Sedation and Analgesia Monitoring of ICU Patients

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A & T Lectures LLC

Objectives

- Introduction of opioids and sedatives in the ICU
- Stress response
- Sedatives
- Benzodiazepines
- Opioids
- Narcan
- Weaning of patients from sedatives


OPIOID
CRISIS

Sedation

- Sedation has become an integral part of the treatment of intubated patients
- Goals for sedation include
  - Facilitation of mechanical ventilation
  - Relief of anxiety, agitation, delirium and pain in order to ensure safety, comfort, amnesia and sleep

Sedation Definitions

- Anxiety
  - psychophysiologic response to the anticipation of real or imagined danger
- Agitation
  - excitement accompanied by motor restlessness

INDICATIONS FOR SEDATION

- Tube irritation
- Fighting the ventilator
- Restlessness
- Noise
- Frightening unfamiliarity of their ICU surroundings
- Fear of medical procedures

Stress Response

- Natural defense mechanism to support our body in times of external stress
- Tissue hypoxia and bacteremia cause the same response
- Initiated by the hypothalamus
- Corticotrophin Releasing Factor (CRF) is released from hypothalamus from sensory nerves

Stress Response continued

- Adrenocorticotropic hormone (ACH) from the anterior pituitary gland which stimulates the release of these two important hormones
- Cortisol- suppresses inflammatory and immune responses
- Aldosterone – retains sodium and water

SEDATIVE AGENTS RECOMMENDED FOR ICU

Sedative Agents Benzodiazepines

- Benzodiazepines
- Class of psychoactive drugs
  - Minor tranquilizers with varying
    - Hypnotic
    - Sedative
    - Anxiolytic
    - Anticonvulsant
    - Muscle relaxant
    - Amnesic properties

Sedation Medication commonly used

- Lorazepam –Ativan
- Midazolam- Versed
- Propofol- Diprivan (Non benzodiazepine)
- Haloperidol

Midazolam & Propofol

- Midazolam (Versed) or Propofol (Diprivan) are the preferred agents only for the short-term (less than 24 Hrs) for treatment of anxiety
- Short-acting
- Produces sedation (2 to 2.5 minutes)

Midazolam-Versed

- Long-term administration results accumulation in body
- Maintenance Midazolam dosage of 0.03 mg/kg/hr
- Titrated to effect over time
- One or more bolus loading doses (0.03 mg/kg) are generally required

Propofol - Diprivan

- Intravenous, general anesthetic agent that has sedative, hypnotic, anxiolytic, and anterograde amnestic properties at subanesthetic dosages
- Anterograde amnestic effects
- Onset of action is rapid (1 to 2 minutes) and its effect is brief (10 to 15 minutes)

Propofol - Diprivan

- Administered only by continuous infusion
- Long-term infusions result in accumulation within lipid stores
- Administered at an initial infusion rate of 0.5 mg/kg/hr and titrated rapidly upward in increments of 0.5 mg/kg every 5 to 10 minutes

Adverse Reactions

- Cardiovascular:
  - Bradycardia
  - Hypertension or hypotension
- Anaphylaxis (rare)
- Priapism
- Apnea, Respiratory acidosis

Lorazepam-Ativan

- Treatment of anxiety for extended ICU stay
- Compared with Versed
  - Longer acting
  - Less hypotension
  - Anterograde amnesia
  - Lower cost
  - Produces more rapid awakening

Ativan

- Lorazepam is mostly administered
  - Intermittent bolus injection
  - Continuous intravenous infusion
- Dosage is 0.044 mg/kg every 2 to 4 hrs
- One or more loading doses are generally required with continuous infusion therapy
- Lorazepam has a slightly delayed onset of action
- Single dose of Versed may be utilized to initiate sedative therapy when rapid sedation is required

Haloperidol (Haldol)

Treatment of delirium

Delirium is a state of reduced ability to appropriately respond to external stimuli

Disorganized thinking (rambling, incoherent/irrelevant speech)

Decreased level of consciousness

- Altered sensory perception
- Disorientation
- Altered level of psychomotor activity

Haloperidol

- ICU psychosis
- Treating delirium with Opiates or benzodiazepines has negative effects
- Paradoxical worsening of symptoms
- Alteration in sensory perception

Haloperidol

- Proven efficacy
- Clinical effects are observed within 30 to 60 minutes and may last 4 to 8 hrs
- Starting dosage is 2 to 10 mg administered intravenously
- Repeated every 2 to 4 hrs.

Dexmedetomidine (Precedex)

- It has both sedative and sympatholytic properties
- No respiratory depression
- Weaning from mechanical ventilation
- Clinically relevant benefits compared with midazolam
- Shorter time to extubation
  - More hemodynamic stability
  - Easy arousability

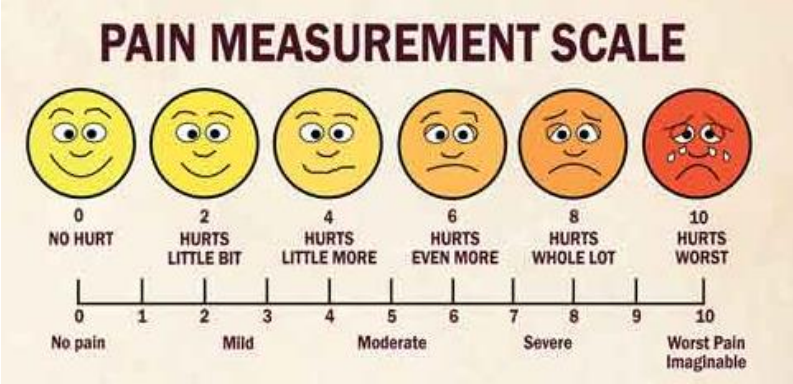
Is this patient in pain or suffering from anxiety?

Consequences of pain

- Lead to clinically significant physiologic responses such as:
  - Tachycardia
  - Increased myocardial oxygen consumption
  - Immunosuppression
  - Persistent catabolism
    - Metabolic process that breaks down molecules

Analgesic Medications

- Control pain
- Control pain before sedation



Morphine sulfate

- Morphine sulfate is the preferred agent for critically ill patients
- Most frequently used intravenous analgesic agent in the ICU
- Low cost, potency, analgesic efficacy, and euphoric effect

Morphine

- Half-life of 1.5 to 2 hours
- Patient each patient may have a different response
  - Distribution volume and protein binding may be abnormal
  - Drug's efficiency may be affected by the degree to which it binds
  - Resulting in an exaggerated or diminished response
- Histamine release causes hypotension
- Respiratory depression

Morphine sulfate

- Administered intravenously
- Dose of 0.05 mg/kg, administered over 5 to 15 mins
- Most adults require 4 to 6 mg/hr
- Redosing should be accomplished every 1 to 2 hours with continuous infusion therapy

Morphine - Contraindications

1. Two Extremes of Age
2. Bronchial asthma
3. Respiratory insufficiency - empysema
4. Head Injury
5. Shock – Hypotension
6. Undiagnosed acute abdomen
7. BHP
8. Renal Failure, Liver diseases and hypothyrodism
9. Unstable personalities

Fentanyl

- Fentanyl for patients that show:
  - Hemodynamic Instability
  - Symptoms of Histamine Release With Morphine
  - Morphine Allergy

Fentanyl

- Synthetic opiate with greater potency
- Faster onset of action
- Does not cause histamine release
- Fentanyl has a relatively short half-life of 30 to 60 minutes
- Prolonged administration leads to accumulation in peripheral compartments

Fentanyl

- Fentanyl
  - Little euphoric effect
  - No active metabolites
- Good for patients with morphine allergy
- Fentanyl should be administered by continuous intravenous infusion
  - 1 to 2 micro gram/kg/hr
- One or more loading doses of 1 to 2 micro gram/kg when therapy is initiated.

Respiratory depression on Fentanyl

- Sudden respiratory depression in some patients? Reasons are:
  - Saturation of Fentanyl the body fat compartment in patients with rapid and profound body fat loss
  - Acidosis which reduces protein binding of Fentanyl (releasing yet more Fentanyl)

Hydromorphone (Dilaudid)

- Acceptable alternative to morphine
- Semi synthetic morphine derivative
- Significantly less euphoria
- Dosage should be initiated at 0.5 mg
  - Titrated by 0.5 mg increments
  - Most patients requiring 1 to 2 mg every 1 to 2 hrs

Meperidine - Demerol

- Like morphine
- May produce less smooth muscle spasm, constipation, and depression of the cough reflex than morphine
- Onset of action is slightly more rapid than with morphine
- Duration of action is slightly shorter
- Contraindicated in patients who are receiving monoamine oxidase (MAO) inhibitors
- Dosage is 50 mg to 150 mg intramuscularly or subcutaneously every 3 or 4 hours

Naloxone- Narcan

- **Narcan is used for**
  - Completely or partially reversing the effects of narcotics.
  - Narcan is a narcotic antagonist
    - Blocks opiate receptor sites, which reverses or prevents toxic effects of narcotic (opioid) analgesics

Readiness for Weaning from Mechanical Ventilation

- Weaning protocols need to reduce sedation to determine readiness
- Pulmonologists and Internal Medicine trust RT assessment skills
  - Communication has been the key
  - Timeliness to weaning is very important
  - Utilizing of RASS score

Sedation Scale- RASS

- Richmond Agitation-Sedation Scale
  - +4 Combative
  - +3 Very agitated
  - +2 Agitated
  - +1 Restless
  - 0 Alert and calm
  - -1 Drowsy
  - -2 Light sedation
  - -3 Moderate sedation
  - -4 Deep sedation
  - -5 Unarousable

Summary

- Know your sedatives and analgesics
- Opioids are the proper medication in the ICU hospital stay
- Wean sedatives before you attempt to wean patients- use the RASS score
- Know the signs of opioid overdose

References

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