IV Procedural Sedation

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Objectives of Course

- Describe and put into practice the methods and principles involved in procedural iv sedation
- Correctly utilize pharmacological agents in the conscious sedation process
- Provide the same standard of care to patients inside and outside the operating room

Purpose

- To define the responsibility and procedure for administration of drugs for sedation to adult patients undergoing diagnostic, therapeutic or other invasive procedures

Moderate Sedation

- A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

Deep Sedation

- A drug-induced depression of consciousness during which patients cannot be easily aroused, but respond purposefully following repeated or painful stimulation. The ability to independently maintain respiration may be impaired. Patients may require assistance in maintaining a patent airway and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained

Policy-Sites of Administration

- IV sedation will be administered by clinicians who have received education in its use, in settings that provide appropriate monitoring and ability to provide support ventilation and resuscitation
- One Day Unit (ODSU) , PACU, Labor and Delivery, Emergency Department, Vascular Radiology, Cath Lab, Endoscopy, Critical Care Units including 7 South and 9 South

Credentialing of staff

- Hospital staff will be credentialed by completion of Procedural iv sedation training that will train staff in the following
  - Medications, dosages and administration techniques for sedation
  - Pre, Intra and Post-Procedure recognition of complications and interventions
  - Airway management and resuscitation
  - BLS required, ACLS recommended

Patient Evaluation

- Documentation of patient's physical status is recommended
- Anesthesia clearance required in any patient who has a potential difficult airway or may be associated with complications related to sedation
  - Morbid obesity
  - OSA, stridor or heavy snoring
  - History of difficult intubation
  - Uncooperative patients
  - Physical habitus suggesting difficult intubation

Physical Status Classification

- PS-I: A normal healthy patient
- PS-II: A patient with mild systemic disease that results in no functional limitation
- PS-III: A patient with severe systemic disease that results in functional limitation
  - Examples: Poorly controlled hypertension, diabetes mellitus with vascular complications, angina pectoris, prior myocardial infarction, pulmonary disease that limits activity .

Physical Status Classification

- PS IV: A patient with severe systemic disease that is a constant threat to life
  - Examples: Congestive heart failure, unstable angina pectoris, advanced pulmonary, renal, or hepatic dysfunction

- PS-V: A moribund patient who is not expected to survive without the operation
  - Examples: Ruptured abdominal aneurysm, pulmonary embolus, head injury with increased intracranial pressure

Physical Status Classification

- PS VI: A declared brain dead patient whose organs are being removed for donor purposes
- Emergency Operation (E) : Any patient in whom an emergency operation is required
  - Example: An otherwise healthy 30 year old female who requires dilation and curettage for moderate but persistent vaginal bleeding (PS: I E)

NPO Guidelines

Ingested material	Minimum Fasting Period
Clear liquids	2 hours
Breast milk	4 hours
Non human milk	6 hours
Light meal	6 hours
Heavy meal including meat and fried or fatty food	8 hours

Patient selection

- ASA I and II patients can be monitored by R.N.
- ASA III, IV and V patients are to be monitored by a R.N. after they have been cleared by a physician trained in conscious sedation
- Any question regarding patient classification will be settled by anesthesiologist

Equipment

- Source of compressed oxygen
- Positive pressure oxygen delivery system
- Source of suction, tubing and catheters
- Pulse oximeter
- Non invasive blood pressure
- EKG monitor
- Emergency crash cart with defibrillator available
- Pharmacologic antagonists and emergency medications available

Monitoring

- Blood Pressure every 5 minutes
- Pulse rate continuously
- EKG continuously
- Oxygen saturation continuously
- Respirations
- Level of consciousness

Intra-procedure responsibilities

- RN
  - Administers medications titrated to sedation
  - 2-5 minutes interval between doses
  - Stop further doses if SaO_2 <90% or maximum dose achieved
  - Verbal reassurance; deep breathing
  - Assesses and documents patient’s response
  - Monitor vitals, EKG and level of consciousness continuously

Intra-procedure responsibilities

- Nurse should observe
  - Allergic reactions
  - Exaggerated response to drugs
  - CNS changes
  - Cardiovascular changes
  - Airway/Respiratory changes
  - Nurse should inform physician conducting the procedure
  - If physician requests antagonists, nurse does so

Deviation from normal

- Notify physician if BP> 20 mm Hg from baseline
- HR > 100 or < 60 beats per minute-notify physician
- Decreases in SaO2 < 90% with adequate levels of consciousness
  - Asks patient to take several deep breaths
  - Assures O_2 is flowing and ambu bag is present
  - Head tilt and supports chin
  - Informs physician of patient condition
  - Checks placement of pulse oximetry

Post procedure monitoring and documentation

- All agents and amounts as administered
- Patient response to medication
- Cardiac rhythm
- Pulse, blood pressure, respiratory rate, oxygen saturation and level of consciousness measured at defined intervals
- Any supportive measures (e.g. O_2 administration, airway support) required
- Procedure performed
- Signature of physician and R.N.

Event Reporting

- Adverse Drug Reaction report if any of the following ADR criteria present
  - Apneic events or sustained O2 desaturations
  - Hemodynamically significant decrease in B/P
  - Symptomatic tachycardia or bradycardia
  - Vomiting or aspiration during procedure
  - Emergency consultation for advanced airway management
  - Use of a reversal agent

Discharge criteria

- Aldrete score of 9-10 or equal to pre-procedure status
- Outpatients should be discharged with an accompanying adult
- All patients and families should receive discharge instructions and must verbalize an understanding of instructions before discharge

Drug matrix

- **Midazolam (Versed)-sedative, hypnotic, anxiolytic, anti-convulsant, muscle relaxant**
  - Exerts effect by action on benzodiazepine receptor on brain that modulates GABA
  - Onset of action is 1-5 minutes; duration: 30-60 minutes
  - 0.5 - 2.5 mg iv over 2 minutes-titrate to end effect such as slurring of speech
  - Total dose > 5 mg usually not needed
  - Patients receiving concurrent narcotics or CNS depressants should have midazolam dose reduced by 30%.

Benzodiazepine properties

- Very favorable properties for sedation
- Anxiolysis- 20% of GABA receptors occupied
- Sedation-30-50% of GABA receptors occupied
- Loss of consciousness-60% of GABA receptors occupied
- Titration is extremely important
- Amnesia
- Slurred speech(ideal endpoint)

Caution with benzodiazepines

- Renal disease-secondary to increased drug availability due to reduced albumin
- Hepatic disease -secondary to reduced metabolism
- Elderly
  - Half life is prolonged
  - Hypnotic effect is prolonged

Reversal

- Flumazenil (Romazicon)
  - Competetive antagonism at GABA receptor-reverses hypnotic effect but not ventilatory depression
  - Should not be used routinely because of short duration and its own side effects
  - Dose: 0.2 mg over 15 seconds
    - May repeat at 1 minute intervals
    - Max total = 1 mg
    - Onset is rapid
    - Peak effect: 1-3 minutes
    - Duration: 20-30 minutes

Opioids

- Analgesic properties
- Activate opioid receptors in CNS
- μ and κ receptors are responsible for analgesia, sedation and respiratory depression
- Opioids produce a dose and concentration dependent reduction in intensity of pain
- Opioid effect is selective for nociception as touch, pressure and other sensations are unaffected

Opioids

- Hepatic metabolism to polar metabolites that are cleared by the kidneys
- Morphine undergoes synthetic bio-transfomation to glucuronides
- Fentanyl and meperidine undergo oxidative metabolism by cytochrome P450 enzymes
- Both morphine and fentanyl have high extraction ratios (0.7 and 0.6 respectively)-thus clearance of these drugs is sensitive to factors that alter liver blood flow
- Clearance is unaffected by enzyme inducers or inhibitors

Opioid metabolism

- Major metabolite of morphine is morphine-3-glucuronide (M3G) and M6G (15%0
- M6G accumulates in the CNS in chronic opioid users
- Morphine toxicity in renal failure patients
- Meperidine is cleared by N-demethylation to normeperidine
- Analgesic in animals but a convulsant in humans-repeated doses will cause seizures

Effects of opioids

- Sedation and Hypnosis
- CNS toxicity
- Respiratory Depression
- Cough Suppression
- Nausea and Vomiting
- Constriction of pupils
- Skeletal muscle rigidity
- Cardiovascular effects
- Histamine release
- Smooth muscle spasm

Drug tolerance with opioids

- Acute Tolerance(Tachyphylaxis)
  - May develop after a single dose
  - Clinical relevance remains to be proven
- Chronic Tolerance
  - May develop in a day or two
  - Decrease in duration of effect after a bolus
  - Decrease in intensity of effect after a bolus
  - Rapid tolerance to analgesia and respiratory depression
  - Slow tolerance to stimulant effects like miosis and constipation

Naloxone

- Opioid antagonist (μ receptor)
- Dose is 0.1 to 0.2 mg depending on severity of respiratory depression
- Short duration of action
- May be repeated every 2 minutes as needed upto 10 mg
- Reliable reversal for 20 minutes
- Re-narcotization is possible
- Sympathomimetic side effects

Use of Reversal agents

- Patient must be observed for 1-2 hours after administration before discharge
- Assess and document every 5 minutes for 20 minutes and then every 15 minutes until discharge criteria are met or pre-procedural status is achieved
- Complete Adverse Drug Report form

Morphine

- 2.5 mg increments over 3-5 minutes upto a maximum of 10 mg
- Decrease dose for patients in renal failure and liver disease
- Onset of action is 10-30 minutes and duration from 1-7 hours
- Recommended for procedures lasting longer than one hour as onset is slow and duration is long

Fentanyl

- 25 µg increments over 2 minutes upto 1-2 µg/kg
- Onset of action-immediate (peak: 7-8 minutes)
- Duration of action is 30-60 minutes

Meperidine

- Approved for patients undergoing endoscopy by physicians experienced with this drug
- Onset of action is 4-5 minutes (peak: 10 minutes
- Duration: 3-4 hours
- In renal dysfunction, duration is increased to 15-30 hours and in liver dysfunction; 7-11 hours

Thank you!!!

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