Post Surgical Pain Management
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Disclosure
I do not have (nor does any immediate family member have):
- a vested interest in or affiliation with any corporate organization offering financial support or grant monies for this continuing education activity
- any affiliation with an organization whose philosophy could potentially bias my presentation

Objectives
1. Describe the common complications associated with post-surgical pain management.
2. Discuss various pharmacologic acute treatment options, including ERAS.
3. Discuss various options for the post-acute setting (ambulatory).

Opioid Crisis
- Every day more than 116 deaths due to opioid overdose.
- Misuse of prescription pain relievers, heroin, and synthetic opioids.
- Economic burden of prescription opioid abuse alone is $78.5 billion a year.

Poorly Controlled Postoperative Pain
- More than 80% of patients experience acute postoperative pain
- 88% of those patients report the pain severity as moderate, severe, or extreme.
- Less than 50% of patients report adequate postoperative pain relief.

Continued Increases
- Surgical procedures continue to increase annually.
- Freestanding ambulatory surgery centers increased by 300% from 1996 to 2006.
- American adults suffering from at least one pain condition increased from 120.2 million in 1997 to 178 Million in 2014
Pain Intensity by Procedure

Comparison of pain intensities between surgical specialties. Worst pain and pain during movement since surgery were assessed on the first postoperative day.

Consequences of Poorly Controlled Postoperative pain

- Inadequately controlled pain negatively affects:
  - Morbidity
  - Quality of life
  - Function
  - Delayed recovery time
  - Risk of post-surgical complications
  - Prolonged duration of opioid use
  - Higher health-care costs

- Presence and intensity of acute pain during or after surgery is predictive development of chronic pain.

Chronic Postoperative Pain (CPOP)

- Definition by Macrae and Davies in 1999
  - Must have developed after surgery
  - Pain lasts at least 2 months in duration
  - Other causes for the pain have been excluded
  - Possibility that the pain is continuing from a pre-existing problem be excluded

- Definition by Werner and Kongsgaard in 2014
  - Develops after a surgical procedure or increases after surgical procedure
  - At least 3-6 months duration
  - Significantly affects quality of life
  - Continuation of acute post surgery pain
  - Localized to the surgical field, projected to innervation territory
  - Other causes excluded

Chronic Postoperative Pain incidence by procedure

Affects 10% to 60% of patients after common operations.

- Abdominal
  - Moderate-to-severe CPOP incidence
  - Moderate-to-severe CPOP incidence

- Breast
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Cardiac
  - Moderate-to-severe CPOP incidence
  - Increase in incidence over time

- Hysterectomy
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Inguinal hernia
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Orthopedic
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Outpatient
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Total knee arthroplasty
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Thoracotomy
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

- Thyroidectomy
  - Moderate-to-severe CPOP incidence
  - Decrease in incidence over time

Chronic Postoperative Pain

- Multiple mechanisms for chronic pain development
  - Inflammatory processes
  - Tissue and nerve damage
  - Central sensitization

Acute Pain Progressing to Chronic Pain

- Some patients experience chronic pain without a clear source
- Pain that persists for more than 6 months
- Pain that continues beyond the expected healing time
- Pain that is not related to the original injury
- Pain that is associated with other chronic conditions

- Factors that increase the risk of chronic pain:
  - Age
  - Gender
  - Previous history of chronic pain
  - Psychological factors
  - Sleep disturbances
  - Poor physical condition

- Treatment options include:
  - Medications
  - Physical therapy
  - Cognitive behavioral therapy
  - Surgery
  - Complementary and alternative medicine
**Risk Factors for Chronic Postoperative Pain**

- Significant predictive risk factors
  - Type of surgery
  - Presence and intensity of postoperative pain
- Other factors
  - Younger age
  - Females
  - Obesity
  - Smoking
  - Genetic predisposition
  - Pre-existing pain
  - Psychological factors (preoperative anxiety and depression)
  - Duration of surgery


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**Enhanced Recovery After Surgery (ERAS)**

- What is it?
  - Enhanced recovery after surgery
  - Umbrella term for over 20 perioperative evidenced based recovery protocols
  - Team based approach with Preop, Intraop and Post op phases
- Pharmacologic options
  - Multi modal pain management
  - Control of nausea vomiting
- Nonpharmacologic options
  - Physical therapy, Nutrition

**ERAS Surgery Specific Guidelines**

- Elective Rectal/Pelvic
- Elective Colorectal
- Breast Reconstruction
- Lung
- Bariatric
- Gynecologic/oncology
- Gastrectomy
- Radical cystectomy for bladder cancer
- Pancreaticoduodenectomy
- Major Head and Neck Cancer Surgery With Free Flap Reconstruction
- Esophagectomy

Enhanced Recovery After Surgery (ERAS) Society's list of guidelines at [erassociety.org](http://erassociety.org)
Preoperative Education

- Patient and family centered education
- Tailored education to the patient (or caregiver)
- Treatment options for postoperative pain
- Discuss plan and goals for postoperative pain
- Benefits
  - Reduced opioid consumption
  - Less preoperative anxiety
  - Fewer requests for sedative medications
  - Reduced length of stay

Preoperative Evaluation

- Preoperative evaluation should include:
  - Assessment of medical and psychiatric comorbidities
  - Concomitant medications
  - History of chronic pain
  - History of substance abuse
  - Previous postoperative treatment regimens and responses
  - Utilize the Opioid Risk Tool

Pain Management Plan

- Individually tailored developed with:
  - Shared decision making approach with patient (or caregiver)
  - Evidence regarding effective interventions for the specific surgery
  - Ability to be modified by factors unique to the patient including:
    - Previous experiences with surgery and postoperative treatment
    - Medication allergies/intolerances
    - Cognitive status
    - Comorbidities
    - Preferences for treatment
    - Treatment goals
  - Adjusted based on reassessments

Multimodal Management Plan

- Target different mechanisms of action in the peripheral and/or central nervous system with the use of:
  - Analytic Medications
  - Techniques
  - Non-Pharmacological interventions

- Since this concept’s introduction in 1993, the combined use of local and regional anesthetics, different classes of nonopioid pharmacologic agents, such as NSAIDs, COX2 inhibitors, NMDA-receptor antagonists, and antiepileptics, and opioid analgesics, has become a widely accepted means of reducing acute postoperative pain while limiting perioperative opioid consumption and opioid-related AEs.

Pharmacological Post Operative Therapies - Patient Controlled Analgesia

- Used when parenteral route is needed
- Parenteral therapy needed for more than a few hours and adequate cognitive function.
- PCA recommended over health care provider-initiated intermittent bolus dosing of opioids.
- Opioid naive adults should not receive basal rates.

Pharmacological Post Operative Therapies - Acetaminophen and NSAIDS

- Recommend acetaminophen and/or nonsteroidal anti-inflammatory drugs (NSAIDS)
- Less postoperative pain or opioid requirements
- Combination of acetaminophen and NSAID might be more effective than either drug alone
- IV or Oral?
- Consideration for preoperative celecoxib in adult patients without contraindications
  - 200 to 400mg administered 30 minutes to 1 hour pre operatively.

Pharmacological Post Operative Therapies - Gabapentin/Pregabalin

- Guideline recommended as a component of multi-modal analgesia
- Reduction in postoperative pain and opioid requirements
- Pre-operative
  - Gabapentin: 600 or 1200mg administered 1-2 hours pre-op
  - Pregabalin: 150 or 300mg administered 1-2 hours pre-op
- Post-Operative
  - Gabapentin: 600mg as a single or in multiple doses
  - Pregabalin: 150 or 300mg
  - Dose reductions in renally impaired

Pharmacological Post Operative Therapies - Other

- Ketamine (Pre-op:0.5mg/kg Intra-Op: 10mcg/kg/min w/ or w/out postoperative infusion at a lower dose)
  - Associated with decreased post-op pain
  - Decreased risk of persistent postsurgical pain
  - Useful in opioid tolerant patients or patients difficulty tolerating opioids
- Intravenous Lidocaine (100-150 mg bolus followed by 2-3 mg/kg/hr)
  - Open and laparoscopic abdominal surgery
  - Shorter duration of ileus.
  - No recommendation for post-op

Pharmacological Post Operative Therapies - Local Anesthetic/Peripheral Regional Anesthesia

- Local Anesthetic
  - Surgical Site Specific with evidence demonstrating benefit
  - Providers should be knowledgeable in specific local anesthetic techniques
- Peripheral Regional Anesthesia
  - Surgical site specific with evidence demonstrating benefit
  - Providers should be knowledgeable in specific local anesthetic techniques
- Neuraxial Therapies
  - Major thoracic and abdominal surgeries
  - Appropriate perioperative monitoring
Management of Postoperative Pain in Patients Receiving Long Term Opioid Therapy

- Conduct preoperative evaluation to determine preoperative opioid use and doses
- Provide education regarding use of opioids before surgery
- Recognize that postoperative opioid requirements will typically be greater and that pain might be more difficult to control
- Consider pain specialty consultation (and in some cases behavioral and/or addiction consultation) for pain that is difficult to manage and complex cases


Consider nonpharmacological interventions
- Transcutaneous electrical nerve stimulation
- Cognitive–behavioral therapies
- Consider non opioid systemic medications
- Gabapentin or pregabalin
- Ketamine
- Consider local anesthetic-based peripheral regional and neuraxial local analgic techniques
- Consider PCA with basal infusion of opioids for difficult to manage pain with appropriate monitoring
- Provide education and instructions on tapering opioids to target dose after discharge

Perioperative Intravenous Methadone

- Murphy et al performed a randomized, double-blinded control trial evaluating 120 patients undergoing spinal fusion
- Randomized and blinded to:
  - Methadone 0.2mg/kg at the start of surgery or
  - Hydromorphone 2mg at surgical closure
- Primary Outcome
  - Intravenous hydromorphone consumption on postoperative day 1
- Secondary Outcomes
  - Pain scores and satisfaction measured at PACU admission, 1, and 2 hour post admission, and mornings and afternoons on postoperative days 1 to 3
  - Hemodynamic variables, potential opioid-related complications, and overall patient satisfaction


Results
- Similar preoperative characteristics
- Patients in both groups treated with hydromorphone PCA then transitioned to hydrocodone 10mg/325mg APAP

Mean Visual Analog Scores (reported at rest, coughing and with movement)
- Lower in the methadone group compared to the hydromorphone group

Patient satisfaction scores
- Overall satisfaction with pain management was higher in the methadone group from PACU admission through the morning of POD 3

Adverse Effects
- No differences in the incidences of nausea, vomiting, itching, hypoventilation, or hypoxic events
- No differences in sedation scores, respiratory rates, peripheral oxygen saturation measurements, and mean arterial pressures

Transition to Outpatient

- Discharge education on Pain treatment plan
  - Indications
  - Opioid tapering
  - Non opioid utilization
  - Stool softeners/laxatives
  - Drug interactions
  - Appropriate disposal
  - Coordinated follow up appointments
Florida CS/CS/HB 21

• Effective July 1st 2018
• Opioid 3-day supply or up to a 7-day supply under special circumstances.
• Must use the PDMP for prescribing or dispensing controlled substances.
• All licensed physicians authorized to prescribe controlled substances must take a board approved 2-hour CE course

Other Modalities

• Physical Modalities
  • Transcutaneous electrical nerve stimulation (TENS)
  • Weak recommendations, moderate evidence
• Acupuncture, massage, cold therapy, or heat therapy
• No recommendation due to insufficient evidence

• Cognitive-Behavioral Modalities
  • Guided imagery and other relaxation techniques, hypnosis, and music.
  • Weak recommendation, moderate quality evidence

Future Therapies

• HTX-011 (extended release bupivacaine and meloxicam)
  • FDA Fast Track designation
  • Under Priority Review
  • Currently studied in hernia repair, abdominoplasty, bunionectomy, total knee arthroplasty and breast augmentation
• SABER®-bupivacaine (extended release biodegradable depot)
  • Phase 3 clinical trials
  • 72 hour release

Summary

• Inadequate post operative pain control still undertreated
• Undertreated pain can lead to post operative complications and lead to chronic postoperative pain
• ERAS refers to surgical specific protocols to enhance recovery addressing pain, nutrition, mobility, etc.
• May not apply to opioid tolerant patients
• Discharge education, counseling, and follow up on opioid use to minimize adverse outcomes
• Research for new techniques and strategies for opioid sparing or “Opioid free” surgical procedures

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