

Moderate Sedation Protocol

Intended for non-anesthesiologist clinicians involved in delivering moderate sedation to patients

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Objectives

Upon completion of this self-study guide, the clinician will be able to:

1. Differentiate between moderate sedation and deep sedation
2. Assess for responsiveness, airway adequacy, ventilation, oxygenation and circulation
3. Describe patient monitoring requirements during moderate (conscious) sedation)
4. Titrate sedatives and analgesics based on pharmacologic characteristics
5. Rescue a patient from deeper-than-intended sedation

Outline

1. Introduction
2. Continuum of Sedation
3. Pre-Procedure Patient Evaluation and Preparation
4. Airway Assessment and Management
5. Patient Safety Monitoring
6. Sedation Pharmacology
7. Respiratory Complications
8. Rescue
9. Recovery

Introduction

Objectives of Moderate Sedation

1. Depressed level of consciousness
2. Decrease anxiety, pain, discomfort
3. Amnesia to the extent possible, but not guaranteed
4. Minimize risk (optimize risk/benefit ratio)
5. Retains airway reflexes and verbal responsiveness
6. Rapid recovery

Continuum of Sedation

	Minimal Sedation	Moderate Sedation	Deep Sedation	General Anesthesia
Response (to simulation)	↔ *	Purposeful** response to verbal/tactile	Purposeful** response to tactile/painful	Unarousable
Airway	↔	No intervention	Intervention often required	Intervention required
Spontaneous Ventilation	↔	Adequate	Possibly adequate	Inadequate
Vital Signs	↔	↔	↔	May be impaired

*↔ Indicates normal or minimal change from baseline

**Localization to pain does not qualify as purposeful response

Joint Commission standards apply for sedation when patients receive “in any setting for any purpose, by any route”

Continuum of Sedation

Minimal Sedation / Anxiolysis

Patient retains:

- Normal response to command
 - Normal respiration and ventilation
 - Normal eye movement
 - Normal or baseline mental orientation
-
- Does not mandate implementation of Moderate Sedation Policy

Continuum of Sedation

Moderate Sedation

Patient retains:

- Purposeful response to tactile or verbal stimulus
- Protective airway reflex intact
- Airway remains patent
- Spontaneous ventilation is adequate
- No adverse effect on cardiorespiratory function

Continuum of Sedation

Deep Sedation

- Depressed consciousness from which patient is not easily aroused
- Beyond the scope of this policy

Patient retains:

- Purposeful response to tactile or painful stimulus
- Partial or complete loss of protective airway reflexes
 - intervention may be required
- Spontaneous ventilation possibly adequate
- Need for airway support

Patient Evaluation and Preparation

Purpose

- To establish baseline patient condition and suitability for planned procedure and sedation
- Assess need for additional testing, consultation or intervention prior to procedure

Components

- Past medical history
- History of receiving sedation or anesthetics, any problems noted
- Height, weight, allergies, medications
- Use of tobacco, ETOH, other drugs/OTC/alternative medications
- Focused physical exam: Baseline vital signs, airway, heart, lungs, mental status

Patient Evaluation and Preparation

Cardiopulmonary Co-morbidities

- Patients with moderate to severe heart or lung disease will have decreased ability to tolerate deviations from normal levels of consciousness
- Note severity, stability, recent changes in condition
- They can easily decompensate during mild hypoxia or hypercarbia
- Consider Anesthesiology consult for such patients

Relative Contraindication to moderate sedation

- Severe, untreated hypertension
- Hemodynamic instability
- Decompensated heart failure
- Unstable angina
- Acute dyspnea
- Recent PO intake
- Significant dysrhythmia or electrolyte disturbance

Patient Evaluation and Preparation

American Society of Anesthesiologists (ASA) Classification

- Method of categorizing patient physical status is a useful and simple method to summarize patient condition.

American Society of Anesthesiologists Physical Status Classification	
I	Normal healthy patient
II	Patient with mild systemic disease without significant impact on daily activity and small risk of impact on anesthesia or surgery
III	Patient with significant or severe systemic disease that affects daily activities and will likely have an effect on anesthesia or surgery
IV	Patient with severe systemic disease that is a constant threat to life or requires intensive therapy and will have a major impact on anesthesia or surgery.
V	Moribund patient who is not expected to survive 24 hours with or without surgery
VI	Brain dead organ donor
* Adding E indicates emergency procedure	

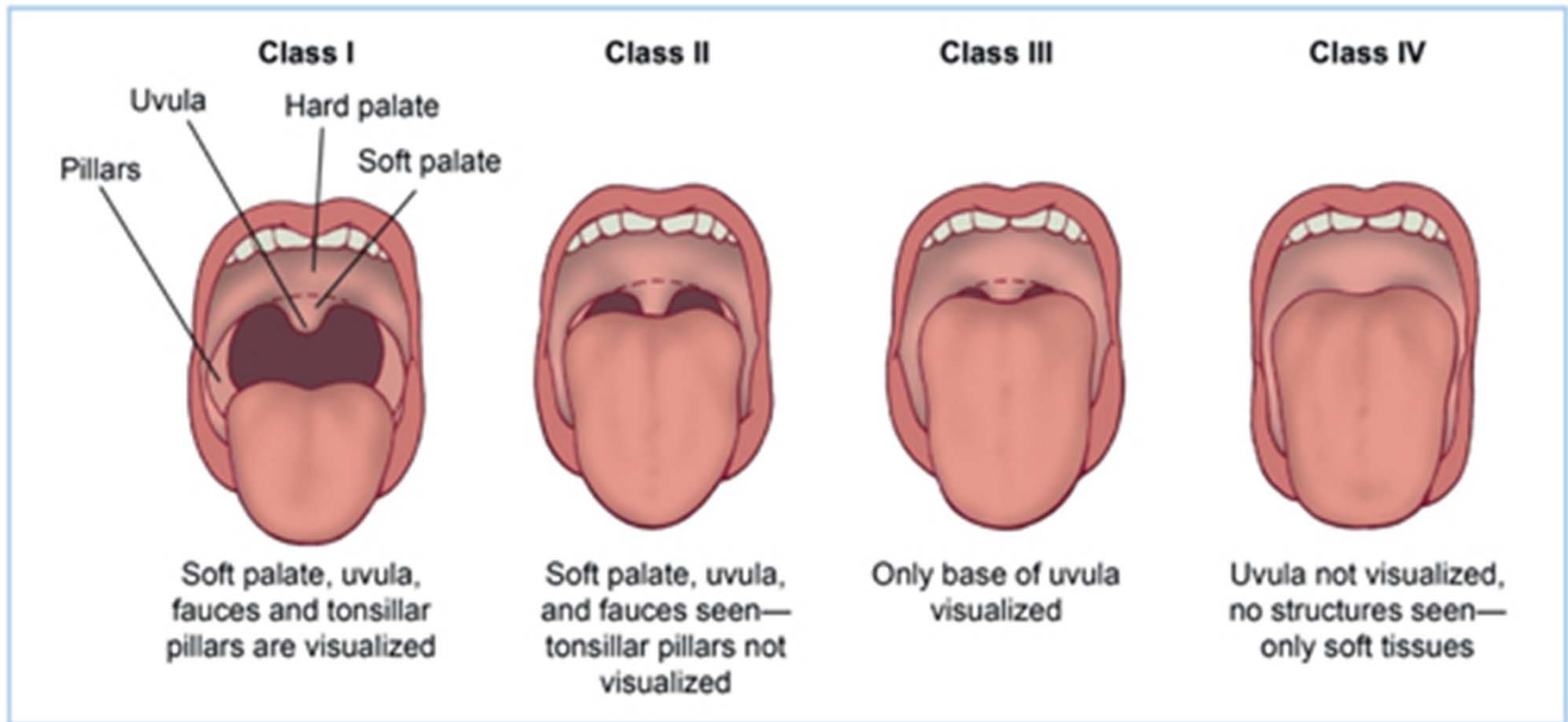
Airway Assessment

1. Body Habitus
 - significant obesity, head and neck deformity
2. Head and neck
 - short neck, limited neck extension, neck mass, cervical spine disease, tracheal deviation, previous surgery and/or radiation
3. Mouth
 - small opening, protruding incisors, macroglossia, tonsillar hypertrophy, non-visible uvula, Mallampati classification
4. Jaw
 - small or receding jaw, trismus, beard



Airway Assessment

Mallampati Classification



Airway Assessment

Diseases associated with difficult airways

- Obesity Sleep apnea
- Rheumatoid arthritis
- Ankylosing spondylitis
- Airway tumors
- Airway infections
- Acromegaly
- Burn patients
- Pierre-Robin Sequence
- Treacher Collins
- Down's Syndrome
- Goldenhar's

Patient Evaluation and Preparation

High Risk – Consider Anesthesiology Consult

High Risk is Defined as High Risk of Failure or High Risk of Adverse Event

- Severe critical organ disease (heart, lung, brain, kidney)
- Difficult airway management (MP Class III or IV, difficult anatomy)
- H/o obstructive sleep apnea or severe snoring
- Morbid obesity (BMI > 40 kg/m²)
- Drug or alcohol abuse
- Chronic opioid use
- ASA Classification ≥3
- Elderly (> 70 years)
- Pregnant patients
- History of failed sedation or failed procedure
- Diseases associated with difficult airways

Patient Documentation and Assessment

The following must be documented pre-procedure

- Patient weight and height
- Complete History and Physical
- Patient's medications and allergies
- ASA physical status
- Pre-sedation vital signs
- Patient airway assessment
- Pertinent lab results
- NPO Status

Patient Documentation and Assessment

NPO Guidelines

Liquids and Food Intake	Minimum Fasting Period
Clear Liquids	2 Hours
Breast Milk	4 Hours
Infant Formula	6 Hours
Non-Human Milk	6 Hours
Solids	8 Hours

Patient Safety Monitoring

Monitoring modalities

1. Non-invasive blood pressure (NIBP)
 2. Respiratory rate (RR)
 3. Electrocardiography (ECG)
 4. Pulse oximetry (SpO₂)
 5. Level of consciousness (LOC)
 6. Capnography (end-tidal CO₂) – if available
- Document patient vital signs and sedation level every five minutes
 - Provides a permanent record of the sedation procedure that may assist patient care during future procedures
 - Alarms should be turned **ON** during procedure

Patient Safety Monitoring

Equipment (SOAPME Acronym)

S	suction
O	oxygen
A	airway
P	pharmacy
M	monitors
E	equipment

Suction (separate from that used for procedure)

Oxygen (nasal cannula, face mask)

Airway (nasal/oral airways, face mask, bag-valve mask assembly)

Pharmacy (sedative medications, emergency medications)

Monitors (ECG electrode pads, pulse oximeter finger probe pad)

Equipment (other equipment airway rescue)

Respiratory Complications

Airway Obstruction Recognition

- Labored Respiration
- Paradoxical chest movement
- Tachypnea
- Inspiratory stridor
- Snoring (partial), No breath sounds (complete)
- Decreased oxygen saturation
- Neuro: Restlessness, decreased mental status, unconscious
- Skin: Cyanosis
- Vitals: Tachycardia, bradycardia, hypertension

Respiratory Complications

Factors that potentiate respiratory depression

- Drugs
- COPD
- Obesity
- Obstructive Sleep Apnea

Respiratory Complications

Airway Obstruction Intervention

- Oropharynx and glottis are the most common sites for airway obstruction
- Maneuvers to relieve obstruction Increase auditory/manual stimulation (call patient's name and shake gently)
- Reposition head
- Chin lift or jaw thrust
- Use of airway adjuncts (oral or nasal airways)
- Assist ventilation as needed
- Use assistant for two-person ventilation if necessary for effective ventilation
- Consider CALL FOR HELP

Sedation Pharmacology

Benzodiazepine

Physiologic effects:

- Anxiolysis, amnesia, sedation
- Mild respiratory and cardiac depressant
- May cause paradoxical dis-inhibition and agitation (especially elderly)
- **HIGHLY SYNERGISTIC WITH OPIOIDS**

Sedation Pharmacology

Benzodiazepine

DRUG	DOSE	ONSET	DURATION
Midazolam (Versed) IV	0.02-0.03 mg/kg Maximum 0.1 mg/kg	1-3 MIN	20-40 MIN
Diazepam (Valium) IV	0.1mg/kg (not to exceed 10mg)	15-60 MIN	240-480 MIN
Reversal			
Flumazenil (Romazicon)	Initial IV dose 0.01mg/kg may be repeated in 45 seconds maximum dose 1mg	1-2 MIN	15-90 MIN

Sedation Pharmacology

Opioids

Physiologic effects:

- Potent respiratory depressant resulting in severe hypoventilation and apnea that may require assisted ventilation or tracheal intubation
- Cardiovascular depressant
- Bradycardia, hypotension
- Chest wall rigidity
- Euphoria
- **HIGHLY SYNERGISTIC WITH BENZODIAZEPINES**

Sedation Pharmacology

Opioids

DRUG	DOSE	ONSET	DURATION
Morphine Sulfate IV	0.025-0.05mg/kg Maximum 0.15mg/kg	1-5 MIN	30-180 MIN
Fentanyl IV	1-2mcg/kg Maximum 3mcg/kg	1-5 MIN	30-60 MIN
Meperidine (Demerol) IV	< 1mg/kg Maximum 50-100mg	1-5 MIN	30-180 MIN
Reversal			
Naloxone (Narcan) IV	Titrate 0.1mg IV to effect	1-2 MIN	60 MIN

Sedation Pharmacology

Local Anesthetics for infiltration

DRUG	MAX DOSE
Lidocaine	3 – 4 mg / kg 5 – 7 mg / kg (w/epi)
Bupivacaine	3 mg / kg

Rescue

Populations at increased risk of oversedation and undersedation

- Pediatrics
- Elderly
- Critically ill
- Obese

Rescue

Most Common Reasons for Sedation Failure

- Poor Patient Selection
- Drug Overdose
- Polypharmacy
- Inadequate Monitoring
- Under Appreciation of Potential Drug Interactions
- Inadequate Preoperative Assessment

Rescue

Consider rescue procedure if there is:

- Decreased level of consciousness
- Loss of protective reflexes
- Unstable vital signs (BP > 30% below or above baseline)
- Respiratory depression: respiratory rate < 10 bpm
- SpO₂ <90% despite mask supplemental oxygen

Recovery

Phase I: Post Anesthesia Recovery Score (PARS)

- Recovery in designated, monitored area until PARS ≥ 9
- Recovery for a minimum of 15 minutes)

points	<i>Activity</i>	<i>Circulation</i>	<i>Oxygenation</i>	<i>Respiration</i>	<i>Consciousness</i>
2	Moves 4 extremities	± 20 mmHg of baseline BP	SpO ₂ > 92% on RA	Adequately ventilating	Fully awake
1	Moves 2 extremities	± 50 mm Hg of baseline BP	SpO ₂ $\geq 90\%$ with O ₂	Hypoventilating	Arousable
0	No spontaneous movement	BP > 50 mm Hg from baseline	SpO ₂ < 90% with O ₂	No respirations	Unarousable

Phase 2: Readiness for discharge

- Must be discharged into the care of a responsible adult

Pediatric Airway

External Anatomy Differences

CHILD

Proportionately larger head

Infants are obligate nose breathers

Larger, more flaccid tongue

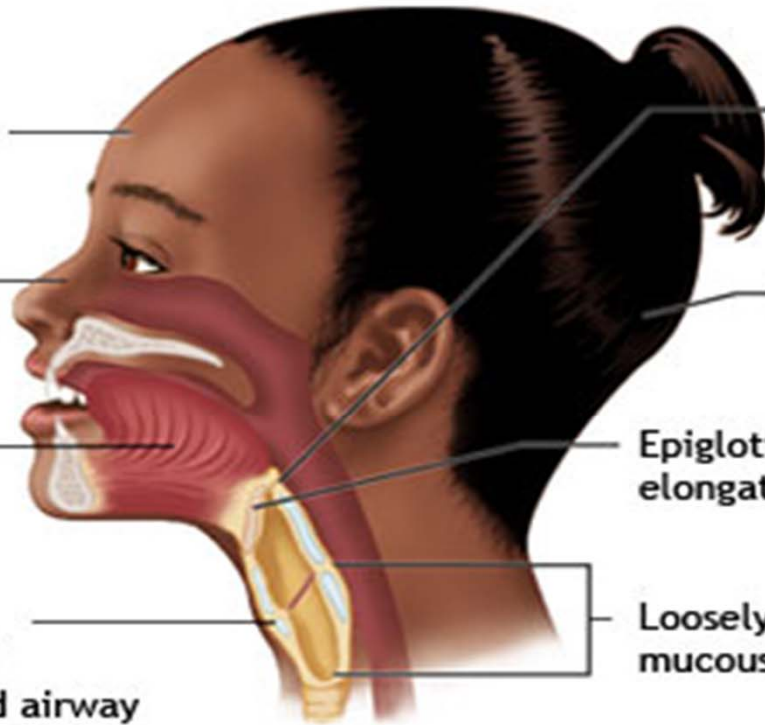
Cricoid cartilage narrowest part of the funnel-shaped airway

Larynx more superior and anterior

Proportionately larger occiput

Epiglottis more cephalid, elongated, and flexible

Loosely attached mucous membranes



Infants and young children rely on the diaphragm to breathe more than adults do.

Pediatric Airway

Major Anatomical Differences

1. Occiput – larger, leads to flexion of neck
2. Tongue – larger, obstructs airway
3. Epiglottis – larger, angled
4. Position of Larynx - cephalad
5. Vocal Folds - angled
6. Subglottis – narrow, funnel shaped

Pediatric Airway Evaluation

- *Mandible: size/position*
- *Tongue size*
- *Loose/missing teeth*
- *Mouth opening*
- Voice change
- Mallampati class
- Thyromental distance

Pediatric Sedatives

Nasal Route

- Nasal route useful for children too young, or unwilling, to drink
- Administer (without needle) into nose with child lying down and head back

DRUG	DOSE	ONSET	DURATION
Midazolam (Versed)	0.2-0.3mg/kg as a single dose.	15-20 MIN	60-90 MIN

Pediatric Sedatives

Oral / Transmucosal Route

DRUG	DOSE	ONSET	DURATION
Midazolam (Versed)	0.5mg/kg as a single dose	15-30 MIN	60-90 MIN

Pediatric Sedatives

Intramuscular Route

DRUG	DOSE	ONSET	DURATION
Atropine	0.01 - 0.02mg/kg IM – one dose only. (Minimum dose 0.1 mg)	15 MIN	60-240 MIN
Ketamine	Up to 3 mg/kg IM Subsequent dosing (IM) – 2 mg/kg (limited to 1 dose) Maximum dose 5 mg/kg IM	5-20 MIN	20-30 MIN
Glycopyrrolate	0.005 - 0.01 mg/kg Maximum single dose 0.2 mg/kg.	15 MIN	60-240 MIN
Meperidine (Demerol)	1-1.5 mg/kg Maximum Dose 1.5 mg/kg or 100 mg	Variable 1-5 MIN	Variable 30-180 MIN

Pediatric Sedation

Reversal Agents

Naloxone (Narcan):

- Reverses opioids
- 1–2 mcg/kg, repeated Q 1 minute (up to 10 mcg/kg) if no effect.
- Caution: Re-sedation may occur due to short half life: Avoid premature discharge

Flumazenil (Romazicon):

- Reverses benzodiazepine
- 0.01 mg/kg, repeated Q minute up to 1 mg
- Onset: 1–2 minutes
- Duration: 15–90 minutes
- Caution: Re-sedation may occur due to short half life