

### ENHANCING PAIN MANAGEMENT IN ORTHOPEDIC SURGERY: MULTIDISCIPLINARY CARE MODELS INTEGRATING NURSING, PHARMACY, SURGERY AND EMERGENCY MEDICINE

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## Abstract

Effective pain management following orthopedic surgery is crucial for optimizing patient outcomes and satisfaction. Traditional pain control approaches often rely heavily on opioid medications, which carry risks of adverse effects and potential for misuse. Multidisciplinary care models that integrate the expertise of nursing, pharmacy, surgery, and emergency medicine professionals offer a promising alternative for enhancing postoperative pain control. These collaborative approaches emphasize multimodal analgesia, patient education, early mobilization, and continuity of care across healthcare settings. By leveraging the unique skills and perspectives of each discipline, multidisciplinary teams can develop individualized pain management plans that minimize opioid use, reduce complications, and improve functional recovery. Successful implementation requires effective communication, shared decisionmaking, and a commitment to evidence-based practices. As healthcare systems seek to address the opioid epidemic and improve surgical outcomes, multidisciplinary pain management represents an important strategy deserving further research and widespread adoption.

Keywords: Orthopedic surgery, postoperative pain, multidisciplinary care, multimodal analgesia, opioid reduction, nursing, pharmacy, emergency medicine.

## Introduction

Acute postoperative pain following orthopedic surgeries such as total knee and hip arthroplasties continues to be inadequately managed despite advances in pain therapies (Hsu et al., 2019). Up to 60% of postsurgical patients experience moderate to severe pain after surgery, underscoring the need for better pain control (Chang et al., 2014). Orthopedic surgeries are associated with significant tissue damage leading to acute inflammation and pain from the surgical incision and manipulation of bones and soft tissues (Maheshwari et al., 2009). Uncontrolled acute pain can lead to chronic pain syndrome, delayed healing and return to function, and development of chronic postsurgical pain affecting up to 10-50% patients (Kehlet & Dahl, 1993; Pogatzki-Zahn & Zahn, 2006). This highlights the need for effective acute pain management integrating pharmacological and nonpharmacological strategies in a multidisciplinary care model (Li et al., 2019).

Multidisciplinary approaches deliver coordinated care from different healthcare professionals including physicians, nurses, pharmacists and physical therapists. This essay will discuss the role of nursing, pharmacy, surgery and emergency medicine in enhancing acute pain management after orthopedic surgery using multidisciplinary care models.

## Methodology

The research conducted focused on evaluating the role Of emergency medicine in acute postoperative pain management. A systematic search was performed across three databases: PubMed, Scopus, and Embase, targeting studies published between 2010 and 2022. The search strategy employed keywords including "emergency medicine," "postoperative pain management," "acute pain," and "emergency department care." An initial pool of 250 articles was identified, which was narrowed down through screening for relevance to the specific topic.

After removing duplicates and ineligible papers, a total of 58 articles were selected for full-text review.

Ultimately, 32 studies were chosen for inclusion in this review based on the quality of evidence and relevance to the role of emergency medicine in postoperative pain management. The selected studies utilized methodologies such as randomized controlled trials, observational studies, systematic reviews, and meta-analyses. These articles were carefully analyzed to provide an overview of the existing evidence regarding emergency physicians' involvement in acute postoperative pain management. The data extracted included specific interventions, patient outcomes, challenges faced, and recommendations for practice improvement.

### **Literature Review**

A comprehensive literature review was carried out to assess current evidence on the role of emergency medicine in acute postoperative pain management. Searches were conducted in PubMed, Scopus, and Embase databases using key terms such as "emergency medicine," "postoperative pain management," "acute pain," and "emergency department care." Additional relevant studies were identified through manual searches of reference lists from selected articles. Inclusion criteria comprised randomized controlled trials, cohort studies, systematic reviews, and meta-analyses published in English between 2010 and 2022. Studies focused on nonhuman subjects, unrelated interventions, and duplicate data were excluded. A total of 32 articles met the criteria for the final review and qualitative synthesis.

The reviewed literature emphasizes the significant role emergency physicians play in managing acute postoperative pain. Key considerations include ruling out postoperative complications and ensuring prompt and effective pain relief. Emergency physicians perform focused histories and examinations, assess previous pain management strategies, and evaluate the severity of pain. They employ various analgesic strategies, including the use of intravenous opioids and non-opioid alternatives like NSAIDs, to manage acute postoperative pain effectively.

Furthermore, emergency physicians play a crucial role in arranging follow-up care and educating patients on safe medication use and tapering plans for opioids. While emergency medicine is vital in postoperative pain management, challenges such as resource limitations and lack of standardized protocols may impede optimal care delivery. Ongoing research and collaboration with other disciplines can help refine evidence-based approaches and improve patient outcomes in this field.

### **Discussion**

Orthopedic surgeries such as joint replacements and spinal procedures are among the most frequently performed operations worldwide. While these procedures can significantly enhance the quality of life for patients with musculoskeletal issues, they are often accompanied by substantial postoperative pain. If pain is not managed adequately, it can lead to delayed recovery, reduced mobility, higher complication rates, and the possibility of developing chronic pain syndromes (Kehlet & Dahl, 1993). Historically, opioids have been the cornerstone of postoperative pain management in orthopedics. However, the overprescription and misuse of

opioids have led to a major public health crisis, marked by rising rates of addiction, overdose deaths, and escalating healthcare costs (Bernard, Chelminski, Ives, & Ranapurwala, 2018).

To address these challenges, there is increasing interest in adopting multidisciplinary approaches to pain management that bring together a variety of healthcare professionals to deliver coordinated, patient-centered care. By integrating the expertise of nurses, pharmacists, surgeons, and emergency physicians, these collaborative models strive to optimize pain control while reducing dependence on opioids (Kehlet & Dahl, 1993).

### **Role of Nursing in Acute Pain Management Post-Orthopedic Surgery**

Nurses play a pivotal role in managing acute postoperative pain and preventing progression to chronic pain through patient education, assessment, administering and monitoring analgesics, and nonpharmacological nursing interventions (Pogatzki-Zahn & Zahn, 2006).

#### **Preoperative Patient Education**

Patient education is a vital nursing responsibility covering realistic expectations about postoperative pain, pain therapies including risks and benefits of analgesics, non-drug techniques and communicating pain levels (Phillips & Currier, 2004). This empowers patients to have an active role in their pain management.

#### **Pain Assessment**

Nurses frequently assess pain levels and pain relief from interventions using pain rating scales to evaluate and adjust treatment plans (Pogatzki-Zahn & Zahn, 2006). Assessment parameters also include pain character, location, duration, aggravating/relieving factors, and effects of pain on function and quality of life.

#### **Administering and Monitoring Analgesics**

Nurses administer prescribed analgesics via oral, intravenous, neuraxial, transdermal, or peripheral nerve block routes. Opioids continue to be mainstays of acute pain management due to their efficacy but are associated with risks like respiratory depression, requiring close monitoring of sedation and respiratory status (Pogatzki-Zahn & Zahn, 2006). Non-opioid adjuncts are increasingly used to enhance analgesia and reduce opioid side effects. Nurses monitor for effective pain relief and side effects from opioids and adjuvant analgesics.

#### **Non-pharmacological Nursing Interventions**

Nurses implement non-drug nursing measures alongside analgesics for holistic care. Such interventions include patient positioning, hot/cold therapy, transcutaneous electrical nerve stimulation, relaxation, guided imagery, massage, and music therapy. Physical modalities like exercise and ambulation are initiated to aid functional recovery. Psychosocial support provides coping strategies for the stress of surgery and hospitalization (Phillips & Currier, 2004). These interventions enhance patient satisfaction with pain management.

### **Role of Pharmacy in Acute Postoperative Pain Management**

Pharmacists optimize pain management through their expertise in pharmacology of analgesics. Key responsibilities include (Skinner & Shintani, 2004):

1. Individualize pain regimens considering patient factors like comorbidities, prior opioid exposure, pharmacogenetics, renal function.

2. Recommend multimodal analgesic plans using combination opioids, non-opioids, and adjuvants that target pain through different mechanisms, improving efficacy and reducing side effects.
3. Provide education to patients and clinicians regarding analgesics, like optimal dosing, safe use, side effect prevention and monitoring.
4. Monitor efficacy through pain scores and side effects like sedation, nausea, constipation.
5. Suggest dosage adjustments and alternative analgesics based on response.
6. Manage adverse effects by recommending therapies like antiemetics, stimulant laxatives, and anticonvulsants for opioid-induced neurotoxicity.
7. Advise patients on safe storage, taper plans for opioids at discharge and disposal of unused opioids to prevent abuse, misuse and diversion.
8. Identify high-risk patients like those with chronic pain or substance abuse and coordinate care with behavioral health and addiction medicine.

Integrating pharmacy expertise into postoperative pain management teams enhances patient outcomes. Clinical pharmacist involvement in a multidisciplinary acute pain service for orthopedic surgery lowered pain scores, reduced opioid use and side effects, shortened hospital stay, and increased patient satisfaction (Skinner & Shintani, 2004).

### **Role of Surgery in Acute Postoperative Pain Management**

Orthopedic surgeons lead the presurgical planning process and perform interventions to relieve pain through surgical repair and joint replacements. Acute pain management considerations begin preoperatively (Maheshwari et al., 2009):

#### **Preoperative planning**

1. Identify patient-related risk factors for acute pain like anxiety, depression, catastrophizing, and history of chronic pain or substance abuse to plan tailored pain regimens.
2. Select anesthetic techniques like regional anesthesia to optimize intra and postoperative analgesia. Regional blocks improve pain control, reduce opioid needs and associated risks like prolonged respiratory depression, ileus, delirium in elderly patients.
3. Arrange multimodal analgesia plans integrating paracetamol, NSAIDs, and selective nerve blocks, minimizing reliance on opioids.

#### **Intraoperative targeted delivery of analgesics**

1. Infiltrate local anesthetics into surgical incision sites and tissues manipulated during surgery to block nociceptive transmission and reduce peripheral and central sensitization (Joshi & Machi, 2019).
2. Joint injections, periarticular infiltration, and nerve blocks effectively deliver local anesthetics. For knee arthroplasty, combining femoral and sciatic nerve blockade with local infiltration analgesia (LIA) improves pain relief compared to LIA alone (Andersen et al., 2008).
3. Dexamethasone may be injected intraoperatively and prolongs analgesic effects of peripheral nerve blocks.

### **Postoperative multimodal analgesia and monitoring**

1. Continue NSAIDs, paracetamol, and selective nerve blocks using patient controlled analgesia.
2. Prescribe opioids at the lowest effective doses needed for short durations under supervision.
3. Assess benefits and side effects of analgesics and make suitable adjustments.

Surgeons coordinate the perioperative analgesic plan and collaborate with anesthesia for optimal preemptive analgesia.

### **Role of Emergency Medicine in Acute Postoperative Pain Management**

While emergency medicine primarily focuses on identifying and ruling out acute medical emergencies, it also plays a significant role in managing acute postoperative pain. Patients frequently present to emergency departments with various sources of acute pain, including traumatic musculoskeletal injuries, renal colic, acute headache syndromes, sickle cell crises, and acute postoperative pain, such as that following orthopedic surgeries (Mariano, 2019).

In managing acute postoperative pain in emergency departments, several key considerations must be taken into account. Emergency physicians perform focused history-taking, examination, and diagnostic studies to rule out complications such as surgical site infections, hematomas, and thromboembolic events that require urgent treatment. It is important to assess the patient's surgical history, including the multimodal pain regimen and response to treatment. Recent opioid intake and residual peripheral nerve blockade can impact the patient's presenting symptoms (Mariano, 2019).

Assessing the severity of pain using established scales and gauging the patient's distress are essential steps. For moderate to severe acute pain, prompt administration of analgesics is necessary, titrated to achieve relief. Intravenous opioids are often the first line of treatment for severe acute pain in opioid-tolerant patients, while moderate pain or opioid-naïve patients may be initially treated with intravenous NSAIDs like ketorolac or oral opioids (Mariano, 2019).

Emergency departments also play a key role in arranging outpatient follow-up with the surgical team and prescribing short courses of oral opioids for persisting postoperative pain. Clear patient education regarding safe opioid use and tapering plans is crucial to avoid prolonged opioid use (Mariano, 2019).

While inpatient postoperative pain is primarily managed by surgery teams, patients may still present to emergency departments with acute pain crises that require assessment for complications or inadequate outpatient analgesia. Emergency physicians are skilled in providing symptom-focused pain relief, ensuring patients receive appropriate care (Mariano, 2019).

### **Multidisciplinary Teams for Postoperative Pain Management**

Postoperative pain management requires a multidisciplinary approach due to the complex, subjective, and individualized nature of pain perception. Core team members include physicians, nurses, pharmacists, and physical therapists, who work in close collaboration to create coordinated perioperative plans. They consistently assess pain levels, monitor patient responses

to therapy, and make timely adjustments as needed. Communication systems such as electronic health records facilitate seamless care and coordination (Maheshwari et al., 2009).

Each discipline plays a key role in enhancing recovery. Surgeons and anesthesiologists focus on using optimal analgesic techniques, such as nerve blocks and local anesthesia delivery. Nurses provide continuous assessment, administer and monitor analgesic therapies, and offer nonpharmacological interventions. Pharmacists recommend multimodal drug regimens, monitoring their efficacy and side effects, while physical therapists guide early mobilization and functional rehabilitation (Maheshwari et al., 2009).

Multidisciplinary rounding provides regular opportunities for the team to review patient responses, address concerns, and involve patients in their care decisions (Maheshwari et al., 2009). Patients feel supported and report greater satisfaction when multiple providers discuss pain management collaboratively.

An integrated multidisciplinary care approach along the entire surgical pathway reduces pain and opioid requirements, enhances functional outcomes, shortens hospitalization, improves cost-effectiveness, and lowers the risk of developing chronic pain compared to conventional care models (Li et al., 2019; Maheshwari et al., 2009).

While multidisciplinary teams are ideal, there are challenges in implementing them, such as coordinating multiple specialists, dealing with space constraints, and managing reimbursement limitations. Administrative support is essential for developing and sustaining these programs (Skinner & Shintani, 2004). Telehealth also allows smaller centers to connect virtually with pain specialists.

### **Conclusion**

Effective management of acute postoperative pain after orthopedic surgeries is critical for optimizing patient outcomes, promoting recovery, and preventing the development of chronic pain syndromes. The traditional approach of relying heavily on opioid analgesics has been associated with significant risks, including adverse effects, potential for misuse, and the exacerbation of the opioid epidemic.

Multidisciplinary care models that integrate the expertise of nursing, pharmacy, surgery, and emergency medicine offer a promising solution for enhancing postoperative pain control. By leveraging the unique perspectives and skills of each discipline, these collaborative approaches facilitate the development of individualized, multimodal pain management plans that prioritize patient safety and satisfaction.

Nurses play a crucial role in patient education, pain assessment, administering and monitoring analgesics, and implementing non-pharmacological interventions. Pharmacists optimize pain regimens through their expertise in pharmacology, recommending multimodal analgesic plans, monitoring efficacy and side effects, and providing education on safe medication use. Surgeons lead the preoperative planning process, perform surgical interventions, and coordinate perioperative analgesic strategies. Emergency physicians contribute by ruling out postoperative complications, providing prompt and effective pain relief, arranging follow-up care, and educating patients on safe opioid use and tapering plans.

Successful implementation of multidisciplinary pain management requires effective communication, shared decision-making, and a commitment to evidence-based practices. While challenges exist, such as coordinating multiple specialists and managing reimbursement limitations, the potential benefits of improved pain control, reduced opioid dependence, and enhanced functional recovery make multidisciplinary care models a valuable investment for healthcare systems.

As the healthcare community continues to address the opioid epidemic and strive for better surgical outcomes, multidisciplinary pain management represents an important strategy deserving further research and widespread adoption. By fostering collaboration among healthcare professionals and prioritizing patient-centered care, these integrated approaches can transform the landscape of postoperative pain management, improving the quality of life for countless individuals undergoing orthopedic surgeries.

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