Treating Acute Pain in the Hospitalized Patient

Abstract: Many hospitalized patients report moderate-to-severe pain despite the use of epidural or patient-controlled analgesia. This article will explore the use of multimodal options for analgesia in hospitalized patients and focus on a difficult-to-treat acute pain condition, abdominal pain.

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Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” Acute pain is defined as pain that lasts for a short period of time, alerts the body that it has been injured, and is the result of tissue injury. Chronic or persistent pain is pain that lasts beyond the normal healing period, does not have a meaning, and is often accompanied by depression. Some patients with acute pain may have underlying chronic pain, which makes the acute pain more difficult to treat.

The source of acute pain may be a symptom of a variety of conditions: orthopedic conditions such as low back pain and injuries, headaches, surgery, or abdominal pain. Most people look into their medicine chests for over-the-counter medications as a way to self-treat minor episodes of acute pain, and have several types of over-the-counter analgesics and pain relievers available to self-treat the pain.

When acute pain becomes severe, patients seek help from healthcare providers at a clinic, ED, or hospital. Usually the treatment of mild-to-moderate level acute pain involves an analgesic medication to relieve pain, and other interventions such as cold packs, wraps, casts, immobilizers, or slings. For more severe acute pain from trauma or surgery, hospitalization and more complex methods are used such as oral and I.V. opioid analgesics, nerve blocks using local anesthetics, patient-controlled analgesia (PCA), or epidural catheters.

The source of pain

The transmission of the sensation of pain requires many different mechanisms activated within the peripheral nervous system and central nervous system. Additionally, to transmit a sensation such as acute pain, a number of complicated inhibitory and excitatory processes including the production and utilization of neurotransmitters are involved.

Key words: abdominal pain, acute pain, epidural analgesia, opioids, patient-controlled analgesia

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of neurotransmitters, cytokines, glutamate, substance P to facilitate pain and enkephalins, serotonin, norepinephrine, and gamma-amino butyric acid for inhibition must be activated.\(^5,6\) The transmission of acute pain is very complex with many different types of substances produced and utilized to help or block pain transmission while many different parts of cells and tissues are also involved.

Despite or perhaps because of the complexity of the sensation of pain, it is extremely important that acute pain be effectively treated. If acute pain is allowed to persist, it may produce a chronic pain syndrome such as complex regional pain syndrome (CRPS) that is much more difficult to treat. One European survey estimated chronic pain resulting from acute pain was approximately 20%, with trauma and surgical patients accounting for 15% of this number.\(^6\)

The development of a chronic pain syndrome for unrelieved or untreated acute pain is thought to involve three physiologic maladaptive processes:

- peripheral sensitization
- central sensitization
- descending modulation of the pain stimulus.\(^7\)

In order to better understand how this process occurs in acute pain after tissue injury, studies have begun to focus on:

- Better evaluation of acute pain resolution using the patient’s individual pain trajectories.
- Assessment of endogenous pain modulating processes.
- The patient’s psychological flexibility when faced with threat of pain.\(^8\)

Overall, it is known that acute pain requires a number of complex, physiologically based conditions to work together to either promote the pain stimulus or inhibit the transmission. Pain medications have been developed that are aimed at blocking the substance production or process in order to relieve pain. Despite this knowledge, practitioners are still searching for the best ways to treat this pain, although medication and interventional options are most commonly used to relieve pain. This article will focus on the assessment and multimodal treatment options for providing analgesia for acute pain. Once a common acute pain condition, abdominal pain will also be discussed.

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**Prevalence of acute pain**

A 2003 survey found that of 73 million patients who underwent surgery, 80% experienced pain and 86% experienced pain that was moderate, severe, or extreme after surgery.\(^9\) Prior to the surgery, 59% of these patients indicated that postoperative pain was a concern.\(^7\) It is important to note that 70% of all surgeries are now performed in ambulatory care centers, where quick and effective pain management is a necessity.\(^9\)

In EDs, acute pain is a common complaint. In a Midwestern hospital ED, a chart review for 1,665 visits during a 7-day period revealed that 61% of the charts documented pain and in 52% of the charts, pain was the chief complaint.\(^10\) In cases where the patient is only seen briefly, efficient and effective pain management is a must.

A French study focusing on patients in a mobile ICU found that they had significant pain even prior to being seen in the ED. Of the 2,279 patients seen, 947 had acute pain with 64% reporting severe pain.\(^11\) The most painful reports were from trauma or cardiac pain. When analgesics were administered to these patients, 51% reported pain relief.\(^11\)

Readmissions for uncontrolled pain are becoming a focus for hospitals whose resources are stretched. Uncontrolled pain is the most common reason for readmission in the first week after surgery.\(^12\) Pain accounts for 36% of all unanticipated admissions and readmissions in same-day surgery centers with 33% of patients having had an orthopedic procedure.\(^13\) It is important that acute pain be well managed, not only to promote good patient care but to also decrease the possibility of readmission for uncontrolled pain.

**Pain assessment**

A pain intensity rating scale with numeric ratings of pain intensity, ranging from 0 no pain to 10 worst possible pain, is normally sufficient to assess acute pain (see Examples of pain intensity scales). This allows the practitioner to establish a baseline of pain and track pain relief when medications are given.

The Joint Commission recommendations state that pain needs to be assessed on admission to the hospital and at regular intervals. There is also a requirement that pain intensity be reassessed after patients are medicated for pain to determine if the medication has relieved the pain. A clinically significant decrease in pain ratings is considered to be 2 points on the numeric rating scale or a 30% overall decrease.\(^2\)

There are a group of pain scales for assessment in the pediatric patient population including the Wong Baker FACES scale using six facial representations of pain. Other
Examples of pain intensity scales

### Simple Descriptive Pain Intensity Scale

- No pain
- Mild pain
- Moderate pain
- Severe pain
- Very severe pain
- Worst possible pain

### 0 – 10 Numeric Pain Intensity Scale

- No pain
- Moderate pain
- Severe pain
- Very severe pain
- Worst possible pain

### Visual Analog Scale (VAS)

- No pain
- Pain as bad as it could possibly be

A 10-cm baseline is recommended for each of these scales.


scales include the use of activity of the legs, facial indicators of pain, or in infants, oxygen consumption combined with other pain indicators. For adult patients who cannot self-report pain, there are a number of behavioral pain scales for both medical and intensive care settings. These scales use muscle tension, facial expression, consolability, or verbalizations to assess for pain. Using the correct scale for the patient population being assessed is important for the process to be successful.

Physiologic indicators such as increased pulse, increased respiratory rate should not be used to assess pain. These differences in physiologic response may be the result of anxiety, fear, or other psychological responses to pain and are difficult to isolate to the specific pain stimulus.21

### Medications and interventional options for multimodal analgesia

Although multimodal analgesia combining medications or interventions is recommended for treating acute pain in hospitalized patients, a recent survey indicates that it is significantly underused.14 In a survey of anesthesiologists, less than 25% indicated that they used more than two non-opioid medications to control postoperative pain. When considering the benefits of non-opioid multimodal analgesia, the anesthesiologist survey respondents indicated that the most significant benefits were:

- reduced opioid use-46%
- increased patient satisfaction-26.8%
- decreased postoperative nausea and vomiting (PONV)-17%
- decreased length of stay-9.8%.14

The results of this survey indicate that surgeons do not oppose anesthesiologists using non-opioid multimodal analgesia; it just is not frequently implemented in the postoperative setting. In order to achieve optimal pain relief for acute pain, different types of medications and interventional techniques are necessary.

### Medications

Medications for acute pain include both non-opioids and opioids. When selecting medications, it is important to consider the patient’s ability to continue the medications as an outpatient. Some insurance plans limit the use of extended-release medications or co-analgesics, so knowing which medications the patient’s insurance plan will cover can help avoid costly co-pays and step management.

### Non-opioid medications and co-analgesics

Non-opioid medications include acetaminophen and other non-steroidal anti-inflammatory drugs. Co-analgesics include antidepressants, antiepileptic medications, muscle relaxants, and targeted topical analgesics. For acute pain, the alpha 2-ligand drug gabapentin (used off-label for acute pain), has demonstrated an opioid-sparing effect of up to 60% when the medication is given preoperatively.1 Knowing the patient’s history and noting any allergies or intolerances can help determine which, if any, of these medications could be useful for pain relief.

### Opioids

Opioids are the most commonly used medications to control pain in hospitalized patients. They can be given orally or I.V. In general, opioid choices follow the recommendations of the World Health Organization (WHO) Ladder, originally designed for cancer pain but adapted for use with most types of pain, and available at the WHO website at http://www.who.int/cancer/palliative/painladder/en#. It is important to keep in mind that each patient is genetically different in his or her response to opioids, and individual medications may work better for one patient than another (See Pain medications based on the patient’s pain level).

A medication that is not recommended for acute pain is fentanyl patches. Patients who start fentanyl patches need
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Pain medications based on the patient’s pain level

<table>
<thead>
<tr>
<th>Medications for mild pain level 1-3:</th>
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<tbody>
<tr>
<td>Acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) used with or without co-analgesics.</td>
<td></td>
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<tr>
<td>Acetaminophen is now available in an I.V. form making it easier to use for patients who are not taking oral medications.</td>
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<tr>
<td>Ketorolac is the only I.V. NSAID and it has a 5-day limit to use.</td>
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<tr>
<td>Medications for moderate pain level 4-6-with or without co-analgesics</td>
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<tr>
<td>Codeine and oxycodone medications used with or without acetaminophen</td>
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<td>Hydrocodone and acetaminophen</td>
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<tr>
<td>tramadol and tapentadol used with or without acetaminophen.</td>
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<tr>
<td>Medications for severe pain level 7-10-with or without co-analgesics</td>
<td></td>
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<tr>
<td>Morphine, hydromorphone, fentanyl</td>
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<tr>
<td>Methadone should be used with extreme caution when initiating treatment; the patient must be opioid-tolerant.</td>
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to be opioid tolerant, meaning they are taking opioids regularly for 2 weeks prior to starting the patch. It can take as long as 48 hours to establish an effective analgesic blood level with the patch so the patient will still need pain medication for that time period. Overall, the medication is designed for use in opioid-tolerant cancer and chronic pain patients, not acute pain patients.23

Because most hospitalized patients need analgesia, the use of oral opioid medications is high. There is some concern about addicting patients with the use of opioids but in most cases of acute pain, the patient will only use the medication for a short period of time and stop the medication once the pain resolves.

Adverse reactions such as constipation and nausea can occur frequently with the use of opioid analgesia. Patients who are using opioids for pain relief should have a laxative regimen and medications for nausea available.

PCA

One of the most common ways to deliver I.V. opioid medication is by using a PCA. This is a way to provide patients with pain medications as they need them by using a small, computerized pump to deliver a prescribed dose of medication when the patient pushes a button. Patients prefer the PCA method because it is convenient and allows them some control over medication delivery. The three most common medications used in PCA are morphine, hydromorphone, and fentanyl. In order to achieve maximum comfort, patients should receive loading doses with the initiation of the PCA and should then be able to maintain comfort with the PCA bolus doses.

One of the most important aspects of PCA therapy is patient safety. There are some patients for whom PCA presents an increased risk and these patients require additional monitoring and assessment parameters. These patients have been identified by the Institute for Patient Safety and the Joint Commission as unsuitable for PCA use or requiring additional monitoring:

- infants and small children
- confused older patients
- patients who have asthma
- patients who are obese
- patients who have sleep apnea
- patients taking medications with sedating effects such as antiemetics, muscle relaxants, and sleeping medications.2,13

Patient safety is paramount when PCAs are being used. Regular assessment of the patient on a PCA is critical. Using sedation scales to assess for increasing sedation is extremely important to detect increasing sedation. The use of continuous pulse oximetry and capnography are both recommended by the Anesthesia Patient Safety Taskforce. If the patient is using supplemental oxygen, the results of the pulse oximetry will be skewed reading higher saturations than the blood oxygenation. The use of end-tidal carbon dioxide, capnography, can help detect impending oversedation as retained carbon dioxide levels rise and respiratory efforts decrease.

The key to successful PCA use is to recognize that the devices are not fail-safe and that patients can become oversedated using them, one dose does not fit all patients, and human error can be a factor in adverse events. Regular assessment for both pain and sedation can make this technique a successful option for acute pain management.

Epidural pain management

Epidural pain management is recommended for patients with large surgeries such as thoracotomy, large abdominal surgeries, multiple rib fractures, labor and delivery, and, in the past, joint replacement surgery. As interventional techniques have grown, the use of epidural catheters has diminished. To use epidural analgesia, the catheter is placed into the epidural space at the level of the surgery. A weak solution of an opioid combined with a local anesthetic is infused continually over the nerve roots in the surgical area.

As with PCA, the same requirements for frequent monitoring and assessment apply. Adequate pain relief with epidural analgesia can help the patient with an epidural to cough and deep breathe more effectively, ambulate, have
the highest level of pain relief with low doses of opioid analgesics. Oversedation can occur with epidural use, so these patients will require the same type of monitoring for oversedation as patients using a PCA.

**Interventional options**

**Peripheral local anesthetic catheters**

One of the newer techniques being used for acute pain management is the peripheral catheter attached to a simple infusion device filled with local anesthetic, usually bupivacaine or ropivacaine. In most cases, the medication is placed into an elastomeric ball-type flow device and the medication infuses slowly over the painful area or over the nerve in the surgical area. The best use for these local anesthetic devices is for continuous nerve blocks when the catheter for the pump is placed along the femoral nerve for total joint replacement. The catheters can also be placed along a surgical incision in a soaker hose-type configuration that can allow for direct pain reduction along the surgical area. This type of placement can be used for thoracotomy or abdominal surgery patient.

Studies show that patients are highly satisfied with this technique, are discharged sooner, and have less pain and opioid medication-related adverse reactions. Patients who use these devices also use less opioid medication.

**Blocks**

Intraoperative blocks are a recommended intervention for use in the perioperative time frame. These blocks can be used for shoulder surgery, joint replacements, circumcision pain, and a wide variety of procedures. Usually the anesthesiologist will inject local anesthetic into the surgical or procedural area and block the involved nerves. The one drawback of this technique is that at most the blocks will last for 6 to 8 hours in the postoperative period and patients often report increased pain when the block wears off.

**Case study:**

Ms. J, 28, is admitted to the ED because she has been complaining of increasingly severe lower abdominal pain for 2 days, rated at 8/10 for pain severity. The pain started out in the middle of her abdomen but has moved to her right lower quadrant. She is febrile, nauseated, pale, and diaphoretic. She has no chest pain or shortness of breath. She states that she is not pregnant as she had her menses last week; urine pregnancy test (human chorionic gonadotropin) results confirm she is not pregnant. She is sent for an abdominal computed tomography (CT). Should Ms. J be given medication for pain or should the nurse withhold medication for pain until Ms. J is seen by the surgeon who has been consulted? What is the most likely cause of Ms. J’s pain? Should she have had a CT?

Abdominal pain is the most common reason for seeking care in EDs accounting for approximately 8 million ED visits. Because the symptoms can have a diverse and confusing presentation of clinical signs, reaching a definitive diagnosis can be difficult. Taking a full history and performing a physical exam, including a full pain assessment and medication use, will help pinpoint the source of the pain and what types of medications or interventions have helped. Typical causes of acute abdominal pain include:

- appendicitis
- aneurysm rupture
- volvulus—may also have a gradual onset pattern
- perforated ulcer
- mesenteric ischemia—may also have a gradual onset pattern
- abdominal abscess
- biliary colic
- bowel obstruction
- cholecystitis
- ectopic pregnancy
- peritonitis
- urinary tract infection

The abdominal pain that patients report can be difficult to pinpoint. Additional information such as lack of or slowed bowel movement patterns, diarrhea, weight loss, or vaginal bleeding may help determine the source of the pain.

Patients who complain of abdominal pain should be medicated appropriately for the intensity of pain reported. Withholding pain medication from these patients will do little to determine if the pain is real. There is also little support for the idea that pain medication hinders assessment or impairs sphincter of Oddi function. If pain relief is only fair, there will only be negative effects and delay return to activity. Providing appropriate postoperative pain relief will help expedite the patient’s return to function. Setting the expectation with the patient that once the patient is able to start a diet oral pain medications will replace the I.V. medications of the immediate postoperative time period will help move the patient through the recovery period.
Case study follow-up
When Ms. J is examined by the surgeon, she demonstrates a clear rebound tenderness when her lower abdomen is palpated. She is diagnosed with appendicitis. She is taken to the OR and a laparoscopic appendectomy is performed. She is placed on a PCA after surgery and she is encouraged to ambulate in the halls once she is able to get out of bed. Ms. J is discharged on postoperative day 2 with oral medications to control her pain.

Important points to consider:
• Appendicitis may be diagnosed clinically, however per the American College of Radiology Guideline, CT is the most accurate diagnostic study when evaluating a patient with suspected acute appendicitis or other causes of right lower quadrant abdominal pain. Because of the ionizing radiation, CT is not recommended during pregnancy.20
• Giving Ms. J pain medication is not contraindicated prior to being evaluated by the surgeon. The pain intensity may be dulled by the medication but the surgeon should be able to make a full evaluation and elicit the pain during the examination.
• There should be high suspicion for acute appendicitis with periumbilical pain that migrates to the right lower quadrant.19

Special patient populations
The older patient
There are many myths surrounding the use of opioids with older patients. Some practitioners feel that older patients cannot tolerate opioids. However, older patients can tolerate opioid medications if the starting doses are reduced by 25% to 50% and frequent monitoring for adverse reactions is used to enhance patient safety.7 Most older patients can use PCAs and epidural analgesia effectively. Listening to what the patient says about prior opioid use will provide keys to what medications will be effective for pain relief.

Patients with addictions
In the acute care setting, patients who are abusing drugs can be admitted for any type of injury or surgery. The patients can be young or old, male or female, be admitted for surgery or trauma, and in most instances, their abuse histories are fairly individual with polyaddiction a common occurrence.

When treating acute pain in a hospitalized patient with an addiction, the plan of care should focus on treating the pain. Using a team approach with specialists in pain and psychology, social workers, and rehabilitation staff for advice and assistance in medication management and progress toward discharge is a high priority.

It is important to understand the difference between opioid dependency and addiction:
• Dependency is a natural phenomenon that occurs with regular use of a medication.
• Addiction is a chronic neurobiologic disease based on the four C’s—continued use despite harm, lack of control over the drug, craving, and compulsive use.21

These two entities should not be confused. Understanding that patients with chronic pain may take opioids daily and lead fairly normal lives, work, and have a good quality of life is very different than the patient with an addiction who has no close family ties and is dysfunctional.

Patients who are being treated for pain in the hospital, who are actively abusing substances, or who have a history of substance abuse will require more analgesics than the average patient. They will also have more difficulty achieving pain control. Trying to convert a heroin addict’s daily street drug usage to oral opioid medication is impossible. Using a PCA to determine how much I.V. pain medication the patient will need can help determine use over a 24-hour period, which can then be converted to oral medications. The patient with an addiction is tolerant to opioids and will require high doses of medication frequently to control pain.23

The overall goal is to progress the patient to discharge, and unrelieved pain will limit the patient’s activity and willingness to participate in activity and physical therapy. Using a baseline like a PCA 24-hour usage can give a guide for conversions allowing the prescriber to be more confident about dosages.

The obese patient
The hospitalized obese patient with acute pain presents the healthcare practitioner with a complex set of needs. By 2030 58% of the world’s population is expected to be obese or overweight.22 Many obese patients have comorbidities such as heart failure that limit the options for pain relief. Obesity can also promote increased pain with higher levels of inflammation fed by increased levels of tumor necrosis factor, interleukin-6, and C-reactive protein secreted by adipose tissue.23
The major concern when opioid analgesics are used for pain relief in an obese patient is respiratory depression. Adipose tissue on the upper abdomen can restrict lung expansion causing a reduced respiratory effort. Also, with the higher ratio of adipose tissue, decreased protein binding can occur allowing an increased concentration of the opioid into the free plasma and hepatic and renal clearance can be reduced due to fatty degeneration of the liver. Obese patients also tend to have a high incidence of sleep apnea, which has been found to contribute to an increased risk for pulmonary complications.

In order to provide adequate analgesia for an obese patient, each patient should be evaluated individually. Recommendations for treating pain in the obese patient after surgery include:

- using multimodal analgesia with regional and opioid-sparing techniques
- avoidance of sedatives, especially when combined with opioids
- noninvasive ventilation with supplemental oxygen
- early mobilization and ambulation
- elevating the head of the bed to 30 degrees
- a low threshold for pulse oximetry, which should be continuous also combined with end-tidal carbon dioxide monitoring for added safety
- arterial BP management
- placement in a nursing specialty area such as an ICU step-down area with continuous, postoperative monitoring until the oxygen saturation is greater than 90% while asleep without supplemental oxygen.

Obese patients need to receive adequate analgesia after injury or surgery but extra precautions should be taken to ensure that respiratory depression does not occur. Most obese patients can tolerate opioids but using multimodal techniques such as peripheral nerve blocks can help to provide a high level of analgesia with an opioid-sparing effect.

**Guidelines for treating acute pain**

There are some national organizations that have formatted evidence-based guidelines for use in treating acute pain. The American Pain Society has published evidence-based guidelines for treating acute and cancer pain in their publication *Principles of Analgesic Use in the Treatment of Acute and Cancer Pain* (2008). This publication offers information on how to use medications, both opioid and non-opioid, and interventional options effectively to treat pain. Information on this guideline can be found at www.ampainsoc.org.

The American Society of PeriAnesthesia Nurses has a postoperative pain guideline that incorporates the use of medications and comfort modalities such as heat, cold packs, and relaxation. This society also has an evidence-based guideline for treating adverse reactions of surgery and anesthesia, a PONV Guideline that outlines the appropriate use of antiemetic therapies.

In an updated guideline, the American Society of Anesthesiologists Task Force on Acute Pain Management outlines basic principles of acute pain management in the perioperative time period. Recommendations include:

- a comprehensive preoperative evaluation with a directed pain history and a developed plan of care for postoperative pain control,
- continuation of medication that if discontinued, may precipitate an abstinence syndrome, patient and family education, medication to reduce anxiety, and premedications for pain and anxiety,
- use of PCA, central regional opioid analgesia (epidural), and peripheral regional analgesic techniques,
- use of multimodal techniques such as medications and blocks,
- development of institutional policies and procedures for providing perioperative pain management.

Using these evidence-based guidelines can help the practitioner decide which techniques or medication can help relieve the patient's pain. In order to ensure the best outcomes with perioperative and postoperative pain management, using evidence-based guidelines can help determine which techniques will provide the best care possible and promote higher patient satisfaction with their postoperative analgesia.

**Treating pain according to type**

Although pain is a very common patient complaint, there are distinct differences between acute pain and chronic, persistent pain. Healthcare providers treating patients with acute pain should be able to recognize the differences between pain types and treat the type of pain accordingly. Acute pain may respond to the typical analgesic, while chronic pain conditions may require a combination of medication and complementary techniques. Treating acute pain effectively can help prevent the development of a...
chronic pain condition such as CRPs that can be much more difficult to treat.

REFERENCES

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