**Goals of Moderate Sedation**

- Minimal physical discomfort and pain
- Minimal psychological response to treatment and potential for amnesia
- Patient Safety – maintain adequate sedation with minimal risk and a rapid return to a state of consciousness in which safe discharge is possible

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**Continuum of Sedation**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimal Sedation</th>
<th>Moderate Sedation</th>
<th>Deep Sedation</th>
<th>General Anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>Normal Response</td>
<td>Purposeful response to verbal or tactile stimulus</td>
<td>Purposeful response to repeated or painful stimulus</td>
<td>Unarousable even with painful stimulus</td>
</tr>
<tr>
<td>Airway</td>
<td>Unaffected</td>
<td>No intervention required</td>
<td>Intervention may be required</td>
<td>Intervention often required</td>
</tr>
<tr>
<td>Spontaneous Ventilation</td>
<td>Unaffected</td>
<td>Unaffected</td>
<td>May be inadequate</td>
<td>Frequently inadequate</td>
</tr>
<tr>
<td>Cardiovascular Function</td>
<td>Unaffected</td>
<td>Usually Maintained</td>
<td>Usually maintained</td>
<td>May be impaired</td>
</tr>
</tbody>
</table>

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**Practice Standards, Guidelines and Position Statements**

- Position Statements represent emerging trends
- Practice Guidelines provide behavioral and critical decision-making recommendations
- Practice Standards are the highest mandate for clinical behavior

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**Joint Commission Standards**

- Standards PC.03.01.01 through PC.03.01.07
- The standards for sedation and anesthesia care apply when patients in any setting receive, for any purpose, by any route:
  - General, spinal, or other major regional anesthesia
  - Moderate or deep sedation (with or without analgesia) that, in the manner used, may be expected to result in the loss of protective reflexes

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**PC.03.01.01**

- The hospital plans operative or other high-risk procedures, including those that require the administration of moderate or deep sedation or anesthesia. Note: Equipment identified in the elements of performance is available to the operating room suites.
PC.03.01.03
• The hospital provides the patient with care before initiating operative or other high-risk procedures, including those that require the administration of moderate or deep sedation or anesthesia.

PC.03.01.05
• The hospital monitors the patient during operative or other high-risk procedures and/or during the administration of moderate or deep sedation or anesthesia.

PC.03.01.07
• The hospital provides care to the patient after operative or other high-risk procedures and/or the administration of moderate or deep sedation or anesthesia.

Presedation Assessment
• Identifies factors that may alter drug dosage or increase risk of aspiration, such as airway malformations or underlying cardiac, pulmonary or neurologic conditions
• Provides baseline vital signs
• Used to select and plan sedation care

Mallimpoti Classification

ASA Physical Status Classification
• Class 1 – normal healthy patient with no systemic illness
• Class 2 – patient with well-controlled systemic illness but without functional restrictions
• Class 3 – patient with significant degree of systemic effects that limits activity
• Class 4 – patient with severe systemic illness associated with significant dysfunction and a constant potential threat to life
• Class 5 – patient in critical condition, who is at substantial risk of death within 24 hours with or without operative procedure
NPO Status

• Fasting is necessary prior to sedating patients to reduce the risk of aspiration of stomach contents.
• Pulmonary aspiration is not limited to patients who are deeply sedated or anesthetized.
• It can occur in any patient whose underlying medical condition or administered drug results in loss of consciousness and/or protective reflexes

Pharmacologic Profile

• Benzodiazepines
• Opioids
• Administration Techniques
  – Titration to Clinical Effect Technique
  – Bolus Technique
• Benzodiazepine Receptor Antagonist
• Opioid Receptor Antagonist

Dosing by Ideal Body Weight

• Use as an initial endpoint for dosing patient
• Base total dose on patient’s response to the medication
• Male IBW = 50 kg + 2.3 kg (# inches over 5 ft.)
• Female IBW = 45 kg + 2.3 kg (# inches over 5 ft.)

Benzodiazepines

• Bind to specific receptor sites (GABA) in the cerebral cortex which inhibits excitatory impulses
• Hepatic metabolism/ Renal Excretion
• Excellent sedative
• Skeletal muscle relaxation
• Anxiolysis
• Anterograde amnesia
• Minimal hemodynamic effects
• Depresses ventilatory response to CO2

Midazolam (Versed®)

• Initial dose: 1-2.5 mg IV over 5 minutes.
• Incremental dose: 0.5 – 1 mg IV
  – Allow at least 2 minutes between doses to assess patient effect.
• Maximum dose: 0.1 mg/kg.
• Onset of action: 1-5 min
• Peak: immediate
• Duration of action: typically 30-40 minutes but may be up to 6 hrs in elderly and obese patients

Diazepam (Valium®)

• Initial dose: 1.5-2.5 mg IV over 1 minute
  – Repeat dosages 5 minutes apart
• Incremental dose: 1-2 mg IV
• Maximum dose: 0.1-0.2 mg/kg
• Onset of action: 1-2 min
• Peak: 3 – 5 minutes
• Duration of action: 4-5 hrs
• Half-Life: Equal to patient’s age in hours
Opioids

• Elevate pain threshold
• Produce sedative effect
• Have no amnestic properties
• Decrease respiratory rate and volume
• Increase CO2

Morphine Sulphate

• Initial dose: 1-2 mg IV
  – Repeat dosages 5 minutes apart
• Incremental dose: 1-2 mg IV
• Maximum dose: 0.1-0.15 mg/kg
• Onset of action: 5 - 10 min
• Peak: 20 minutes
• Duration of action: 4 hrs
• Can cause histamine release in some patients

Fentanyl

• Initial dose: 1 – 1.5 mcg/kg IV
  – Repeat dosages 3 minutes apart
• Incremental dose: 1 mcg/kg IV
• Maximum dose: 2 mcg/kg IV
• Onset of action: 1 – 2 minutes
• Peak: 3 – 5 minutes
• Duration of action: 30 – 60 minutes
• 100 times more potent than morphine

Meperidine (Demerol®)

• Initial dose: 12.5 - 25 mg IV over 1 min
  – Repeat dosages 5 minutes apart
• Incremental dose: 5 - 10 mg IV
• Maximum dose: 1 mg/kg
• Onset of action: 1 - 5 min
• Peak: 5 – 7 minutes
• Duration of action: 2-4 hrs
• 1/10th as potent as Morphine

Propofol

• Controversies surrounding non-anesthesiologist administered propofol
• The use of propofol by non-anesthesiologists is off-label
• Practitioners administering propofol need to be prepared to manage adverse events
• Sedation-related complications appear to decrease with advanced experience-level (≥ 100 NAPS procedures)

ASA Statement on Safe Use of Propofol (2009)

• Non-anesthesia personnel who administer propofol should be qualified to rescue* patients whose level of sedation becomes deeper than initially intended and who enter, if briefly, a state of general anesthesia.**
**Titrate to Clinical Effect Technique**

**Advantages**
- Allows careful titration of sedative analgesics
- Reduces total medication via synergistic action
- Provides a slow, controlled rise in therapeutic plasma level
- May provide for more rapid patient recovery

**Disadvantages**
- May be time consuming

**Bolus Technique**

**Advantages**
- Provides rapid rise in therapeutic plasma levels
- Provides a sedate, analgesic state quickly based on patient weight mg/kg dosage

**Disadvantages**
- Rapid administration may result in excess therapeutic plasma levels
- Respiratory obstruction, depression, hypoventilation, tachycardia and cardiovascular instability frequently occurs with excess plasma levels

**Benzodiazepine Receptor Antagonist - Flumazenil**

- 0.2 mg (2ml) IVP over 15 seconds. Wait 45 seconds (total time-frame = one minute). If desired level of consciousness not obtained, may be repeated up to four times at 60 second intervals with a maximum dose of 1 mg.
- Onset: 1 - 2 minutes
- Peak: 6 – 10 minutes
- Duration: 45 – 90 minutes
- Should not be given to patients on chronic benzodiazepine therapy

**Opioid Receptor Antagonist - Naloxone**

- 0.1-0.2 mg IVP
  - Repeat dose every 2-3 minutes to the desired degree of reversal
- Onset: 2 minutes
- Peak: 5 – 15 minutes
- Duration: 30 – 45 minutes
- Naloxone can also eliminate the analgesic effects of the opioid.

**Procedural Patient Monitoring**

- Sedation Scale
- Pulse Oximetry
- Non-Invasive Blood Pressure
- Electrocardiogram
- Capnography
- Bispectral Index

**Pulse Oximetry**

- Provides estimation of arterial oxyhemoglobin saturation
- A saturation of 90% is equivalent to arterial oxygen blood gas of 60 torr
- Doesn’t provide information on patient’s ventilatory status
- Limitations: hypotension, hypothermia, anemia, intravascular dye use, movement
### Non-Invasive Blood Pressure

- **Moderate Sedation**
  - Monitor and record blood pressure presedation and every 15 minutes during procedure
- **Deep Sedation**
  - Monitor and record blood pressure presedation and every 5 minutes during procedure

### Electrocardiogram

- **Deep Sedation**
  - Continuous EKG monitoring
- **Moderate Sedation**
  - Patients with significant cardiovascular disease
  - During procedures in which dysrhythmias are anticipated
  - If the observer cannot directly see the patient (e.g., some radiological procedures).

### Postsedation Patient Care

- Patient Assessment/Management
- Teaching and Follow-up
- Discharge Criteria

### Patient Assessment & Monitoring

- Ensures the return of physiologic function before discharge or return to the inpatient setting
- Mechanisms must be in place to assess home readiness
- Monitoring continues at least every 15 minutes for 30 minutes following the last dose of medication
- If a reversal agent was given, monitoring continues for at least 2 hours to ensure that resedation doesn’t occur

### Teaching & Follow-Up

- Should be done in the presence of the responsible adult assuming the care of the patient on discharge
- Written instruction should include information about the procedure, medications, homecare instructions and follow-up care
- Emergency contact information should be included for family member
- Follow-Up gives the nurse the ability to receive direct feedback on complications and return to function

### Discharge Criteria

- Specific criteria must be met prior to the patient being returned to a nursing unit or sent home with a family member
- If patient does not achieve that score, the physician must be notified for further orders. Assesses return to presedation levels of consciousness
- Intact airway reflexes
- Return to baseline vital signs
- Return to baseline movement or ambulation
**Documentation**

- Goals of Documentation
  - Maximize patient safety
  - Medico-legal documentation
  - Continuous quality improvement

**Pre-Procedure Documentation**

- H&P including physical status classification
- Informed consent
- Airway assessment
- Baseline vital signs with oxygen saturation
- Previous sedation/anesthesia history
- Fasting status
- Responsible adult
- Instructions about procedure, medication effects

**Intra-Procedure Documentation**

- Medications administered
- Response to medications
- Vital signs
- Sedation score

**Post-Procedure Documentation**

- Vital signs
- Emergence from sedation / Discharge criteria
- Discharge Instructions

**Differential Diagnosis and Treatment of Complications**

- Restlessness
- Hypotension
- Hypertension
- Dysrhythmias
- Respiratory Depression

**Restlessness**

- Hypoxemia
- Pain
- Hypotension
- Bladder distension
- Hypothermia
- Hypercarbia
- Psychotropic effects of sedative medications
Hypotension

- Decreased preload
  - Hypovolemia from prolonged fasting or inadequate fluid replacement
  - Excessive urinary losses, bleeding
  - Peripheral vasodilation
- Effects of sedatives and opioids
- Decreased myocardial contractility
- Orthostatic effects of progressive ambulation

Hypertension

- Pain, surgical stimulation
- Hypoxemia
- Bladder distension
- Vasoconstriction, shivering due to hypothermia
- Preexisting disease
- Hypercarbia
- Retching or vomiting
- Fluid overload

Dysrhythmias

- Pain
- Hypoxemia
- Procedural myocardial infarction
- Catecholamine release
- Metabolic changes
- Preexisting disease
- Hypercarbia
- Electrolyte imbalance

Respiratory Depression

- Obstructed airway
- Splinting secondary to pain
- Pulmonary congestion
- Positioning, especially the obese
- Mechanical failure of the equipment
- Preexisting disease

Airway Management

- Management of Airway Obstruction
- Oxygen Delivery Devices
  - Cannulas
  - Face Masks
- Emergency Management
  - Bag-Mask Devices
  - Intubation Preparation
  - Suction