly defined as continued opioid consumption for more than 90 days following surgery. Studies have shown that

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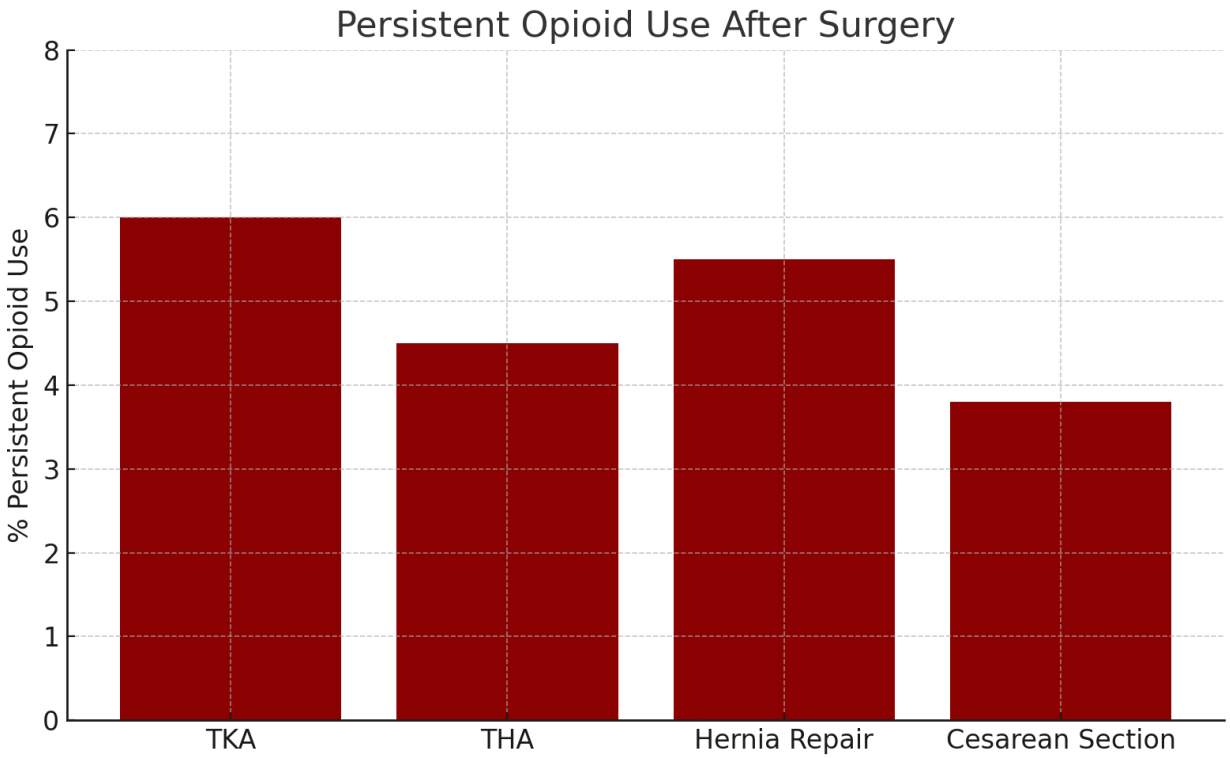
6% of opioid-naive patients still use opioids three to six months after surgery, and the risk increases with each additional day of prescription (figure 1).[3] The overprescription of opioids in surgical settings became one of the initial entry points for many individuals into chronic use and, in some cases, addiction.

Figure 1. Persistent Opioid Use After Surgery



This review explores whether non-opioid analgesics—including NSAIDs, acetaminophen, and gabapentinoids—can offer equivalent pain relief to opioids while reducing risks of dependence, adverse effects, and prolonged use. TKA was chosen as a representative procedure because of its high surgical volume, well-documented pain burden, and standardized recovery protocols. It provides a clear and replicable lens through which to assess pain management strategies that might also benefit patients undergoing other types of surgery.

Methods

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a widely accepted framework that enhances transparency and rigor in systematic reviews. PRISMA was used in this review to ensure consistent study selection, clear reporting, and reproducibility of methods—important features when synthesizing clinical trial data on pain management strategies. A comprehensive literature search was conducted using PubMed, Scopus, and the Cochrane Library to identify randomized controlled trials published between January 2010 and April 2024. Search terms included combinations of: “total knee arthroplasty,” “TKA,” “postoperative pain,” “opioid,” “NSAID,” “acetaminophen,” “gabapentin,” “non-opioid analgesia,” and “multimodal pain management.”

Studies were included if they (1) enrolled adult patients undergoing primary total knee arthroplasty, (2) compared opioid-based regimens to at least one non-opioid analgesic (NSAIDs,

acetaminophen, or gabapentinoids), and (3) reported outcomes such as pain scores, morphine milligram equivalent (MME) use, opioid-related side effects, or length of hospital stay. Studies that did not provide quantifiable data on these outcomes or used opioids in both control and intervention groups were excluded.

Data were extracted and synthesized narratively and graphically to highlight key trends and treatment effects. No new statistical analysis was performed. A meta-analysis from the search results was not conducted due to heterogeneity in study designs, outcome measures, medication combinations, and follow-up durations across trials. This variability limited the ability to produce a meaningful pooled estimate, and thus a narrative synthesis was determined to be the most appropriate and transparent way to present the findings.

Results

Pain Control

There was no statistically significant difference in pain scores between the groups within the first 48 hours after surgery, meaning that patients who received non-opioid regimens experienced pain relief comparable to those who received traditional opioid-based protocols.[4] In fact, several studies noted that patient-reported pain scores fell within clinically acceptable ranges across both groups, suggesting that opioids may not be necessary as a first-line option for managing early postoperative discomfort after TKA. Additionally, multimodal regimens combining two or more non-opioid medications often provided enhanced control of both resting and movement-related pain.

One patient, a 64-year-old retired teacher who underwent knee replacement last year, shared that her care team used a non-opioid regimen including celecoxib, acetaminophen, and a nerve block. “I was nervous at first, thinking the pain would be unmanageable,” she said. “But honestly, I never felt like I needed anything stronger. I was able to start walking the next day.”

This aligns with the growing trend of patient empowerment through education. When individuals understand that pain control can be achieved without relying solely on opioids, they are more likely to embrace alternatives and feel satisfied with their recovery process. Many patients report less fear about side effects, increased ability to participate in physical therapy, and a greater sense of autonomy in their recovery.

Opioid Use

Patients in the non-opioid groups used significantly fewer opioids overall—especially when NSAIDs and gabapentinoids were included in the regimen. Some studies reported a 30–60% reduction in total morphine milligram equivalents (MME) consumed during hospitalization and post-discharge follow-up.[5] This reduction is clinically meaningful, as it not only limits patient exposure to addictive substances, but also reduces the risk of long-term opioid use and lowers the chance of leftover pills being diverted or misused in the community.

Another patient described her previous experience with opioids after an earlier hip procedure: “They made me nauseous, dizzy, and I couldn’t focus. When my surgeon said we could try fewer opioids this time around, I was relieved. The new protocol actually worked better and I didn’t have that foggy feeling.”

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The community impact of reduced prescribing should not be understated. Fewer pills prescribed means fewer opportunities for misuse by others in the household, accidental ingestion by children, or diversion into illicit markets. Surgeons who adopt opioid-sparing protocols aren't just protecting individual patients—they're helping mitigate a wider public health risk.

Side Effects

The non-opioid groups consistently experienced fewer opioid-related side effects such as nausea, vomiting, constipation, and sedation—symptoms that can delay mobilization and negatively impact patient experience.[6] Importantly, concerns about NSAID-related complications like gastrointestinal bleeding or renal impairment *were not* substantiated in the short-term follow-up periods included in these trials. When used appropriately, NSAIDs proved to be both safe and effective within the context of a controlled perioperative protocol.

Patients commonly cited the ability to think clearly and move early after surgery as a major benefit. One individual noted, "It felt empowering to be alert and in control of my body. That wasn't the case after my last surgery when I was on oxycodone." Providers have echoed these observations, with many noting that patients on non-opioid protocols are more engaged during rounds, more motivated in physical therapy, and more confident about returning home.

Hospital Stay

While not statistically significant across all studies, there was a slight trend toward shorter hospital stays in patients managed with multimodal, opioid-sparing protocols (figure 2).[7] This trend is likely influenced by faster return to mobility and fewer medication-related complications. Shorter hospital stays can reduce healthcare costs and lower the risk of hospital-acquired complications such as infections or delirium in older adults.

Additionally, patients on non-opioid protocols were less likely to experience delays in discharge due to issues like opioid-induced constipation or disorientation. Several studies noted improved coordination of care and earlier mobilization milestones in these patients, helping them transition more smoothly to outpatient rehabilitation or home-based recovery.

Figure 2. Hospital Stay Duration by Pain Management Strategy

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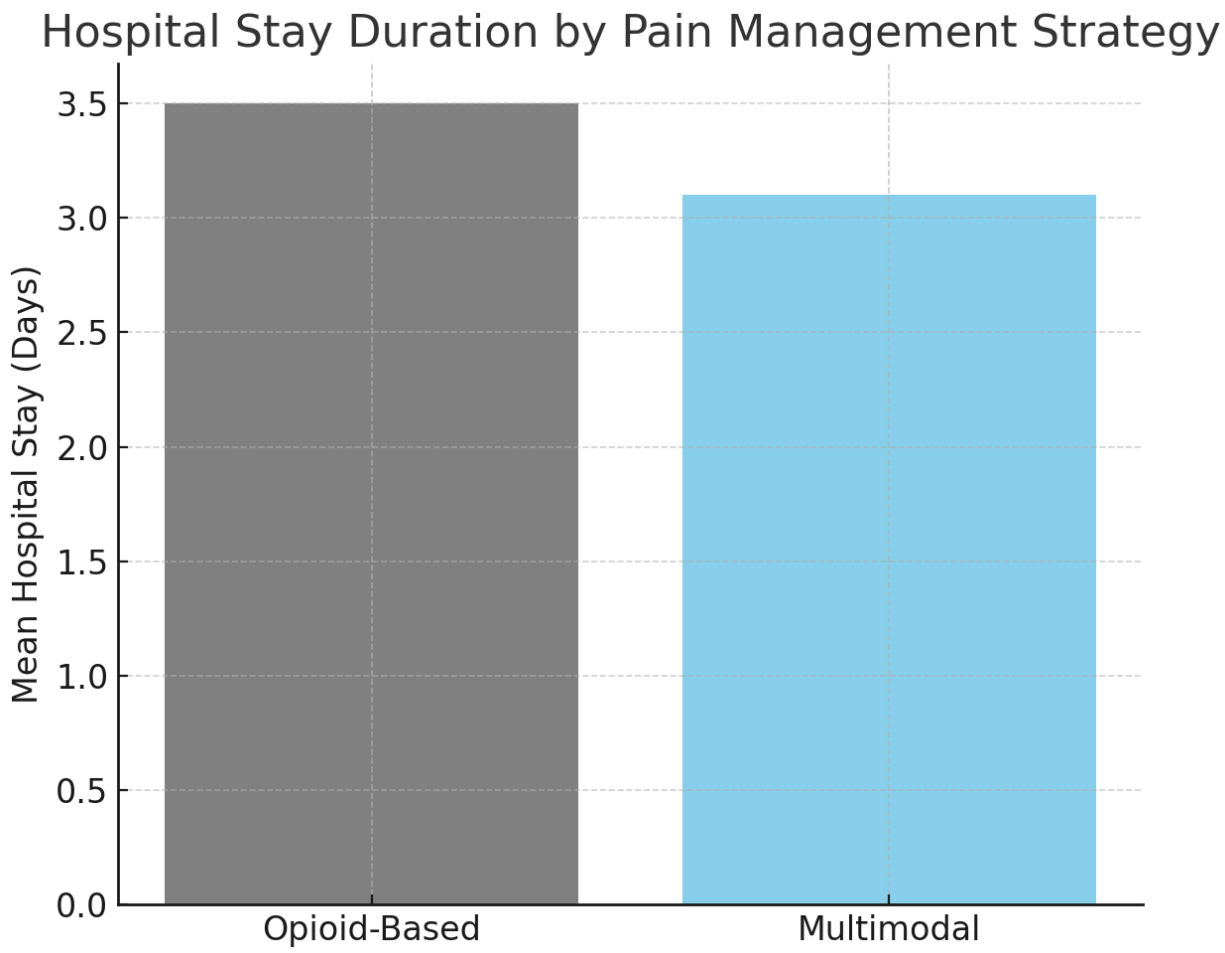

Why This Matters Beyond Orthopedics

Although this review focuses on TKA, its findings are relevant to a broad range of surgical specialties. Procedures such as cesarean sections, colorectal surgeries, spinal operations, and even outpatient orthopedic interventions like arthroscopy have similarly benefited from non-opioid, multimodal pain management strategies.[8] The common thread across these procedures is the effectiveness of targeting multiple pain pathways—rather than relying on opioids alone—to achieve adequate pain relief.

In gynecological and general surgery, for instance, combining acetaminophen with NSAIDs has shown similar reductions in opioid use, while regional blocks and local anesthetics are gaining traction in laparoscopic procedures. As in TKA, patients in these settings report higher satisfaction and fewer complications when opioids are minimized.

Furthermore, the adoption of these strategies supports public health goals to reduce opioid exposure at the population level. Many patients receive their first opioid prescription in the perioperative setting, and minimizing that exposure could prevent progression to misuse. Hospitals and surgical teams that prioritize evidence-based, opioid-sparing approaches are playing a direct role in reshaping how pain is treated and how risk is managed.

Future Steps

Looking ahead, more research is needed to evaluate long-term outcomes, including the risk of persistent opioid use, quality of life, and functional recovery. There is also an opportunity to investigate how patient education, particularly around realistic pain expectations and the safety and effectiveness of non-opioid options, can influence patient buy-in and recovery. Expectation-setting and preoperative screening can enhance the success of non-opioid regimens. Multidisciplinary collaboration between surgeons, anesthesiologists, pharmacists, and physical therapists will be key in expanding the reach and impact of opioid-sparing strategies.

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