

# Perioperative Pain Management

Preetma Kooner, MD

Objectives for Learning Outcomes:

Following my presentation, participants will be able to apply:

1. Understanding impacts of chronic pain in various phases of perioperative pain management.
2. Components of multimodal analgesia and the benefits and side effects of various techniques.

*If handouts are not included in the session, they were not provided by the presenter.  
The presenter may choose to provide handouts at the time of the presentation.*

# PERIOPERATIVE PAIN MANAGEMENT

Preetma Koener, MD  
Acting assistant professor, Dept of Anesthesia and Pain Medicine  
Challenge of Pain Conference 2018



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## OBJECTIVES

Discuss important aspects of perioperative pain medicine including assessment, goals and challenges

Consider the different ways to think about pain in the post surgical period

Understand the role of opioids and multimodal pain management in throughout the perioperative period



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## SCOPE OF PERIOPERATIVE PAIN MANAGEMENT

Preoperative management

history and physical: risk assessment

risk factors: age, gender, surgery, catastrophizing

preventative analgesia

Intraoperative management

Postoperative management

PACU → beyond discharge



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**PERIOPERATIVE PAIN**



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**WHY DO WE NEED TO TREAT POSTOPERATIVE PAIN**

- Facilitate recovery from the underlying injury, surgery, or disease
  - Reduce neuroendocrine stress
  - Minimize impact of pain on recovery activities
- Control and reduction of pain to tolerable level for function
- Relieve suffering
- Prevent chronic pain



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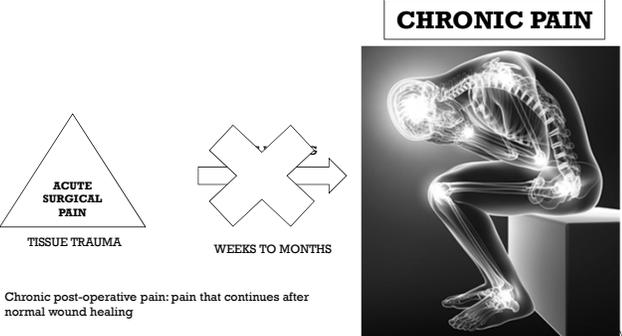
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**CHRONIC PAIN**



Chronic post-operative pain: pain that continues after normal wound healing

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## ALL PAIN ISN'T THE SAME

- Acute pain
- **Acute on chronic pain**
- Persistent post surgical pain
- New persistent opioid use after surgery



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## ACUTE ON CHRONIC PAIN IN THE POST SURGICAL PATIENT

- higher pain scores (both resting and dynamic), and may require up to three times greater opioid or epidural dosages compared to opioid naive patients undergoing similar procedures
- Increased length of stay and increased rate of readmission
- Opioid tolerant patients are still at risk for negative side effects
- Opioid withdrawal
- Opioid use disorder



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## ASSESSMENT AND TREATMENT



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## ASSESSMENT TOOLS

- Pain ratings at rest and with activity
  - VAS
- Vitals- pain as the 5<sup>th</sup> vital sign
- Unidimensional vs multidimensional pain assessment
  - McGill questionnaire
  - Clinically aligned pain assessment (CAPA)




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## CLINICALLY ALIGNED PAIN ASSESSMENT TOOL (CAPA®)

Domain	Response
Comfort	- Intolerable
	- Tolerable with discomfort
	- Comfortably manageable
Change in Pain	- Negligible pain
	- Getting worse
	- About the same
Pain control	- Getting better
	- Inadequate pain control
	- Partially effective
Functioning	- Fully effective
	- Can't do anything because of pain
	- Pain keeps me from doing most of what I need to do
	- Can do most things, but pain gets in the way of some
Sleep	- Can do everything I need to
	- Awake with pain most of night
	- Awake with occasional pain
	- Normal sleep

CAPA is designed to assess pain more effectively, in a clinically valid way, and to have more dialog with the patient about their pain experience. Printed with permission, University of Utah Hospital & Clinics, Department of Anesthesiology.




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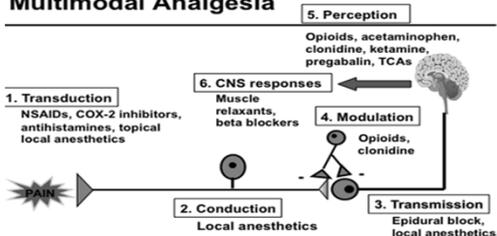
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## Multimodal Analgesia



1. Gottschalk A, Smith DS. *Am Fam Physician*. 2001;63:1979-1984; 2. Iyengar S, Webster AA, Hemrick-Luecke SK, et al. *J Pharmacol Exp Ther*. 2004;311:576-584; 3. Morgan V, Pickens D, Gautam S, et al. *Gut*. 2005;54:601-607. Reproduced with permission from R. Sinatra, MD.




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## OPIOIDS AND SURGERY

Short acting vs long acting: unsafe to start long acting post op  
 IV to oral opioids: PCA and transition to orals when appropriate  
 avoid concurrent sedating medications  
 Taper plan at discharge




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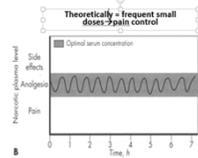
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## PCA'S

- x/y/z (dose/lockout /specified hour limit)
- Rapid onset, safe, superior satisfaction to other methods of pain control
- Serious respiratory depression side effects rare

Bennett et al, 1982 (0% in 1300 patients)  
 McKenzie et al, 1988 (0% in 18,000)  
 Etches et al, 1994 (0.5% in 1600)  
 Lyons et al, 1996 (0.33% in 4000)  
 Sidebotham et al, 1997 (0.19% in 6000)




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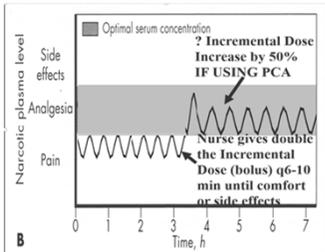
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### Problem with PCA's

- Pt ability to push the button
- Finding the button
- Other people pushing the button
- Setting an alarm for the button




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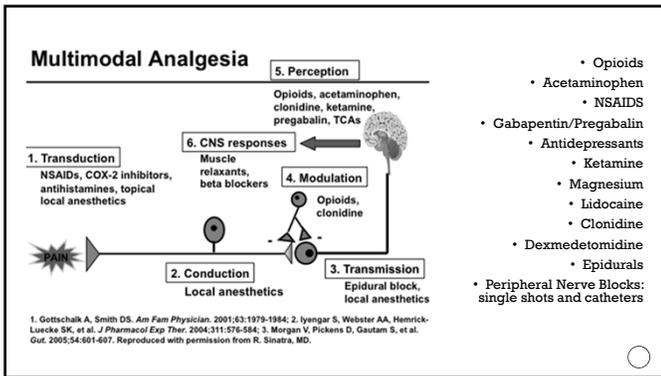
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## KETAMINE

- N-Methyl-D-Aspartate (NMDA) Antagonist
- Activation of NMDA receptors has been associated with hyperalgesia, neuropathic pain, and reduced functionality of opioid receptors
- Properties:
  - Does not cause respiratory depression at subanesthetic dosing
  - Does not depress cardiovascular function, hepatic blood flow, nor bowel function
  - Dissociative
  - Amnesic
  - Analgesic

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## GABAPENTIN

- 22 RCT gabapentin, 8 pregabalin, 7 meta-analysis
- Improved pain relief
- Opioid sparing with single dose
  - $30 \pm 4$  mg morphine/24hrs
  - Not gabapentin dose dependent
- Number-needed-to-harm 35 sedation/12 dizziness
- Dose defining study for gabapentin in diskectomy = 600mg

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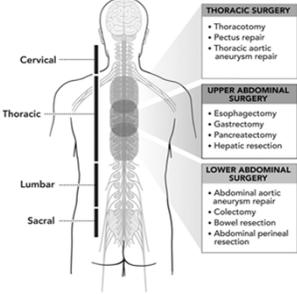
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**THORACIC SURGERY**

- Thoracotomy
- Pectus repair
- Thoracic aortic aneurysm repair

**UPPER ABDOMINAL SURGERY**

- Esophagectomy
- Gastrectomy
- Pancreatectomy
- Hepatic resection

**LOWER ABDOMINAL SURGERY**

- Abdominal aortic aneurysm repair
- Colectomy
- Bowel resection
- Abdominal perineal resection

**EPIDURALS**

Most beneficial in open thoracic and abdominal procedures

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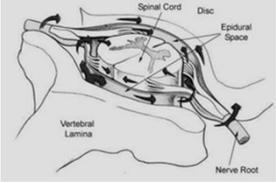
**EPIDURALS**

Superior intra-operative and post-operative pain control vs. IV opioids alone

PCEA: patient-controlled bolus in addition to continuous infusion of local +/- opioid

**Local anesthetic MOA:** spinal nerve roots; systemic absorption

**Opioid MOA:** crosses dura and arachnoid membrane to CSF, and binds to opioid receptors in the dorsal horn; systemic absorption





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**THORACIC EPIDURALS CAUSE A SYMPATHECTOMY**

System	Effect
Pulmonary	improved cough, decreased rate of pneumonia (Popping et al 2008)
Cardiac	reduce adverse perioperative cardiac events due to superior pain relief with concomitant reduction of the postoperative stress response and systemic sympathetic activity (less HTN, tachycardia, myocardial work, oxygen consumption). (Aken 2010, Beattie 2001, Farouk, 2017)
Metabolic	less catecholamine release → reduced stress response Less catecholamine release → less muscle breakdown → less amino acids providing substrate for gluconeogenesis → less insulin resistance
GI	Enhances bowel blood flow, increase in bowel motility, reduced duration of post operative ileus Vasodilation of the splanchnic vasculature can contribute to hypotension by decreasing SVR and preload

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## IV LIDOCAINE INFUSIONS

- 45 trials/2802 patients
- Significant decreases
  - Duration of ileus
  - Length of hospital stay
  - Postoperative pain and opioid requirements
  - Incidence of nausea and vomiting
- Attenuated levels of pro-inflammatory mediators (IL-6, IL-8, IL-1ra, complement C3a integrins, platelet leukocyte aggregates)

Kranke P. et al. *Cochrane Database Syst Rev* 2015 Jul 16(7):DC009642.  
 Marret et al. *British Journal of Surgery* 2008;95:1331-38




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## QUICK WORD ABOUT EXPAREL

### Bupivacaine liposome injectable solution (long acting bupivacaine)

Exparel use contraindicates administration of any other local anesthetic (and thus utilization of any regional technique) for **96 hours**

#### UW 2017

Exparel used ~1400times

Spent 500K on un-reimbursed Exparel

Exparel: \$315/vial vs Bupivacaine HCL: \$2.50/vial

Implementation of restricted use: Pre-approved ERAS pathway




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## NON-PHARMACOLOGICAL TREATMENTS

- Acupuncture
- Meditation, Guided imagery
- Sleep
- Distraction
- Music
- Cognitive-behavioral psychotherapy
- Biofeedback
- Heat/Cold
- Massage
- Transcutaneous electrical nerve stimulation

Bjorndal JM, Johnson MI, Ljunggreen AE. *Eur J Pain* 2003;7(2):181-188.  
 Freynet A, Falcoz PE. *Interact Cardiovasc Thorac Surg* 2010;10(2):283-288




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**CASE STUDY: BUPRENORPHINE AND THE POST-OP PATIENT**

- 60 yo male with CAD (on dual antiplatelet therapy), chronic low back pain, and bladder CA scheduled to undergo radical cystectomy
- Prior history of oxycodone ER, methadone with remote history of opioid abuse.
- In 2017 he was started on buprenorphine 8mg/ 2mg BID

Preop: perioperative pain clinic, epidural, gabapentin

Intraop: epidural, ketamine, opioids, IV apap

Post-op: epidural, HM PCA (pt refused), apap, ketamine

POD 2 (once tolerating diet) epidural removed and pt transitioned to buprenorphine

Discharged to perioperative clinic for short term buprenorphine dosing




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**COMPONENTS/GOALS OF PAIN TREATMENT**




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- Defining a realistic aim with the patient, taking into account pre-operative pain and functional status
- Emphasizing functional goals
- Communication of a plan and expectations for post-discharge analgesic tapering
- Counseling patients and families; assuring them our priority is comfort however it is normal to have some discomfort after surgery.




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## FOR THE PATIENT

- Realistic aims
- Other chronic pain won't be completely alleviated
- No promise of specific pain ratings (no chasing a pain score)
- Time=wound healing
- Goal is functionality
- Balance between comfort and safety
- Expectations for post-discharge medication taper




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## EVERY PERSON HAS A STORY

• "To the suffering person suffering is solely suffering. It is only for others, as a symbol, that suffering takes on any meaning or purpose. No one ever got lynched and thought, Well, at least this will lead inexorably to the civil-rights movement. They just shook, suffered, screamed, and died. Pain is the least symbolic thing there is."

-Zadie Smith

"There are so many ways of being despicable it quite makes one's head spin. But the way to be really despicable is to be contemptuous of other people's pain."

-James Baldwin




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## FUTURE OF PERIOPERATIVE MEDICINE

- Perioperative pain clinic
- Personalized medicine and genetic evaluation
- Cannabis
- Opioid free OR
- Virtual reality




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## QUESTIONS AND DISCUSSION

What are common frustrations you encounter?

What are resources you wish you had?

What do you wish other clinicians understood about your role in perioperative pain management?

Further discussion:

Opioid use disorder and the inpatient/surgical patient

Role of surgery for pain control



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**THANK YOU!**



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## Perioperative pain management

Preetma Kooner, MD pkkooner@u.washington.edu

### Definitions

Nociception: sensory nervous system's response to certain harmful or potentially harmful stimuli

Pain: an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage

Acute pain: proved by disease or injury, can serve a biological purpose and is usually self-limited by tissue healing/repair

Chronic pain: a disease state that outlasts normal healing time, serves no biological purpose with no end point. It often cannot be cured and instead has to be managed. Often defined as pain lasting more than 6 months

Perioperative period: the preoperative, intraoperative and post-operative period in a patient's care. This can include time from decision to go forward with surgery until end of outpatient post-surgical care

### Risk factors for difficult to control post-operative pain

- Type of surgery: abdominal (open), orthopedic, thoracic
- Age: negative correlation (the younger the patient increased risk of post op pain)
- Psychiatric conditions (anxiety is the most common predictor of post op pain).
- Catastrophizing: magnification of the level of threat caused by pain, fear or rumination about potential pain.
- Pre-existing pain: not necessarily in the area of the operation
- Opioid tolerance: patients on opioids for an extended period of time prior to surgery often require greater amounts of medication to reach therapeutic effect

### Post-operative patients with pre-existing chronic pain

- goal of pain treatment post-operatively is to reduce pain to a tolerable enough level to facilitate recovery
- Remind the patient that providers must be mindful of medication side effects and in some cases safety will limit treatment
- Do not promise the patient a particular "pain score" or to be "pain free"; using a comprehensive assessment of pain
- Educate the patient about anticipated multimodal pain care
- Consider providing information on non-pharmacologic techniques
- For patients on chronic opioid therapy the goal is to taper back opioids to preoperative doses while continuing adjuncts as is appropriate

### Opioids

- Opioids are associated with respiratory depression, sedation, nausea and vomiting, constipation, and potential for addiction and abuse

- The risk of oversedation and respiratory depression is increased with concurrent use of psychoactives, especially benzodiazepines
- Patient controlled analgesia (PCA) with an opioid is a reasonable option for those unable to tolerate oral medications or poorly controlled pain on an oral regimen
- Oral administration is the preferred route for patients who can take oral medications
- Long-acting opioid formulations should NOT be started for acute pain

Multimodal analgesia:

opioid sparing and more holistic approach to pain management

Opioids, Acetaminophen, NSAIDS, Gabapentin/Pregabalin, Antidepressants

Ketamine, Magnesium, Lidocaine, Clonidine, Dexmedetomidine

Epidurals, Peripheral Nerve Blocks

NMDA Receptor Antagonists: Ketamine, Magnesium

- Reduces central sensitization
- Opioid sparing
- Ketamine has psychogenic side effects (hallucinations, nightmares)

Lidocaine: Mechanism of Action:

- Class 1b antiarrhythmic and sodium channel blocker
- Analgesic effects
  - suppression of spontaneous impulses
    - injured nerve fibers
    - proximal dorsal root ganglion
  - Inhibition of sodium channels
  - NMDA
  - G-Protein-coupled receptors

Goal: treat pain through several modalities in order to create antinociception through multiple receptors which cascade into several known (and some yet to be elucidated) pathways in the creation of pain.

Regional techniques:

Include epidurals (thoracic, lumbar), peripheral nerve catheters (upper and lower extremities), single shot blocks

Side effects of thoracic epidurals:

System	Effect
Pulmonary	improved cough, decreased rate of pneumonia
Cardiac	Reduced adverse perioperative cardiac events reduction of the postoperative stress response and systemic sympathetic activity
Metabolic	less catecholamine release → reduced stress response  → less muscle breakdown → less insulin resistance
GI	Enhances bowel blood flow, increase in bowel motility, reduced duration of post operative ileus, vasodilation of the splanchnic vasculature