Acute Pain Management

1. APM for medical students

1.1 Intro to Acute Pain Management

1.2 When should you start thinking of pain control plan for the patient?

(Multiple Choice, 10 points, unlimited attempts permitted)
1. When should you start thinking of pain control plan for the patient?

- a. At the preoperative area
- b. In the PACU
- c. On admission to the floor
- d. In the preoperative clinic visit
- e. Upon discharge

Correct Choice

<table>
<thead>
<tr>
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<td>Upon discharge</td>
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**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.
Correct (Slide Layer)

1. When should you start thinking of pain control plan for the patient?
   - a. At the preoperative area
   - b. In the operative area
   - c. On the ward floor
   - d. In the recovery area
   - e. Upon leaving

   Correct
   That's right! You selected the correct response.
   Continue

Incorrect (Slide Layer)

1. When should you start thinking of pain control plan for the patient?
   - a. At the preoperative area
   - b. In the operative area
   - c. On the ward floor
   - d. In the recovery area
   - e. Upon leaving

   Incorrect
   You did not select the correct response.
   Continue
Try Again (Slide Layer)

1. When should you start thinking of pain control plan for the patient?
   - a. At the preoperative area
   - b. In the recovery room
   - c. Once the patient is transferred to the ward
   - d. In the postoperative area
   - e. Upon admission

   Incorrect
   That is incorrect. Please try again.

1.3 Opioid receptors include all of the following except?

(Multiple Choice, 10 points, unlimited attempts permitted)

2. Opioid receptors include all of the following except?
   - a. Mu
   - b. Delta
   - c. NMDA
   - d. Kappa

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<td>a. Mu</td>
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Published by Articulate® Storyline www.articulate.com
b. Delta

X  c. NMDA

d. Kappa

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
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Correct (Slide Layer)
Incorrect (Slide Layer)

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Try Again (Slide Layer)

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   - a. Mu
   - b. Delta
   - c. NMDA
   - d. Kappa

Incorrect
That is incorrect. Please try again.
1.4 A 45 year old male s/p AKA for a non-healing diabetic ulcer and poor peripheral vascular disease is experiencing phantom limb pain. Which of the types of pain below best describes his pain?

(Multiple Choice, 10 points, unlimited attempts permitted)

3. A 45 year old male s/p AKA for a non-healing diabetic ulcer and poor peripheral vascular disease is experiencing phantom limb pain. Which of the types of pain below best describes his pain?

- a. Visceral pain
- b. Somatic pain
- c. Neuropathic pain
- d. Neural pain

Correct Choice

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3. A 45 year old male s/p AKA for a non-healing diabetic ulcer and poor peripheral vascular disease is experiencing phantom limb pain. Which of the types of pain below best describes his pain?

- a. Visceral pain
- b. Soft tissue pain
- c. Neural pain
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Incorrect (Slide Layer)

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- a. Visceral pain
- b. Soft tissue pain
- c. Neural pain
- d. Neural pain
1.5 A 65 year old male comes in for total shoulder arthroplasty for rotator cuff repair. Which of the regional blocks below is the appropriate one for this type of surgery?

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<table>
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<td>a. Supraclavicular block</td>
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<td>d. Cervical paravertebral block</td>
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**Correct (Slide Layer)**

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That's right! You selected the correct response.
1.6 A 75 year old female is having surgery tomorrow for a total hip arthroplasty and they are planning to place an epidural before the surgery. The patient is on Lovenox 40mg daily for prophylaxis. You are asked by
the orthopedic surgeon to write the order to hold Heparin. The ASRA guidelines require that the heparin be held for how long before an epidural placement?

(Multiple Choice, 10 points, unlimited attempts permitted)

5. A 75 year old female is having surgery tomorrow for a total hip arthroplasty and they are planning to place an epidural before the surgery. The patient is on Lovenox 40mg daily for prophylaxis. You are asked by the orthopedic surgeon to write the order to hold Heparin. The ASRA guidelines require that the heparin be held for how long before an epidural placement?

- a. 2 hours
- b. 8 hours
- c. 24 hours
- d. 12 hours

Feedback when correct:
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Correct (Slide Layer)

- a. 2 hours
- b. 8 hours
- c. 24 hours
- d. 12 hours

Incorrect (Slide Layer)

- a. 2 hours
- b. 8 hours
- c. 24 hours
- d. 12 hours
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- a. 2 days
- b. 8 hours
- c. 24 hours
- d. 12 hours

1.7 Table of Contents

Table of Contents

- What is pain
- Types of pain
- Multimodal pain management
- Opioids and pharmacology
- Regional anesthesia
- Local anesthetics
- Anticoagulation and neuraxial techniques
1.8 Definition of pain

Definition of Pain

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”

1.9 Why treat pain

Why Treat Pain?

- Patient satisfaction and PACU length of stay
- Increases morbidity and mortality
- Stress response reduces healing
- Immunosuppressive
- Hypercoagulability
- Participation in PT and daily activities
- Chronic pain
1.10 Types of pain

Types of Pain

Somatic Pain
- Nociceptive pain
- Damage to tissue
- Arises from bone, skin, muscle, joints, ligaments
- Sharp pain
- Patient can localize

Visceral Pain
- Diffuse
- Difficult for patient to localize
- Referred pain
- Arises from damage to viscera, body cavities or internal organs

1.11 Neuropathic pain

Neuropathic Pain
- Pain distribution along nerve and due to:
  - Mechanical trauma, ischemia, sympathetic discharge, etc
- Described as:
  - Burning, lancinating, electric, tingling
- Results from injury to a nerve
1.12 Neuropathic pain

Neuropathic Pain

- Neuropathic pain can come in waves or be constant
- Some examples:
  - Phantom limb pain
  - Diabetic neuropathy
  - Trigeminal neuralgia
  - Post-herpetic neuralgia

1.13 A 24 year old female presents to the ER with diffuse abdominal pain that started 8 hours ago. A CT of the abdomen shows acute appendicitis. What type of pain is being experienced by this patient?

(Multiple Choice, 10 points, unlimited attempts permitted)

6. A 24 year old female presents to the ER with diffuse abdominal pain that started 8 hours ago. A CT of the abdomen shows acute appendicitis. What type of pain is being experienced by this patient?

- a. Neuropathic
- b. Sympathetic
- c. Somatic
- d. Non-nociceptive
- e. Visceral
- f. Radicular
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- b. Sympathetic
- c. Somatic
- d. Non-nociceptive
- e. Visceral
- f. Radicular

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That's right! You selected the correct response.

Continue
6. A 24 year old female presents to the ER with diffuse abdominal pain that started 8 hours ago. A CT of the abdomen shows acute appendicitis. What type of pain is being experienced by this patient?

- a. Neural
- b. Symptomatic
- c. Somatic
- d. Nociceptive
- e. Visceral
- f. Radicular

Incorrect

You did not select the correct response.

Try Again

That is incorrect. Please try again.

Try Again
1.14 Modes of analgesia

Modes of Analgesia

- Acetaminophen
- NSAIDs
- NMDA antagonists
- Neuropathic agents
- Anxiolytics
- Antidepressants
- Cannabinoids
- Muscle relaxants

1.15 Acetaminophen

Acetaminophen

- Used for mild to moderate pain
- Mechanism of Action: unknown; possible actions COX inhibitor, NMDA and opioid receptor
- PO, IV, PR
- Dose:
  - 650mg-1gram Q6 scheduled (not to exceed 4 grams/day)
- Pros
  - Antipyretic, no sedation, no nausea/vomiting, no respiratory depression, and PO/PR/IV
- Cons
  - No anti-inflammatory effects, caution with severe liver and kidney disease
1.16 NSAIDs

**NSAIDs**

- Mild to moderate pain
- MOA: COX inhibitors
- Great for joint, bone, muscle or uterine pain
- Example: ketorolac 30mg IV is comparable to 10mg of IV morphine
- SE: gastric ulcers, platelet dysfunction, renal dysfunction

1.17 NMDA antagonists

**NMDA antagonists**

- Adjuncts for the treatment of acute and chronic pain
  - Attenuates hyperalgesia and minimizes opioid tolerance
- Examples:
  - Ketamine
    - Can be given IV, IM or PO
    - Minimal hemodynamic effects at low doses and no respiratory depression
    - Benzodiazepines recommended given euphoria side effect
  - Methadone
    - PO and IV formulation
    - Also has mu opioid agonist effect
  - Dextromethorphan
    - PO, IV or IM formulation
    - Can cause nausea/vomiting and hypotension/tachycardia with high doses

1.18 A 35 year old male involved in MVC is in the ICU with multiple rib fractures with moderate pain with good effort on incentive spirometry
wanting pain relieve that is not opioids due to previous drug abuse problems. Which of the following is the best choice?

(Multiple Choice, 10 points, unlimited attempts permitted)

7. A 35 year old male involved in MVC is in the ICU with multiple rib fractures with moderate pain with good effort on incentive spirometry wanting pain relieve that is not opioids due to previous drug abuse problems. Which of the following is the best choice?

- a. Ketamine IV
- b. Acetaminophen IV
- c. Dilaudid IV
- d. Percocet PO

Feedback when correct:
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7. A 35 year old male involved in MVC is in the ICU with multiple rib fractures with moderate pain with good effort on incentive spirometry wanting pain relieve that is not opioids due to previous drug abuse problems. Which:

- a. Ketorolac
- b. Acetaminophen
- c. Dilaudid
- d. Percocet PO

Correct (Slide Layer)

Incorrect (Slide Layer)
Try Again (Slide Layer)

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- c. Dilaudid
- d. Percocet PO

Incorrect.
That is incorrect. Please try again.

1.19 Neuropathic agents

Neuropathic Agents

- Gabapentin and Pregabalin are the most popular
- Used for neuropathic pain
- Gabapentin 300-600mg for acute pain
- SE: sedation, dizziness, confusion
1.20 Antidepressants

Antidepressants

Antidepressants such as tricyclic antidepressants, SSRI SNRI have also been used as adjuncts for neuropathic pain and chronic pain patients

1.21 Anxiolytics and Muscle Relaxants

Anxiolytics and Muscle Relaxants

- Anxiety is an important component of pain perception
  - Xanax, Valium, Versed, etc
  - No analgesic effects
- Muscle relaxants help with spasm related pain
  - Flexeril, Baclofen, etc
- Both types of drugs cause sedation

1.22 A 58 year old male presents to the outpatient surgical center for right knee arthroscopy and osteotomy with a medical history significant for morbidly obese with BMI of 70 and severe OSA. Post-operative his pain is
5/10 and you receive a call from PACU for pain medication orders. Which is the best choice?

(Multiple Choice, 10 points, unlimited attempts permitted)

8. A 58 year old male presents to the outpatient surgical center for right knee arthroscopy and osteotomy with a medical history significant for morbidly obese with BMI of 70 and severe OSA. Post-operative his pain is 5/10 and you receive a call from PACU for pain medication orders. Which is the best choice?

- a. Morphine IV
- b. Percocet PO
- c. Ketorolac IV
- d. Hydromorphone IV
- e. Valium PO

Correct Choice

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- c. Ketorolac
- d. Hydromorphone IV
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Correct (Slide Layer)

Incorrect (Slide Layer)
Try Again (Slide Layer)

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   b. Percocet
   c. Ketorolac
   d. Hydromorphone IV
   e. Valium PO

Incorrect
That is incorrect. Please try again.

1.23 Opioids

Opioids

- Mainstay treatment for moderate to severe pain
- Can be administered IV, PO, epidural, spinal
- Three opioid receptors
  - Mu receptor
    - Mu1: analgesia, euphoria
    - Mu2: respiratory depression, pruritis, prosactin release, dependence, anorexia, sedation
  - Kappa
    - Spinal analgesia, sedation, dyspnea, dependence, dysphoria, and mild respiratory depression
  - Delta
    - Psychomimetic and dysphoric effects
1.24 Side Effects

Side Effects

- Respiratory Depression
  - Caution with OSA
- Nausea, vomiting
- Muscle rigidity and myoclonus
- Reduces cough reflex
- Sedation
- Constipation
- Delayed gastric emptying
- Urinary retention
- Pruritis
- Opioid-induced hyperalgesia
- Tolerance
- Dependence

1.25 The opioid side effect of pruritis is associated with which of the following receptors?

(Multiple Choice, 10 points, unlimited attempts permitted)

9. The opioid side effect of pruritis is associated with which of the following receptors?

  - a. Delta
  - b. Mu1
  - c. Kappa
  - d. Mu2
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**Correct (Slide Layer)**

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9. The opioid side effect of pruritis is associated with which of the following receptors?

- a. Delta
- b. Mu
- c. Kappa
- d. M

Incorrect (Slide Layer)

Incorrect.
You did not select the correct response.

Try Again (Slide Layer)

Incorrect.
That is incorrect. Please try again.

Try Again.
1.26 Repertoire of opiates

Repertoire of opiates

- PO
  - Short acting: hydrocodone, morphine, oxycodone, dilaudid...
  - Long acting: oxycotin, XR morphine, methadone...
- IV
  - Short acting: meperidine, morphine, hydromorphone, fentanyl...
  - Long acting: methadone...
- Transdermal
  - Long-acting: fentanyl patch...

1.27 PCA management

PCA Management

- Loading dose needed (2.4 mg IV morphine, 0.5 to 1 mg IV dilaudid, may repeat if minimal effect)
- PCA
  - Dose: starting 1mg morphine or 0.2mg hydromorphone
  - Time interval: every 6 to 15 min
  - Lockout: starting 10mg morphine/h or 2mg hydromorphone/h
- May escalate PCA dose every 2 to 3 hours if patient with severe pain still
- Be extremely cautious with basal rates as these bypass the safety of required patient interaction and frequently lead to overdose
1.28 Opiate conversion

Opiate Conversion

- Conversion charts available online:
  - http://www.globalph.com/narcoticonv.htm
- Adjust for variability in cross tolerance
- 30-50% decrease in dose

1.29 Opioids can have multiple side effects, from the list below, which one is NOT a side effect?

(Multiple Choice, 10 points, unlimited attempts permitted)

10. Opioids can have multiple side effects, from the list below, which one is NOT a side effect?

- a. Nausea
- b. Pruritis
- c. Respiratory depression
- d. Loose stools
- e. Sedation
- f. Urinary retention
Correct Choice

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**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.

**Correct (Slide Layer)**
Incorrect (Slide Layer)

10. Opioids can have multiple side effects, from the list below, which one is NOT a side effect?

- a. Nausea
- b. Pruritis
- c. Respiratory depression
- d. Look
- e. Sedation
- f. Urinary retention

Incorrect

You did not select the correct response.

Try Again (Slide Layer)

10. Opioids can have multiple side effects, from the list below, which one is NOT a side effect?

- a. Nausea
- b. Pruritis
- c. Respiratory depression
- d. Look
- e. Sedation
- f. Urinary retention

Incorrect

That is incorrect. Please try again.

Try Again
1.30 Regional Anesthesia

Regional Anesthesia

- Local anesthetic deposition to the nerve distribution of the area in question.
- Provides improved analgesia, can be used as sole anesthetic in some cases, minimizes opiate consumption and is non-sedating.
- Block can be either single shot lasting 12-18 hours or continuous catheter that can remain in situ for 5-7 days.

1.31 Untitled Slide

- Orthopedic surgeries
  - Extremity blocks
    - Brachial plexus blocks for distal upper extremity
    - Lumbar/Sacral plexus blocks for lower extremity (femoral/Sciatic)
  - Truncal surgeries
    - Thoracic epidurals
    - Lumbar epidurals
1.32 Untitled Slide

- TAP (transversus abdominis plane) for cutaneous infraumbilical surgeries
  - Hysterectomy, C-section, inguinal hernia

1.33 Paravertebral blocks

Paravertebral Blocks

Examples:
- Cervical (shoulder surgery)
- Thoracic (thoracotomy)
- Lumbar (Hip Arthroplasty)
1.34 Epidural Analgesia

- Epidural placement depending on dermatome distribution of the surgery
- Local anesthetic
  - Motor blockade
  - Sympathectomy
- Narcotic
  - No motor blockade
  - No sympathectomy
  - Pruritus, nausea, urinary retention

1.35 A 24 year old male comes to the ER with an open distal radius fracture after an accident on his motorcycle. The patient is in severe pain. After discussion with the patient a regional block is offered. Which one of the following blocks is indicated?

(Multiple Choice, 10 points, unlimited attempts permitted)

11. A 24 year old male comes to the ER with an open distal radius fracture after an accident on his motorcycle. The patient is in severe pain. After discussion with the patient a regional block is offered. Which one of the following blocks is indicated?

- a. Femoral nerve block
- b. L1-2 epidural
- c. Sepracavitary (brachial plexus block)
- d. Sciatic nerve block
- e. T4-5 epidural
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b. L 1-2 epidural
X c. Supraclavicular (brachial plexus block)
d. Sciatic nerve block
e. T4-5 epidural

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Continue
Correct (Slide Layer)

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- b. L1
- c. Supraclavicular
- d. Sciatic nerve block
- e. T4-5 epidural

Incorrect (Slide Layer)

In correct
You did not select the correct response.

Try Again (Slide Layer)

In correct
That is incorrect. Please try again.

Try Again
1.36 Local anesthetics

Local Anesthetics

- Block voltage gated Na channels
- Non-ionized form penetrates the membrane

1.37 Classification

Classification

Amides
- Bupivacaine (Marcaine)
- Ropivacaine (Naropine)
- Etidocaine (Duranest)
- Lidocaine (Xylocaine)
- Mepivacaine (Carbocaine)
- Prilocaine (Citanest)

Esters
- Chloroprocaine
- Cocaine
- Procaine
- Tetracaine

All primarily metabolized by liver

All metabolized by pseudocholinesterase (PABA metabolite)
1.38 Classification

**Classification**

<table>
<thead>
<tr>
<th>Extended duration (5-24 hours)</th>
<th>Intermediate/short duration (2-5 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bupivacaine</td>
<td>• Lidocaine</td>
</tr>
<tr>
<td>• L-bupivacaine</td>
<td>• Mepivacaine</td>
</tr>
<tr>
<td>• Ropivacaine</td>
<td>• Chlorprocaine</td>
</tr>
<tr>
<td>• Tetracaine</td>
<td></td>
</tr>
</tbody>
</table>

Duration of local anesthetic depends on the nerve anesthetized and its blood flow

1.39 A 43 year old female with known pseudocholinesterase deficiency comes in to the hospital for total knee arthroplasty. Which of the following local anesthetics should be avoided?

(Multiple Choice, 10 points, unlimited attempts permitted)

12. A 43 year old female with known pseudocholinesterase deficiency comes in to the hospital for total knee arthroplasty. Which of the following local anesthetics should be avoided?

- a. Ropivacaine
- b. Chlorprocaine
- c. Bupivacaine
- d. Lidocaine
- e. Mepivacaine
Correct Choice

- a. Ropivicaine
- b. Chlorprocaine [X]
- c. Bupivicaine
- d. Lidocaine
- e. Mepivicaine

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
You did not select the correct response.

Correct (Slide Layer)

12. A 43 year old female with known pseudocholinesterase deficiency comes in to the hospital for total knee arthroplasty. Which of the following local anesthetics should be avoided?

- a. Ropivicaine
- b. Chlorprocaine [X]
- c. Bupivicaine
- d. Lidocaine
- e. Mepivicaine

That's right! You selected the correct response.

Continue
12. A 43 year old female with known pseudocholinesterase deficiency comes in to the hospital for total knee arthroplasty. Which of the following local anesthetics should be avoided?

- a. Ropivacaine
- b. Chloroprocaine
- c. Bupivacaine
- d. Lidocaine
- e. Mepivacaine

You did not select the correct response.

Try Again

That is incorrect. Please try again.

Try Again
### 1.40 Anticoagulation medications

#### Anticoagulation Medications

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time off before placement or removal of epidural/spinal</th>
<th>Time to restart agent after epidural/spinal placement or removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfractionated Heparin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous infusion</td>
<td>4 hours</td>
<td>1 hour</td>
</tr>
<tr>
<td>Heparin 5000 u SQ, BID</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>SQ &gt; 5000 u BID (ex Q8)</td>
<td>8 hours</td>
<td>1 hour</td>
</tr>
<tr>
<td>LMWH (Lovenox)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q 24 h</td>
<td>12 hours</td>
<td>8 hours</td>
</tr>
<tr>
<td>Q 12 h</td>
<td>24 hours</td>
<td>Contraindicated</td>
</tr>
<tr>
<td>Warfarin</td>
<td>5 days and normal INR</td>
<td>Immediately</td>
</tr>
</tbody>
</table>

---

### 1.41 Anticoagulation medications

#### Anticoagulation Medications

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time off before placement or removal of epidural/spinal</th>
<th>Time to restart agent after epidural/spinal placement or removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiplatelet agents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSAID</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Aspirin</td>
<td>No restrictions</td>
<td>No restrictions</td>
</tr>
<tr>
<td>Ticlopidine (Ticlid)</td>
<td>14 days</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Clopidogrel (Plavix)</td>
<td>7 days</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Abciximab (ReoPro)</td>
<td>48 hours</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Eptifibatide (Integris)</td>
<td>8 hours</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Thrombin inhibitors</td>
<td>Contraindicated</td>
<td>N/A</td>
</tr>
</tbody>
</table>
1.42 New anticoagulation drugs

New Anticoagulation Drugs

- Factor Xa inhibitor
  - Fondaparinux (Arixtra), half life-21 hours
  - Rivaroxiban (Xarelto), half life-9 hours
  - Apixaban (Eliquis), half life-15 hours

- Direct thrombin inhibitors:
  - Lepirudin (Refludan), half life-1.3 hours
  - Bivalirudin (Angiomax), half life-25 minutes
  - Dabigatran (Pradaxa), half life-17 hours
  - Argatroban, half life-9 hours

No official recommendations by ASRA for neuraxial techniques on patients on these medications, therefore one must go by half life of the medications.

1.43 Herbal medications

Herbal Medications

- Garlic, ginger, feverfew: inhibit platelet aggregation
- Ginseng: antiplatelet components
- Alfalfa, chamomile, horse chestnut, ginseng: contain a coumadin component
- Vitamin E: reduces platelet thromboxane production
- Gingko: inhibits platelet activating factor

Patients advised to stop herbal products 5-7 days before surgery.
1.44 Untitled Slide

Thank you for completing the content portion of this module. You must now complete a 10 question quiz and score a minimum 80% in order to pass.

Please click Next to continue.

1.45 Which of the following is not a known side effect of opioids?

(Multiple Choice, 10 points, 1 attempt permitted)

<table>
<thead>
<tr>
<th>Correct Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Respiratory depression</td>
</tr>
</tbody>
</table>
b. Urinary retention

c. Improved immune function

d. Nausea/vomiting

e. Pruritis

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
You did not select the correct response.

Correct (Slide Layer)
1.46 Which of the following agents can decrease opioid-induced hyperalgesia and minimize opioid tolerance?

(Multiple Choice, 10 points, 1 attempt permitted)
<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Midazolam</td>
<td></td>
</tr>
<tr>
<td>b. Acetaminophen</td>
<td></td>
</tr>
<tr>
<td>c. Dexamethasone</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>d. Ketamine</td>
</tr>
<tr>
<td>e. Celecoxib</td>
<td></td>
</tr>
</tbody>
</table>

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
You did not select the correct response.

Correct (Slide Layer)
Incorrect (Slide Layer)

2. Which of the following agents can decrease opioid-induced hyperalgesia and minimize opioid tolerance?

- a. Midazolam
- b. Acebutolol
- c. Doxepin
- d. Ketamine
- e. Celecoxib

Correct Choice

1.47 Which of the following agents has no analgesic effects?

(Multiple Choice, 10 points, 1 attempt permitted)

3. Which of the following agents has no analgesic effects?

- a. Midazolam
- b. Ketorolac
- c. Acetaminophen
- d. Gabapentin
- e. Ketamine
- f. Tramadol

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>a. Midazolam</td>
</tr>
</tbody>
</table>
b. Keterolac

c. Acetaminophen

d. Gabapentin

e. Ketamine

f. Tramadol

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
You did not select the correct response.

Correct (Slide Layer)
Incorrect (Slide Layer)

1.48 Which level epidural would be most appropriate for cystectomy (infra-umbilical incision) surgery?

(Multiple Choice, 10 points, 1 attempt permitted)
<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. T5-6</td>
</tr>
<tr>
<td></td>
<td>b. T7-8</td>
</tr>
<tr>
<td>X</td>
<td>c. T10-12</td>
</tr>
<tr>
<td></td>
<td>d. L1-2</td>
</tr>
<tr>
<td></td>
<td>e. L4-5</td>
</tr>
</tbody>
</table>

**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.

**Correct (Slide Layer)**

4. Which level epidural would be most appropriate for cystectomy (infra-umbilical incision) surgery?

- a. T5-6
- b. T7-8
- c. T10-12
- d. L1-2
- e. L4-5

Correct

That's right! You selected the correct response.
1.49 Which of these herbal medications has NO anti-coagulation effects?

(Multiple Choice, 10 points, 1 attempt permitted)

<table>
<thead>
<tr>
<th>Correct Choice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Ginseng</td>
<td></td>
</tr>
</tbody>
</table>
Feedback when correct:

That's right! You selected the correct response.

Feedback when incorrect:

You did not select the correct response.

Correct (Slide Layer)
1.50 A 68 year old female s/p MVC with femoral head fracture is posted for the OR. The regional anesthesia team is planning to place an epidural for intra and post op pain control. The patient is on Plavix for coronary artery stents. What are the ASRA guidelines regarding stopping Plavix before a neuraxial technique?

(Multiple Choice, 10 points, 1 attempt permitted)
6. A 68 year old female s/p MVC with femoral head fracture is posted for the OR. The regional anesthesia team is planning to place an epidural for intra and post op pain control. The patient is on Plavix for coronary artery stents. What are the ASRA guidelines regarding stopping Plavix before a neuraxial technique?

<table>
<thead>
<tr>
<th>Correct Choice</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>a. 7 days</td>
</tr>
<tr>
<td></td>
<td>b. 1 month</td>
</tr>
<tr>
<td></td>
<td>c. 2 days</td>
</tr>
<tr>
<td></td>
<td>d. 12 hours</td>
</tr>
<tr>
<td></td>
<td>e. 6 months</td>
</tr>
</tbody>
</table>

**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.
6. A 68 year old female s/p MVC with femoral head fracture is posted for the OR. The regional anesthesia team is planning to place an epidural for intra and post op pain control. The patient is on Plavix for coronary artery disease. What is the correct time regarding stopping Plavix? 

- a. 7 days
- b. 1 month
- c. 2 days
- d. 12 hours
- e. 6 months

Correct (Slide Layer)

Incorrect (Slide Layer)
1.51 You are requested to order a morphine PCA for a 23 year old male s/p MVC with multiple orthopedic fractures. Which of the ordered below is an appropriate starting dose?

(Multiple Choice, 10 points, 1 attempt permitted)

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. 0.1mg/6 minutes/1 mg max/hour</td>
</tr>
<tr>
<td></td>
<td>b. 10mg/6 minutes/100mg max/hour</td>
</tr>
<tr>
<td>X</td>
<td>c. 1mg/6 minutes/10mg max/hour</td>
</tr>
<tr>
<td></td>
<td>d. 0.05mg/6 minutes/0.5mg max/hour</td>
</tr>
</tbody>
</table>

Feedback when correct:
That's right! You selected the correct response.

Feedback when incorrect:
You did not select the correct response.
Correct (Slide Layer)

7. You are requested to order a morphine PCA for a 23 year old male s/p MVC with multiple orthopedic fractures. Which of the ordered below is an appropriate starting dose?

- a. 0.1mg
- b. 10mg
- c. 1mg
- d. 0.05mg

Correct
That's right! You selected the correct response.

Incorrect (Slide Layer)

7. You are requested to order a morphine PCA for a 23 year old male s/p MVC with multiple orthopedic fractures. Which of the ordered below is an appropriate starting dose?

- a. 0.1mg
- b. 10mg
- c. 1mg
- d. 0.05mg

Incorrect
You did not select the correct response.

1.52 What is the mechanism of action of local anesthetics?

(Multiple Choice, 10 points, 1 attempt permitted)
8. What is the mechanism of action of local anesthetics?

- a. NMDA receptor agonist
- b. Na+/K+ ATPase receptor
- c. Voltage gated Na+ channel blocker
- d. V2 receptor
- e. Na+/Ca2+ receptor

**Correct Choice**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>NMDA receptor agonist</td>
</tr>
<tr>
<td>b.</td>
<td>Na+/K+ ATPase receptor</td>
</tr>
</tbody>
</table>
| c. | Voltage gated Na+ channel blocker | **X**
| d. | V2 receptor |
| e. | Na+/Ca2+ receptor |

**Feedback when correct:**
That's right! You selected the correct response.

**Feedback when incorrect:**
You did not select the correct response.
1.53 All of the local anesthetics are amides except?

(Multiple Choice, 10 points, 1 attempt permitted)
9. All of the local anesthetics are amides except?

- a. Lidocaine
- b. Ropivacaine
- c. Bupivacaine
- d. Procaine
- e. Mepivacaine

**Correct Choice**

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Lidocaine</td>
</tr>
<tr>
<td></td>
<td>b. Ropivacaine</td>
</tr>
<tr>
<td></td>
<td>c. Bupivacaine</td>
</tr>
<tr>
<td>X</td>
<td>d. Procaine</td>
</tr>
<tr>
<td></td>
<td>e. Mepivacaine</td>
</tr>
</tbody>
</table>

**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.
1.54 Which of the following medications is considered a long-acting opioid?

(Multiple Choice, 10 points, 1 attempt permitted)
10. Which of the following medications is considered a long-acting opioid?

- a. Fentanyl IV
- b. Oxycontin®
- c. Dilaudid®
- d. Oxycodone

**Correct Choice**

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Fentanyl IV</td>
</tr>
<tr>
<td>X</td>
<td>b. Oxycontin®</td>
</tr>
<tr>
<td></td>
<td>c. Dilaudid®</td>
</tr>
<tr>
<td></td>
<td>d. Oxycodone</td>
</tr>
</tbody>
</table>

**Feedback when correct:**

That's right! You selected the correct response.

**Feedback when incorrect:**

You did not select the correct response.
Correct (Slide Layer)

10. Which of the following medications is considered a long-acting opioid?
   a. Fentanyl IV
   b. OxyContin
   c. Dilaudid
   d. OxyContin

   Correct
   That's right! You selected the correct response.
   Continue

Incorrect (Slide Layer)

10. Which of the following medications is considered a long-acting opioid?
   a. Fentanyl IV
   b. OxyContin
   c. Dilaudid
   d. OxyContin

   Incorrect
   You did not select the correct response.
   Continue

1.55 Results Slide

(Results Slide, 0 points, 1 attempt permitted)
<table>
<thead>
<tr>
<th>Results for</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.45 Which of the following is not a known side effect of opioids?</td>
<td></td>
</tr>
<tr>
<td>1.46 Which of the following agents can decrease opioid-induced hyperalgesia and minimize opioid tolerance?</td>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
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<tr>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>
1.52 What is the mechanism of action of local anesthetics?

1.53 All of the local anesthetics are amides except?

1.54 Which of the following medications is considered a long-acting opioid?
Failure (Slide Layer)

Results

Your Score: [Your score here]
(Pass score: [Pass score here])

Passing Score: [Passing score here]
(Pass score: [Pass score here])

Result:

✗ You did not pass.

Retry Quiz  Exit Module