Pain Management Essentials
Objectives

• RN learners will be able to:
  • Apply the principles of pain assessment and risk factors
  • Apply the principles of pain pharmacotherapy to a range of hospitalized patients
  • Develop advanced skills and confidence in assessing and treating patients’ pain
  • Appreciate the importance of follow-up assessment of patients’ pain management
  • Optional (if time): Discuss the principles of pharmacotherapeutics in developing the treatment plan
Pain Definitions

• “Unpleasant sensory and emotional experience associated with actual or potential tissue damage.” (Merskey, 1986)

• “Pain is what the person says it is, existing whenever the person says it does.” (McCaffery, 1986)
Pain Assessment and Risk Factors
Types of Pain

- Nociceptive
  - Somatic
  - Visceral
- Neuropathic
- Peripheral
- Centrally mediated
- Sympathetically maintained
- Others:
  - Incident pain: pain generated by movement or activity: turning, sitting, walking, etc.
  - End of dose pain: pain that increases prior to the next scheduled dose
Characteristics

• Acute
  • Lasting less than six months
  • Etiology is known

• Chronic
  • Usually lasts longer than three months
  • Etiology and progression may be unclear, making the patient appear a “poor historian”.
  • Often accompanied by depression, fatigue
Personal and Psychosocial Factors

• Patient Fears
  • Fear and misunderstanding of concepts surrounding medication administration; analgesic tolerance and addiction
  • Fear of pain is a sign of progressive disease, resultant denial and unwillingness to treat pain adequately

• Provider Fears
  • Misunderstanding of addiction (psychologic dependence) analgesic tolerance and physical dependence
  • Reluctance to prescribe
  • Inadequate or poorly interpreted analgesic management education
Clinical Pain Assessment

- Location, intensity, quality and temporality
- Affective or emotional dimension
- Behavioral
- Cognitive and mental dimension
- Social dynamics
Clinical Pain Assessment

• Diagnosis
• Review H & P
• Scans, X Rays, CTs, MRIs, tumor markers
• Physical Exam, include neuro, muscle tone
• Pain behaviors, vital signs
• Assess for alterations in:
  • VS, respiratory status, CNS changes, CV, GI, GU, cutaneous reactions, diaphoresis, flushing and/or pruritus
Special Population Pain Assessment

• Geriatric patient risks
  • Previous history
  • May need to start at lower doses and slowly titrate due to potential prolonged half-life from less efficient excretion
  • Use appropriate pain scales
  • Sensory deficits and mentation
  • Financial concerns; may be less compliant d/t cost

• Pediatric population
  • Assess developmental age
  • Appropriate pain scales
  • Dosing calculated by weight
  • Children with disabilities and poor communication
Special Population Pain Assessment

• Developmentally Delayed Adults
  • May not be able to communicate (therefore...)
    • At risk for under treatment of pain
  • Pain assessment is very much related to the individual’s baseline.
    • A Pre-assessment with the patient’s caregiver and provider may be extremely valuable (ex. DisDat).
    • How does the individual normally appear?
    • Are there any particular indicators they display.
      • Self-distraction such as rocking, fidgeting, repetitive movements.
      • Anger
      • Withdrawal
  • As with geriatrics, pain may contribute to or worsen confusion.
## Criteria to Use Pain Assessment Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wong Baker Face Scale</td>
<td>Children 3-18</td>
</tr>
<tr>
<td>N-PASS scale</td>
<td>Premature neonates and infants up to 2 months old</td>
</tr>
<tr>
<td>rFLACC scale</td>
<td>Children ages 3-7.</td>
</tr>
<tr>
<td>Verbal Descriptors</td>
<td>Pediatric through adult</td>
</tr>
<tr>
<td>UCLA Behavioral Pain Scale</td>
<td>Pediatric through adult, a variation on numeric scale that equates pain with functional status.</td>
</tr>
<tr>
<td>PAIN AD</td>
<td>Patients with advanced dementia and End of Life</td>
</tr>
<tr>
<td>CPOT</td>
<td>Critical Care Pain Observation Tool, used with nonverbal patients primarily in ICU.</td>
</tr>
<tr>
<td>UCLA Functional Pain Scale</td>
<td>A variation of 1-10 for verbal adults</td>
</tr>
<tr>
<td>Not Well Controlled</td>
<td>Well Controlled</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td><strong>Mild</strong></td>
</tr>
<tr>
<td>Unable to do normal activities</td>
<td></td>
</tr>
<tr>
<td>- hard or unable to think, talk, or move or do activities (examples: bathing, dressing, eating)</td>
<td></td>
</tr>
<tr>
<td>- hard or unable to enjoy life because of pain</td>
<td></td>
</tr>
<tr>
<td>10 😞</td>
<td>3 😐</td>
</tr>
<tr>
<td>Worst Possible</td>
<td>Uncomfortable</td>
</tr>
<tr>
<td>9 😞</td>
<td>2 😐</td>
</tr>
<tr>
<td>Severe</td>
<td>Mild</td>
</tr>
<tr>
<td>8 😞</td>
<td>1 😐</td>
</tr>
<tr>
<td>Intense</td>
<td>Moderate</td>
</tr>
<tr>
<td>7 😞</td>
<td>0 😄</td>
</tr>
<tr>
<td>Strong</td>
<td>Uncomfortable</td>
</tr>
<tr>
<td>6 😞</td>
<td>3 😐</td>
</tr>
<tr>
<td>Nagging / Distressing</td>
<td>Uncomfortable</td>
</tr>
<tr>
<td>5 😞</td>
<td>2 😐</td>
</tr>
<tr>
<td>Annoying / Distracting</td>
<td>Mild</td>
</tr>
<tr>
<td>4 😞</td>
<td>1 😐</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>3 😐</td>
<td>2 😐</td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>Mild</td>
</tr>
<tr>
<td>2 😐</td>
<td>1 😐</td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>Mild</td>
</tr>
<tr>
<td>1 😐</td>
<td>0 😄</td>
</tr>
<tr>
<td>No Pain</td>
<td>No Pain</td>
</tr>
</tbody>
</table>

*This pain scale is intended to be used with verbal/adult patients. It has been adapted with permission from Geisinger's Pain Scale.*
Planning and Implementation Interventions

• Pharmacologic/Non pharmacologic Management
  • Treat the underlying cause or major cause of pain
  • Distinguish and manage breakthrough pain

• Pharmacologic:
  • Long Acting Analgesics: ATC
  • Breakthrough pain adjustments
    • PO: 5%-20% of 24 hour dose
    • Parenteral: 25-50% of hourly infusion rate
  • Begin with least invasive
Treatment: Pharmacologic and Non-Pharmacologic
Routes of Administration

- Most common and preferred route for pain medications is **PO**
  - Safe, cheap, easy
    - Can manage 90% of all pain
Routes of Administration

- Oral transmucosal/SL/buccal and transdermal
  - Lipophilic drugs absorb well
  - Circumvents first-pass (hepatic metabolism) effect
- PR (rectal)
  - Lipophilic drugs absorb well
  - Contraindicated in setting of neutropenia or thrombocytopenia
Routes of Administration

- If PO/SL/TD/PR routes cannot be used:
  - SC—especially when pt cannot take PO or needs IV medications but has poor venous access
  - IM—painful and no pharmacokinetic advantage over SC—avoid if possible
  - IV—especially when rapid titration is necessary
Routes of Administration

- **Neuraxial routes:**
  - **Epidural injection/infusion:**
    - Standard of post-op pain management for major abdominal, thoracic, and joint surgeries where severe pain is expected
    - Not usually used for cancer pain or chronic non-cancer pain
  - **Intrathecal:**
    - Injection/infusion into the subarachnoid space
    - Usually given as single bolus for acute pain
How to choose a pain medication:
Follow the WHO 3-Step Pain Ladder
Step 1: Non-Opioid Analgesia (Mild Pain 0-3)

- Aspirin—anti-inflammatory & analgesic
- NSAIDs—anti-inflammatory & analgesic
- Acetaminophen—primarily analgesic
- +/- Adjuvants (may include, not limited to):
  - Lidocaine, e.g. Lidoderm patch/gel
  - Gabapentin or pregabalin (neuropathic pain)
  - Tricyclic antidepressants (neuropathic pain)
Step 2: “Weak” Opioids (Moderate Pain—4-6)

- Opioid + APAP
  - Codeine + acetaminophen (30/325)
  - Hydrocodone + acetaminophen (5/325)
  - Oxycodone + acetaminophen (5/325)
- Weak opioid agonist
  - Tramadol
- +/- Adjuvant agents
Opioid Responsiveness

- Potency
- Efficacy
- Tolerance
- Incomplete cross-tolerance
- Physical dependence
- Pseudoaddiction
- Addiction
Step 3: “Strong” Opioids (Severe Pain—7-10)

- Morphine
- Hydromorphone
- Oxycodone
- Fentanyl
- Methadone
- +/- Adjuvants
  - Ketamine
Equianalgesia

- Getting the same pain relief from different types of opioids
- Some patients will require rotation of opioids for inadequate pain relief
- Commonly available charts/calculators provide a way to easily convert dosages and intervals between different opioids
  - Be aware that these may vary widely; there is no “exact” conversion or substitution for clinical judgment
- Providers must always account for cross-tolerance when switching from one opioid to another (should generally order about 75% of the equivalent dose)
# Opiate Conversion Chart

**OPIATE CONVERSION CHART**

<table>
<thead>
<tr>
<th>DRUG</th>
<th>Oral</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>30 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>Hydromorphone (Dilaudid)</td>
<td>7.5 mg</td>
<td>1.5 mg</td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>30 mg</td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>20 mg</td>
<td></td>
</tr>
<tr>
<td>Levorphanol</td>
<td>4 mg</td>
<td>2 mg</td>
</tr>
<tr>
<td>Codeine</td>
<td>200 mg</td>
<td></td>
</tr>
</tbody>
</table>
## Adjuvant Analgesics

<table>
<thead>
<tr>
<th>Classification</th>
<th>Indication</th>
<th>Major Side Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>Mild to mod. pain and fever</td>
<td>Hepatotoxicity</td>
</tr>
<tr>
<td>Alpha Agonist</td>
<td>Epidural</td>
<td>Hypotension</td>
</tr>
<tr>
<td>CNS Stimulants</td>
<td>Reduce sedation effects of opioids</td>
<td>Nervousness, hypertension</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Neuropathic pain</td>
<td>Sedation, BM depression</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Neuropathic pain</td>
<td>Dry mouth, sedation, constipation</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>Pruritic pain, musculoskeletal pain, anxiety</td>
<td>Dry mouth, sedation, constipation</td>
</tr>
<tr>
<td>Antispasmodics</td>
<td>GI spasm</td>
<td>Dry mouth, sedation, constipation</td>
</tr>
<tr>
<td>Antispastic agent</td>
<td>Spastic pain, centrally mediated pain</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Anxiety assoc. with pain panic attack</td>
<td>Sedation dementia, delirium, hypotension</td>
</tr>
<tr>
<td>Classifications</td>
<td>Indications</td>
<td>Side Effects</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Nerve compression, plexopathies</td>
<td>Gastritis, fluid retention</td>
</tr>
<tr>
<td>Local anesthetics</td>
<td>Lidocaine for post herpetic pain, neuralgia, peripheral neuropathy</td>
<td>Lidocaine Patch may cause mild rash at application site</td>
</tr>
<tr>
<td>Muscle relaxants</td>
<td>Short term, musculoskeletal pain</td>
<td>Sedation, lightheadedness</td>
</tr>
<tr>
<td>NMDA Antagonists</td>
<td>Neuropathic pain, synergistic with opioids</td>
<td>Psychotomimetic side effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hallucinations, drowsiness, dizziness</td>
</tr>
<tr>
<td>NSAIDS COX 1-2 inhibitors</td>
<td>Bone metastasis</td>
<td>COX 1- may cause inhibition of platelets, GI bleeds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>COX 2 are more selective</td>
</tr>
</tbody>
</table>
Non Pharmaceuticaal Interventions

• Non-traditional therapies
  • Meditation
  • Music
  • Herbal or non-traditional
  • Pet therapy
  • Urban Zen
Pain Reassessment
Pain Reassessment

• Reassessment is critical to determining whether your pain management strategy is working!

  • Reassessment is a required element of pain management documentation

• Always use the appropriate pain scale for reassessment
• Document your reassessment based on the pharmacokinetics of the drug

  • IV medications generally have a faster onset
  • PO medications generally have a slower onset
Pharmacotherapeutics:
General Principles
*if time permits
Pharmacodynamics

• What the drug does to the body
  • NSAIDs and APAP
    • Anti-inflammatory properties
    • Side effects—hepatic, renal, GI, hematologic, CV
  • Opioids
    • Mimic naturally-occurring endorphins
    • Bind to opioid receptors (mu, delta, kappa)
    • Side effects—respiratory, GI
  • Adjuvants
    • A varied bunch—e.g. ketamine is an NMDA antagonist, lidocaine is a local anesthetic, gabapentin is an anti-convulsant
Pharmacokinetics

• What the body does to the drug
  • Absorption—through gut, skin, tissue, mucosa
  • Distribution—via bloodstream
  • Metabolism—via liver
  • Elimination—via bile/urine

• This process is highly dependent on other variables
  • Age
  • Hepatic and renal function
  • Concomitant food/alcohol consumption
  • Interactions with other medications
Pharmacokinetics: Elimination

- **Half-Life ($T_{1/2}$)**
  - The point in time at which 50% of the drug has been eliminated from the body
  - Depends on patient’s hepatic/renal function (ability to metabolize/clear the drug) and the volume of distribution of the drug in the body
  - Important because it defines dosing intervals!
Pharmacokinetics: Elimination

- Tylenol, NSAIDs, and most opiates follow first-order kinetics
- The rate of elimination is proportionate to the amount of drug in the body
  - Every hour X percent of the drug is eliminated
- Larger concentrations of drug are eliminated faster, then as the concentration of drug becomes smaller, the drug is eliminated more slowly.
Elimination

- Example: Morphine—$T_{1/2}$ is about 3 hrs
  - 0600—Mr. Smith gets Morphine 2mg IVP
  - 0900—1 mg morphine lost
  - 1200—0.5mg morphine lost
  - 1500—0.25mg morphine lost
  - 1800—0.125 mg morphine lost
  - 2100—0.0625 mg morphine lost

- It takes about 5 half-lives to clear 98% of a drug after you stop it completely.
The serum level curve observed from a drug eliminated by a first order process.
Multimodal Analgesia

• Systematic approach to pain management
  • Use a variety of drugs in combination to hit different receptor targets
  • Different drugs with different underlying mechanisms of action
    • NSAID + opioid (e.g. hydrocodone/acetaminophen)
    • Opioid + local anesthetic (e.g. hydromorphone/bupivucaine)
  • Synergy: Whole is greater than the sum of the parts
Steady State

- What does it mean to achieve “steady state”?  
  - Steady state is when drug in = drug out
- This means that repeated doses of a drug are given to achieve steady state (plateau level) in the plasma
  - Rule of thumb: Steady state is attained after 5 half-lives
    - This is independent of the dose size, as long as the dosage remains constant
    - Meaning—it doesn’t matter if you give 10mg or 20mg of morphine—as long as you’re giving 10 or 20 EACH TIME
Peak & Trough vs Steady State
PRN vs. ATC Dosing

- If pain is intermittent, then it is appropriate to use a PRN dose
  - “Incident” pain with movement, e.g. turning or walking
- If pain is constant/continuous, it is more appropriate to use ATC dosing to achieve steady state and reduce peak/trough effect
  - Surgical/incisional pain
  - Cancer/tumor/bone pain
  - Neuropathic pain
Reducing Drug Level Fluctuations

- Administer long-acting PO preparations (extended-release, controlled-release)
- Administer drugs by constant infusion (IV)
  - Plasma levels kept nearly constant (after achieving steady state, that is)
- Administer a depot preparation (e.g. SC/TD)
  - Releases drug slowly and steadily
- Reduce the size of each dose and interval
  - Take ½ the daily dose BID rather than the full dose QD
Dosing Intervals

- Dosing intervals are typically based on the half-life of the drug
  - To prevent peaks and troughs in the serum drug level, set the dose frequency for q ½ life
  - Using the example of morphine, how should the order be written?
    - Morphine sulfate 2mg IVP q3 hrs
  - For a patient with hepatic/renal dysfunction, you may want to decrease the dosage or increase the interval or both (e.g. q4 hrs or q6 hrs)
Continuous Opioid Infusions

• Maintain initial rate of continuous opioid infusions until the medication reaches steady state (~5 $T_{1/2}$)
  • Morphine: 3-4 hrs
  • Hydromorphone: 2-3 hrs
  • Fentanyl: 3 hrs
• If patient’s pain is not controlled with initial rate
  • BOLUS the patient with the bolus dose (should already be ordered)
Allergies to Opioids

• True opioid allergies are rare
  • Patients commonly confuse side effects, such as nausea or pruritus, with drug allergies
  • Ask the patient to describe their specific reaction
    • Any hypersensitivity reaction, such as anaphylaxis or angioedema, is an absolute contraindication to opioid use
  • Document and communicate allergies/intolerances to medical team and pharmacy
Opioid Administration: Nausea/Vomiting

- Tolerance to N/V may occur over time.
- Rule out reversible causes, e.g. constipation
- Can use Zofran, Reglan, or other anti-emetic PRN
- Dilute ALL IV formulations of opioids and push over 2-5 minutes AT A MINIMUM to reduce administration-related N/V
Opioid Adverse Effects: Sedation

• Patients **may** develop a tolerance to the sedating side effects of opioids
  • Sedation is a better indicator of over-medication than respiratory rate
• If you have to give naloxone (Narcan), dilute the vial in 10 cc of NS and **give 1 cc at a time** until patient arouses and responds
  • Do NOT push all 10cc if not indicated!
Opioid Adverse Effects: Constipation

• Patients **never** develop a tolerance to the constipating side effects of opioids.
  • ALWAYS assess your patient’s abdomen and stool pattern for opioid-induced constipation—know when they last had a BM!
  • Assess the MAR for the presence of a bowel regimen (minimally should include a stool softener and a stimulant laxative, e.g. docusate and senna)
  • Educate your patients about opioid-induced constipation and need to prophylax against it!
Presumptive Treatment of Pain in Special Populations

- Treat presumptive pain in non-verbal patients who can be reasonably expected to be in pain either from chronic conditions or from procedures.
  - For example: Try APAP around the clock in older adult patients with advanced dementia who may be non-verbal, bedbound, contracted, have many invasive tubes, pressure ulcers, etc.
Questions?

I has a question...
References

References

- [http://www.aacn.org/wd practice/content/practicealerts/assessing-pain-critically-illadult patients.](http://www.aacn.org/wd)
- End of Life Nursing Care Consortium-Critical Care Training Program; Administered by the City of Hope and American Association of Colleges of Nursing, Updated in 2013.
References
