Pain
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Pain
• An unpleasant sensory and emotional experience associated with actual or potential tissue damage
• Whatever the person says it is and existing whenever the person says it does (Margo McCaffery)

Pain versus Suffering
• Suffering - State of severe distress associated with events that threaten the intactness of the person
• Pain – conscious experience of discomfort occurring when the pain threshold is reached

Physiology
• Nociception
  • Noxious stimuli activation of primary afferent nerves (PANs)
  • Nociceptors sense and transmit pain signals
• Gate Control Theory (Melzack and Wall, 1965)
  • Pain transmitted to the dorsal horn of the spinal cord (substantia gelatinosa)
  • Cells act as a gate which can be either opened or closed
  • Gates are influenced by stimulatory or inhibitory signals from either the periphery or higher centers in the CNS
  • Brain does not perceive pain while it is occupied with other sensory input
    ▪ Massage, vibration, pressure, heat, cold, non-drug

Physiology
• Transduction
  • Noxious stimuli – pressure, heat, and chemical activate primary afferent Nociceptors
  • Tissue damage leads to release of chemicals around the Primary Afferent Neuron (PAN)
    ▪ Bradykinin, histamine, prostaglandins, substance P
    ▪ Local inflammatory response
• Transmission
  • Projection to CNS
  • Different types of fibers cause different sensations
    ▪ A - fast large myelinated fibers = sharp, well localized and distinct pain
    ▪ C fibers – very small, slow unmyelinated dull – poorly localized, persistent aching, burning sensation, diffuse nature, slow onset,
  • Processing in dorsal horn
    ▪ Substantia gelatinosa - dorsal horn act as gate
    ▪ Pain impulses then cross spinal cord from dorsal horn (via interneurons) and travel via either of two pathways to higher levels of CNS
      ▪ Spinothalamic tract (STT)
      ▪ Spinoreticular tract (SRT)
  • Transmitters can facilitate or inhibit transmission to a second neuron in the dorsal horn synapses
    ▪ Perception of pain is based on the modulation ascending pathways and descending inhibitory pathways
• Drugs which cause membrane stabilization inactivate sodium channels, prevent action potential
  ▪ Prevent transmission
    ▪ E.g. lidocaine, bupivacaine
    ▪ Anti seizure drugs
      ▪ phenytoin (dilantin).
      ▪ gabapentin (Neurontin)
• Referred pain
  ▪ Pain transmission may be carried by fibers that also carry info from distance anatomical locations referred pain
    ▪ Same spinothalamic tracts
    ▪ Related embryological dermatomes
• **Modulation**
  • Endorphins (from endogenous and morphine)
  • Endogenous morphine like pentapeptides
  • These are the body’s pain relievers, (natural opioids)
  • Descending (efferent) pathways from thalamus and midbrain carry inhibitory impulses which prevent the release of neurotransmitters associated with pain e.g. substance P and prostaglandins

• **Pain Perception**
  • Pain Perception – Conscious experience of discomfort occurs when the pain threshold is reached.
  • Pain Threshold – Point at which sufficient signals reach the brain
  • Pain Tolerance – Point at which individual withdraws or asks to have the stimulus stopped

• **Types of Pain**
  • Nociceptive
  • Neuropathic pain
  • Acute versus Chronic
  • Somatic, Visceral or Superficial
  • Phantom limb pain

• **Pain Assessment**
  • Onset
  • Pattern
  • Quality/nature
  • Intensity
  • Location
  • Duration
  • Relief
  • See text for pain assessment tools
  • Older Adult
  • Cognitively Impaired

• **Nurses Attitudes About Pain**
  • Patient is at the mercy of the nurse
  • Respect clients response to pain
  • Never stereotype a person based on culture

• **VITAL SIGNS ARE NOT A RELIABLE INDICATOR OF PAIN**

**Pain Management**
• JCAHO
• APA
• Standards for the Relief of Acute Pain and Cancer Pain

**WHO Analgesic Ladder**
• Mild pain
  • Low doses on nonopioid drugs
• Intermediate pain or pain not well controlled with nonopioid
  • Combine nonopioid with low-dose opioid
  • Adjuvants
• Severe pain
  • Higher doses of opioids
  • Adjuvants

**Approaches to Pain Management**
• Drug Therapy for Pain
• Equianalgesic dose
- Dose of drug to produce the same effect as: Standard 10 mg morphine IM
- Scheduling
- Prevention is the key
- Continuous versus PRN medication
- Additional dose for breakthrough pain
- Titration of Opioids

WHO step approach to Pain
- Step 1 - Nonopioids
  - Pain 1-3 – Nonopioids
  - Good for pain caused by inflammation
  - Block Prostaglandins
  - Aspirin *
  - NSAIDs – Ibuprofen * and Celebrex *
    - Acetaminophen * - Exception
      - Blocks unknown central mechanism
      - Not for pain caused by inflammation
    - Adjuvants
      - Tricyclic antidepressants
  - NSAIDs
    - Nonsteroidal Anti-inflammatory Drugs
    - Large diverse group of drugs
    - Prostaglandin Synthetase Inhibitors
      - 70 million prescriptions per year
      - 5% all prescriptions
      - Salicylates
        - Analgesia, Antipyretic, Anti-inflammatory, Anti-thrombolytic
        - Aspirin has irreversible effects
        - Adverse reactions:
          - Salicylism – mild toxicity
          - Salicylate poisoning
          - Excessive bleeding
          - Caution in patients with liver and renal disease
  - Ibuprofen
  - Cox II Inhibitors - Celebrex
    - Adverse Reactions
      - CV, GI
      - Few available on the market
  - Acetominaphen (Tylenol)
    - Synthetic – nonopioid
    - Analgesic and Antipyretic
    - Not anti-inflammatory

- Step 2
  - Moderate Pain (4 to 6) or pain that persists with Step 1 drugs
  - Moderate opioid analgesics
    - Codeine *
    - pentazocine (Talwin) *
  - Hydrocodone (Davis pg 510) PO Route only
    - Vicodin = Hydrocodone and Acetaminophen
    - Lortab ASA = Hydrocodone and ASA
    - Vicoprofen = Hydrocodone and Ibuprofen
  - Propoxyphene (Davis pg 888) PO Route only
- Darvon Compound 65
- Darvon N
- Darvocet-N
- Darvon N with ASA
- Darvon N Compound

- Continuation of step 1 drugs
- Adjutants

- Step 3
  - Moderate to Severe Pain (7-10)
  - Or moderate pain uncontrolled by step 2 meds
  - Opioids e.g. morphine
  - May continue step 2 meds
  - Adjutants
  - Opioids
    - Morphine (Roxanol) *
      - 0.05 to 0.1 mg/kg every 2 hours
      - Oxycodone, methadone and fentanyl
      - Bind to opioid receptors in NS
      - Mimic descending inhibitory system by to endogenous endorphin receptors in brain, brainstem, spinal cord and peripheral tissues
      - Inhibit A-delta and C fibers (inhibit AP)
    - Therapeutic uses of Opioids
      - Relief of pain
      - Injury, surgery, renal colic, MI, terminal CA
      - Relief depends on opioid and receptor
      - Anti-tussive
      - Balanced anesthesia
      - Pulmonary edema
      - Diarrhea
    - Routes of Administration
      - Oral
      - Sublingual
      - Transmucosal
      - Transdermal
      - Infusion
    - Agonist/Antagonist Opioids
      - Opioids bind to different receptors
      - Pentazocine
      - Agonist to kappa receptors
        - Blocks mu receptors
        - Use cautiously in patients with mu dependence
    - Drug Interactions
      - Alcohol, sedative, hypnotics, anesthetics
      - Tricyclic anti-depressants, phenothiazines and anticholinergics
    - No dose ceiling for agonist drugs
    - Adverse Reactions
      - Decreased respiration
        - Biggest risk with first dose - Opioid naïve patients
      - Cough suppressant
      - Itching, rash, hemodynamic changes
      - Light-headed and orthostatic hypotension
      - N/V, constipation
- Addiction
  - Tolerance
  - Physical dependence
  - Withdrawal
  - Psychological dependence
  - Opioid Abstinence Syndrome
    - Anxiety
    - Irritability
    - Chills, hot flashes
    - Tears, rhinorrhea
    - Sweating
    - Abdominal cramps, N/V

- Combination Drugs
  - Vicodin *
    - Hydrocodone (5mg) and acetaminophen (500mg)

- Opioid Antagonists
  - Narcan * – Naloxone hydrochloride

- Merperidine (Demerol)
  - Known neurotoxicity
  - Normeperidine

- Potentiators
  - Agents which enhance opioid effect
  - Few potentiators shown to be effective
  - Promethazine (Phenergan)
    - Does NOT potentiate
    - Use separately for nausea
  - Vistaril
    - Equivalent to 5 mg MS but .....  
    - Painful and irritating injection
    - Questionable analgesic effects

**Patient Controlled Analgesia**
- Loading dose (bolus)
  - MS 5 mg
- Continuous infusion
- Hourly rate MS 0.5-1.0 mg/hr
- Bolus 1mg
- Lock out period Q 6 minutes
- Hourly limit 10 mg

**Non-Pharmacological Methods**
- Placebo
- Mobility
- Relaxation
- Cutaneous stimulation
- Cooling/heating
- TENS/PENS
- Acupressure/Acupuncture
- Nerve blocks
- Neurosurgery
- Cognitive behavioral therapies
Summary

- Opioids - look at effect not dose
- Give the next dose before the last wears off
- Relieve pain before it starts
- There is no maximum dose for morphine
- UNRELIEVED PAIN IS UNACCEPTABLE