The Role of the Advanced Practice Provider in the Acute Care Setting

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Disclosures

- Speakers Bureau: Allergan, Depomed, Pernix
Objectives

- Discuss importance of managing acute pain and the role of the APP
- Explore the treatment options unique to the acute care setting
- Evaluate the use of pharmaceuticals and multimodal analgesia

Pain Classifications

<table>
<thead>
<tr>
<th>Acute</th>
<th>Chronic/Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short duration</td>
<td>Duration &gt;3 months</td>
</tr>
<tr>
<td>Recent onset</td>
<td>Persistent or recurrent</td>
</tr>
<tr>
<td>Transient</td>
<td>Outlasts protective benefit</td>
</tr>
<tr>
<td>Protective</td>
<td>Unknown causality</td>
</tr>
<tr>
<td>Known causality</td>
<td></td>
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</tbody>
</table>

Breakthrough/Flare

- Unpredictable
- Fear association
- Multicausality
# Pain Characteristics

| Nociceptive Pain | Normal processing of stimuli that damages normal tissues  
|                 | Responds to opioids  

- **Somatic**  
  - Pain arises from bone, joint, muscle, skin or connective tissue  
  - Aching, throbbing  
  - Localized

- **Visceral**  
  - Organs  
  - Deep  
  - Not well localized

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# Pain Characteristics (cont’d)

| Neuropathic Pain | Abnormal processing of sensory input by PNS or CNS  
|                 | Less responsive to opioids  

- **Centrally generated**  
  - Deafferentation pain: injury to PNS or CNS (eg, phantom limb)  
  - Sympathetically maintained pain: dysregulation of autonomic nervous system (eg, CRPS)

- **Peripherally generated**  
  - Polyneuropathies (eg, diabetic neuropathy)  
  - Mononeuropathies (eg, nerve root compression)
Pain—Impact on Society

- >60 million trauma-related pain episodes each year
- >75 million surgical procedures annually
- Undertreated acute pain result in chronic pain


Surgical Pain

- 46 million inpatient surgeries
- 53 million outpatient surgeries
- Fewer than half of postoperative patients with adequate pain relief
- 80% report postoperative pain

Pain was the most commonly reported reason for unanticipated admission or readmission.

Coley et al. 2002

Benhamou et al. 2008
Apfelbaum et al. 2003

Other Acute Hospital Pain

- 40% of over 100 million ED visits annually for acute pain (Pletcher et al. 2008)
- Pain continues to be a prevalent problem for medical inpatients (Helfand et al. 2009)
- Critical care units (Azzam et al. 2013; Kohler et al. 2016)
- Oncology, transplant, psychiatry, ...
Inadequate pain relief occurs secondary to multiple factors:
- Insufficient knowledge of the care providers
- Inadequate patient preparation
- Fear of medication side effects

Optimal management of postoperative pain requires an understanding of:
- Pathophysiology of pain
- Methods used for assessment of pain
- Awareness of the various options available for pain control

Deleterious Effects ...
- Cardio: HR, PVR, MAP = > MI, arrhythmia
- Pulmonary: splinting, cough, shallow breathing = > atelectasis, V/Q Mismatch, infection
- GI: reduced motility = > ileus, nausea/vomiting
- Renal: oliguria, urinary retention
- Coagulation: PLT aggregation, venostasis = > DVT/PE
- Immune: impaired = > infection
- Muscle: weakness, atrophy, fatigue
- Psychological: anxiety, fear, depression, satisfaction
- IMPAIRED SLEEP
- Overall: delayed recovery, slower return of function, reduced QOL, delayed discharge, increased cost

Joshi & Ogunnaike 2005; Sinatra 2010
Melatonin reduces the need for sedation in ICU patients: a randomized controlled trial.


Single-center, double-blind randomized placebo-controlled trial was carried out from July 2007 to December 2009, in a mixed medical-surgical intensive care unit of a university hospital. N = 1158 patients

- Randomized 1:1 to receive, at 8pm and midnight, melatonin (3+3mg) or placebo, from the third ICU day until ICU discharge.
- Primary outcome was total amount of enteral hydroxyzine administered
- Melatonin treated patients received lower amount of enteral hydroxyzine

Conclusion:
- Long-term enteral melatonin supplementation may result in a decreased need for sedation, with improved neurological indicators and cost reduction
- Further multicenter evaluations are required to confirm these results with different sedation protocols

Goals of Pain Management—Acute Care Setting

- Identify and address the cause of pain
- Treat acute pain aggressively; prevent chronic
- Maintain alertness and function; minimize SE
- Expedite discharge
- Excellent communication between nursing/primary and consult services/patient
- Eliminate subjective discomfort
  - Sensory and affective components of pain
- Improve outcomes
- Facilitate recovery/rehabilitation
- Minimize and appropriate management of side effects
- Cost effective therapy
**Patient Satisfaction**

- Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)

- First: comparable data on the patient’s perspective on care that allows objective and meaningful comparisons between hospitals
- Second: designed to create incentives for hospitals to improve their quality of care
- Third: enhance public accountability in health care by increasing the transparency of the quality of hospital care provided

- CMS will penalize underperforming hospitals by reducing Medicare and Medicaid payments by up to 1% in 2013 and up to 2% in 2017

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**JCAHO Pain Standards**

- Recognize the right of patients to appropriate assessment and management of their pain
- Assess pain in all patients
- Record the results of the assessment in a way that facilitates regular reassessment and follow up
- Pain is considered the “fifth” vital sign. Pain intensity ratings are recorded along with temperature, pulse, respiration, and blood pressure
- Educate relevant providers in pain assessment and management
- Determine competency in pain assessment and management during the orientation of all new clinical staff
- Establish policies and procedures that support appropriate prescription or ordering pain medications

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General Principles: Preoperatively

- History of poorly managed surgical pain
- On chronic opioid therapy
- High risk of surgical nerve damage/compromise (thoracotomy/amputation)
- History chronic pain
- Significant anxiety over postsurgical pain
- Other risk factors...

Risk Factors for Postoperative Pain

- Pain, moderate to severe, lasting more than 1 month
- Repeat surgery
- Catastrophizing, anxiety, depression
- Female gender, younger age (adults)
- Workers’ compensation
- Genetic predisposition
- Surgical approach with risk of nerve damage
- Moderate to severe postoperative pain
- Radiation therapy, neurotoxic chemotherapy

General Principles: Preoperatively

- Consider preemptive analgesia
  - Medications
  - Regional anesthesia techniques

- Setting expectations

- Detailed history of all nonopioid analgesics used, anxiolytics, cannabinoids, illicit substances, alcohol, muscle relaxants, etc

- Discharge planning
**General Principles: SHC Existing Chronic Pain**

**Give a gabapentinoid:**
- Gabapentin 1200 mg 2 hours preincision. 400-600 mg 3 times a day for 14 days postoperatively
- Pregabalin (Lyrica) 300 mg 2 hours preincision. 150 mg twice a day for 14 days following surgery

**Nonopioid analgesics:**
- Acetaminophen 1000 mg by mouth the AM of surgery, and every 8 hours after surgery
- Vitamin C 500-1000 mg for 40 days starting the AM of surgery
- Venlafaxine 37.5 mg of extended release starting the day before surgery and continuing for 10 to 14 days following surgery

**Opioids:**
- Continue current long acting opioids unchanged including the morning of surgery to prevent perioperative withdrawal; may need to increase these 25%-50% and supplement with a short acting, such as oxycodone 5-10 mg every 2 hours as needed after surgery

**Methadone:**
- Make sure they continue to get their daily dose but don’t increase daily methadone without expert consultation. These patients have up to a 40% chance of developing significant postoperative sedation or respiratory depression so monitor appropriately and consider an inpatient pain consult

**Buprenorphine (suboxone/subutex/buprenorphine):**
- Continue current dosing, using increased doses of buprenorphine for acute pain, alt. IV fentanyl. Intra-operatively can use Sufenta

**Regional anesthesia:**
- Where possible (a continuous catheter technique would be preferable if possible)
  - Intrathecal space
  - Epidural space
  - UE regional block
  - LE regional blocks
  - Paravertebral space
  - The transverse abdominis plane (TAP) block

**General Principles: SHC Existing Chronic Pain (cont’d)**

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General Principles: SHC Existing Chronic Pain (cont’d)

Infusions:
- IV ketamine: preincision intravenous bolus 0.5 mg/kg followed by intravenous infusion 0.25 mg/kg/hour
- IV lidocaine: preincision intravenous bolus 1.5 mg/kg followed by intravenous infusion 1-1.5 mg/kg/hour

Wound infiltration:
COMMUNICATION IMPERATIVE WITH ALL CARE PROVIDERS TO REDUCE INCIDENCE OF LOCAL ANESTHETIC TOXICITY
- Infiltrate ropivacaine 0.75% 20 mL in the wound
- Liposomal bupivacaine (Exparel)
- Apply 20 g of EMLA cream around the site of the wound preoperatively 5 min before surgery and daily for the first 4 days following surgery

General Principles: Perioperatively

- Preoperatively
  - Cyclooxygenase-2-selective (eg, celecoxib 400 mg)
  - Oral lorazepam or clonidine for anxiety (Blaudszun et al. 2012)

- Intraoperatively
  - IV Magnesium 40-50 mg/kg single dose (Albrecht et al. 2013)
  - IV dexamethasone at induction, 8 mg single dose (Waldron et al. 2013)
  - Dexmedetomidine (Precedex): IV, IT (Li, et al. 2016; Mohamed, et al. 2016), IV 0.2-1.4 mcg/kg/hr titrating to effect
<table>
<thead>
<tr>
<th>Surgery</th>
<th>Preoperative</th>
<th>Intraoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal Surgery</td>
<td>Thracic epidural (intrathecal morphine/lidocaine infusion/TAP block), dexamethasone, ketamine magnesium, acetaminophen &amp; NSAIDs/COX-2 selective</td>
<td>Epidural</td>
<td>Acetaminophen NSAIDs</td>
</tr>
<tr>
<td>Hernia Surgery</td>
<td>Gabapentinoids</td>
<td>PVB, wound infiltration, acetaminophen &amp; NSAIDs/COX-2 selective</td>
<td>Acetaminophen NSAIDs/COX-2 selective</td>
</tr>
<tr>
<td>Total Knee Arthroplasty</td>
<td>Gabapentinoids</td>
<td>Epidural (intrathecal morphine/lidocaine infusion/AFC/Femoral block), ketamine, acetaminophen &amp; NSAIDs/COX-2 selective</td>
<td>Epidural (adductor canal catheter)</td>
</tr>
<tr>
<td>Spine Surgery</td>
<td>Gabapentinoids</td>
<td>Epidural (intrathecal morphine), lidocaine infusion, ketamine, acetaminophen &amp; NSAIDs/COX-2 selective</td>
<td>Ketamine</td>
</tr>
<tr>
<td>Consider for all other surgeries</td>
<td>Gabapentinoids</td>
<td>Lidocaine infusion, dexamethasone, ketamine magnesium, incisional infiltration, α2 agonists, acetaminophen &amp; NSAIDs/COX-2 selective</td>
<td>Acetaminophen NSAIDs/COX-2 selective</td>
</tr>
</tbody>
</table>

Clinical Pathways @ SHC

- Formal for THA/TKA
- Informal for:
  - Thoracotomies
  - Foot and ankle
  - Shoulder and elbow
  - Complex spine
- In process:
  - Breast
  - Abdominal
  - Colorectal
- **Foot/ankle**
  - Popliteal catheter and single shot saphenous
  - PCA, short acting opioid (SAO) prn

- **Shoulder/elbow**
  - Interscalene or other brachial plexus catheter
  - PCA, SAO prn

- **Complex spine**
  - Surgeon placed epidural with mostly local anesthetic
  - PCA, SAO prn
Should We Formalize the Rest?

- It will be easy to add all ortho to the same pre/post protocols. Still need to discuss and consider the intraoperative portion

Other potential target populations?
- Major abdominal surgery
- Breast surgery
- Major trauma
- A specific pathway for patients at high risk for high intensity postsurgical pain or chronic persistent pain
  - (CRPS, other central pain, high dose preop opioids)

Multimodal Analgesia

- No longer rely on just a morphine PCA
- Nonopioid adjuncts
  - Acetaminophen PO IV
  - NSAIDs: celecoxib, ketorolac
  - Gabapentinoids: gabapentin, pregabalin
  - Antidepressants (SNRI, TCA)
  - IV lidocaine
  - IV ketamine
  - IV magnesium
- Neuraxial anesthesia and analgesia
- Peripheral neural blockade
Pharmacologic Approach to Treatment

**Peripheral Nervous System**
- Carbamazepine
- Oxcarbazepine
- TCA
- Topiramate
- Lamotrigine
- Mexiletine
- Lidocaine

**Brain**
- TCA
- SSRI
- SNRI
- Ketamine
- Amantadine
- Memantine
- Topiramate
- Opiates
- COX-2 inhibitor

**Spinal Cord**
- Gabapentin
- Pregabalin
- Oxcarbazepine
- Ketamine
- Dextromethorphan
- Memantine
- Topiramate
- Opiates
- COX-2 inhibitor

**Locally**
- COX-2 inhibitor
- Local anesthetic
- Capsaicin
- Cold

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**Multimodal Analgesia**

- **Prospective, randomized study:** postoperative pain management after lumbar decompression surgery

- **22 patients:** randomly assigned to receive either only intravenous morphine or a multimodal (celecoxib, pregabalin, extended release oxycodone) analgesic regimen

- **Patients demonstrate lower intravenous morphine requirements, better pain scores, and earlier time to solid food intake**

Garcia et al. 2013
**Multimodal Analgesia (cont’d)**

- A prospective randomized controlled trial: perioperative regimen of pregabalin and celecoxib reduces pain scores and improve physical function after total hip arthroplasty
- 80 patients: randomly assigned pregabalin (75 mg twice per day) and celecoxib (100 mg twice per day) for 14 days before THA & for 3 weeks after discharge, vs placebo (all patients received pregabalin and celecoxib 2 hours before surgery and while in the hospital)
- Lower pain scores prior to surgery
- More manageable pain in the hospital
- Quicker return of functioning at discharge

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**Multimodal Analgesia (cont’d)**

- 220 ankle fusion surgeries: multimodal analgesia reducing length of stay
  - Oxycodone ER 10 mg, pregabalin 75 mg, celecoxib 100 mg, acetaminophen 1000 mg, oxycodone 5-20 mg
  - PCA only
  - PNB and spinal did not make a difference
  - Reduction length of hospital stay by 1.7 days.
Multimodal Analgesia (cont’d)

- 85 patients undergoing complex multilevel spine fusion: (acetaminophen, NSAIDs, gabapentin, S-ketamine, dexamethasone, ondansetron, and epidural local anesthetic infusion or patient controlled analgesia with morphine)
  - Less opioids
  - Earlier mobilization and ambulation
  - Less nausea, sedation, dizziness
  - Less PACU LOS (270 vs 345 min)
  - Discharge (7 vs 9 days)

Mathiesen et al. 2013

Epidural Local Anesthetic & Orthopedic Surgery

- Decrease (31%) in DVT incidence in patients receiving epidural vs general anesthetic
- Reduction in intraoperative blood loss (29%)
- Better pain relief at rest and with mobilization following total knee replacement
- Suppression of surgical stress response
- Decrease length of hospitalization

Scott & Kehlet 1988; Sorenson & Pace 1992; Mainiche et al. 1994
Epidural or Spinal Analgesia With Local Anesthetics

<table>
<thead>
<tr>
<th>Perioperative parameter</th>
<th>Effect</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss or transfusion requirements</td>
<td>↓</td>
<td>20%-30%</td>
</tr>
<tr>
<td>Pulmonary complications (infection, embolism)</td>
<td>↓</td>
<td>30%-40%</td>
</tr>
<tr>
<td>Other thromboembolic complications</td>
<td>↓</td>
<td>40%-50%</td>
</tr>
<tr>
<td>Ileus</td>
<td>↓</td>
<td>2 days</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>↓</td>
<td>30%</td>
</tr>
</tbody>
</table>


Regional Anesthesia Techniques for Acute Pain

- Neuraxial blockade – single vs continuous
  - Epidural
  - Subarachnoid
  - Location is key
    - Lumbar epidurals limit walking

- Peripheral nerve block – single vs continuous
  - No hypotension
  - Weakness can be variable depending on local anesthetic

- Local infiltration/intra-articular
General Principles: Acute Hospitalization

Where are we concerned about pain in the hospital?
- Postsurgical/med-surg units
- Critical care regions (ICU, ED)
- Oncology
- Same-day infusion units
- Psychiatry
- Labor and delivery

Who has a role to play in pain management?
- Hospitalists
- Acute pain service
- Pharmacists
- Clinical nurse specialists
- PCP
- Case managers
General Principles: Acute Hospitalization (cont’d)

Why is it important?
- ↓ cost, ↓ suffering, ↓ morbidity, ↑ patient satisfaction

How best is pain managed?
- Identifying patients at risk for prolonged hospital course (comorbid medical history, poor coping skills, catastrophizing, etc)
- Incorporating behavioral management/setting expectations
- Interdisciplinary care/coordinated care among disciplines
- Family/team meetings
- Multimodal analgesia

Psychological preparation & postoperative outcomes for adults undergoing surgery under general anaesthesia.


- In a review and meta-analysis conducted in 1993, psychological preparation was found to be beneficial for a range of outcome variables including pain, behavioural recovery, length of stay and negative affect

- The present review examines whether psychological preparation (procedural information, sensory information, cognitive intervention, relaxation, hypnosis and emotion-focused intervention) has impact on the outcomes of postoperative pain, behavioural recovery, length of stay and negative affect

- The evidence suggested that psychological preparation may be beneficial for the outcomes postoperative pain, behavioural recovery, negative affect and length of stay, and is unlikely to be harmful. However, at present, the strength of evidence is insufficient to reach firm conclusions on the role of psychological preparation for surgery
Pain Psychology and Pain Catastrophizing in the Perioperative Setting
A Review of Impacts, Interventions, and Unmet Needs

Beth D. Darnall, PhD

Brief overview of the literature on perioperative pain psychology in terms of relevant factors and treatments. With emphasis hand surgery, hand trauma & relevant musculoskeletal surgery literature

- A meta-analysis of 15 studies and 5046 patients having musculoskeletal surgery revealed that presurgical pain catastrophizing was the strongest predictor of postsurgical chronic pain (Theunissen et al. 2012)
- Seems to be moderate evidence suggesting that presurgical pain catastrophizing and pain-related anxiety predict short-term and long-term outcomes for musculoskeletal surgery
- Screening and treating pain-related distress may have salutary effects in surgical populations, including reductions in pain and opioid use, and increased function

General Principles: Acute Hospitalization

- Multimodal analgesia
  - Oral/IV ketamine
  - IV lidocaine: anti-inflammatory, antihyperalgesic, gastrointestinal pro-peristaltic, sodium channel modulator (Eipe et al. 2016)
  - PCA (principles dose stacking, safety, patient control)
  - Nonopioid analgesics (NSAIDs, acetaminophen, antiepileptics, SNRIs)

- When?

- Preemptive: when admission is anticipated
- Aggressively during
- Discharge planning
**General Principles: Acute Hospitalization**

**Discharge planning**

- Communication at discharge, expected course/medications going home with (particularly new medications and opioids)
- About 15% of a group of Medicare patients who had not used opioid medications in the previous 2 months, filled prescriptions within a week of hospital discharge, according to a research report published online June 13 in *JAMA Internal Medicine*
- The follow-up report found suboptimal practices can be related to sharing storing and disposing of opiates as well as poor communication of information on these topics to patients
- Hospitals may be encouraged to prescribe opioids upon discharge in response to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) initiative which asks patients about satisfaction with pain control in the hospital

Jena et al. 2016
Summary

- Importance and challenge of pain management in the acute care setting
- Options unique to the acute care/hospital setting
- Use of pharmaceuticals and multimodal analgesia
- Setting patient expectations and early discharge planning
- Surgical patients
  - Target multiple analgesic receptors to reduce opioid side effects
    - Better acute patient experience; perhaps improved QOL months later as well
  - Utilize regional/neuraxial analgesia when possible
  - IV infusions of lidocaine and ketamine in patients at high risk for acute pain
    - Neuraxial contraindications
    - Large surgeries
    - Chronic pain/opioid patients

Reducing the emotional stress response

- Neuraxial
  - Intrathecal
  - Epidural

- Peripheral Nerve Block
  - Peripheral Nerve Blocks
  - Transversus Abdominis Plane Block
  - Paravertebral Block

- Local infiltration
  - Intra-articular
  - Incisional

- Systemic
  - Acetaminophen; NSAIDS/COX2-Selective; Gabapentinoids; Ketamine; Lidocaine; α2 agonists; Magnesium; Dexamethasone; Tramadol; Opioids
REFERENCES


REFERENCES (cont’d)

REFERENCES (cont’d)


REFERENCES (cont’d)

- Michelson JD, Addante RA, Charlson MD. Multimodal analgesia therapy reduces length of hospitalization in patients undergoing fusions of the ankle and hindfoot. Foot Ankle Int. 2013 Nov;34(11):1526-34.
REFERENCES (cont’d)

Pain Medicine treats more than 800 chronic pain conditions using a multi-modal approach

Non-opioid medications
- Neck pain
- Back pain
- Headache
- Chronic migraine
- Chronic facial pain
- TMJ dysfunction
- CRPS / RSD
- Abdominal pain
- Pelvic pain
- Mucosal erosional pain
- Arthritis
- Fibromyalgia
- Thoracic outlet syndrome
- Peripheral neuropathy
- Pre-operative optimization
- Chronic post-surgical pain
- Chronic CTS pain
- Postherpetic neuralgia

Psychology
- Pain is a product of the brain. It has sensory & affective components. Psychological skills help individuals modulate pain and engage in life.
- Mind-body treatments reduce depression, anxiety, and helplessness.
- Pain coping skills
- Self-hypnosis & meditation
- Free support group for individuals, family & friends
- Acceptance & commitment therapy
- Cognitive behavioral therapy

Physical therapy
- Pain therapy procedures, including exercise, tissue manipulation, and other treatments focused on maximizing function to help relieve pain.
- Therapy for fear of movement
- Home-exercise program
- Restorative movement group

Interventional procedures
- Pain Medicine specializes in more than 250 types of interventional procedures for appropriate conditions.
- Epidural steroid injections for nerve impingement
- Radiofrequency nerve ablation for neck & back pain
- For painful scars after surgery or trauma
- Cryoneuroablation for occipital headache
- Spinal cord stimulation for failed back surgery syndrome & peripheral neuropathy
- Intraspinal medication delivery systems

Complimentary & alternative
- Pain acupuncture & evidence-based supplements.

Pre-habilitation
- Optimize surgical outcomes with pre-surgery nerve & psychology treatments.

Patient-centered care
- Patient Family Advisory Council to implement care that meet the needs of patients & their families.

Precision health care
- Outcomes-based care using our open systems platform for learning health systems, CHQRI
- Collaborative Health Outcomes Information Registry

“Chronic pain affects more American adults than heart disease, cancer and diabetes combined”

Every year:
- ~100 Million Americans
- $635 Billion cost to the US
- ~44 people die in the US from overdose of prescription painkillers and many more become addicted

Opioid Tolerance
- Over time, opioids desensitize pain pathways, requiring ever higher doses & causing side effects.

Side effects of long-term opioid use
- Cognitive Dysfunction
- Sleep Disorders
- Mood Swings
- Physical Dependence & Tolerance
- Dry Mouth & Tooth Decay
- Constipation
- Inability to hiccup
- Accidental Overdose & Deaths
- Breathing & Heart Problems
- Complications & Bowel Obstruction
- Low Blood Pressure
- Low Bowel Movements
- Risk of Fracture

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