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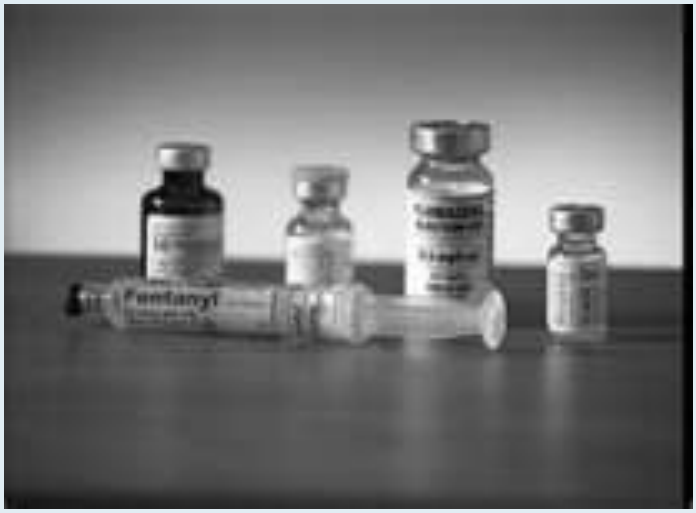
MODERATE SEDATION MODULE



Introduction

The purpose of this program is to provide the professional nurse with information necessary to safely and appropriately care for a patient receiving moderate/conscious sedation within the healthcare setting.

These settings usually have policies set forth to help guide nursing staff who cares for the patient receiving and recovering from moderate sedation. For Example, Huron Medical Center's policy is called "Guidelines for Moderate Sedation for Short Term Therapeutic, Diagnostic, or Surgical Procedures (051.700.15). Such resources often address the administration and care of patients receiving moderate (conscious) sedation, including definitions of levels of sedation and monitoring requirements.

> ***"Moderate sedation will be administered under the direction of a credential physician performing the procedure and by a competency validated RN. The physician must have been granted moderate sedation privileges by the Huron Medical staff credentialing committee."***

At many hospitals, all moderate sedation is overseen by the Anesthesia Department. Forms are created to help ensure documentation meets moderate sedation policy guidelines. Please refer to the Moderate Sedation Record in your department for proper documentation.

Please understand that frequent administration of moderate sedation/conscious sedation does not necessarily guarantee competency. Staff may be educated in moderate/conscious sedation but perform the procedure infrequently, with the possibility of long periods between procedures. Regardless of sedation administration, all individuals performing sedation must meet the same standards (i.e. ACLS and PALS certification, etc.). To obtain a list of physicians credentialed in conscious/moderate sedation, you may refer to HMC's Intranet.

Objectives

After completion of this module, the learner will be able to:

- Identify the difference between moderate/conscious sedation and deep sedation.
- Identify the purpose of moderate/conscious sedation.
- Identify the elements required for pre-sedation, intra-procedure, and post sedation assessment.
- Identify discharge criteria for patients who have received moderate sedation.
- Discuss common adverse reactions related to drugs used in moderate sedation.
- Identify the signs of respiratory depression and airway compromise.
- Articulate the elements of airway management during moderate/conscious sedation.
- Identify emergency situations arising from moderate/conscious sedation .

As you complete this module and the accompanying test, feel free to seek clarification from other sources as needed; such as a medication book, your Department Director, and hospital policies.

This module, objectives, and test were authored/prepared by Mary Aymen, CRNA, in conjunction with Huron Medical Center's Community Outreach/Hospital Education Department. Additional contributor: Dr. Naeem Haider, M.D.

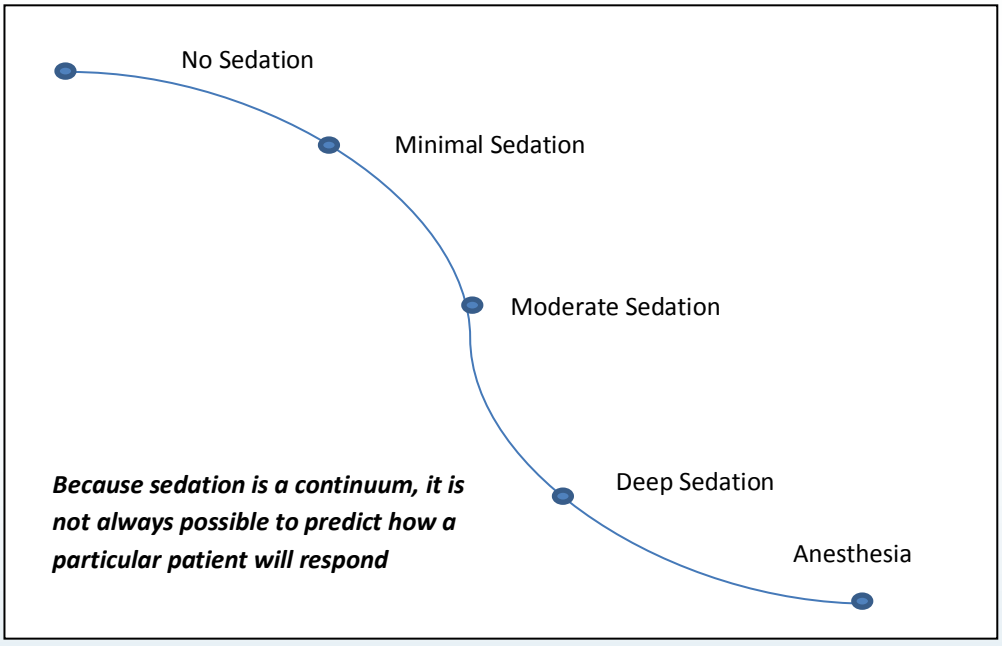
Moderate Sedation & Analgesia

Definition:

Moderate sedation/analgesia is a drug-induced depression of consciousness during which patients retain the ability to independently and continuously maintain a patent airway; as well as respond appropriately to verbal and/or light tactile stimulation.

The Continuum of Sedation:

Practitioners intending to produce a level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended.



Levels of Sedation

Minimal Sedation is a drug-induced state during which patients respond normally to verbal commands *(note: reflex withdrawal from painful stimulus is not considered a purposeful response.)* Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

Moderate Sedation/Analgesia (Formerly referred to as "Conscious Sedation") is 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 may be adequate. Cardiovascular function is usually maintained.

Deep Sedation/Analgesia is 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 ventilatory function may be impaired. Patients may require assistance maintaining a patent airway and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

Anesthesia consists of general anesthesia, spinal, or major regional anesthesia. It does not include local anesthesia. General anesthesia is a drug-induced loss of consciousness during which patients are not arousable even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Moderate Sedation: What it's not:

- **Pre-Medication:**
  - -Defined as a single dose prior to a medication
  - -Medication is not TITRATED to effect as in moderate sedation
- **Post-Operative Pain Management:**
  - -Given for post op pain, Including PCA
  - -Medication is not TITRATED to effect as In moderate sedation

Goals of Moderate Sedation

- Alteration of LOC and mood
- Maintenance of consciousness and cooperation
- Elevation of pain threshold
- Minimal variation of vital signs
- Rapid degree of ambulation
- Safe and prompt recovery

Moderate Sedation should result in:

- A patient that is relaxed & cooperative with:
  - -Purposeful responses to verbal communication and instruction
  - -Purposeful responses to tactile stimulation
  - -Easy and prompt arousal from sleep

Personnel Qualifications

Moderate sedations will be administered under the direction of a credentialed physician performing the procedure, and by a registered nurse who has been deemed competent through the hospital's competency assessment and validation process to monitor and manage the care of sedated patients.

Assessment of competency is intended to assure that the RN:

- Understands the principles of oxygen delivery and respiratory physiology
- Understands the action, side effects and potential complications of the most commonly prescribed sedatives and their antidotes
- Identify abnormal and life threatening cardiac rhythms
- Demonstrates skill in airway management and resuscitation
- Is able to utilize emergency equipment and effectively intervene in the event of complications or undesired outcomes
- Can assess total patient care requirements during sedation and recovery
- If performing sedation on a patient, one must demonstrate competency through ACLS (adult patient) and PALS (pediatric patient) in airway management and resuscitation appropriate to patient age

Physicians

Physicians must be granted clinical privileges for moderate sedation procedures by the Huron Medical Staff Credentialing Committee. Elements of physician responsibilities include:

- Perform a pre-sedation patient assessment and document properly on the chart
- Develop a sedation plan and obtain informed consent
- Be present during the administration of the drug, duration of the procedure, as well as during immediate post-operative stage until the patient is medically stable

Equipment and Supplies

Each designated area where sedation is administered must have emergency resuscitative equipment immediately available - equivalent to that used in other areas of the hospital, and which is checked and maintained on a scheduled basis. All Emergency equipment must be able to accommodate patients of any size or age undergoing procedures in that area. Appropriate equipment for patient care and resuscitation will include:

- Emergency cart
- Emergency drugs
- Defibrillator
- EKG monitor
- Blood pressure monitor
- Stethoscope
- Pulse oximeter
- Appropriate airways
- Suction device/suction catheters
- Oxygen source
- Nasal O_2 cannulas/O_2 masks
- Intubation equipment
- Positive pressure oxygen delivery device (bag-valve mask)
- IV supplies
- CO_2 detector

Pre-Procedure Patient Assessment

Patient selection for moderate sedation is based on many factors. A patient presenting with any one of the following conditions is **NOT** a candidate for moderate sedation by a non-anesthesia provider:

- Morbidly obese
- Severe sleep apnea or airway-related issue
- Current history of respiratory or hemodynamic instability
- Previous difficulties with anesthesia or sedation
- Pregnancy
- Inability to communicate
- Multiple drug allergies
- Multiple medications with potential for drug interaction with sedative/analgesics
- Current substance abuse
- ASA (American Society of Anesthesiologists) physical classification of an unstable Class 3 (see Table 1.1)
- ASA (American Society of Anesthesiologists) physical classification of a Class 4 or greater (see Table 1.1)

The anesthesia department should be consulted for the management of these patients.

Topics to Review Upon Assessment

Pre-procedure patient assessment *(informed consent will be obtained prior to moderate sedation/analgesia)* should include evaluation of the following, but is not necessarily limited to:

- Relevant aspects of the patient's medical history of organ systems
- Obtaining of vital signs (blood pressure, pulse, respiratory rate, and O_2 saturation)
- Focused physical examination of the cardiac and pulmonary systems
- Review of height and weight
- Review of present medication regimen (prescribed, over-the-counter, and herbal supplements), medication taken within the last 48 hours including any as needed medications; especially opioids or other narcotics
- Review of substance use
- Review of tobacco and alcohol use
- Verification of allergies and sensitivities to medications, latex, chemical agents, foods, and adhesives

Topics to Review Upon Assessment *(continued)*

- Determination of patient's ability to tolerate and maintain the required position for the duration of the planned procedure
- Status of any labs ordered per physician
- Status of pregnancy test *(if possible)*
- Patients for sedation must have a responsible adult to accompany them home after the procedure. If no ride/responsible adult can be arranged, the procedure will be cancelled

American Society of Anesthesiologists Physical Risk Classification

TABLE 1.1

ASA Classification System			
ASA Classification	Medical Description	Comment	Example
ASA I	No known systematic disease.	May have moderate sedation without other consideration.	Healthy patient without evidence of systematic disease.
ASA II	Mild or well controlled systematic disease.	May have moderate sedation without other consideration.	Patient who smokes, with well controlled hypertension.
ASA III	Multiple or moderately controlled systematic disease.	Consider medical consultation.	Patient with diabetes and fairly stable angina.
ASA IV	Poorly controlled systematic disease.	Consider involvement of anesthesia for MAC (monitored anesthesia care).	Patient with diabetes, angina and CHF with dyspnea and chest pain on exertion **or** not expected to survive without intervention.
ASA V	Moribund patient.	Patient with little chance of survival.	Massive pulmonary embolus or rupture of vascular structures with profound shock.

Confirmation of NPO Status

NPO Facts

- Sedation and analgesics tend to impair airway reflexes in proportion to the degree of sedation achieved
- Aspiration is the most common cause of Death associated with IV moderate sedation (1-20%)

NPO guidelines specify the time frames for patients to be restricted from consuming fluids or solids by gastrointestinal route. This includes nasogastric and gastrostomy tubes. These recommendations are not intended for women in labor.

NPO FASTING GUIDELINES

Age	Solids or non-clear liquids	Clear liquids
Adults	6-8 hours or NPO at Midnight	4 hours
Children >36mo	6-8 hours	2-3 hours
Children 6-36mo	6 hours	2-3 hours
Children <6mo	4-6 hours	2 hours

NPO Guidelines

- Gastric emptying can be influenced by many factors including anxiety, pain, pregnancy or mechanical obstruction
- The suggested times do not guarantee gastric emptying
- As a rule for adults, for solids and non-clear liquids, the patient should fast for at least 6-8 hours before their procedure

Airway Assessment

The administration of sedative and analgesic medications may interfere with the patient's ability to maintain a patent airway; therefore pre-procedure evaluation of the lungs and airway is essential. The lungs should be assessed for any abnormal breath sounds such as rales or wheezing. The airway may be assessed using the Mallampati technique, which is used by anesthesia providers to determine possible intubation difficulty. The Mallampati technique categorized the airway into one of four classes:

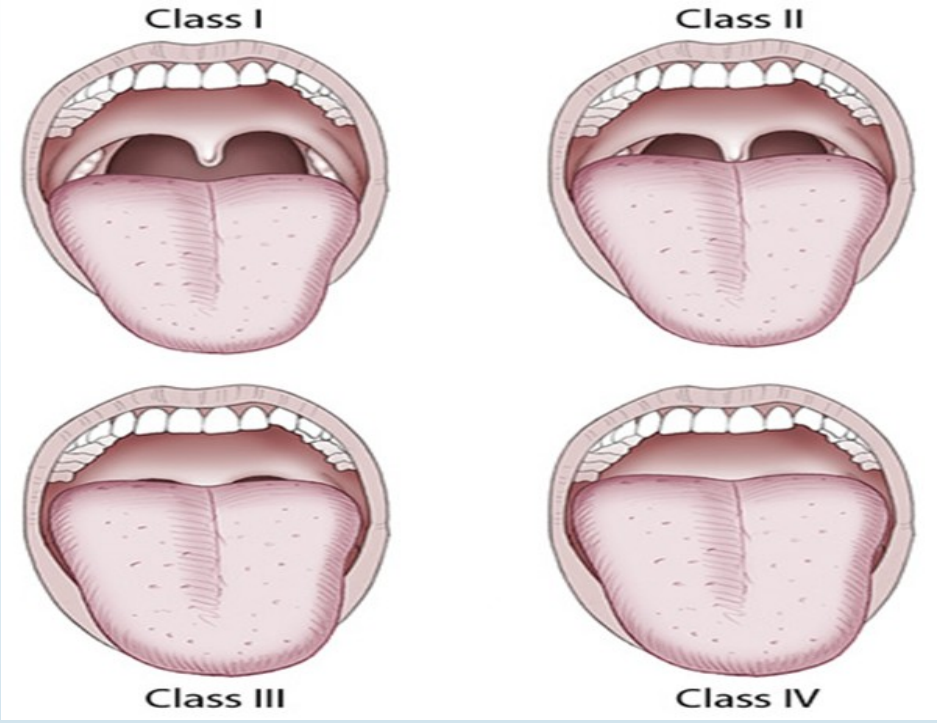
Class I: Visualization of the faucial pillars, soft palate and uvula.

Class II: Visualization of the faucial pillars and soft palate. The uvula is marked by the tongue.

Class III: Visualization of only the soft palate.

Class IV: Soft palate not seen.

If possible, the patient should be assessed in a sitting position. The patient is directed to open the mouth as wide as possible and protrude the tongue; exposing the faucial pillars and uvula at the tongue base. This simple precautionary measure alerts the physician to anticipate difficulty in the event of respiratory depression requiring intubation. For patients with a Class II, III, and IV airway, a consultation with an anesthesia provider is recommended.



Informed Consent

The patient must be informed about the risks, benefits and alternatives to sedation as a component of the planned procedure. There must be documentation in the medical record of informed consent and the plan of sedation prior to the procedure

Here is a general list of risks and complications that could be associated with a sedative procedure:

<table>
<tr>
<td>Relatively common and short-lived
▪ Nausea and vomiting
▪ Prolonged sleepiness</td>
<td>Uncommon and short-lived
▪ Headache
▪ Excitability and agitation
▪ Low blood pressure
▪ Nightmares</td>
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<tr>
<td colspan="2">Uncommon, but may last a short time
▪ Sore, lumpy vein (if medication was administered intravenously)</td>
</tr>
<tr>
<td>Rare
▪ Allergic reaction
▪ Diminished respiratory effort
▪ Inhalation of stomach contents
▪ Pneumonia</td>
<td>Extremely Rare
▪ Damage or failure of the heart, liver, stomach, kidneys and or brain
▪ Cardiopulmonary arrest
▪ Death</td>
</tr>
</table>

Intra Procedure

Administration of medications and dosage titration to individual patient effect will be directed by a physician

Role of the RN in Sedation

- Use of touch, verbal reassurance, and coaching to assist in reducing patient anxiety
- Encourage patients to deep-breath and provide information regarding progress of the procedure

Role of the RN in Sedation *(continued)*

▪All patients receiving moderate sedation must be continuously observed and physiologically monitored by a designated qualified nurse throughout the sedation period.

▪Assessment data must be documented **at least every 5 minutes** or more frequently as indicated by the patient's condition.

▪The sedation period includes the period of time during the administration of sedation until the patient has reached their pre-procedure level of consciousness.

Always Remember...

▪ The RN monitoring the patient should not be engaged in other activity during the period of moderate sedation

Documentation

Vital Signs: Blood pressure, heart rate, oxygen saturation. A cardiac monitor strip must be run throughout the procedure at 5 minute intervals.

If during the patient pre-assessment, performance of the procedure, or post procedure the nurse detects through his/her clinical assessment or mechanical monitoring (and ±20% deviation from baseline vital signs or reassessment for the purposes of airway management), he/she will inform the physician in charge. The physician is responsible to decide and implement the necessary corrective measures, and/or requests an anesthesia consult.

▪Prevention is the key

▪Always be vigilant

▪Nurse & patient are best monitors

▪Titrate drugs to effect

Monitoring and Documentation

- Times: Time patient was assessed prior to procedure, when initiated, when ended, and when medications given
- LOC (level of consciousness)
- Adverse reactions
- Vital signs and cardiac strip obtained **every 5 minutes** during and at the end of the procedure
- Continuous monitoring of heart rate and oxygen saturation, **documented** every 5 minutes

Respiratory Depression & Airway Compromise

Sedative-analgesic combinations used during IV moderate sedation can also cause a variety of pulmonary disorders. In addition to altering protective reflexes that assist in maintaining a patent airway, benzodiazepines and opioids can produce a loss of submandibular muscle tone. The submandibular muscles provide direct support of the tongue and indirect support of the pharynx. The epiglottis may occlude the airway at the level of the larynx. The tongue, epiglottis, or both can occlude the entrance of the trachea. In the unconscious patient, the tongue is the most common cause of airway obstruction. If the airway is not cleared, hypoxia and cardiopulmonary collapse will soon follow.

Indicators of a Patient with an Inadequate Airway

- Change in breathing (snoring, or loss of snoring)
- Decreased oxygen saturation
- Loss of chest expansion
- Rocking of chest and abdomen
- Changes in heart rate or blood pressure
- Changes in mental status; increased difficulty in arousing, agitation
- Changes in skin color from pink to pale or dusky (late sign of hypoxemia
- Changes in head position
- Any sign of a change in the patient's general status should initiate an inspection of respiratory status.

Airway Management

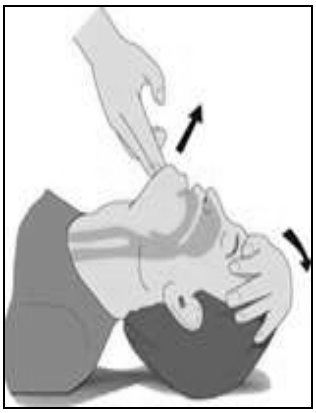
It is important to remember that hypoxemia is generally a late sign of hypoventilation or airway obstruction. However, hypoxemia during pre-procedure, intraprodedure, and post procedure, may prove to be extremely difficult to recognize and treat accordingly, as gradual hypoxemia may not always produce any signs or symptoms. If airway compromise is suspected, and the need to intervene arises, it is important to do the following:

1. Ask your patient how they are doing. If they respond and deny any respiratory problems, then one can be reasonably certain that the airway remains patent.
2. If a patient does not respond, then gentle stimulation should be attempted such as shaking a shoulder and using a louder voice.
3. If a patient has not yet responded, try moving the patient's tongue off the back of their throat by first turning the head laterally, followed by a head-tilt/chin-lift, and finally a jaw thrust maneuver to stimulate the patient to breathe.
4. If you need to place an airway to provide an added degree of airway patency for patients whose tongue is obstructing the back of the throat (or in obese patients with large tongues), call the anesthesiologist.

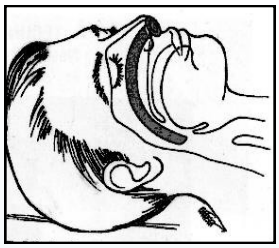
Airway Management *(continued)*

Head-tilt/Chin-lift Maneuver

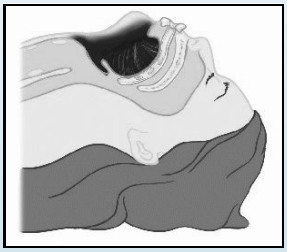
- Left hand is used to apply pressure to the forehead in order to extend the neck
- Right hand is used to elevate the mandible, which will lift the tongue from the posterior pharynx



Airway Adjuncts



The nasopharyngeal (nasal) airway should be inserted in the nasal opening (nare). These airway adjuncts are usually tolerated well, and can be used in a conscious patient. When attempting to place a nasal airway, the correct size should be chosen first. This is accomplished by measuring the nasal airway to match the length from tip of the nare to the lobe of the patient's ear. Begin by lubricating the adjunct first with a water-soluble jelly, and insert into the right nostril with the bevel facing toward the septum. Slight rotation may help to guide the nasopharyngeal airway into place, however, gentle pressure rather than force, should be used. If excessive pressure is encountered upon attempted placement, immediately withdraw the adjunct and attempt placement on the other nare. It is still important to assess lung sounds immediately after placement. Be cautious of laryngospasm or bronchospasm due to placement, as epistaxis (nosebleed) down the back of the throat can trigger this.



The oropharyngeal (oral) airway is used only in unconscious patients and those without a gag reflex because it's placement may stimulate vomiting. When attempting to place an oral airway, begin by measuring it properly. This is accomplished by measuring from the corner of the patient's mouth to the tip of the earlobe. If needed, suction the patient's mouth before placing the airway. Start by inserting the adjunct with the curve facing upward toward the roof of the patient's mouth. As the adjunct reaches the back of the throat, rotate it 180 degrees, so that the curve faces down and prohibits the tongue from occluding the patient's airway. Again, be sure to assess lung sounds after insertion. Risks with placement may include bradycardia due to vagal stimulation, and retching may cause hypertension, tachycardia, laryngospasm, dental damage, and lip lacerations.

Airway Adjuncts *(continued)*

An Ambu-bag is a positive pressure ventilation, bag-valve mask device. They can be used without supplemental oxygen to ventilate a patient, however, they will not provide oxygen at 100% unless attached to 10-15 liters of flow. In order to utilize an Ambu-bag, begin by removing any caps used by the manufacturer to keep the bag deflated for packing purposes. The face mask apex should fit snugly over the bridge of the patient's nose and their chin; as well as the medial aspects of the face. When used properly, no air should escape the mask seal. If the patient is breathing inefficiently (but not completely apneic), then synchronize your bagging with the patient's inspiration effort. If the patient cannot breath on their own, bag ventilate them at a rate of 10-12 breaths per minute, or once every 5-6 seconds.

If basic airway maneuvers fail to provide a patent airway with adequate air exchange, or if the patient has limited respiratory efforts, the physician supervising the procedure should do the following:

1. Consider administering reversal agents and/or,
2. Call for help to initiate advanced airway management (i.e. calling a "Code Blue" if necessary, or paging/phoning the anesthesiologist on-call.)
3. Prepare for intubation with an endotracheal tube. Familiarize yourself with your department's emergency intubation kit or crash cart contents so you can assist as needed.

Aspiration

As mentioned before, aspiration is the most common cause of death associated with IV moderate sedation, and accounts for 1-20% of all deaths involving sedation and/or analgesia. The increased likelihood of aspiration with IV moderate sedation and analgesia is due to impairment or absence of protective reflexes such as the cough and gag reflex, when accompanied with excess sedation. A patient with symptoms of aspiration may exhibit wheezing, crackles, coughing, hypoxia, pulmonary edema, cyanosis, fever and/or hyperventilation. The level of risk escalates for pregnant patients, obese patients, as well as older adult patients with hiatal hernias or gastro-esophageal reflux. Those patients at increased risk for nausea and vomiting include children, obese patients, individuals with a history of nausea and vomiting associated with sedation, as well as patients with a history of motion sickness.

Aspiration

If the patient vomits:

- Turn to side
- Suction airway

Afterwards, may only require observation and Supplemental oxygen

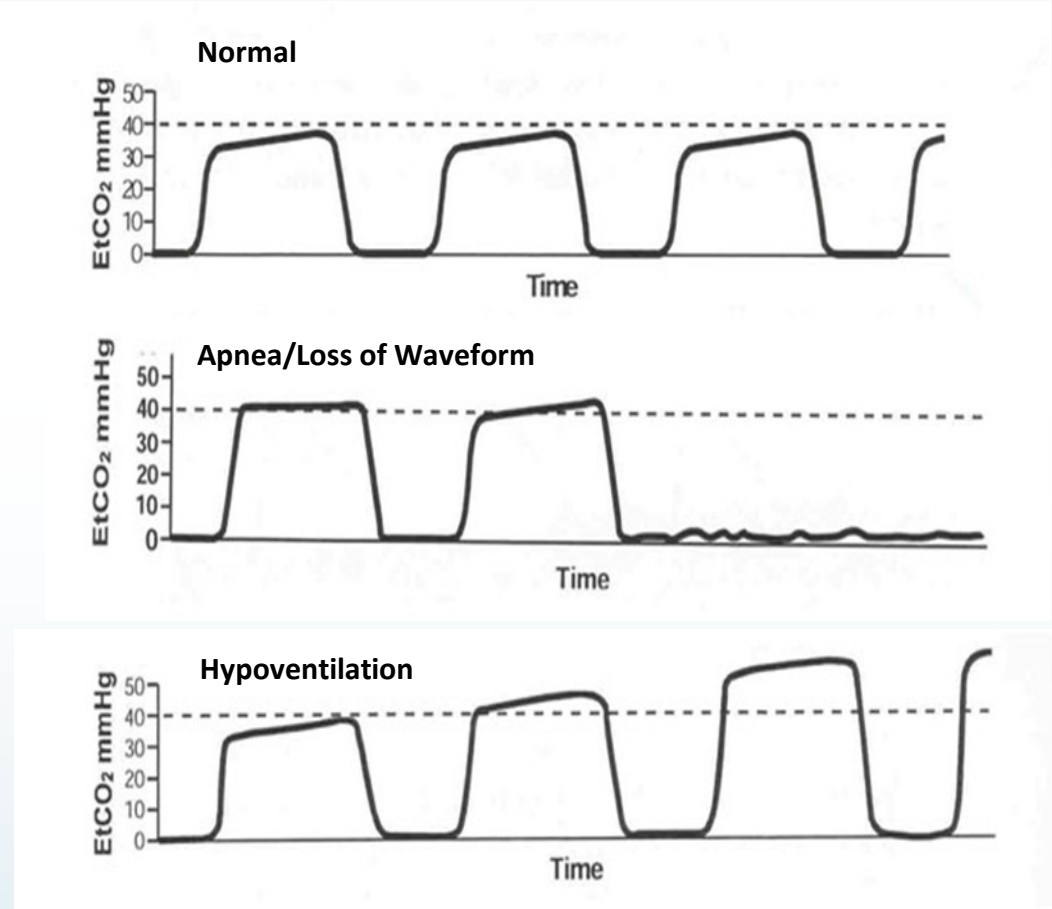
Supplemental Oxygen

You need to know how to correctly use the oxygen supply available at HMC, including how to open a cylinder of oxygen, checking it for adequate pressure, as well as proper use of a flow meter.

Nasal Cannula: 1-6 liters/minute = 24-44% for a patient with normal tidal volume 1 liter = 24% 2 liters = 28% 3 liters = 32% 4 liters = 36% 5 liters = 40% 6 liters = 44%
Face Mask: 8-10 liters = 40-60% (Flow should be greater than 5 liters/minute to avoid rebreathing air held in mask)
Ambu-bag: 15 liters = up to 100% (Use basic airway head positioning and oropharyngeal airway if possible. Hold mask to patient's face and squeeze the bag. Watch for gastric distention)
Note: Oxygen tank safety includes estimating if your tank will last long enough before transporting your patient.

Using Capnography to Monitor Ventilation

Carbon Dioxide (CO_2) is the most significant factor in monitoring ventilation. Capnography measures the CO_2 in every breath, and monitors air exchange in the patient's alveoli. Measuring CO_2 levels during procedural sedation can detect problems in the lungs or airway, and offers earlier warning of hypoventilation, respiratory depression, hypermetabolism, and hypoperfusion than monitoring oxygen saturation alone. Capnography measures CO_2 with infrared technology, and gives graphic and digital numeric displays for end-tidal CO_2 ($ETCO_2$) and SpO_2 (oxygen saturation).



What the Waveform Tells you…

The capnograph waveform plots the patient's CO_2 level on the vertical axis and time on the horizontal axis. The highest point represents end-tidal CO_2-$ETCO_2$- the concentration of CO_2 at the end of exhalation, which provides a clinical estimate of alveolar CO_2.

What the Waveform Tells you… *(continued)*

Follow these interventions for any change from baseline:

- Check the patient
- Stimulate the patient
- Consider withholding additional sedating medication
- Inform the practitioner
- Stop the procedure if necessary
- Administer a reversal agent if necessary

Post Procedure Practices

An objective scoring system will be used to assess the patient's recovery from sedative effects, as well as his or her eligibility for discharge from the procedure area or hospital. Post-procedure monitoring of blood pressure, heart rate and rhythm , as well as respiratory rate and oxygen saturation will be done per the Aldrete (Table 1.2) or React Scoring Guidelines (as indicated) - until the Aldrete score is 8-10, the patient's pre-procedure score is reached, or as the physician directs. Use of reversal agents may increase recovery time.

ALDRETE SCORING SYSTEM

Ambulatory Recovery Post-Anesthesia Status		Frequency	Admitting	15	30	45
Activity	-Able to move four extremities voluntarily on command	4 Extremities	2	2	2	2
	-Able to move two extremities voluntarily on command	2 Extremities	1	1	1	1
	-Able to move no extremities voluntarily on command	0 Extremities	0	0	0	0
Respiration	-Able to deep breathe & cough freely		2	2	2	2
	-Dyspnea or limited breathing		1	1	1	1
	-Apneic		0	0	0	0
Circulation	-BP +20mm of pre-anesthetic level		2	2	2	2
	-BP +21-49mm of pre-anesthetic level		1	1	1	1
	-BP +50mm of pre-anesthetic level		0	0	0	0
Consciousness	-Fully awake		2	2	2	2
	-Arousable on calling		1	1	1	1
	-Not responsive		0	0	0	0
Oxygen Saturation	-Able to maintain O_2 saturation greater than 92% on room air		2	2	2	2
	-Needs 0_2 inhalation to maintain 0_2 saturation great than 90%		1	1	1	1
	-0_2 saturation great than 90% even with 0_2 supplement		0	0	0	0
TOTAL SCORE						

Discharge Criteria

Patients may be discharged from the procedure area if they meet all of the following criteria:

- Patient is alert and oriented as at baseline (pre-procedure)
- Stable vital signs documented **for a minimum of 60 minutes** after the last dose was given **(90 minutes if reversal agent used—Narcan or Romazicon)**
- Documentation that includes BP, pulse rate, respiratory rate and oxygen saturation on room air (>95% or at baseline) and level of consciousness at or near pre-sedation levels
- Temperature not >101°F
- Cardiac rhythm consistent with baseline
- A discharge score >8 (Aldrete score) or equivalent to pre-sedation baseline
- Dry surgical dressings or minimal drainage anticipated
- Minimal or absent nausea
- Pain controlled by analgesics or rated at or below baseline
- Voiding (may be required by physician)
- Presence of protective reflexes (swallow and gag), and tolerating fluids by mouth as ordered by physician
- Patient is able to ambulate as well as he/she was able to prior to the procedure
- Responsible adult is present to drive patient home and remain with patient during recovery phase

Patient Education for Discharge

All patients being discharged within 24 hours of receiving moderate sedation should be provided with written and verbal discharge instructions. Each area providing moderate sedation may develop and use a department and procedure specific teaching tool. Instructions included on the teaching tool should adhere to the following guidelines:

- Instructions should be age-specific
- Emergency care and phone numbers should be provided in a clear fashion
- Patients should be instructed to avoid alcohol, tranquilizers, sleeping medication, and other over-the-counter medications that have sedating effects for 24 hours; as appropriate for age group
- Adult patients should be instructed in the avoidance of driving or operating heavy machinery for 24 hours. Parents should receive safety instructions for care of children
- Patients should be instructed in the avoidance of signing important papers or making important decisions for 24 hours
- Advice should be given regarding resumption of activities of daily living including eating, drinking, and appropriate rest
- Instructions should be given regarding signs and symptoms to expect after moderate drowsiness and altered memory

Medications Used in Moderate Sedation

Titrate drugs slowly to evaluate the patient's response to that dose. Give the medication time to reach it's peak effect.

Benzodiazepines

- Most widely used for sedation
- Effects are sedation, relief of anxiety, antegrade amnesia, anti-convulsive, and skeletal muscle relaxation
- No analgesic properties of it's own
- Have a synergistic (additive) effect when given with narcotics

Medications Used in Moderate Sedation

DRUG	INDICATION(S)	ONSET/DURATION	PRECAUTIONS
Diazepam (Valium)	**IV:** 2.5 milligrams in increments, (not to exceed 5 milligrams per single dose over 60 seconds.) Individual response is variable. ▪Do not dilute with saline or H_20. ▪Do not mix with other drugs. ▪Reduce dose of narcotic by a third when used with diazepam. Reduce diazepam dose by 30-50% in elderly.	***Onset:*** 30 Seconds to 2 minutes (may take up to 5 minutes). ***Duration:*** 60-180 minutes (may last up to 4 hours); sedative effects usually last for 3 hours.	Administer into large vein; monitor airway, 0_2 saturation and heart rate. *Titrate to slurred speech.* Contraindicated in untreated narrow-angle glaucoma; irritating to veins—may cause phlebitis, thrombosis, and local inflammation. Avoid in pregnant women, especially during first trimester.
Midazolam (Versed) **Healthy adults** (greater than 60 years of age)	**IV:** 0.5 to 2.5 milligrams over at least 2 minutes. Repeat in 2 minutes, if needed, in small increments of initial dose over at least 2 minutes to achieve desired effect. Overall dose 2.5-5 milligrams. **Elderly:** Initial dose 0.5 milligrams slow IV, give no more than 1.5 milligrams over 1 minute period, waiting another 2 minutes to evaluate sedative effect. Total dose greater than 3.5 milligrams is rarely necessary. Titrate with small increments allowing 2 minutes after each dose to evaluate effect. Once sedation is achieved, additional doses should be 25% of the dose required to produce the sedative endpoint; for maintenance, use 0.25 milligram to 1 milligram. **Total dose:** Usually less than or equal to 5 milligrams. Reduce dose by 30% if patient was premedicated with a narcotic or other CNS depressant.	***Onset:*** 1.5 to 5 minutes. ***Duration:*** 2 to 6 hours. Recovery usually occurs within 2 hours, but effects may last as long as 6 hours.	*Titrate to slurred speech.* Monitor airway, oxygen saturation, and heart rate. Contraindicated in acute narrow-angle glaucoma. May potentiate adverse effects of opioids— including respiratory depression— when used in combination. Reduce dose in patients with compromised renal or hepatic dysfunction. Avoid use with alcohol, St. John's Wort, Valerian, Kava-Kava, and Gotukola. May increase CNS depression. Blood pressure monitoring required during IV administration.
Lorazepam (Ativan)	**IV:** 1-2 milligrams IV, not to exceed 2 milligrams per minute (dilute 1 milligram per milliliter).	***Onset:*** Slow, with prolonged duration.	Use carefully in elderly. Contraindicated in narrow-angle glaucoma. May cause agitation, respiratory depression, dizziness, and hypotension.

Benzodiazepine Reversal

Romazicon (Flumazenil)

Class: Benzodiazepine antagonist.

Actions: Reverses sedative effects of benzodiazepines, does not completely reverse amnesia, and may not reverse respiratory depression.

Contraindications: Patients with a history of hypersensitivity to the drug; patients who have been given a benzodiazepine for control of a potentially life-threatening condition (e.g. control of intracranial pressure or status epilepticus.)

Precautions:

1. The onset of reversal is usually evident within 1 to 2 minutes after the injection.
2. If patient does not reach desired level of consciousness after 1 minute, repeat at 1 minute intervals until total dose 1 milligram is given (initial dose plus 4 additional doses,) prn.
3. Romazicon's duration of action is shorter than all benzodiazepines (e.g. half life is half that of Versed or Valium.)
4. In case of RESEDATION give no more than 1 milligram (at 0.2 milligram/minute doses) at any one time, and no more than 3 milligrams should be given in any 1 hour.
5. Severe resedation unlikely in patients showing no signs of resedation 2 hours after 1milligram of Romazicon.
6. Administer into free-flowing IV solution if appropriate, to minimize pain on injection.
7. Tell patient to avoid operating equipment, using alcohol, CNS depressants and over-the-counter drugs for 24 hours.
8. If reversed, patient won't recall information given in post-procedure period. Romazicon doesn't reverse amnesic effects of benzodiazepines.

Romazicon *(continued)*

DRUG	INDICATION(S)	ONSET/DURATION	PRECAUTIONS
Flumazenil (Romazicon) **For benzodiazepine reversal**	**ADULT-** **IV:** 0.2 mg over 15 seconds. If patient does not reach desired level of consciousness after 45 seconds, repeat dose. Dose may be repeated at 1 minute intervals until a cumulative dose of 1 milligram has been given. Dose may be repeated after 20 minutes if resedation occurs, but no more than 1 milligram should be given at one time. Do not exceed 3 milligrams in 1 hour. 0.1 to 0.2 milligram increments in opioid dependent patients and in post operative patients to avoid large cardiovascular changes. **PEDIATRIC-** **IV:** 0.01 milligrams per kilogram given IV over 15 seconds (up to 0.2 milligram total dose.) May repeat the dose at 1 minute intervals until desired endpoint, or 5 total doses of 0.01 milligrams per kilogram. Max dose is 0.05 milligrams per kilogram or 1 milligram, whichever is lower.	**Onset:** Immediate. Duration: **Initial half life:** 7-15 minutes. **Terminal half-life:** 41-79 minutes.	Benzodiazepine antagonist. Use has been associated with occurrence of seizures. Monitor for reoccurrence of sedation. Monitor ventilation, heart rate and oxygen saturation. **NOTE:** The effects of Flumazenil may wear off before the effects of the benzodiazepine. Repeat doses may be required. Flumazenil is not generally recommended for use in children.

Opioids

Opioids bind with specific receptors in the central nervous system. The action of each receptor type varies, but all provide some level of analgesia. The main use of narcotics during conscious sedation is to provide the patient with Some level of pain relief. Additionally, narcotics can produce sedation, and in higher doses, all will produce a profound decrease in the patient's level of consciousness, and a risk of respiratory arrest.

Opioids *(continued)*

DRUG	INDICATION(S)	ONSET/DURATION	PRECAUTIONS
Meperidine (Demerol) **Pure opioid agonist**	**IV:** Dilute to achieve concentration of 10mg/ml and administer 12/5-25 milligrams over 2 minutes. May repeat incremental dose at 2 minute intervals to achieve desired endpoint for sedation. Do not exceed 200 milligrams in 1 hour. Do not exceed 600 milligrams over 24 hour period. (It's 1/10 as potent as Morphine Sulfate.) Reduce dose in elderly patients.	**Onset:** 5 minutes. **Duration:** 2-4 hours	*Titrate to slurred speech.* Contraindicated in patients with hypersensitivity to the drug and in those who have received an MAO inhibitor within the past 14 days. Normeperidine, a metabolite of Meperidine is a CNS endotoxin. Patients with compromised renal function are particularly at risk. Meperidine should not be used for more than 48 hours for acute pain or at a dose greater than 600 milligrams in 24 hours.
Morphine **Pure opioid agonist**	**IV:** Dilute to achieve concentration of 1mg/ml. Administer 1 to 2 milligrams over 1 to 2 minutes. May repeat incremental dose at 5 minute intervals to achieve desired endpoint for sedation. **Usual max total dose:** 10 milligrams in a 24 hour period. Reduce dose in elderly or debilitated patients.	**Onset:** 5 minutes. **Duration:** 4-5 hours.	*Titrate to slurred speech.* Monitor respiratory rate and depth continuously; respiratory depression may occur. Be prepared to assist ventilations. Contraindicated if drug allergy exists; use cautiously in elderly and debilitated patients. Hypotension is possible, especially if the patient is hypovolemic. Nausea and vomiting may occur. Less nausea/vomiting versus Meperidine.
Fentanyl (Sublimaze) **Opioid analgesic**	**IV:** 25-50 micrograms, up to 150 micrograms. Slow IV administration over 2 minutes. Fentanyl is 100 times more potent than Morphine Sulfate. (100 micrograms Fentanyl = 10 milligrams Morphine Sulfate).	**Onset:** 1-2 minutes. **Duration:** 30-60 minutes.	*Titrate to slurred speech.* Monitor respiratory rate and depth continuously; respiratory depression may occur. Crosses the blood brain barrier quickly. **With rapid administration, can cause skeletal muscle and chest wall rigidity impairing ventilation.** More sedative effects when compared with Morphine. Shorter acting when compared to Morphine.

Opioid Reversal

Naloxone (Narcan)

Although the mechanism of action of Naloxone hydrochloride (Narcan) is not fully understood, studies suggest that it competes with narcotics for the mu, kappa, and delta receptors. By binding with these receptors, Naloxone counteracts the sedation, respiratory depression, analgesia, hypotension, and gastrointestinal stasis produced by opioids.

Class: Opioid antagonist

Action: Counteracts narcotic effects.

Contraindications: Hypersensitivity to Naloxone.

Precautions: Use cautiously in patients suspected to be physically dependent on opiates. The drug may precipitate acute withdrawal symptoms. Rare occurrences of hypertension, hypotension, pulmonary edema, and ventricular arrhythmias have been reported.

Naloxone (Narcan)

- Dilute an ampule (0.4 mg in 1cc) in 9cc of Normal Saline to create concentration of 0.04 milligram per cc
- Inject at 1-3 cc increments at 2-3 minute intervals to the desired degree of reversal
  - -Adequate ventilation and alertness
  - -No significant pain or discomfort

DRUG	INDICATIONS	ONSET/DURATION	PRECAUTIONS
Naloxone (Narcan) **Narcotic Antagonist**	**ADULTS-** **IV:** 0.4 to 2milligrams over 2 minutes with repeated doses at 2 to 3 minute intervals. Max total dose = 10 milligrams. **PEDIATRIC-** **IV:** 0.01 milligrams per kilogram over 2 minutes and may repeat with a dose of 0.1 milligram per kilogram if needed.	**Onset:** 2-3 minutes. **Duration:** 45 min-4 hours. **Half-life:** Adults 30-80 minutes. Neonates 2.5-3.5 hours.	Narcotic antagonist. Contraindicated in patients with hypersensitivity to Naloxone. **NOTE:** The effects of Naloxone may wear off before the effects of the narcotic. Repeat doses may be required. **Naloxone does not reverse and may even exacerbate hyperexcitability response associated with Normeperidine toxicity.**

Other Medications

Pentobarbital

Pentobarbital is a barbiturate given to immobilize pediatric patients, particularly during radiology procedures. It has very strong sedative properties (can lead to deep sedation,) but provides no analgesia. There is NO reversal agent for Pentobarbital. The medication is titrated in 1 milligram per kilogram increments over 3-5 minutes until the desired effect is achieved. Pentobarbital is administered no faster than 50 milligrams per minute

Moderate Sedation Agents: Pediatric Dosages

- Pentobarbital (Nembutal)
  -IV 0.5-1.0 milligrams per kilogram, titrate to a max of 6 milligrams per kilogram; 150 milligrams
- Onset of 1-10 minutes
- Duration of 1-4 hours
- Side Effects: Respiratory depression, laryngospasm, Hypotension, bronchospasm. No reversal agent

DRUG	INDICATION(S)	ONSET/DURATION	PRECAUTIONS
Pentobarbital (Nembutal) **Alternative for benzodiazepine allergy**	**IV:** 50-100 milligrams at a rate no greater than 50 milligrams per minute to prevent hypotension and respiratory depression. May repeat in 2 minutes to achieve sedation endpoint. **PO:** 150-200 milligrams in divided doses. If desire to repeat, consider IV to titrate effect.	**Onset:** PO = 20 minutes. IV = 15 seconds. **Duration:** PO = 1-4 hours. IV = 15 minutes.	*Titrate to slurred speech.* Contraindicated in patients with hypersensitivity to barbiturates or porphyria, or with severe respiratory disease when dyspnea or obstruction is evident. Use cautiously in geriatric or debilitated patients.

Ketamine

Ketamine is a non-barbiturate phencyclidine derivative that produces "dissociative anesthesia," a cataleptic state in which the eyes remain open with a slow, nystagmic gaze. The patient is non-communicative although wakefulness may appear to be present. Varying degrees of hyper-tonus and purposeful movement may occur independent of the procedure. Ketamine has analgesic, amnesic and altered consciousness properties making this an ideal agent for painful procedures. Ketamine is a potent cerebral vasodilator; its use is controversial in head trauma as it may increase intracranial pressure. Ketamine is also a potent hallucinogen. Emergence from Ketamine sedation is associated with visual and auditory illusions. The incidence of illusions is greatest in patients over 16 years of age, and those patients with a history of psychosis. Providing education, a quiet environment, as well as co-administration of a benzodiazepine (Midazolam) will prevent or minimize these reactions. When given slowly, Ketamine does not produce significant respiratory depression. However, it will produce apnea following rapid Intravenous administration (1-2 milligrams per kilogram.)

Moderate Sedation Agents: Pediatric Dosages

- Ketamine
  -IV 0.25-0.5 milligrams per kilogram
  -PO/PR 50 milligrams per kilogram; max dosage of 1 gram
  -Side effects: Hypertension, tachycardia, PCP type hallucinations, "Herky-jerky" movements