Moderate Sedation

A Self-Learning Module
Moderate Sedation

This self-learning module is required for health care professionals monitoring patients receiving or recovering from sedation.

IV moderate sedation is not within the basic educational preparation of RNs.

Nurses involved in the care of these patients must seek additional education enabling them to make judgements in delivering safe patient care.

Please study the material, complete the post-test and attendance sheet.

You will also need to complete the competency checklist after passing the post-test.

Objectives

Define moderate sedation (MS).

Define the scope of practice for caregivers monitoring the patient receiving moderate sedation.

Outline the required assessment/monitoring parameters for the patient receiving moderate sedation, including age-specific criteria.

Describe potential complications of moderate sedation and appropriate management.

Describe dosage and administration of medications used for moderate sedation.

List discharge criteria for transfer to a lower level of care for patients receiving moderate sedation.

Identify essential components of patient and family education concerning moderate sedation.
Moderate Sedation Defined

Moderate sedation is the administration of systemic medications by any route to produce sedation. Medications may include any combination of sedatives, hypnotic, and opioid drugs to produce sedation, analgesia, and amnesia.

DEFINITIONS:

A. Sedation Analgesia:

- Sedation analgesia is produced by the administration of amnesiac, analgesic, and sedative pharmacological agents under the direct supervision of a physician. A patient receiving sedation analgesia has a “depressed level of consciousness.” However, they “retain the ability to independently and continuously maintain a patent airway and respond appropriately to physical and verbal stimuli.”

B. Minimal Sedation: (Anxiolysis)

- A drug-induced depression of consciousness during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

C. Moderate Sedation/Analgesia:

- 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.

D. Deep Sedation:

- Deep sedation is a state of depressed consciousness or unconsciousness, which may be accompanied by a partial or complete loss of protective reflexes, including the ability to maintain a patent airway and to respond to physical stimulation or verbal command. Deep sedation and general anesthesia are inseparable for the purposes of monitoring.
Sedation occurs on a continuum

<table>
<thead>
<tr>
<th>Awake</th>
<th>Minimum Sedation</th>
<th>Moderate Sedation</th>
<th>Deep Sedation</th>
<th>General Anesthesia</th>
</tr>
</thead>
</table>
| • Responsive  
  • Alert | • May be anxious, despite sedation | • Maintains own airway  
 • Has a gag reflex  
 • Responds to verbal commands  
 • Responds to pain | • Loss of ability to maintain own airway  
 • Partial/complete loss of gag reflex  
 • Not easily aroused  
 • Unable to respond purposefully to physical stimulation | • Complete loss of protective reflexes  
 • Loss of ability to maintain airway  
 • Unable to respond to verbal commands  
 • Unable to respond to physical stimulation |

As the level of sedation increases, so does the risk of complications

Keep in mind that moderate sedation does not include:

• General anesthesia

• Peripheral nerve blocks, oral or topical anesthesia, or up to 50% nitrous oxide, provided no other systemic sedatives or analgesics are given.

• Oral pre-medication for anxiolysis or analgesia in adults.
The primary goal of MS is to decrease the patient’s anxiety and fear.
Indications for Moderate Sedation

« MS is utilized to minimize anxiety and fear.
« MS allows the patient to tolerate unpleasant situations or procedures.
« Often necessary in order to safely perform procedures on pediatric patients.
   • MS should be considered for any procedure that will be painful or uncomfortable; require the child to not move; or will last a long time.

Moderate Sedation Objectives

- Alter mood.
- Increase pain threshold.
- Maintain stable vital signs.
- Induce amnesia.
- Safe and rapid recovery

Desirable Effects of Moderate Sedation

- Relaxed and cooperative patient
- Stable vital signs
- Diminished verbal communication
- Arousable sleep
- Early ambulation possible
- Some degree of amnesia
- Elevation of pain threshold
Undesirable Effects of MS

- Apnea
- Respiratory depression/laryngospasm
- Unarousable sleep
- Severely slurred speech
- Combativeness/agitation
- Hypotension/cardiac irregularities
- Involuntary movement of eyes
RESPONSIBILITY & CREDENTIALING

I. Practitioners who have appropriate credentials and are permitted to administer moderate sedation are qualified to rescue patients from deep sedation and are competent to manage a compromised airway and to provide adequate oxygenation and ventilation.

II. Practitioners who have appropriate credentials and are permitted to administer deep sedation are qualified to rescue patients from general anesthesia and are competent to manage an unstable cardiovascular system as well as a compromised airway and inadequate oxygenation and ventilation.

(CAMH Update 3, August 2000)

CLINICAL PRIVILEGES / QUALIFICATIONS FOR ADMINISTERING MODERATE SEDATION

I. The medical staff should be granted privileges to administer and supervise the administration of moderate sedation based on the following criteria:

A. Be familiar with proper dosages, administration, adverse reactions, and interventions for adverse reactions and overdoses.

B. Know how to recognize airway obstruction and demonstrate skill in airway management and resuscitation.

C. Assess total patient care requirement/parameters including, but not limited to, respiratory rate, oxygen saturation, blood pressure, cardiac rate and rhythm, and level of consciousness.

D. Have the knowledge and skills to intervene appropriately in the event of complications.

E. Administration of sedation analgesia may only be performed by a physician with moderate sedation privileges or the RN with moderate sedation competencies who is functioning under the direct supervision of a qualified physician.

Physician Responsibility

PHYSICIAN PRIVILEGES:

A. Physicians who order or administer moderate sedation should have specific procedure and sedation privileges.

B. Moderate sedation policy implementation and compliance is directed by the Chairman of each service with the Chairman of Anesthesia having ultimate responsibility for developing policies regarding moderate sedation administration in a safe and appropriate manner, consistent with the patient’s needs. This will be achieved through continuous monitoring of moderate sedation administration by the involved department with final review and evaluation to be performed by the Department of Anesthesia.

C. All complications of the moderate sedation procedure should be reviewed by the involved Department and reported to the Chairman of the Department of Anesthesia.

Revised October 2006
D. The use of Ketamine for moderate sedation will be restricted to the Emergency Care Center and may only be administered by the Emergency Care Center Physician.

- Sedation is always administered under the direction of a physician.
- The ultimate responsibility for the care of the patient lies with the physician.
- Physicians providing sedation must be credentialed to do so.

Each licensed staff member shares with the physician in the responsibility for the care of the patient receiving MS within the scope of their license, including:

  Recognizing problems  
  Intervening appropriately  
  Receiving appropriate training  
  Practicing within their scope of practice

**STAFFING**

In accordance with JCAHO standards, there must be sufficient numbers of **qualified personnel** (in addition to the licensed independent practitioner performing the procedure) present during procedures using moderate or deep sedation and anesthesia to:

I.  appropriately evaluate the patient prior to beginning moderate or deep sedation and anesthesia;  
II. provide the moderate or deep sedation and anesthesia;  
III. perform the procedure;  
IV. monitor the patient; and  
V. recover and discharge the patient either from the post-sedation or post-anesthesia recovery area or from the organization.
Therefore,

**Sufficient qualified staff must be present:**
- to perform the procedure (physician)
- to monitor the patient (RN)
- to assist with procedure or obtain additional equipment

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**JCAHO Requirements**

**Risks and benefits** – patients have the right and need to be informed of the risks, benefits, and alternatives of moderate sedation. An informed consent is required prior to moderate/deep sedation.

**Physical history and evaluation** – a pre-procedural patient assessment must be performed by the physician and documented within 7 days prior to the procedure.

**Resuscitation readiness** – resuscitative equipment must be readily available in any location where patients under moderate sedation receive care.

**Agent selection and range of sedation** – Moderate sedation agents are selected according to the procedure, familiarity of the provider, and information from the patient’s history and physical assessment.

**Monitoring and continual assessment** – An RN will be specifically assigned to observe and monitor the patient during the procedure. This nurse is not to assist with the procedure or
engage in other activities, but is only to observe, monitor and intervene in case of unexpected medical emergency. Continually monitor and record B/P, ECG, Pulse, RR, and O2 saturation, and LOC. An assigned nurse or technician may assist the physician with the procedure.

**Recovery** – Assess each patient for recovery against an objective anesthesia recovery scoring system as defined in the hospital’s policy and procedure of moderate sedation. Consider patients recovered when they return to and maintain an acceptable score as determined by the hospital’s policy and procedure.

**Discharge criteria** – Record the mode of transportation home and the name of a responsible person to whom the patient is discharged in the medical record. Give both verbal and written discharge instructions to the patient and responsible adult.
Preparation Phase

- **Informed consent must be obtained**
  - Need written consent for both the invasive procedure and for the MS procedure

- **Make sure the patient has an adult escort to drive them home.**
  - An outpatient may not be discharged to his/her own care

- **History & Physical performed by physician**
  - Within 7 days of the procedure
  - Should include:
    - Chief Complaint
    - Allergies, including past medication reactions
    - Current medications and dosages
    - Significant medical history
    - Physical exam
    - Previous problems with anesthesia or sedation
    - History of stridor, snoring or sleep apnea
    - Age
    - Time of last fluid/food intake

- **Initial assessment completed by the RN to determine baseline by which to compare the patient’s recovery from sedation. This assessment should include:**
  - Height and weight
  - Level of consciousness and mental status
  - Mobility status
  - Baseline Vital sings (T, B/P, P, RR, and O2 saturation)
  - Examination of heart and lungs by auscultation
  - Indications/symptoms for procedure requiring moderate sedation
  - Emotional status and communication ability
  - Ability to maintain a patent airway

Revised October 2006
Fasting Guidelines

ASA CLASSIFICATION

Prior to beginning the procedure, the physician must determine the patients ASA Classification. An anesthesiology consult is highly recommended for all patients with an ASA classification of III or higher.

Level I: Healthy Patient
Level II: Mild Systemic Disease – no functional limitations
Level III: Severe Systemic Disease – no definite functional limitations
Level IV: Severe Systemic Disease that is a constant threat to life
Level V: Morbid – patient not expected to survive 24 hours with/without operation

CONTRAINDICATIONS FOR MODERATE

1. Head Injuries
2. ASA classification Level V
3. Patients with severe cardiopulmonary disease
4. Compromised airway
SEDATION
Patient/Family Education

- Education should include:
  - Preparation for procedure
  - Purpose of moderate sedation
  - Variable dose-response
  - Monitoring standards
  - Post-sedation behavioral changes
  - Discharge Instructions
In accordance with JCAHO, appropriate equipment for care and resuscitation must be made available for monitoring vital signs. Heart rate, respiratory rate, pulse oximetry, adequacy of pulmonary ventilation, and BP must be monitored. EKG is monitored in patients with significant cardiovascular disease or when dyrythmias are anticipated or detected.

**Equipment List includes:**

- IV equipment and fluids
- Airway Management Equipment:
  - Endotracheal tubes of various sizes
  - Laryngoscope
  - Oral and Nasal airways.
- Pulse oximeter
- Manual resuscitation bag and mask
- Supplemental oxygen setup
- Appropriate oxygen delivery system
- Functional suction apparatus with suction catheters
- Non-invasive B/P devise
- Emergency cart with drugs and equipment
- ECG monitor and defibrillator
- Have appropriate reversal agents immediately available
- For children of < 40kg, have weight-based pediatric cart at bedside prior to procedure

**Before the medications are administered:**

- have oxygen delivery available
- IV access line established
- Monitors in place

**Position the patient properly**

- Make them as comfortable as possible
- Protect them with side rails, blanket rolls, and safety belts as indicated.
Emergency Sedation

• The use of sedation must be preceded by evaluation of fluid and food intake.

• The increased risks of sedation must be weighed against benefits; the lightest effective sedation should be used.

• Patients may benefit from delaying the procedure to administer drugs that reduce gastric volume and increase gastric pH.
Continuous observation for maintenance of a patent airway and for potential complications

This is done by placing the patient on a cardiorespiratory monitor, pulse oximeter and automatic B/P cuff.

Documentation throughout moderate sedation procedures should reflect consistent patient assessment, implementation, planning and evaluation. Documentation should include, but not limited to:

**MONITOR, REPORT, AND DOCUMENT:**

1. Dosage, route, time of all medications given
2. Type and volume of fluids given
3. Monitoring devices and equipment used
4. Level of consciousness—before during and after sedation
5. Cardiac monitoring and pulse oximeter data
6. Any interventions and the patient’s response to the interventions
7. Any untoward reactions and its resolution
8. Respiratory rates less than 10/minute or greater than 26/minute (adults).
   Acceptable respiratory rates for pediatric patients should be age appropriate and designated by the nurse and physician prior to the procedure.
9. Oxygen saturation lower than 90%
10. Deviation from baseline that will negatively affect the patient’s hemodynamic status.
11. Cardiac dysrhythmias if observed
12. Significant change in level of consciousness (patient unresponsive)

Notify physician of any undesirable effects of sedation

**POST PROCEDURAL PHASE**
POST-PROCEDURAL PHASE
CARE OF THE PATIENT AFTER MODERATE SEDATION

♦ TRANSFER GUIDELINES:

A. Patients who have received moderate sedation should be monitored until appropriate stability criteria have been met.

B. A registered nurse/tech should monitor the patient until stability criteria are satisfied.

C. If discharge criteria is met and documented, the patient can be transferred per physician orders.

♦ Discharge Criteria

– **Inpatients** may return to their nursing unit when the above post-procedure stability criteria have been met.

– **Outpatients**:

  1. Should be alert and oriented, able to sit up and talk, and meet post-procedure stability criteria.

  2. Should be discharged in the presence of a responsible adult who will accompany them home and be able to report any post-procedure complications

  3. Outpatients and responsible adults should be provided with verbal and written instructions regarding post-procedure diet, medications, activities, and a phone number in case of an emergency.

  4. Infants and patients whose mental status was initially abnormal should have returned to their baseline. Caregivers should be aware that pediatric patients are at risk for airway obstruction should the head fall forward while the child is secured in a car seat.

  5. Sufficient time should have elapsed after the last administration of reversal agents assuring that patients do not become re-sedated after reversal agents have abated.

  6. A discharge order should be obtained from the attending physician or supervising physician.

– **Deeply Sedated patient or patient requiring reversal agents**:

  1. The *Aldrete score* system will be utilized in conjunction with the above.
The Aldrete score includes 5 categories: activity, respiration, circulation, consciousness, and color and is scored 0 to 2. The total number of points attainable is 10.

### ALDRETE SCORE

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<thead>
<tr>
<th>Legend</th>
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<tbody>
<tr>
<td>Activity</td>
<td>2 – Able to move 4 extremities voluntarily or on command.</td>
<td>1 – Able to move 2 extremities voluntarily or on command.</td>
<td>0 - Able to move 0 extremities voluntarily or on command.</td>
</tr>
<tr>
<td>Respiration</td>
<td>2 – Able to deep breathe and cough freely.</td>
<td>1 – Dyspnea or limited breathing</td>
<td>0 – Apneic</td>
</tr>
<tr>
<td>Circulation</td>
<td>2 – B/P plus or minus 20% of pre-anesthetic level.</td>
<td>1 - B/P plus or minus 20%-50% of pre-anesthetic level.</td>
<td>0 - B/P plus or minus 50% of pre-anesthetic level.</td>
</tr>
<tr>
<td>LOC</td>
<td>2 – Fully awake</td>
<td>1 – Arousal on calling</td>
<td>0 – Not are responding</td>
</tr>
<tr>
<td>Color</td>
<td>2 – Pink or normal</td>
<td>1 – Pale or dusky</td>
<td>0 – cyanotic</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Score 8 or above for discharge.</td>
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*A patient must meet discharge criteria before leaving the recovery area.*
DISCHARGE INSTRUCTIONS

- Outpatients should be discharged to an adult who assumes responsibility for transport and is able to report any post-procedure complications.

- Complete written discharge instructions regarding post-procedure diet, medication, activity, and phone number to use in case of emergency should be given to the ambulatory patient and adult following recovery from sedation.

DOCUMENTATION

- Documentation should be completed on the Universal Protocol (Timeout) form, informed consent form with physician assessment included, the pre- and post-procedure flowsheet, and the PI form. It must include:

  - Pre-procedural vital signs (P,RR, B/P, and O2 sat)
  - History and Physical completed by the physician
  - Vital signs, including pulse oximeter value, are recorded every five minutes during the procedure.
  - Dosage, route, time, and effects of all drugs or agents used.
  - Type and amount of fluids administered, including blood and blood products.
  - Level of consciousness/responsiveness to verbal and physical stimulation is documented every five minutes during the procedure.
  - Any untoward or significant patient reactions.

- Any interventions and the patient’s response.
Medications

Sedatives
Opioids
Reversal Agents
### Guidelines for Medications Used in Moderate Sedation

*Note: While these medications may be used for other purposes, these guidelines apply only when used for the purpose of moderate sedation.*

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosing</th>
<th>Onset/Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benzodiazepines</strong></td>
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<tr>
<td>Diazepam (Valium®)</td>
<td>Increments of 2.5 mg until desired end-point. Average total dose is 0.1 mg to 0.15 mg/kg, generally 5 to 30 mg is required. DO NOT exceed more than 5 mg/min. Do not dilute. The recommended end-point is marked slurred speech (thickened), eyelids become partially closed (ptosis), and the patient reports euphoric state. Reduce dose by 30% when an opioids are used concomitantly.</td>
<td>Onset: 30 seconds to 2 minutes. Duration: 2 to 4 hours Individual response is variable.</td>
<td>The appropriate technique for the administration of intravenous benzodiazepines for conscious sedation is the slow titration method. Contraindications: no history of benzodiazepine hypersensitivity, acute narrow-angle glaucoma, absence of pregnancy. Caution should be used in the elderly.</td>
</tr>
<tr>
<td>Midazolam (Versed®)</td>
<td>The dose of midazolam should be slowly titrated to the desired effect. Some patients may respond to as little as 0.5 mg. Initial dose of no more than 2.5 mg should be administered over 3 minutes. An additional 2 minute period should be used to fully evaluate the sedation effect. Further titration should be done in small increments waiting at least 2 minutes between increments to assess sedation. A total dose greater than 5 mg is not usually necessary. DO NOT ADMINISTER AS A BOLUS DOSE. Reduce dose by 30% when used with premedication narcotic or other CNS depressants are used.</td>
<td>Onset: 3 to 5 minutes Duration: maximum effect lasts about 5 minutes, gradually declining over the next 30 to 40 minutes. Recovery within 2 hours, but effects may last as long as 6 hours.</td>
<td>Maintenance doses in increments of 25% of the initial may be given to maintain the desired level of sedation, but only administered by slow titration. Doses of 0.1 to 0.15 mg/kg IV provided effective sedation for patients undergoing upper endoscopy. Doses of 0.1 mg/kg are considered optimal. Slurred speech may precede onset of sleep. Contraindications: no history of benzodiazepine hypersensitivity, acute narrow-angle glaucoma, absence of pregnancy. Caution should be used in the elderly and debilitated.</td>
</tr>
<tr>
<td>Lorazepam (Ativan®)</td>
<td>IV: 0.05-0.1 mg/kg incremental titration to desired effect within 10 to 15 minutes of procedure.</td>
<td>IV Onset: 1 to 5 minutes</td>
<td>Dilute with equal volume of NS, D5W or sterile water prior to IV injection. Do not exceed 2 mg/min. Monitor respiratory and cardiovascular status.</td>
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<tr>
<td>Drug</td>
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<tr>
<td><strong>Opioids Analgesics</strong></td>
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<tr>
<td>Morphine Sulfate</td>
<td>Dose: 0.1 mg/kg 1 to 2 mg increments; titrated to patient response</td>
<td>Onset: 1 to 3 minutes Duration: 3 to 4 hours</td>
<td>Monitor respiratory rate and depth continuously; respiratory depression may occur. Be prepared to assist ventilation. Hypotension is possible especially if patient is hypovolemic. Nausea and vomiting may occur. Note: Narcotic of choice for use with patients on MAO Inhibitors.</td>
</tr>
<tr>
<td>Meperidine (Demerol®)</td>
<td>The medication is titrated slowly to effect at 6.25 mg to 12.5 mg increments IV depending on the weight and condition of the patient not to exceed 200 mg over 1 hour. Dose must be reduced when given in conjunction with other CNS medications.</td>
<td>Onset: 1 to 3 minutes Duration: 3 to 4 hours</td>
<td>Same as Morphine, but may cause more nausea and vomiting. Caution: The combination with MAO Inhibitors should be avoided. An immediate severe reaction has been reported and is unpredictable, patients are at risk for this reaction for several weeks after the D/C of the MAO Inhibitor.</td>
</tr>
<tr>
<td>Fentanyl (Sublimaze®)</td>
<td>0.1 mg (100 mcg) is roughly equivalent to 10 mg of morphine or 75 to 100 mg of meperidine. The dosage is usually 1 to 2 mcg (0.002 mg) per kg IV or IM, with typical dose of 50 to 100 mcg. Titrate in 1 mcg/kg increments.</td>
<td>Onset: 1 to 3 minutes Duration: 30 to 60 minutes</td>
<td>Same as morphine. For short diagnostic procedures or treatments that require the patient to be awake. Used for balanced conscious sedation, usually combined with a neuroleptic agent, such as droperidol, or a sedative-hypnotic, like midazolam. Caution: The combination with MAO Inhibitors should be avoided. An immediate severe reaction has been reported and is unpredictable, patients are at risk for this reaction for several weeks after the D/C of the MAO Inhibitor.</td>
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</tbody>
</table>
### Pediatric Dosages

<table>
<thead>
<tr>
<th>Drug</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloral Hydrate</td>
<td>Pediatric Conscious Sedation: The most common dose used was 50 mg/kg (range 20 to 100 mg/kg) with a maximum single dose of 1 gram. Many standard drug references recommend that pediatric patients not receive a single dose of chloral hydrate that exceeds 1 gram.</td>
<td>Onset: 30 minutes Duration: half life of 4 to 12 hours, but depending on age (younger, less mature) effects can remain for days.</td>
<td>Response to overdose amounts of chloral hydrate can be quite variable; therefore, patients should be monitored carefully when receiving large doses.</td>
</tr>
<tr>
<td>Midazolam</td>
<td>Oral: 0.2-0.4 mg/kg (maximum 0.5mg) 30 to 45 minutes before procedure. IV: 0.05 mg/kg 3 minutes prior to procedure (children &gt; 12 years: IV 0.5 mg every 3 to 4 minutes until effect is achieved).</td>
<td>Onset: IV: 1 to 5 minutes PO: 30 to 60 minutes Duration: 30 to 80 Minutes</td>
<td>Infuse IV doses over 2 to 3 minutes. Monitor respiratory rates, blood pressure. Additive effect may occur with concomitant respiratory depressants. Reduce dose by 25-50%.</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Oral: 0.15 to 0.3 mg/kg before procedure. (Maximum 10mg dose for Sedation Analgesia. IV: 0.05-0.1 mg/kg over 5 minutes (not to exceed 2 mg/min) wait 9 to 10 minutes before second dose (1/2 to 1 times first dose, third dose is not recommended).</td>
<td>IV Onset: 1-5 minutes Duration: 20 to 30 minutes after single dose.</td>
<td>Do not dilute! Do not exceed 1 to 2 mg/minute IV push. Rapid injection may cause respiratory depression or hypotension. Additive effects may occur with concomitant respiratory depressants.</td>
</tr>
<tr>
<td>Meperidine</td>
<td>IV: 1-1.5 mg/kg over 2-3 minutes (maximum dose: 100mg) IM: 1-2 mg/kg 15-45 minutes prior to procedure</td>
<td>IV Onset: within 5 minutes IM Onset: within 10 to 15 minutes IM/IV Duration: 2 to 4 hrs</td>
<td>Dilute with NS or water 5 mg/ml final concentration for IV use. Give slow IV push over 2-3 minutes.</td>
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<tr>
<td>Drug</td>
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<tr>
<td><strong>Pediatric Dosages - Continued</strong></td>
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<tr>
<td>Morphine</td>
<td>IV: 0.05-0.1 mg/kg</td>
<td>IV Onset: within 5 minutes</td>
<td>Dilute with NS or water to 0.5-5 mg/ml final concentration for IV use. Give slow IV push over 4-5 minutes. Monitor Respiratory Rate (RR) and Blood Pressure (BP). Possible BP &amp; RR drop that may not appear until 60-90 minutes after dose.</td>
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<tr>
<td></td>
<td>IM: 0.1 mg/kg 15-45 minutes prior to procedure. Max dose: 15 mg</td>
<td>IM Onset: 30 to 60 minutes IM/IV Duration: 4 to 5 hrs</td>
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</tr>
<tr>
<td>Fentanyl</td>
<td>IV: 1-2 micrograms/kg within 5 minutes of procedure. IM: 1-2 micrograms/kg 30 to 60 minutes prior to procedure. Maximum Dose: 3 micrograms/kg in the unintubated patient.</td>
<td>IV: Onset 1-3 minutes IM Onset: 7-15 minutes Duration: 1 to 2 hrs</td>
<td>Warning: rapid IV infusion and high doses may cause chest wall rigidity; respiratory distress; apnea. Slow IV push over 3-5 minutes. Additive effects may occur with concomitant respiratory depressants. Reduce dose by 25-50%.</td>
</tr>
<tr>
<td><strong>Reversal Agents</strong></td>
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<tr>
<td>Naloxone</td>
<td>Intravenous doses of 0.4 to 2 mg are recommended, with repeat doses at 2 to 3 minute intervals to a maximum of 10 mg. Pediatric IV dosing are 0.2 mg/kg for children under 20 kg. Children over 20 kg dose of 2 mg with repeated intervals of 2 to 3 minutes.</td>
<td>Onset is 2 to 3 minutes with duration between 45 minutes to 4 hours. Duration: 20 to 60 minutes</td>
<td>Naloxone is an effective narcotic antagonist. Will not aggravate respiratory depression. Naloxone is as effective as nalbuphine in antagonizing opioid-induced respiratory depression. Repeated doses may be necessary, as duration of action is usually shorter than most opioids.</td>
</tr>
<tr>
<td>(Narcan®)</td>
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<tr>
<td>Flumazenil</td>
<td>Flumazenil is a benzodiazepine antagonist. For anesthesia reversal: Intravenous 0.2 mg followed by 0.2 mg every 30 to 60 seconds until the patient awakens or until a total dose of 1 mg is reached.</td>
<td>Onset is within minutes of administration and the effects last approximately 1 to 4 hours Duration: related to dose given and Blood plasma concentration; re-sedation usually occurs within 1 hr.</td>
<td>Generally well-tolerated. Dizziness, nausea and vomiting are the most common side effects.</td>
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<tr>
<td>(Romazicon®)</td>
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TITRATION

IV medications for moderate sedation are administered by titration.

“Titration” means slowly administering a minimum dose and assessing the patient for effect. Doses are repeated until desired effect is achieved.

Moderate sedation relies heavily on the synergistic action of two medications together, striving for the desired effect utilizing the smallest possible doses. This reduces side effects and promotes quicker recovery.

When are they sedated enough?

- Each patient is different but look for:
  - Slurred speech
  - Drowsiness
  - Cooperation
Physiological Effects of MS
Cardiovascular Effects of MS

- **Goals:**
  - Minimize variations in physiological parameters caused by anxiety.
  - Titrate dose to minimize hypotension and bradycardia that can occur with MS medications.

- **Geriatric patients:**
  - Delayed medication effects
  - Toxic medication effects

- **Pediatric patients:**
  - Rapid deterioration when compensatory mechanisms are exhausted

Neurological Effects of MS

- MS alters mental status by depressing the central nervous system

- **Goals**
  - Patient anxiety relieved but still able to follow simple commands
  - Some degree of amnesia is ideal

- **Geriatric patients:**
  - Overdosage

- **Pediatric patients:**
  - Paradoxical effects
Respiratory Effects of MS

- MS medications depress respiratory function
- MS medications potentiate the effects of other medications, many of which also depress respiratory function

Goal:
- The patient maintains adequate respiratory rate and oxygen saturation

Geriatric patients:
- Pulmonary function is reduced
- Reduced blood flow to lungs increases chance for developing hypoxia
- Cough reflex is diminished

Pediatric patients
- Smaller airways more prone to occlusion
- More flexible airways prone to occlusion

POTENTIAL COMPLICATIONS

- Do not underestimate the potential for serious trouble during moderate sedation.
- Should a patient progress from deep sedation to general anesthesia, the Anesthesia Department to be notified immediately for management of the patient.
- Be prepared to recognize clinical and other potential problems quickly and intervene appropriately.
Reportable Concerns

Adult
- SBP <90>160
- HR <60>100
- RR <10>20
- SaO2 <90%
- Change in LOC
- Any other complications

Child, less than 10 years old
- SBP < 70 + 2x age in years
- HR < 80 > 180
- RR and depth outside norms for age
- SaO2 < 90%
- Change in LOC
- Any other complications

POTENTIAL COMPLICATIONS

- Apnea/Respiratory distress/Arrest
- Hypotension
- Hypertension
- Significant cardiac changes
- Paradoxical Response
- Nausea/Vomiting
Apnea/Respiratory Depression/Arrest

Who is at risk
- Tobacco users
- Patients who snore
- Patients with big chests, short necks, large tongue, no chin
- Patients with pre-existing pulmonary disease
- Patients who have received large doses of medications
- Hypoventilation is one of the most common complications seen in the pediatric population

What happens
- Significant decrease in respiratory effort
- Airway obstruction from the tongue falling into the airway inhibiting ventilation

Interventions
- Stimulate patient
- Ask the patient to take a deep breath
- Maintain airway - chin tilt or jaw thrust or use of oral airways
- Change oxygen delivery system
- Manually ventilate
- Notify physician
- Administer reversal agents as ordered
- Intubate and full resuscitation if necessary
Hypotension

Who is at risk?
- Most common cardiovascular complication seen in sedating patients.
- Hypovolemic
- Cardiac patients
- Patients who have received large doses of medication

Interventions
- IV fluid bolus as ordered by physician
- Administration of reversal agents
- Maintain adequate oxygenation
- Lay flat and raise the patients legs. Do Not put in Trendelenburg position.

Hypertension

Who is at risk?
- Hypoxic patients
- Painful patients
- Anxious patients

Interventions:
- Respiratory assessment
- Pain assessment
- Sedation assessment
- Reassurance
- Administration of pharmacological agents as needed
Significant Change in Heart Rate/Rhythms/Cardiac Output

- Note that dysrhythmias may or may not be serious
- The two most common dysrhythmias seen in patients experiencing MS are sinus tachycardia and sinus bradycardia

Who is at risk?
- Patients with a cardiac history
- Patients with a pulmonary history
- Anxious patients
- Patients who breath hold

Causes
- Catecholamine release related to anxiety or pain
- Valsalva
- Coronary ischemia
- Hypercarbia
- Hypoxia

Interventions
- Assess patient response (B/P, HR, LOC)
- Check lead placement
- Relieve the pain or nausea with additional medication
- Have the patient take deep breaths
- Provide supplemental oxygen via nasal cannula
- Supplement intravascular loss in the case of hypovolemia
- Alert physician
- Implement BLS/ACLS/PALS protocols - rarely will anti-arrhythmia medications be necessary.
PARADOXICAL RESPONSE

Who is at risk?
- Patients who use/abuse certain drugs
- Patients who abuse alcohol
- Pediatric patients sometimes have reverse response to medications

Interventions:
- Perform a respiratory assessment first
- Consider that the patient might be under the effects of medication
- Narcan is not recommended in true paradoxical response
- Consider additional opioids to control pain
- Administer oxygen
- Change medications

Nausea/Vomiting

Who is at risk?
- Patients with history of nausea and vomiting issues
- Hypoxic patients
- Patients in pain and/or experiencing anxiety
- Non-NPO patients
- Obese patients
- Women experience nausea more often then men do
- Essentially every patient is at risk for nausea.

Interventions:
- ALWAYS have suction completely set up and operational
- Pre-medicate those with nausea and vomiting history
- Be sure the patient is well oxygenated
- Treat pain and anxiety appropriately
- Turn head to side, suction as indicated
Unarousable Sleep/Re-sedation

Who is at risk?
- Patients who have received large doses of medication

Interventions
- Administer reversal agent
- Monitor patient for at least 60 minutes to detect resedation
- Consider the specific drug duration of action when monitoring the patient for appropriate return to baseline LOC.

Allergic Reaction to Medication

Who is at risk?
- Every patient, but especially someone with multiple allergies

Signs and Symptoms
- Rash; Redness; Hives; and/or Itching
- Edema
- Bronchoconstriction
- Hypotension
- Syncopy
- Respiratory/cardiac arrest

Interventions:
- Administer oxygen
- Maintain airway
- Notify physician
- Administer antihistamines and/or steroids as ordered

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Adverse reactions that may require reversal agents include:

- Respiratory depression
- Hypoventilation
- Apnea
- Hypotension
- Agitation
- Combativeness
- Unarousable sleep

If a reversal agent is administered:

- Monitor the patient for resedation for at least 60 minutes after last dose of reversal agent.
- If resedation occurs, notify the physician for further instructions.
- Discharge patient after 60 minutes, if criteria are met.

Special Considerations

- If MS agents are administered other than immediately prior to a procedure, the patient will be monitored as indicated by the patient’s status and route of medication administered.
- Children receiving MS should be transported in a supine position to maintain airway...
Pediatric Instructions

- Include parent and child
- Cover routine instructions
- Prepare parent to support child during procedure
- Parents should remain with child, if possible
- Sometimes the parents are more anxious and upset than the child
- All monitoring equipment should be explained and shown to the pediatric patient.

- Preschoolers (up to age 6):
  - Need to understand that the hospital has special people to take care of them and make them feel better.
  - Fear separation from their parents, so you must reassure them you will stay with them.
  - If both parents must leave the child for a brief period, it is helpful to have a person your child feels comfortable with stay with them.

- School age (ages 6 through 12):
  - Understand why going to the hospital is necessary
  - Need information about treatments using terms they understand.
  - Clarification of unfamiliar words is necessary.
  - Child should be told what they will feel, see smell, or touch during a procedure, and what they can do during the treatment.

- Adolescents (ages 13 through 17):
  - Usually understand all aspects of their treatment plan and illness
  - Value their appearance and independence.
  - Allow them to share in the responsibility of their care