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Postoperative Multimodal Analgesia Pain Management With Nonopioid Analgesics and Techniques
A Review

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IMPORTANCE Amid the current opioid epidemic in the United States, the enhanced recovery after surgery pathway (ERAS) has emerged as one of the best strategies to improve the value and quality of surgical care and has been increasingly adopted for a broad range of complex surgical procedures. The goal of this article was to outline important components of opioid-sparing analgesic regimens.

OBSERVATIONS Regional analgesia, acetaminophen, nonsteroidal anti-inflammatory agents, gabapentinoids, tramadol, lidocaine, and/or the *N*-methyl-D-aspartate class of glutamate receptor antagonists have been shown to be effective adjuncts to narcotic analgesia. Nonsteroidal anti-inflammatory agents are not associated with an increase in postoperative bleeding. A meta-analysis of 27 randomized clinical trials found no difference in postoperative bleeding between the groups taking ketorolac tromethamine (33 of 1304 patients [2.5%]) and the control groups (21 of 1010 [2.1%]) (odds ratio [OR], 1.1; 95% CI, 0.61-2.06; *P* = .72). After adoption of the multimodal analgesia approach for a colorectal ERAS pathway, most patients used less opioids while in the hospital and many did not need opioids after hospital discharge, although approximately 50% of patients received some opioid during their stay.

CONCLUSIONS AND RELEVANCE Multimodal analgesia is readily available and the evidence is strong to support its efficacy. Surgeons should use this effective approach for patients both using and not using the ERAS pathway to reduce opioid consumption.

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The enhanced recovery after surgery (ERAS) pathway, when effectively implemented, has emerged as one of the best strategies to improve the value and quality of surgical care, having been adopted for a broad range of complex surgical procedures. An essential component of most ERAS pathways is multimodal pain management. Poorly controlled postoperative pain may result in adverse events that may prolong the patient's hospital stay, delay patient recovery, and affect the patient's experience with the health care system. Most opioids traditionally have been prescribed by nonperioperative physicians; however, for many years, perioperative providers (ie, surgeons and anesthesiologists) have ordered liberal amounts of opioids, both intravenous and oral, to achieve optimal pain control for their patients. Although multimodal, opioid-sparing analgesia has been promoted for more than 20 years, only recently with the increasing adoption of ERAS pathways has it begun to have broad uptake. Unlike traditional perioperative care, ERAS pathways typically use a standardized multimodal analgesic regimen with nonopioid agents or techniques to minimize the use of perioperative opioid and to decrease opioid-related adverse effects (eg, nausea, vomiting, sedation, ileus, pruritus, and respiratory depression) with the goal of improving and expediting patients' recovery after surgery. The minimization of opioids is especially important in the context of the opioid epidemic, one of the most pressing public health crises in the United States today, and should become the standard care for all surgical patients—not only those on ERAS pathways. The goal of this article was to outline important components of opioid-sparing analgesic regimens.

Opioid Epidemic

During the 1990s, there was liberalization of the use of opioids for the treatment of noncancer pain. A combination of decreased restrictions on state laws for prescribing opioids, introduction of pain management standards by regulatory agencies such as The Joint Commission,[1] greater awareness of the need to assess and treat pain ("pain as the fifth vital sign"),[2] and aggressive marketing by pharmaceutical companies all contributed to the increased use of opioids for noncancer pain.[3] In the United States, sales of oxycodone hydrochloride and methadone hydrochloride nearly quadrupled between 1997 and 2002, and unintentional drug overdose has become the second leading cause of accidental death.[4] Studies have indicated a strong association between states with the highest drug-poisoning mortality and states with the highest opioid consumption.[4]

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Table 1. Analgesic Options Under ERAS Pathway for Patients Undergoing Abdominopelvic Operation

Analgesic Agent and Technique	Advantages	Disadvantages
Systemic opioid	No analgesic ceiling	Nausea; vomiting; pruritus; reduced GI tract function; sedation; respiratory depression; immunosuppression; urinary retention
Neuraxial opioid	Less overall opioid use	Nausea; vomiting; pruritus; respiratory depression; urinary retention; technique failure; backache; PDPH; infection; hematoma
Neuraxial local anesthetic	Less pain; return of GI tract function; attenuates immunosuppression; reduced pulmonary/cardiac morbidity	Technique failure, hypotension, reduced sensory/motor function, urinary retention; LA toxicity, backache, PDPH, infection, hematoma
Peripheral regional: TAP	Less pain; opioid-sparing effect; nonopioid analgesia	Technique failure; LA toxicity; perforation of peritoneum
Peripheral regional: paravertebral	Less pain; opioid-sparing effect; nonopioid analgesia	Technique failure; hypotension; vascular/pleural puncture; pneumothorax
Wound infiltration (LA)	Fast and simple; minimal risk	Duration of analgesia limited to duration of LA action
Intravenous lidocaine	Less pain; return of GI tract function; reduced LOS for open procedures	Uncertain optimal dosage regimen
NSAID	Less pain; opioid-sparing effect; nonopioid analgesia	Platelet dysfunction; GI tract irritation; renal dysfunction; anastomotic leakage
Acetaminophen	Less pain; opioid-sparing effect; nonopioid analgesia	Liver toxic effects
Gabapentinoid	Less pain; opioid-sparing effect; nonopioid analgesia	Dizziness; sedation; peripheral edema; renal excretion
Glucocorticoid	Less pain; reduced length of recovery room stay	High serum glucose levels
α2-Adrenergic receptor agonist	Less pain; opioid-sparing effect; nonopioid analgesia	Hypotension; bradycardia
NMDA	Less pain; opioid-sparing effect; nonopioid analgesia	Uncertain optimal dosage regimen
Tramadol	Opioid-sparing effect; minimal opioid analgesia	Seizures; possible serotonin syndrome with SSRI

Abbreviations: ERAS, enhanced recovery after surgery; GI, gastrointestinal; LA, local anesthetic; LOS, length of stay; NMDA, *N*-methyl-D-aspartate; NSAID, nonsteroidal anti-inflammatory agent; PDPH, postdural puncture headache; SSRI, selective serotonin reuptake inhibitor; TAP, transversus abdominis plane.

Statistics for the current opioid epidemic in the United States alone are startling. Opioids contribute to 1 death approximately every 35 minutes.[3] The US population accounts for approximately 5% of the world's population, but opioid users in this country consume 99% of the world's supply of hydrocodone bitartrate and 83% of the world's supply of oxycodone.[3] In fact, the sale and distribution of opioids increased to 710 mg of morphine sulfate equivalents per person in 2010; this amount is equivalent to supplying every adult in the country with 5 mg of hydrocodone every 6 hours for 45 days.[3] The increased prescription drug abuse in the past decades has been linked to the prevalence of fatal drug overdoses and growth in heroin use in urban and rural areas.[4]

Analgesic Principles

A standardized, multimodal analgesic regimen is an essential and central component of all ERAS pathways but is also important in the context of the current opioid epidemic. Multimodal analgesia is based on the premise that the concurrent use of primarily nonopioid analgesics can have additive, if not synergistic, effects that produce superior analgesia while decreasing opioid use and opioid-related side effects. Minimization of opioid use and side effects is a key component of almost any standardized analgesic ERAS pathway, with the multimodal regimen consisting mostly of nonopioid analgesics and techniques. A multimodal analgesic regimen can be designed such that the physiologic and pharmacologic benefits are maximized and the adverse effects are minimized to facilitate the patient's recovery and return to baseline function (**Table 1**). We review the common nonopioid analgesics and techniques that are used in a typical ERAS pathways and are effective pain management strategies for most surgical patients.

Regional Analgesic Techniques

Regional analgesic techniques (**Table 2**) generally are classified as neuraxial (eg, epidural analgesia, spinal morphine) or peripheral (eg, transversus abdominis plane [TAP], paravertebral, brachial plexus or sciatic/femoral nerve blocks, or wound infiltration) blocks or catheters. These techniques can be administered as a single shot (eg, single dose of intrathecal morphine) or a continuous catheter (eg, epidural analgesia). The primary agents injected are local anesthetic or opioids, although other adjuvants (eg, clonidine hydrochloride) may be added. Many of these blocks are performed prior to surgical incision (eg, spinal morphine, epidural catheter placement, paravertebral, or brachial plexus or sciatic/femoral nerve blocks), although some may be administered after surgery (eg, TAP blocks, wound infiltration). The advantages of performing the regional anesthetic or analgesic technique prior to surgery are that there may be less intraoperative opioid use and lower pain scores in the immediate postoperative period in part by attenuating the process of nociception and sensitization.

Continuous Epidural Analgesia

Epidural analgesia may confer significant benefits because it (rather than opioids) has been shown to provide superior postoperative analgesia, decrease perioperative pulmonary-cardiac mor-

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Table 2. Common Regional Analgesic Techniques

Techniques	Advantages	Disadvantages
Neuraxial		
Epidural	Less pain (vs systemic opioids); reduced cardiac/pulmonary morbidity; earlier return of GI tract function; catheter use can continue into the postoperative period	Epidural LA: hypotension; sensory deficits; motor weakness; urinary retention
		Epidural opioids: nausea; vomiting; pruritus; respiratory depression
		Technique related: backache; PDPH (spinal); neurologic injury; epidural hematoma
Spinal/intrathecal	Less pain; reduced systemic opioid requirements	Nausea; vomiting; pruritus; respiratory depression
Peripheral		
TAP block	Less pain; reduced systemic opioid requirements in the immediate postoperative period; typically performed under ultrasonographic guidance	Visceral pain; LA toxicity; perforation of the peritoneum with possible damage to visceral structures
Paravertebral block	Less pain; reduced systemic opioid requirements; lower risk of pulmonary complications for patients undergoing thoracotomy; catheter use can continue into the postoperative period; comparable levels of analgesia as epidural analgesia; less hypotension	Possible hypotension; vascular or pleural puncture; possible pneumothorax
Brachial plexus, sciatic/femoral nerve block	Less pain (vs systemic opioids); reduced systemic opioid requirements; catheter use can continue into the postoperative period	Not useful for abdominal or thoracic surgery; LA toxicity
Wound infiltration	Less pain and morphine consumption within the first few hours after surgery; easily administered by the surgeon	Uncertain long-term (≥24 h) analgesic efficacy

Abbreviations: GI, gastrointestinal; LA, local anesthetic; PDPH, postdural puncture headache; TAP, transversus abdominis plane.

bidity, and facilitate earlier return of gastrointestinal tract function.[5-7] These benefits are best seen in open surgical cases and in patients with decreased physiologic reserves. The overall benefits of epidural analgesia in patients undergoing laparoscopic surgical procedures are uncertain.[8,9] Local anesthetics (eg, bupivacaine hydrochloride, ropivacaine hydrochloride) are probably the most common agents used in epidural analgesia. Although an opioid (eg, fentanyl citrate, hydromorphone hydrochloride) is commonly added to the local anesthetic, the clinician should consider using only a local anesthetic-based regimen because lipophilic epidural opioids, such as fentanyl or sufentanil citrate, may be absorbed systematically and theoretically contribute to decreased gastrointestinal tract function.

Adverse effects from an epidural are generally the result of the analgesic agents administered through the catheter. For epidural local anesthetics, hypotension, sensory deficits, motor weakness, and urinary retention may be present. For epidural opioids, adverse effects include nausea, vomiting, pruritus, or respiratory depression. Technique-related issues, such as epidural catheter backache, postdural puncture (spinal) headache, neurologic injury, and epidural hematoma, may be possible. The administration of anticoagulants, especially low-molecular-weight heparin sodium, heparin infusions, and oral anticoagulants (eg, warfarin sodium, novel oral anticoagulation compounds), and newer antiplatelet agents (eg, clopidogrel bisulfate) in the presence of epidural analgesia should be performed with caution because the risk of epidural hematoma may be increased. In general, traditional unfractionated heparin dosing (eg, 5000 IU twice a day or 3 times a day), compared with dosing of other anticoagulants, may be associated with a lower risk of epidural hematoma, and guidelines for the concurrent use of anticoagulants and neuraxial anesthesia or analgesia have been established.[10]

Single-Dose Neuraxial Opioids

Opioids used for neuraxial (epidural or spinal) analgesia include lipophilic opioids (eg, fentanyl, sufentanil), which have a faster onset but shorter duration of action, as well as hydrophilic opioids (eg, morphine, hydromorphone), which have a slower onset but longer duration of action. For a single-shot spinal injection prior to surgery, morphine sulfate (0.1-0.5 mg) is typically used and provides analgesia for 6 to 24 hours after injection. This is associated with significantly lower pain and reduced systemic opioid requirements.[11] Like the adverse effects of drugs administered by other routes, the adverse effects of neuraxial opioids include nausea, vomiting, pruritus, and respiratory depression. The incidence of respiratory depression with single-dose neuraxial opioids appeared to be much higher when first used several decades ago but seems to have decreased as anesthesiologists have used much lower doses. Guidelines for monitoring the use of neuraxial opioids have been published.[12]

TAP Blocks or Catheters

TAP blocks or catheters may be a valuable regional technique for surgical cases for which epidural analgesia may not be needed (eg, laparoscopic procedures) or neuraxial techniques have not been used. The TAP block is designed to anesthetize the nerves innervating the anterior abdominal wall (T6 to L1) and involves injection of local anesthetic into the plane between the internal oblique and transversus abdominis muscles. Several meta-analyses suggest that the use of TAP blocks or catheters (generally placed under ultrasonographic guidance) provides superior analgesia and decreases postoperative opioid consumption in the immediate postoperative period.[13,14] TAP blocks do not cover visceral pain, and the adverse effects and complications may (rarely) include local anesthetic toxicity and perforation of the perito-

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neum with possible damage to visceral structures, although ultrasonographic guidance may mitigate this complication.

Paravertebral Blocks and Catheters

Paravertebral blocks and catheters may be useful for patients undergoing major abdominal or thoracic surgery, with most of the literature focused on patients undergoing breast or thoracic surgery. Paravertebral blocks and catheters are typically inserted by an anesthesiologist under ultrasonographic guidance, but insertion by the surgeon under direct vision can be performed in open thoracic procedures. Use of paravertebral blocks is associated with a lower risk of pulmonary complications in patients undergoing thoracotomy.[15] Paravertebral blocks and catheters provide comparable levels of analgesia as epidural analgesia and are generally associated with less hypotension. Another benefit of paravertebral analgesia is that the concurrent use of anticoagulation appears to be less of a concern than with epidural analgesia. Complications of paravertebral blocks include hypotension (which is less than with epidural analgesia), vascular or pleural puncture, and pneumothorax.[16]

Wound and Peritoneal Infiltration and Catheters

Wound infiltration can be performed either as a single injection of local anesthetic (typically at the conclusion of surgery) or as a continuous infusion of local anesthetic through a catheter at the incision site placed by the surgeon prior to skin closure. Incisional-site infiltration of local anesthetic at the end of surgery has been associated with a decrease in morphine consumption, a need for opioid rescue, and significantly lower pain scores within the first hour, although there does not appear to be analgesic benefit at 24 hours.[17] Despite the widespread use of elasometric pumps infusing local anesthetics through wound catheters, the analgesic efficacy of these wound catheters for postoperative pain is uncertain given that the most recent meta-analysis indicated wound catheters provided no significant analgesia at rest or on activity (except for those undergoing gynecological and obstetric surgery).[18]

Nonsteroidal Anti-inflammatory Agents

Nonsteroidal anti-inflammatory agents (NSAIDs) are potent analgesics (600 mg of ibuprofen is as efficacious as 15 mg of oxycodone hydrochloride) and act through inhibition of cyclooxygenase and prostaglandin synthesis.[19] Nonsteroidal anti-inflammatory agents are most commonly administered through the intravenous or oral route and should be administered on a scheduled rather than on an as-needed basis. When added to opioids, NSAIDs (including cyclooxygenase 2 inhibitors) produce superior analgesia and an opioid-sparing effect that is associated with a decrease in some opioid-related adverse events, such as postoperative nausea or vomiting and sedation.[20,21] Nonsteroidal anti-inflammatory agents do have an analgesic ceiling and may be associated with platelet dysfunction, gastrointestinal tract irritation or bleeding, and renal dysfunction. With regard to NSAIDs and renal function in the perioperative period, a Cochrane review examining 23 trials (comprising 1459 patients) noted that NSAIDs caused a clinically unimportant transient reduction in renal function in the early postoperative period in patients with normal preoperative renal function and should not be withheld from adults with normal preoperative renal function because of concerns about postoperative renal impairment.[22] However, NSAIDs are not associated with an increase in postoperative bleeding.[23,24] A meta-analysis of 27 randomized clinical trials (comprising 2314 patients undergoing a variety of surgical procedures) found no difference in postoperative bleeding between the group taking ketorolac tromethamine (33 of 1304 patients [2.5%]) and the control group (21 of 1010 [2.1%]) (odds ratio [OR], 1.1; 95% CI, 0.61-2.06; $P = .72$).[25] A postmarketing study of 10 272 doses of parenteral ketorolac therapy were compared with 10 247 doses of a parenteral opiate. The multivariate adjusted OR noted no increase in gastrointestinal tract bleeding (OR, 1.30; 95% CI, 1.11-1.52) or operative-site bleeding (OR, 1.02; 95% CI, 0.95-1.10) when comparing ketorolac with opiates; however, there were increased odds for both gastrointestinal tract bleeding (OR, 1.66; 95% CI, 1.23-2.25) and operative-site bleeding (OR, 1.12; 95% CI, 0.94-1.35) for study participants 75 years or older.[24] Some data suggest an association between NSAID use and an increase in anastomotic leakage; however, further studies are needed to determine the validity of this association.[16]

Acetaminophen

Like NSAIDs, acetaminophen (given either intravenously or orally) should be administered on a scheduled rather than on an as-needed basis. When added to opioids, acetaminophen produces superior analgesia and an opioid-sparing effect associated with a decrease in some opioid-related adverse events, such as postoperative nausea or vomiting and sedation.[25] Acetaminophen should be concurrently administered with NSAIDs on a scheduled basis (assuming no contraindications) because the administration of both agents will result in an additive, if not synergistic analgesic, effect. The maximum dosage of acetaminophen for a normal-sized adult is commonly quoted at 4 g/d, although the manufacturer of Tylenol in the United States has dropped the maximum daily dose to 3 g/d (see https://www.tylenol.com/safety-dosing/usage/dosage-for-adults). Acetaminophen is hepatically cleared and thus should be avoided for patients with liver insufficiency.

Gabapentanoids

Gabapentanoids (gabapentin and pregabalin) were originally designed as anticonvulsants but have been used for the treatment of chronic neuropathic pain. Meta-analyses indicate that a single dose of gabapentin or pregabalin administered preoperatively is associated with a decrease in postoperative pain and opioid consumption at 24 hours but an increase in postoperative sedation, dizziness, and visual disturbances.[26,27] Gabapentin and pregabalin are commonly administered during the postoperative period for many ERAS pathways, although the optimal dosing regimen and duration of administration is unclear.[27] Gabapentanoids are associated with several adverse effects, including sedation, dizziness, and peripheral edema. As such, in elderly patients, these agents should be used with caution or the dose should be decreased. Gabapentanoids are renally excreted; thus, the dose should be decreased in patients with renal dysfunction.

Lidocaine

Lidocaine hydrochloride is an integral part of many ERAS pathways and may be administered either as an intravenous infusion or a transdermal patch. Longer-acting local anesthetics, such as bupivacaine or ropivacaine, are not administered as an intravenous infusion because of local anesthetic toxicity concerns, including cardiac arrest

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and death. Intravenous lidocaine in the perioperative period results in less postoperative pain and opioid consumption, earlier return of gastrointestinal tract function, and reduced hospital length of stay following open procedures.[28] Whether intravenous lidocaine is more effective than epidural analgesia for open procedures is unclear. The optimal use of postoperative intravenous lidocaine on surgical wards is uncertain because the data are insufficient to determine efficacy between intraoperative and postoperative use, and not all institutions will allow the use of intravenous lidocaine on unmonitored floors. Lidocaine may be delivered through a transdermal patch, although the analgesic efficacy for postoperative pain is uncertain.[29] Lidocaine patches are generally well tolerated and, compared with other opioid and nonopioid analgesics, have a very favorable (low-risk) adverse effect profile. In some patients, transdermal lidocaine may provide analgesia and should be considered as part of any multimodal analgesic regimen.

Tramadol

Tramadol hydrochloride produces analgesia via dual opioid (very weak mu-opioid receptor activation) and nonopioid (inhibits serotonin and norepinephrine reuptake) mechanisms of actions. Tramadol is metabolized by cytochrome CYP2D6 to an active metabolite, and elimination is primarily by the hepatic route with some renal excretion. Although less potent as analgesics than opioids or NSAIDs, tramadol produces analgesia with a relatively lower risk of addiction, less constipation, minimal cardiovascular adverse effects, and minimal respiratory depression.[30,31] However, tramadol use is associated with a slightly higher incidence of seizures and should be used with caution in patients with a history of seizures. In addition, tramadol should be used cautiously in patients taking concurrent selective serotonin reuptake inhibitors because there may be a theoretical increased possibility of serotonin syndrome.[32]

N-Methyl-D-Aspartate Antagonists

The *N*-methyl-D-aspartate (NMDA) class of glutamate receptor are involved with nociceptive processing and development of chronic pain. The inhibition of NMDA receptors during the perioperative period is desirable because these agents provide a nonopioid mechanism of analgesia. Clinically available NMDA antagonists include ketamine hydrochloride, magnesium sulfate, dextromethorphan hydrobromide (found in cough syrup), and methadone. Ketamine traditionally has been used intraoperatively by anesthesiologists as an anesthetic; however, it can be given postoperatively in subanesthetic doses as an infusion and has been shown to decrease intravenous patient-controlled analgesia morphine use, postoperative nausea, and postoperative vomiting.[33] Magnesium also can be administered in the perioperative period as an infusion, and pooled data from studies indicate that perioperative magnesium infusion is associated with a decrease in postoperative pain and opioid consumption without clinical toxic effects caused by toxic serum levels of magnesium.[13,34] A recent meta-analysis indicated that the perioperative use of dextromethorphan was associated with a reduction of postoperative opioid consumption at 24 to 48 hours and pain scores at 1, 4 to 6, and 24 hours.[35] Methadone should not be routinely used postoperatively and typically should be used only in consultation with a pain specialist.

Opioid Analgesics

Although for decades opioids have been a mainstay for postoperative pain management, they have many adverse effects, including nausea, vomiting, sedation, gastrointestinal ileus, immunosuppression, and respiratory depression, that may delay patient recovery. Thus, most ERAS pathways target a decrease in the perioperative use of opioids. Ideally, opioids in ERAS pathways would not be prescribed on a scheduled basis but rather administered on an as-needed basis as a rescue analgesic when other nonopioid analgesics fail. One major exception to this rule is that opioids should be administered on a scheduled basis in opioid-tolerant patients to prevent opioid withdrawal. Minimizing opioid use via a multimodal analgesic approach in an ERAS pathway is ideal, but it is difficult to achieve a completely opioid-free hospital stay. The overall use of opioids in ERAS pathways appears to be significantly decreased; anecdotally, many patients are discharged with minimal opioid requirements.

Creating a Multimodal Analgesic Pathway

Just as no 2 ERAS pathways are completely identical, no specific way exists to create a multimodal analgesic protocol for any given ERAS pathway. The key point to remember is that the concept of multimodal analgesia is based on the concurrent use of primarily nonopioid analgesics and techniques to minimize opioid use and opioid-related adverse effects. The typical multimodal analgesic regimen starts in the preoperative period, when the patient typically receives a combination of an acetaminophen, an NSAID (cyclooxygenase 2 inhibitors have a minimal effect on platelet function), and a gabapentanoid, assuming there are no medical contraindications to any of these medications. Intraoperative use of regional anesthesia or analgesic techniques (Table 2) and an opioid-sparing anesthetic is preferable. For the postoperative period, continuation of the regional analgesic technique (with a local anesthetic–based solution) is preferable particularly when the patient has a nothing-by-mouth order. Continuation of the multimodal analgesic regimen of an acetaminophen, an NSAID, and a gabapentanoid (again, assuming no medical contraindications) administered on a regularly scheduled basis is ideal. For breakthrough pain, tramadol followed by opioids can be given to complete the multimodal analgesic pathway. We have used this approach in colorectal surgery, liver resection, cystectomy, and gynecological oncology. In colorectal surgery, liver resection, and cystectomy, we observed a 1- to 2-day reduction in length of stay, cost savings, and improvement in the patient experience as well as a decrease in complications. In liver resection, we specifically compared pain scores before and after implementation and noted an improvement with the multimodal analgesia approach.

ERAS and Opioid Use

In the United States alone, there were 289 million prescriptions for opioids in 2012 that accounted for approximately 7% of all prescriptions for that year.[36] Although primary care specialties account for approximately half of all opioid prescriptions, the rate of opioid prescribing was highest for specialists, including surgeons (36.5%).

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Surgeons contribute to the opioid epidemic by prescribing more doses of opioids than needed or prescribing more potent opioids when other nonopioid analgesics (eg, NSAID, acetaminophen, or tramadol) may be able to control postoperative pain.[37] Excessive or leftover opioids may be diverted or used by other members of the patient's family, including children; given away; or sold.[37] The source of nonmedical (free, bought, or stolen) pain relievers was a friend or relative in approximately 75% of cases.[3] One possible reason opioids have become so attractive to prescribe is that health care providers may view them as a single versatile analgesic agent and thereby avoid polypharmacy; however, the current opioid epidemic and presence of opioid-related side effects, which may impede patient recovery, make clear that opioids may not be the effective analgesic providers once thought; there have been several state and national initiatives to monitor opioid use and prescriptions. The trends are shifting toward multimodal analgesics with primarily nonopioid analgesics. The presence of a dedicated pain service may not only facilitate the development of a multimodal analgesic regimen for ERAS pathways but also assist in postdischarge management of analgesics.

Multimodal analgesia with nonopioid analgesics will most likely result in less opioid use in the hospital and postdischarge period, although extensive published data for this hypothesis is lacking. Several observational studies comparing pre-ERAS with post-ERAS opioid consumption consistently note a significant decrease in primary inpatient opioid consumption with implementation of an ERAS pathway in a variety of surgical procedures.[38-41] Whether these inpatient decreases translate into less postdischarge opioid consumption or even lower rates of addiction is unknown at this time. In our experience adopting this approach for our colorectal ERAS pathway, most patients used less opioids while in the hospital and many did not need opioids after hospital discharge, although approximately 50% of patients received some opioid during their stay (although at lower amounts compared with the pre-ERAS number).

With use of pathways like ERAS, surgeons can play an important role in stemming the flow of opioids, which has contributed to the current opioid epidemic in the United States. Other ways in which surgeons may address the opioid epidemic include participating in the safe disposal of unwanted prescription opioids (typically through medicine take-back programs), helping to educate the public about opioids (including adverse effects, safe storage, and appropriate disposal), participating in clinician education on opioids (including inappropriate prescribing and inadequate counseling or monitoring), and promoting the use of alternative and complementary medicine rather than opioids for pain control.

Just as opioid prescribing is more complex than was first appreciated by most frontline clinicians, multimodal analgesia can result in unanticipated consequences resulting from drug-drug interactions and adverse effects. Therefore, clinicians should consider continuing medical education training in this area as well as collaborative care with hospital and outpatient pharmacists and pain management experts.

Conclusions

Opioids have been a cornerstone of postoperative analgesia for many years; however, they are associated with many adverse effects that may prevent patient recovery after surgery. The excessive use of opioids in the medical profession over the past 2 decades has contributed to the current opioid epidemic in the United States. Surgeons can use many strategies to combat this epidemic, including using ERAS pathways, which typically incorporate a standardized, multimodal analgesic regimen with nonopioid agents and techniques to control pain after surgery. The use of a multimodal nonopioid regimen will minimize perioperative opioid use and may lead to reduced opioid use in the hospital and postdischarge period.

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