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

Theresa Mallick-Searle, MS, RN-BC, ANP-BC

Disclosures

Speakers Bureau: Allergan; Pernix
Objectives

- Discuss importance of managing acute pain and the role of the (A)ll (P)roviders involved in (P)ain Management
- Explore the treatment options unique to the acute care setting
- Evaluate the use of pharmaceuticals and multimodal analgesia

Pain Classifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>Short duration, Recent onset, Transient, Protective, Known causality</td>
</tr>
<tr>
<td>Chronic/Persistent</td>
<td>Duration &gt;3 months, Persistent or recurrent, Outlasts protective benefit, Unknown causality</td>
</tr>
<tr>
<td>Breakthrough/Flare</td>
<td>Unpredictable, Fear association, Multicausality</td>
</tr>
</tbody>
</table>
### 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

### Pain Characteristics (cont’d)

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

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

- **Peripherally generated**
  - Polyneuropathies (**diabetic neuropathy**)  
  - Mononeuropathies (**nerve root compression**)
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 (epidural/intraspinal)
- Peripheral neural blockade

Address Pain & Suffering

Opioid & Nonopioid Analgesics

Regional Anesthetic Techniques

Infusions

Increase Time to Discharge

Diagnostic/Ablative Injection Therapies, Implantables

Nurse Practitioners

Physician Assistants

Pharmacists, Case Managers, Social Workers

Clinical Nurse Specialists

Behavioral Management (sleep, anxiety, symptoms management)
Pharmacologic Approach to Treatment

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

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

Descending Inhibition
- TCA
- Opiates
- Venlafaxine
- Duloxetine

Brain
- TCA
- SSRI
- SNRI
- Tramadol
- Opiates
- COX-2 inhibitor

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

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, infusion centers . . .

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**National Pain Strategy/IOM Report: Work Groups**

- Population Research:
  Increase the quantity/quality of what is known about chronic pain within the US population

- Prevention & Care:
  Prevention of acute and chronic pain, especially primary prevention strategies, needs greater emphasis throughout the healthcare system, including delivery of long term services and support

- Disparities: Pain is more prevalent or disabling and/or care is inadequate in certain vulnerable populations

- Service Delivery & Payment:
  Most healthcare professional education programs do not give pain management adequate attention

- Professional Education & Training:
  Variations in clinical practice, individual pain therapies, and inappropriate prescribing of opioids contribute to poor quality care and increase health costs

- Public Education & Communication: The key to transformation in pain care is greater understanding
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)
 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

JCAHO Pain Standards

- Pain is considered the “fifth” vital sign. Pain intensity ratings are recorded along with temperature, pulse, respiration, and blood pressure
- Awareness: the right of patients to appropriate assessment and management of their pain
- Assess pain in all patients
- Facilitates regular reassessment and follow up
- Educate 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
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

Incidence of and Risk Factors for Chronic Opioid Use Among Opioid-Naive Patients in the Postoperative Period

Eric Sun, MD, et al.
Retrospective analysis of administrative health claims to determine the association between chronic opioid use & surgery among privately insured patients between January 1, 2001, and December 31, 2013.

Surgeries associated with increased risk of chronic opioid use:
- total knee arthroplasty
- total hip arthroplasty
- laparoscopic (open) cholecystectomy
- open appendectomy
- cesarean delivery
- simple mastectomy
- Male sex
- Age older than 50 years
- Preoperative history of drug abuse, alcohol abuse, depression, benzodiazepine use, or antidepressant use

General Principles: Preoperatively

- Consider preemptive analgesia
  - Medications, multimodal
  - Regional anesthesia techniques
- Setting expectations
- Detailed history of all nonopioid analgesics used, anxiolytics, cannabinoids, illicit substances, alcohol, muscle relaxants, etc
- Treat aggressively during hospital course
- Discharge planning
General Principles: Acute Hospitalization

- Multimodal analgesia
  - IV Lidocaine:
    - Anti-inflammatory
    - Antihyperalgesic
    - Gastrointestinal properistaltic
    - Sodium channel modulator (Eipe et al. 2016)
  - PCA (principles dose stacking, safety, patient control)
  - Nonopioid analgesics (NSAIDs, acetaminophen, antiepileptics, SNRIs)
  - Ketamine (oral/IV)
**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% to 50% and supplement with a short acting such as oxycodone 5-10 mg every 2 hours as needed after surgery

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

- **Methadone:** Make sure they continue to get their daily dose but don’t increase their daily methadone dose 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. Intraoperatively can use Sufenta

- **Regional anesthesia:**
  - Where possible (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)

- **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 minutes 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 40-50mg/kg single dose (Albrecht et al. 2013)
  - IV dexamethasone at induction, 8mg 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/hour, titrating to effect
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Gabapentinoids</th>
<th>Epidural (intrathecal morphine/lidocaine infusion/IV-PCA)</th>
<th>Acetaminophen NSAIDs COX-2 selective IV-PCA or PO opioids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal Surgery</td>
<td></td>
<td>Thoracic epidural (intrathecal morphine/TAP block), dexamethasone, ketamine, magnesium, acetaminophen &amp; NSAIDS/COX-2 selective</td>
<td>Acetaminophen NSAIDs COX-2 selective IV-PCA or PO opioids</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 IV-PCA or PO opioids</td>
</tr>
<tr>
<td>Total Knee Arthroplasty</td>
<td>Gabapentinoids</td>
<td>Epidural (intrathecal morphine/lidocaine infusion/ACC/Femoral block), acetaminophen &amp; NSAIDS/COX-2 selective</td>
<td>Epidural (adductor canal catheters) Acetaminophen NSAIDs/COX-2 selective Ketamine Gabapentinoids IV-PCA or PO opioids</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>Acetaminophen NSAIDs/COX-2 selective Ketamine Gabapentinoids IV-PCA or PO opioids</td>
</tr>
<tr>
<td>Consider for all other Surgeries</td>
<td>Gabapentinoids</td>
<td>Lidocaine infusion, dexamethasone, ketamine, magnesium, incisional infiltration, α2 agonist, acetaminophen &amp; NSAIDS/COX-2 selective</td>
<td>Acetaminophen NSAIDs/COX-2 selective Gabapentinoids IV-PCA or PO opioids</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
<table>
<thead>
<tr>
<th>Foot/ankle</th>
<th>Shoulder/elbow</th>
<th>Complex spine</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Popliteal catheter and single shot saphenous</td>
<td>- Interscalene or other brachial plexus catheter</td>
<td>- Surgeon placed epidural with mostly local anesthetic</td>
</tr>
<tr>
<td>- PCA, short acting opioid (SAO) prn</td>
<td>- PCA, SAO prn</td>
<td>- PCA, SAO prn</td>
</tr>
</tbody>
</table>
Other Potential Target Populations?

- Major abdominal surgery
  - Epidural, multimodal medications, early mobility
- Breast surgery
  - Paravertebral, multimodal medications, emotional support
- Major trauma
  - Multimodal medications, emotional support, other regional?
- Pathway for patients’ at high risk, or high intensity postsurgical pain, patients’ with existing persistent (chronic) pain

Multimodal Analgesia: Garcia et al. 2013

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

| IV Morphine | IV Morphine
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Celecoxib</td>
<td>Pregabalin</td>
</tr>
<tr>
<td>ER oxycodone</td>
<td></td>
</tr>
</tbody>
</table>

- Patients demonstrate:
  - Lower intravenous morphine requirements
  - Better pain scores
  - Earlier time to solid food intake
**Multimodal Analgesia: Carmichael et al  2013**

- A prospective randomized controlled trial: perioperative regimen of pregabalin & celecoxib reduces pain scores & improve physical function after total hip arthroplasty.

- 80 patients
- All pregabalin & celecoxib 2h before surgery

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Standard care (placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregabalin 75 mg BID &amp; celecoxib 100 mg BID</td>
<td>14 days before surgery &amp; 3 weeks after</td>
</tr>
</tbody>
</table>

- Lower pain scores prior to surgery
- More manageable pain in the hospital
- Quicker return of functioning at discharge

**Multimodal Analgesia: Michelson et al 2013**

- Ankle fusion surgeries: multimodal analgesia
- Reducing length of stay

- 220 Patients

<table>
<thead>
<tr>
<th>Treatment</th>
<th>PCA alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxycodone ER 10 mg BID</td>
<td></td>
</tr>
<tr>
<td>Pregabalin 75 mg</td>
<td></td>
</tr>
<tr>
<td>Celecoxib 100 mg</td>
<td></td>
</tr>
<tr>
<td>Acetaminophen 1000 mg q8hr</td>
<td></td>
</tr>
<tr>
<td>Oxycodone 5-20 mg PRN</td>
<td></td>
</tr>
</tbody>
</table>

— Regional techniques did not make a difference
— Reduction length of hospital stay by 1.7 days
Multimodal Analgesia: Mathiesen et al 2013

- Complex multilevel spine fusion:
  - 85 patients
  - Less opioids
  - Earlier mobilization and ambulation
  - Less nausea, sedation, dizziness
  - Less PACU LOS (270 vs 345 min)
  - Discharge (7 vs 9 days)

<table>
<thead>
<tr>
<th>Acetaminophen</th>
<th>NSAIDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabapentin</td>
<td>S-ketamine</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Ondansetron</td>
</tr>
<tr>
<td>Epidural infusion (local anesthetic)</td>
<td>PCA w/morphine</td>
</tr>
</tbody>
</table>

Epidural Local Anesthetic and Orthopedic Surgery

- ↓ DVT incidence (31%) 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; Sorensen & Pace 1992; Moiniche 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>

(Kehlet & Mogensen 1999; Joshi et al. 2008; Nguyen-La et al. 2016)

Regional Anesthesia Techniques for Acute Pain

- Neuraxial blockade—single vs continuous
  - Epidural
  - Subarachnoid/spinal
  - 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/intraarticular
General Principles: Acute Hospitalization

- **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 impact on - pain, behavioral recovery, length of stay & negative affect.

The evidence suggested that psychological preparation may be beneficial for the outcomes postoperative pain, behavioral recovery, length of stay & 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.

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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 pre-surgical 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.
My Surgical Success: A Randomized Controlled Pilot Study of a Pre-surgical Psychological Intervention

Helps patients develop a personalized pain-management plan to control the anxiety associated with anticipating surgical pain.

90 women undergoing breast cancer surgery.

My Surgical Success website
- A relaxation audiofile
- 90-minute video on pain
- Downloadable worksheets to develop a personalized action plan to reduce post-surgical pain

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 eight p.m. 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.
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 2016 in JAMA Internal Medicine.
- The follow up report found suboptimal practices:
  - “over-prescribing” and communications w/patients – not sharing, proper storing & disposal of opiates
- Hospitals may be encouraged (Discharging Prescribers) to prescribe opioids upon discharge in response to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. (Jena et al. 2016)
**CDC Guidelines Safe Opioid Prescribing**

CDC’s: Proposed 2016 Guideline for Prescribing Opioids for Chronic Pain  
https://www.federalregister.gov/articles/2015/12/14/2015-31375/proposed-2016-guideline-for-prescribing-opioids-for-chronic-pain

- Consider alternative options first
- Opioids when other options fail
- Start lowest effective dose for shortest duration
- Implementing pain treatment agreements
- Importance of monitoring (UDT, state PDMP)
- Encouraging manufactures to design abuse deterrent products

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**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
- Identifying patients at risk for poor outcomes and modifications in management
REFERENCES


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- 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.
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