Chapter 7
Analgesia and Sedation

Learning Objectives

- Discuss why, despite frequency of patient reports of pain, it often is not treated in the field

Learning Objectives

- Discuss narcotics (opiates) that prehospital providers may encounter:
  - Morphine sulfate
  - Fentanyl citrate (Sublimaze)
  - Meperidine (Demerol)
  - Butorphanol (Stadol)
  - Nalbuphine (Nubain)
Learning Objectives

● Discuss effects of nonsteroidal antiinflammatory drugs such as ketorolac (Toradol)

● List benefits of nitrous oxide and demonstrate proper procedure for administering the drug

Learning Objectives

● Discuss various roles of ketamine (Ketalar), etomidate (Amidate), and propofol (Diprivan) in prehospital care

● Explain benefit of the ability of benzodiazepines to induce anterograde amnesia

Learning Objectives

● Discuss role of sedatives (benzodiazepines) in pain management, including:
  ▶ Diazepam (Valium)
  ▶ Midazolam (Versed)
  ▶ Lorazepam (Ativan)
  ▶ Flumazenil (Romazicon)
  ▶ Naloxone (Narcan)
Learning Objectives

● Explain why antiemetics may be necessary in treatment of pain

● Discuss effects of the following antiemetics:
  ➢ Promethazine (Phenergan)
  ➢ Ondansetron (Zofran)
  ➢ Dolasetron (Anzemet)

Introduction

● Pain is common complaint
  ➢ Headaches
  ➢ Chest pain
  ➢ Pain from trauma

Introduction

● Agents and treatments available
  ➢ Narcotics
  ➢ Nonsteroidal antiinflammatory drugs
  ➢ Sedatives
  ➢ Antiemetics
  ➢ Others
Overview of Analgesia and Sedation

- Pain is not often treated in the field
  - Can cause respiratory depression and hypotension
  - May mask progression of symptoms
  - Can complicate assessment of patient after arrival in ED
  - Narcotics in excessive doses can reduce patient's ability to protect the airway and decrease respirations

Overview of Analgesia and Sedation

- Must closely monitor:
  - O₂ saturation
  - Ventilations
  - Airway

Overview of Analgesia and Sedation

- Elements of patient distress
  - Pain
    - Treated with analgesics
  - Anxiety
    - Treated with sedative drugs
Management

- Narcotics (opiates)
  - Used to treat moderate and severe pain
  - Derive from or contain chemical structures similar to opium
  - Opiates possibly seen by prehospital provider
    - Morphine sulfate
    - Fentanyl citrate (Sublimaze)
    - Meperidine (Demerol)
    - Butorphanol (Stadol)
    - Nalbuphine (Nubain)

Management

- Narcotics (opiates)
  - Bind with opiate receptors in the CNS
    - Results in reduction of pain sensation
  - Do not address underlying mechanism producing pain
  - Judicious use provides some relief to patient
  - Safe practice is to administer small doses with frequent reevaluation between each dose

Management

- Narcotics (opiates)
  - Signs of severe pain:
    - Agitation
    - Restlessness
    - Tachycardia
    - Hypertension
Management

Narcotics (opiates)
  > Excessive administration can result in respiratory depression
    * Give supplemental O₂
    * Be equipped and skilled to intervene and support patient's airway in case of respiratory depression or arrest

Management

Narcotics (opiates)
  > Hypotension especially occurs in patients who are hypovolemic
    * Administration of narcotics can result in vasodilation and subsequent hypotension
      * Must ensure patient has adequate intravascular blood volume before administering narcotics

Management

Narcotics (opiates)
  > Morphine induces release of histamine
    * Causes vasodilation, which produces hypotension
    * Fentanyl citrate (Sublimaze) does not release histamine
      * Less associated with hypotension after IV administration
Management

- Narcotics (opiates)
  - Meperidine (Demerol)
    - Synthetic narcotic used for moderate to severe pain
    - Can decrease cardiac output in higher dosage ranges
    - Is broken down or metabolized by the liver
    - Metabolites can cause:
      - Confusion
      - Hallucinations
      - Seizures
    - In single dose, toxic metabolites are insignificant

Management

- Nonsteroidal antiinflammatory drugs
  - Inhibit body’s pathways for producing inflammatory response
  - Provide pain relief and decrease inflammation partly responsible for generation of pain
  - Most common: aspirin and ibuprofen

Management

- Nonsteroidal antiinflammatory drugs
  - Ketorolac (Toradol)
    - NSAID that can be delivered IV, IO, or IM
    - Dose of 60 mg IM = 800 mg ibuprofen
    - Can provide pain relief at level traditionally provided by narcotics
    - Holds advantage over narcotics in treatment for renal colic from kidney stones
      - Block production of prostaglandins, which blocks spasms and peristalsis of ureter
      - Narcotics increase ureteral spasm and increase patient discomfort
Management

- Nonsteroidal antiinflammatory drugs
  - Ketorolac (Toradol)
    - Lack most common adverse effect of narcotics: respiratory depression
    - Complications:
      - Gastric ulcers
      - Prolongation of bleeding time
      - Decreased kidney function

Management

- Other pain medications
  - Nitrous oxide
    - Inhaled agent that provides relief for fractures
    - Used for dental and surgical procedures
    - Delivered by demand-valve face mask as 50:50 mixture with O₂

Management

- Other pain medications
  - Nitrous oxide
    - Provides mild anesthesia and sedation
    - Rapid onset of action, within 30 to 60 sec
    - Patient can protect and maintain airway
    - No adverse cardiovascular effects
Management

- Other pain medications
  - Nitrous oxide
    - Equipment needed:
      - Nitrous oxide and O2 cylinders
      - Blender
      - Mask with demand valve
      - Gas scavenger circuit

- Procedure:
  - Tell patient to hold mask tightly against face
  - Instruct patient not to talk or remove mask between breaths
  - Instruct patient to breathe normally
  - Monitor patient's vital signs and pulse oximetry
  - Continuously assess patient for lightheadedness, restlessness, and nausea

- Ketamine
  - Provides anesthesia
  - Allows for invasive procedures
  - Used by air medical services, combat medics
  - Considered dissociative anesthetic
  - Can be used in patients with hypovolemia
Management

- Other pain medications
  - Etomidate
    - Used in rapid sequence and pharmacologically assisted intubations
    - Hypnotic drug
    - Induces rapid and brief state of deep sleep or unconsciousness
    - After bolus, patient is ready for intubation within 1 min
      - Duration lasts only 3 to 5 min
    - Typically does not cause cardiovascular system depression

- Other pain medications
  - Propofol
    - Sedative agent administered to intubated patients being transported from one facility to another
    - Used by:
      - Air ambulance services
      - Interhospital critical care transport services
      - Military medicine units

- Other pain medications
  - Propofol
    - Bolus can be used to induce immediate unconsciousness
      - Infusion is required to maintain unconsciousness
    - Patients are able to wake with minimal confusion
    - Metabolized by both liver and kidney
      - Duration of action after single dose is only 2 to 3 min
    - Does not provide pain relief
Management

- Sedatives (benzodiazepines)
  - Used to reduce anxiety, relax muscles, and treat seizures
  - Cause generalized depression of CNS
  - Induce state of anterograde amnesia
    - Amnesia of events after trauma or disease that caused the conditions

Management

- Sedatives (benzodiazepines)
  - Diazepam (Valium)
    - Sedative
    - After IV administration, rapid onset of CNS effects
    - Long duration of action
      - Several hours
      - Half-life from 20 to 70 hours
    - Can irritate site of injection
      - Causes inflammation of the vein
    - Should be injected into larger veins and administered slowly

Management

- Sedatives (benzodiazepines)
  - Midazolam (Versed)
    - Short acting
      - Peak sedation occurs in 30 to 60 min
      - Half-life of 2.5 hours
    - Onset of action is 3 to 5 min after IV administration
    - Can provide sedation
**Management**

- Sedatives (benzodiazepines)
  - Lorazepam (Ativan)
    - Used for sedation and to reduce anxiety
    - Long duration of action
    - Half-life of 10 to 20 hours
    - 30 min until CNS depression occurs

- Sedatives (benzodiazepines)
  - Flumazenil (Romazicon)
    - Benzodiazepine antagonist
    - Treats benzodiazepine overdose
    - Competes with same receptor used by benzodiazepines
    - Does not reverse excessive sedation
    - Does not reverse respiratory depression caused by benzodiazepines
    - Must continue to provide airway and ventilator support after administration

- Sedatives (benzodiazepines)
  - Naloxone (Narcan)
    - Narcotic antagonist
    - Reverses effects of opiate narcotics
      - CNS depression
      - Respiratory depression
    - Short-lived, 20 min
    - Second dose may be required 20 min after initial dose
Management

- Antiemetics
  - Treat nausea and vomiting
    - Common adverse effects of narcotic administration
  - Promethazine (Phenergan)
    - Also used as adjunct for pain control
    - Used for prevention of chemotherapy-associated nausea
    - Nausea that fails to respond to promethazine
  - Dolasetron (Anzemet)
    - 5-HT$_3$ receptor antagonist

Questions?