

# Systematic Review of Peripheral Nerve Blocks for Postoperative Pain Management

## Background

Approximately 14.6 million elective surgeries were performed in the United States in 2017.<sup>1</sup> Although the COVID-19 pandemic led to a reduction in surgeries, surgical volume is returning to pre-pandemic levels.<sup>2</sup> Postoperative pain is a major concern for most surgical patients and their providers.<sup>3</sup> Eighty percent of patients undergoing surgery experience postoperative pain and fewer than half of these patients report optimal pain relief.<sup>4</sup> Inadequate postoperative pain management is associated with increased morbidity and delayed recovery, ultimately impacting long-term quality of life.<sup>3,5</sup> Conversely, optimal postoperative pain management can improve patient outcomes, reduce psychological distress, and facilitate recovery.<sup>3,4,6</sup> Poorly treated postoperative pain is also associated with long-term opioid use and dependence.<sup>7-9</sup>

Multimodal analgesic strategies to manage postoperative pain exist. Strategies may include opioid or non-opioid analgesics (e.g., NSAIDs, acetaminophen), regional anesthesia (e.g., peripheral nerve and neuraxial blocks, local infiltration), and non-pharmacologic interventions (e.g., music, acupuncture, TENS). However, opioids remain the mainstay in postoperative pain management, especially in the US. In a study of 14 hospitals from eight countries, 91% of US patients were prescribed opioids postoperatively compared to 5% of non-US. patients.<sup>10</sup> A strong body of evidence has highlighted the increased risk for postoperative morbidity and mortality from opioid-related adverse events<sup>10,11</sup> and for postoperative long-term opioid use.<sup>7</sup> Thus, multiple national organizations have called on diverse communities of stakeholders to develop and implement guidelines and strategies to reduce opioid use while also ensuring adequate pain management in the perioperative setting.<sup>4,11,12</sup>

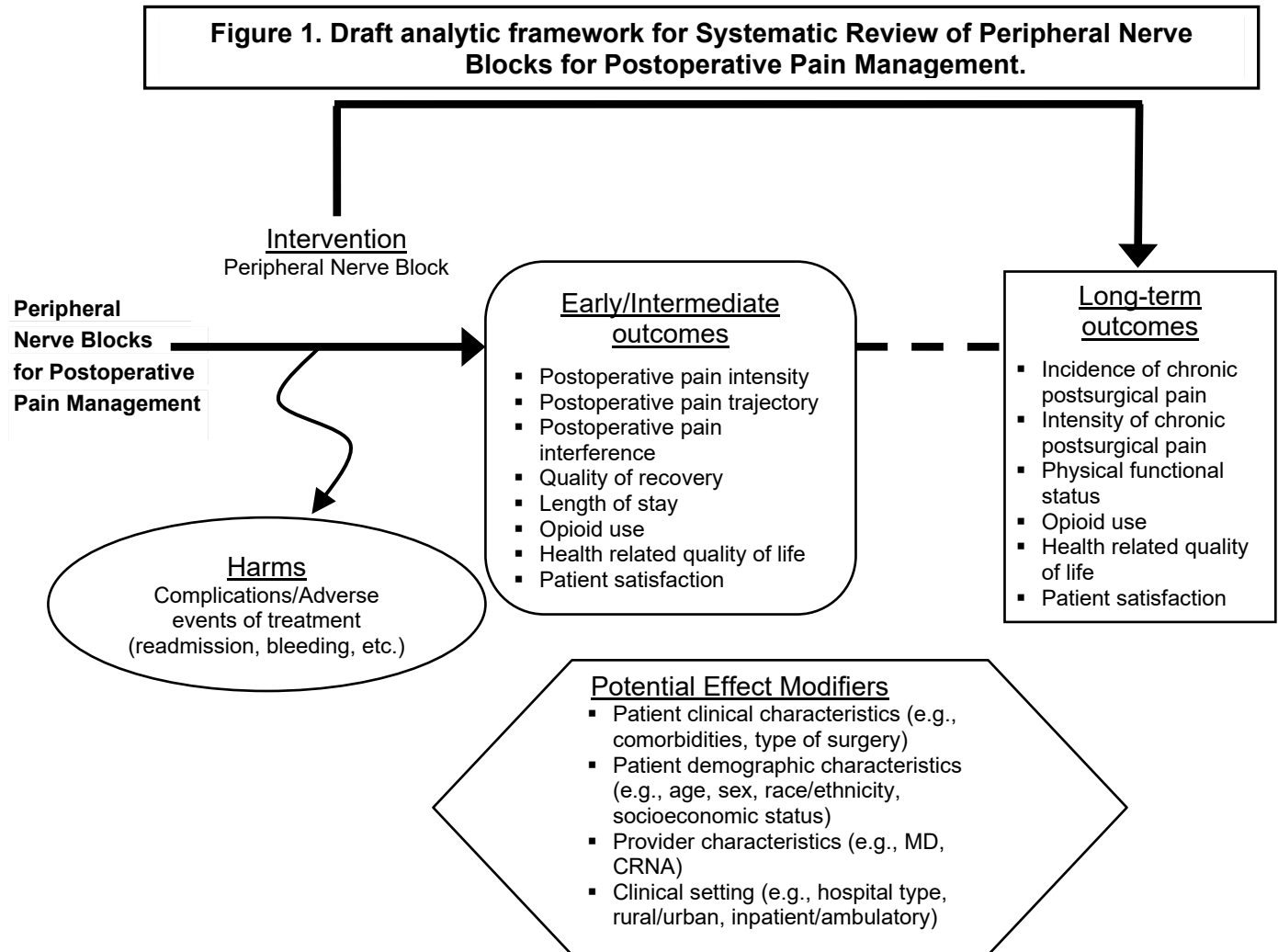
Peripheral nerve blocks are a type of regional anesthesia in which anesthetic is injected near a specific nerve or bundle of nerves to block pain. Peripheral nerve blocks can be administered pre-, intra- and/or postoperatively (i.e., perioperative setting) to manage postoperative pain. These interventions have the potential to reduce perioperative opioid use and its associated adverse effects; however, providers require specialized training to administer them.<sup>13-16</sup> While multiple guidelines include moderate to strong recommendations for how to incorporate non-opioid analgesics in perioperative multimodal analgesia,<sup>11,17-20</sup> there are no comparable, recent clinical guidelines around peripheral nerve blocks, except in orthopedic surgery.<sup>21-23</sup> Older guidelines from the American Society of Anesthesiologists (2012)<sup>24</sup> and the American Pain Society (2016)<sup>20</sup> referenced peripheral nerve blocks; however, updated, evidence-based guidance could lead to wider training and implementation initiatives for this anesthetic technique in perioperative multimodal analgesia.

## **Draft Key Questions**

Question 1: In surgical patients, what are the effectiveness, comparative effectiveness, and harms of peripheral nerve blocks for managing postoperative pain and its sequelae — including opioid use?

Sub-Question 1.a How do findings vary by patient clinical (e.g., comorbid conditions, type of surgery) or demographic characteristics (e.g., age, sex, race/ethnicity, socioeconomic status), provider characteristics (e.g., MD, CRNA), or setting (e.g., teaching hospital, rural/urban, inpatient/ambulatory)?

## Draft Analytic Framework



## PICOTS

### Population(s)

- All patients (adults, children, and infants) undergoing the following open, elective surgeries:
  - Intrathoracic
  - Extrathoracic (e.g., breast)
  - Abdominal/pelvic/retroperitoneal

### Interventions

- Peripheral nerve block either alone or as part of multimodal analgesia for postoperative pain management

## Comparators

- Placebo or sham; usual care; multimodal analgesia without peripheral nerve block; other peripheral nerve block administration (e.g., different location, medication, technique); other local or regional anesthesia

## Outcomes

- Early/Intermediate outcomes
  1. Postoperative pain intensity
  2. Postoperative pain trajectory
  3. Postoperative pain interference
  4. Quality of recovery
  5. Hospital length of stay (inpatient)
  6. Opioid use
  7. Health related quality of life
  8. Patient satisfaction
- Long-term outcomes
  1. Incidence of chronic postsurgical pain
  2. Intensity of chronic postsurgical pain
  3. Physical functional status
  4. Opioid use
  5. Health related quality of life
  6. Patient satisfaction
- Harms
  1. Complications and/or adverse events of treatment (readmission, bleeding, etc.)

## Timing

- Post-operative period less than 3 months
- Post-operative period 3-12 months

## Settings

- Perioperative and all follow-up settings

## Study Design

- Randomized controlled trials, non-randomized, observational, and non-controlled study designs

## **Definition of Terms**

Peripheral nerve block: a type of regional anesthesia in which anesthetic is injected near a specific nerve or bundle of nerves to block pain

NSAIDs: Non-steroidal anti-inflammatory drugs

TENS: Transcutaneous electrical nerve stimulation

MD: Medical doctor

CRNA: Certified Registered Nurse Anesthetist

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