CHAPTER 10

Analgesic Agents

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Analgesics

- Medications that relieve pain without causing loss of consciousness
- Painkillers

Pain

- Pain is whatever the patient says it is
- It exists whenever the patient says it exists
- It's an unpleasant sensory and emotional experience associated with actual or potential tissue damage
- Pain is a personal and individual experience

Pain Threshold

- The level of stimulus needed to produce the perception of pain
- A measure of the physiologic response of the nervous system

Pain Tolerance

- The amount of pain a patient can endure without its interfering with normal function
- Varies from person to person
- Subjective response to pain, not a physiologic function
- The point beyond which pain becomes unbearable

Classification of Pain by Onset and Duration

- Acute pain
  - Sudden in onset
  - Usually subsides once treated
- Chronic pain
  - Persistent or recurring
  - Often difficult to treat

TABLE 10-2
ACUTE VERSUS CHRONIC PAIN

Type of Pain	Onset	Duration	Examples
Acute	Sudden (min to hr); usually sharp, localized; physiologic response (SNS: tachycardia, sweating, pallor, increased blood pressure)	Limited (has an end)	Myocardial infarction, appendicitis, dental procedures, kidney stones, surgical procedures
Chronic	Slow (days to months); long duration; dull, persistent aching	Persistent or recurring (endless)	Arthritis, cancer, lower back pain, peripheral neuropathy

SNS, Sympathetic nervous system.

Table 10-2 Acute Versus Chronic Pain

Classification of Pain

- Somatic
- Visceral
- Superficial
- Vascular
- Referred
- Neuropathic
- Phantom
- Cancer
- Psychogenic
- Central

Pain Transmission Gate Theory

- Most common and well described
- Uses the analogy of a gate to describe how impulses from damaged tissues are sensed in the brain
- Many current pain management strategies are aimed at altering this system

Pain Transmission

Tissue injury causes the release of:

- Bradykinin
- Histamine
- Potassium
- Prostaglandins
- Serotonin

These substances stimulate nerve endings, starting the pain process

Pain Transmission (cont'd)

There are two types of nerves stimulated

- “A” fibers
- “C” fibers

TABLE 10-3
A AND C NERVE FIBERS

Type of Fiber	Myelin Sheath	Fiber Size	Conduction Speed	Type of Pain
A	Yes	Large	Fast	Sharp and well localized
C	No	Small	Slow	Dull and nonlocalized

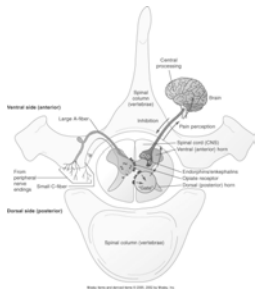

Table 10-3 A and C Nerve Fibers

Figure 10-1 Gate Theory of Pain Transmission.

Pain Transmission (cont'd)

- Types of pain related to proportion of "A" to "C" fibers in the damaged areas

Pain Transmission (cont'd)

- These pain fibers enter the spinal cord and travel up to the brain
- The point of spinal cord entry is the dorsal horn
- The dorsal horn is the location of the "gate"

Pain Transmission (cont'd)

- This gate regulates the flow of sensory impulses to the brain
- Closing the gate stops the impulses
- If no impulses are transmitted to higher centers in the brain, there is *no* pain perception

Pain Transmission (cont'd)

- Activation of large “A” fibers closes gate
- Inhibits transmission to brain
  - Limits perception of pain

Pain Transmission (cont'd)

- Activation of small “B” fibers opens gate
- Allows impulse transmission to brain
  - Pain perception

Pain Transmission (cont'd)

- Gate innervated by nerve fibers from brain, allowing the brain some control over gate
- Allows brain to:
  - Evaluate, identify, and localize the pain
  - Control the gate before the gate is open

Pain Transmission (cont'd)

"T" cells

- Cells that *control* the gate have a threshold
- Impulses must overcome threshold to be sent to the brain

Pain Transmission (cont'd)

- Body has endogenous neurotransmitters
  - Enkephalins
  - Endorphins
- Produced by body to fight pain
- Bind to opioid receptors
- Inhibit transmission of pain by closing gate

Pain Transmission (cont'd)

- Rubbing a painful area with massage or liniment stimulates large sensory fibers
- Result:
  - Gate closed, recognition of pain reduced
  - Same pathway used by opiates

Opioid Analgesics

- Pain relievers that contain opium, derived from the opium poppy or chemically related to opium
- Narcotics: very strong pain relievers

Opioid Analgesics (cont'd)

- codeine sulfate
- meperidine HCl (Demerol)
- methadone HCl (Dolophine)
- morphine sulfate
- propoxyphene HCl

Opioid Analgesics: Mechanism of Action

Three classifications based on their actions:

- Agonist
- Partial agonist
- Antagonist

Agonists

- Bind to an opioid pain receptor in the brain
- Cause an analgesic response (reduction of pain sensation)

Partial Agonists

- Bind to a pain receptor
- Cause limited actions, not as pronounced as the actions produced by an agonist
- Also called *agonist-antagonists*

Antagonists

- Reverse the effects of these agents on pain receptors
- Bind to a pain receptor and exert no response
- Also known as *competitive antagonists*
- Endorphins

Opioid Receptors

Five types of opioid receptors

- Mu *
- Kappa *
- Delta *
- Sigma
- Epsilon

* Primary receptors

TABLE 10-5
OPIOID RECEPTORS AND THEIR CHARACTERISTICS

Receptor Type	Prototypical Agonist	Effects
Mu	morphine	Supraspinal analgesia, respiratory depression, euphoria, ++sedation
Kappa	ketocyclazocine	Spinal analgesia, ++++sedation, miosis
Delta	enkephalins	Analgesia

Table 10-5 Opioid Receptors and Their Characteristics

Opioid Analgesics: Indications

- Main use: to alleviate moderate to severe pain
- Often given with adjuvant analgesic agents to assist the primary agents with pain relief
  - NSAIDs
  - Antidepressants
  - Anticonvulsants
  - Corticosteroids

Opioid Analgesics: Indications (cont'd)

Opioids are also used for:

- Cough center suppression
- Treatment of diarrhea
- Balanced anesthesia

Opioid Analgesics: Contraindications

- Known drug allergy
- Severe asthma or other respiratory insufficiency
- Elevated intracranial pressure
- Pregnancy

Opioid Analgesics: Side Effects

- Euphoria
- CNS depression
- Nausea and vomiting
- Respiratory depression
- Urinary retention
- Diaphoresis and flushing
- Pupil constriction (miosis)
- Constipation
- Itching

Opiate Antagonists

naloxone (Narcan)

naltrexone (Revia)

- Opiate antagonists
- Bind to opiate receptors and prevent a response
  - Used for complete or partial reversal of opioid-induced respiratory depression

Opiates: Opioid Tolerance

- A common physiologic result of chronic opioid treatment
- Result: larger dose of opioids is required to maintain the same level of analgesia

Opiates: Physical Dependence

The physiologic adaptation of the body to the presence of an opioid

Opiates: Psychological Dependence

A pattern of compulsive drug use characterized by a continued craving for an opioid and the need to use the opioid for effects other than pain relief

Opiates

Opioid tolerance and physical dependence are expected with long-term opioid treatment and should not be confused with psychological dependence (addiction)

Opiates (cont'd)

Misunderstanding of these terms leads to ineffective pain management and contributes to the problem of undertreatment

Opiates (cont'd)

- Physical dependence on opioids is seen when the opioid is abruptly discontinued or when an opioid antagonist is administered.
  - Narcotic withdrawal
  - Opioid abstinence syndrome

Opiates (cont'd)

Narcotic withdrawal opioid abstinence syndrome

- Manifested as:
  - Anxiety, irritability, chills and hot flashes, joint pain, lacrimation, rhinorrhea, diaphoresis, nausea, vomiting, abdominal cramps, diarrhea

Nonopioid Analgesics
Acetaminophen

- Analgesic and antipyretic effects
- Little to no antiinflammatory effects
- Available OTC and in combination products with opioids

Mechanism of Action

- Similar to salicylates
- Blocks pain impulses peripherally by inhibiting prostaglandin synthesis

Indications

- Mild to moderate pain
- Fever
- Alternative for those who cannot take aspirin products

Toxicity and Managing Overdose

- Even though available OTC, lethal when overdosed
- Overdose, whether intentional or due to chronic unintentional misuse, causes hepatic necrosis
- Long-term ingestion of large doses also causes nephropathy
- Recommended antidote: acetylcysteine

Dosage

- Maximum daily dose for healthy adults is 4000 mg per day
- Inadvertent excessive doses may occur when different combination drug products are taken together
- Be aware of the acetaminophen content of the medications taken by the patient

Interactions

- Dangerous interactions may occur if taken with alcohol
- Should not be taken in the presence of:
  - Liver dysfunction
  - Possible liver failure
  - When taking other hepatotoxic drugs

Analgesics: Nursing Implications

- Before beginning therapy, perform a thorough history regarding allergies and use of other medications, including alcohol, health history, and medical history
- Obtain baseline vital signs and I&O
- Assess for potential contraindications and drug interactions

Analgesics: Nursing Implications (cont'd)

- Perform a thorough pain assessment, including pain intensity and character, onset, location, description, precipitating and relieving factors, type, remedies, and other pain treatments
  - Assessment of pain is now being considered a “fifth vital sign”

Analgesics: Nursing Implications (cont'd)

- Be sure to medicate patients before the pain becomes severe as to provide adequate analgesia and pain control
- Pain management includes pharmacologic and nonpharmacologic approaches; be sure to include other interventions as indicated

Analgesics: Nursing Implications

- Patients should not take other medications or OTC preparations without checking with their physician
- Instruct patients to notify physician for signs of allergic reaction or adverse effects

Opioid Analgesics: Nursing Implications (cont'd)

- Oral forms should be taken with food to minimize gastric upset
- Ensure safety measures, such as keeping side rails up, to prevent injury
- Withhold dose and contact physician if there is a decline in the patient's condition or if VS are abnormal, especially if respiratory rate is less than 12 breaths/minute

Opioid Analgesics: Nursing Implications (cont'd)

- CHECK DOSAGES CAREFULLY
  - Follow proper administration guidelines for IM injections, including site rotation
  - Follow proper guidelines for IV administration, including dilution, rate of administration, and so forth

Opioid Analgesics: Nursing Implications (cont'd)

- Constipation is a common side effect and may be prevented with adequate fluid and fiber intake
- Instruct patients to follow directions for administration carefully, and to keep a record of their pain experience and response to treatments
- Patients should be instructed to change positions slowly to prevent possible orthostatic hypotension

Monitor for Side Effects

- Should VS change, patient's condition decline, or pain continue, contact physician immediately
- Respiratory depression may be manifested by respiratory rate of less than 12/minute, dyspnea, diminished breath sounds, or shallow breathing

Monitor for Therapeutic Effects

- Decreased complaints of pain
- Decreased severity of pain
- Increased periods of comfort
- Improved activities of daily living, appetite, and sense of well-being
- Decreases fever (acetaminophen)