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## Optimizing pain management to facilitate Enhanced Recovery After Surgery pathways.

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### Abstract

**PURPOSE:** The optimal management of postoperative pain using multimodal analgesia is a key component of Enhanced Recovery After Surgery (ERAS). Pain has adverse clinical implications on postoperative recovery, including prolonging the time to recovery milestones and length of hospital stay. Moreover, the ubiquity of opioids in postoperative analgesic regimens results in adverse effects, such as sedation, postoperative nausea and vomiting, urinary retention, ileus, and respiratory depression, which can delay discharge. Thus, multimodal analgesia, i.e., the use of more than one analgesic modality to achieve effective pain control while reducing opioid-related side effects, has become the cornerstone of enhanced recovery. The purpose of this review is to address the analgesic techniques used as part of multimodal analgesic regimens to optimize postoperative pain control and to summarize the evidence for their use in reducing opioid requirements and side effects.

**PRINCIPAL FINDINGS:** There is a wide variety of analgesic techniques available for multimodal postoperative analgesia. These modalities are divided into pharmacological and non-pharmacological techniques. Systemic pharmacological modalities involve opioids and non-opioids such as acetaminophen, non-steroidal anti-inflammatory drugs, N-methyl-D-aspartate receptor antagonists, anticonvulsants (e.g., gamma-aminobutyric acid analogues), beta-blockers, alpha-2 agonists, transient receptor potential vanilloid receptor agonists (capsaicin), and glucocorticoids. Other pharmacological modalities include central neuraxial techniques, surgical-site infiltration, and regional anesthesia. Evidence supports the use of these pharmacological techniques as part of multimodal analgesia, but each has its own advantages and specific safety profile, which highlights the importance of selecting the appropriate analgesics for each patient. Adjunctive non-pharmacological techniques include acupuncture, music therapy, transcutaneous electrical nerve stimulation, and

hypnosis. There is mixed evidence regarding such techniques, although a lack of harm is associated with their use.

**CONCLUSION:** There are continuing advancements in multimodal analgesic techniques; however, postoperative pain in general continues to be undermanaged. Furthermore, a continuing challenge in multimodal pain research related to ERAS is the difficulty in carrying out randomized trials to determine the relative importance of any one component, including analgesia.

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