2016 AAP Sedation Guidelines:

What does it mean for my practice?

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Pediatrics

Disclosures

- We have no disclosures

~~Conscious Sedation~~

Procedural Sedation

Objectives

1. Define the changes in the 2016 Sedation guideline
2. Identify areas for improvement in your current sedation practice
3. Define system-wide processes that contribute to the implementation of the guidelines

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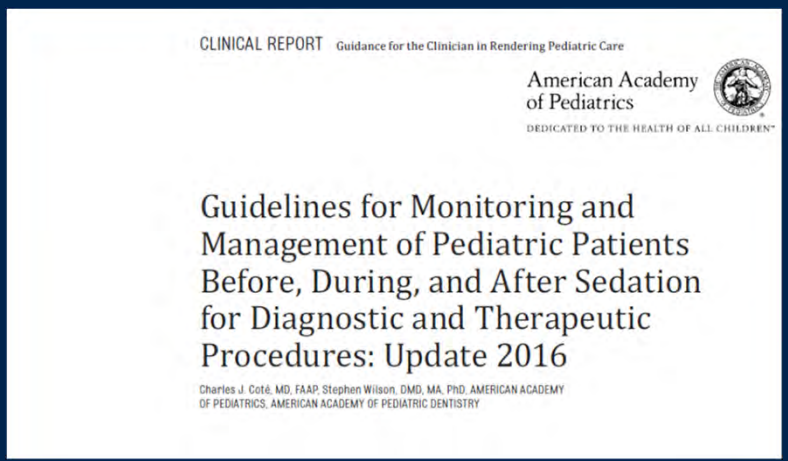
CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures: Update 2016

Charles J. Coté, MD, FAAP, Stephen Wilson, DMD, MA, PhD, AMERICAN ACADEMY OF PEDIATRICS, AMERICAN ACADEMY OF PEDIATRIC DENTISTRY

Pediatrics

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Goal

https://perthzoo.wa.gov.au/schools

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Importance of sedation and analgesia in pediatrics

- Pain and anxiety are under-treated
- Increasing number of procedures outside the operating room
- Improved patient care and patient satisfaction
- Joint Commission

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Pediatric Sedation

- Increasing pediatric sedations performed outside OR
  - Sedations conducted by wide range of non-anesthesiologist practitioners in diverse locations
  - Preventable adverse events, some fatal (Cote, 2000)
- Sedation Monitoring/Management Guidelines
  - American Academy of Pediatrics - 1985, 1995, 2006, 2016 (finally!!)
  - American Society of Anesthesiology - 2002
  - American College of Emergency Physicians - 2005
- No standardized educational curriculum exists

Pediatric Sedation

- Cote reports (2000) – describe systems related sedation complications
  - Poor outcome linked to insufficient provider knowledge, technical skills and vigilance:
    - Inadequate pre-sedation risk assessment
    - Insufficient knowledge of sedative pharmacology
    - Incomplete understanding and uses of monitoring
    - Lack of response to monitoring information
    - Insufficient resuscitation skills (failure to rescue)
  - Respiratory compromise initial event in > 80% of cases

SEDATION CONTINUUM

LEVELS OF SEDATION

- **Minimal Sedation**
  - Cognitive function and coordination may be impaired
  - Patient can provide appropriate response to physical stimulation and verbal command
  - Airway protective reflexes, ventilatory and cardiovascular status maintained
  - Example – oral ativan for lumbar puncture or intranasal midazolam for laceration repair

LEVELS OF SEDATION

- **Moderate Sedation**
  - Blunted but purposeful response to verbal or light tactile stimulation
  - May be minimal to mild alterations in ventilatory responsiveness
  - Airway protective reflexes and cardiovascular function usually maintained
  - Example – Pentobarbital for CT of neck with contrast, Etomidate for hip dislocation

LEVELS OF SEDATION

- **Deep Sedation**
  - Blunted but purposeful response to painful stimulation
  - Spontaneous ventilation and ability to maintain protective airway reflexes may be inadequate
  - Cardiovascular function usually maintained
  - Example – propofol and ketamine for fracture reduction

LEVELS OF SEDATION

- **General Anaesthesia**
  - No response to painful stimulation
  - Airway reflexes and spontaneous ventilation often impaired, necessitating airway control and/or positive pressure ventilation
  - Cardiovascular function may be impaired

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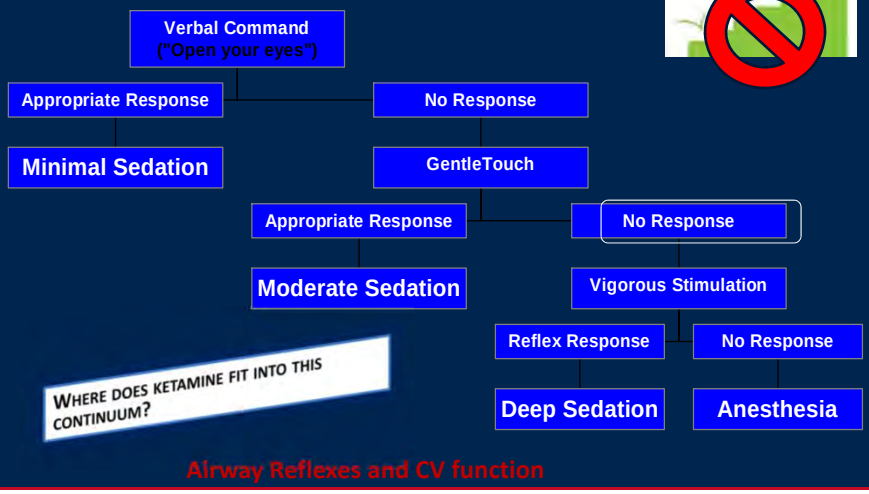
SEDATION CONTINUUM



Airway Reflexes and CV function

Maintainable ----------→Not Maintainable

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Rescue

"Practitioners of sedation must have the skills necessary to rescue the patient from one level greater than the intended level of sedation."

---AAP Guidelines, 2016

New AAP Sedation Guideline

Monitoring During Recovery

TCH Guideline

- 5-15 minutes after last medication administration until the patient meets discharge criteria

AAP Guideline

Recovery from Moderate Sedation: Initial recording of vital signs may be needed at least every 10 minutes until the child begins to awaken, then recording intervals may be increased

Recovery from Deep Sedation: Initial recording of vital signs may be needed for at least 5-minute intervals until the child begins to awaken, then recording intervals may be increased to 10–15 minutes

LEVELS OF SEDATION

Dexmedetomidine (IN)* O: 15-25 min Dur:~ 85 min	**Children ≥6 months of age:** 1-3 mcg/kg/dose once **MAX** 200 mcg (100 mcg per nare)	**Children ≥6 months of age:**4 mcg/kg/dose **MAX** 200 mcg (100 mcg per nare)
Diazepam (IV) O: 1-3 min Dur: 20-120 min	**Children and Adults:** 0.04-0.1 mg/kg/dose **MAX** single dose 10 mg	**Children and Adults:** 0.04-0.2 mg/kg/dose **MAX** cum.dose:0.6 mg/kg or 10 mg
Etomidate (IV) O: < 1 min Dur: 5-15 min	N/A	**Children > 10 yrs and Adults:**0.1-0.3 mg/kg/dose Repeat doses may be needed
LORazepam (IV) O: 15-20 min Dur: 8-12 h	**Infants and Children <12 yrs:** 0.01-0.03 mg/kg/dose **MAX** cum. dose: 2 mg **Children ≥ 12 yrs or >50 kg and Adults:** 0.05 mg/kg/dose **MAX** cum. dose: 4 mg	N/A
Midazolam (IV) O: 2-3 min Dur: 60 min	**Infants and Children < 12 yrs:** 0.05-0.1 mg/kg/dose **MAX** single dose: 6 mg **Children ≥ 12 yrs and Adults:** 0.05-0.1 mg/kg once **MAX** single dose:10 mg	**Infants, Children and Adults:** 0.05-0.1 mg/kg/dose, dose may be repeated once in 2-3 minutes if needed. **MAX** cum. dose: 10 mg
Midazolam *(Intranasal)* O: 10-15 min Dur: 45-60 min	**Infants, Children, and Adults:** 0.2 – 0.3 mg/kg/dose **MAX** dose: 10 mg (5 mg per nare)	**Infants, Children, and Adults:** 0.4 – 0.5 mg/kg/dose **MAX** dose: 10 mg (5 mg per nare)

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http://connect2depts.texaschildrens.org/depts/1/nursing/Evidence%20Based%20Outcomes%20Center/Documents/Procedural%20Sedation/Guideline%20Procedural%20Sedation%20070815.pdf

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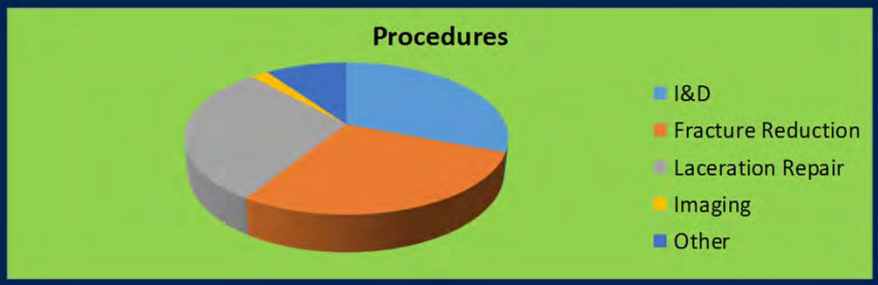
Sedation in the TCH ED



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General Approach

- Assign a qualified person (10 supervised cases completed)
- Determine the depth of PSA needed
- Tailor PSA to each patient's needs
- Understand actions, indications, onset, and contraindications of common medications
- Obtain initial sedation depth with frequent reassessment and titration = ideal depth, lowest doses, and minimal risks
- Anticipate and prepare for common complications

Pre Sedation Assessment

- Signs and symptoms
- Allergies
- Medication
- Past history
- Last meal
- Events

NPO recommendations

- Adherence to fasting guidelines is highly variable
  - -**NO** cases of aspiration in children in the ED
- Several prospective cohorts have shown NO association between fasting duration and adverse events
- Aspiration risk for ED patients lower than for elective sedation
  - Patients healthy, sedations are short, ketamine is the predominant drug

Pediatrics

Thorpe et al. BMJ 2010
Bhatt et al. Ann Emerg Med 2009
Roback et al. Acad Emerg Med 2005
Babl et al. Pediatr Emerg Care 2005
Agrawal et al. Ann Emerg Med 2003

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Table 9. Degree of Procedural Urgency in Texas Children's Hospital® Emergency Center [78]

Urgency and Fasting Parameters	Types of Procedures
Emergent (No fasting)	- Cardioversion for life-threatening dysrhythmia - Reduction of a markedly angulated fracture or dislocation with soft tissue or neurovascular compromise - Chest tube placement for tension pneumothorax - Intractable pain or suffering - Testicular torsion - Paraphimosis reduction - Reduction of an incarcerated hernia - Neuroimaging for trauma/cord compression/sudden blindness/suspected stroke - Intubation
Urgent	- Care of wounds and lacerations - Animal and human bites - Abscess I&D - Fracture reduction - Joint dislocation - LP - Chest tube placement - Thoracocentesis - Arthrocentesis - Neck imaging

Minimal and Moderate Sedation Fasting Guidelines for an Urgent Procedure [78]

Ingested Food	Minimum Fasting Period (in hours)
Clear liquids	0
Anything other than cle	3

Sedation Fasting Guidelines

Ingested Food Minimum Fasting Period

	Non-Urgent/Semi-Urgent Urgent Procedures Outside the EC	*Urgent Procedure in the EC*
Clear liquids	2 hours	0 hours
Breast milk	4 hours	3 hours
Infant formula	6 hours	3 hours
Non-human milk	6 hours	3 hours
Light snack (plain toast/clear)	6 hours	3 hours
Heavy snack (fried/fatty foods)	8 hours	3 hours

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Pre Sedation Assessment

- Signs and symptoms
- Allergies
- Medication
- Past history
- Last meal
- Events

ASA Scoring – Risk Classification

I	A healthy patient
II	A patient with mild systemic disease, no functional limitations
III	A patient with severe systemic disease that limits activity but is not incapacitating
IV	A patient with an incapacitating systemic disease that is a constant threat to life
V	A moribund patient that is not expected to survive 24 hours with or without an operation

Physical Examination

- Upper airway evaluation
- Neck flexion
- Breath sounds
- Heart sounds
- Distal perfusion
- Vital signs
- Level of consciousness

We're ready for you in room 14…

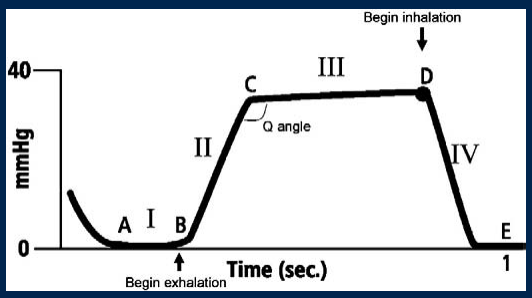
MAIDS

- Monitors
- Airway Equipment
- IV in place if necessary
- Drugs- with backup doses and plan
- Suction - connected with the appropriate size suction catheter

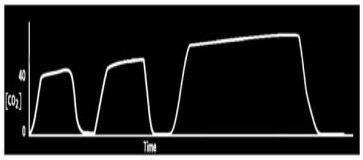
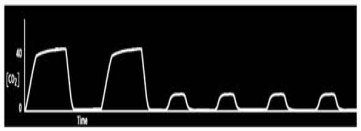
MAIDS

- Monitors - Cardiac monitors, pulse oximetry, blood pressure cuff, end tidal CO2- connected with the appropriate size cannula

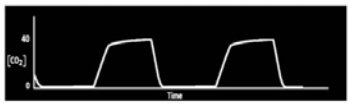
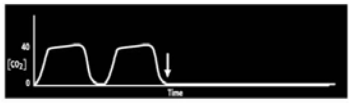
Capnography



Capnography

Bradypneic hypoventilation		SpO_2 Normal or ↓ $EtCO_2$ ↑ Waveform increased amplitude and width RR ↓↓↓
Hypopneic hypoventilation		SpO_2 Normal or ↓ $EtCO_2$ Waveform decreased amplitude RR ↓
Physiological variability		SpO_2 normal $EtCO_2$ normal Waveform varying* RR normal

Capnography

Bronchospasm		SpO_2 normal or ↓ $EtCO_2$ normal, ↑, or ↓** Waveform curved RR normal, ↑, or ↓** Other wheezing
Partial laryngospasm or airway obstruction		SpO_2 normal or ↓ $EtCO_2$ normal Waveform normal RR variable Other noisy breathing and/or inspiratory stridor
Apnea		SpO_2 normal or ↓*** $EtCO_2$ zero Waveform absent RR zero Other no chest wall movement or breath sounds
Complete laryngospasm or airway obstruction		SpO_2 normal or ↓*** $EtCO_2$ zero Waveform absent RR zero Other chest wall movement and breath sounds present

Krauss et al, **Ann Emerg Med** 2007

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MAIDS

- Monitors - Cardiac monitors, pulse oximetry, blood pressure cuff, end tidal CO_2- connected with the appropriate size cannula
- Airway Equipment – Bag-valve mask with O_2 reservoir, connected to the bag with the appropriate size mask

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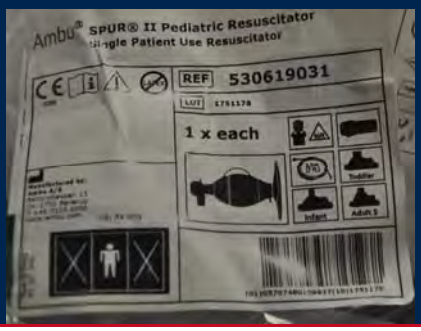
Airway Equipment



MAIDS

- Monitors - Cardiac monitors, pulse oximetry, blood pressure cuff, end tidal CO2- connected with the appropriate size cannula
- Airway Equipment – Bag-valve mask with O2 reservoir, connected to the bag with the appropriate size mask
- IV in place if necessary
- Drugs- with backup doses and plan
- Suction - connected with the appropriate size suction catheter

Monitoring

- Oxygen source, connected to the bag with the appropriate size mask
- Suction, connected with the appropriate size suction catheter
- End tidal CO_2 monitor, connected with the appropriate size cannula
- Code cart

Personnel/Back-up Protocol

- Two health care providers must be present during the procedures: one to perform the procedure, and a second to monitor the level of sedation and physiologic changes from sedation. Both individuals must be trained in resuscitation.
- Protocol for access to back-up emergency services
- Code cart outside the room

Monitoring and Documentation

- Prior to procedure
  - ❑ Assess and document ABC's
  - ❑ Record HR, RR, BP, oxygen saturation, level of consciousness, skin color, and sedation score
- During procedure
  - ❑ Continuous pulse oximetry and HR monitoring
  - ❑ Record HR, RR, BP, oxygen saturation, level of consciousness, skin color, and sedation score every 5-10 minutes
- Following sedation and until patient returns to baseline (at least 30 minutes)
  - ❑ Record HR, RR, BP, oxygen saturation, level of consciousness, skin color, and sedation score every 5-15 minutes

Discharge Criteria Following Sedation

- Baseline Sedation score
- Reasonably free of pain
- Free of nausea, vomiting, and dehydration
- Observe infants less than one month or less than 52 weeks post conceptual age for a minimum of 12 apnea free hours

Discharge Criteria Following Sedation

- Monitor for an additional 2 hours if flumazenil or naloxone are administered
- Responsible person present
- If child is to ride home in a car seat, 2 responsible people in the car are optimal

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Evolution of an Adverse Event

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Sedation for Tests and Procedures

What is sedation?

For many tests and procedures, children need to lie quietly or fall asleep. Medicine may be needed to "sedate" or help them be still. The medicines used most are sedatives.

Your child's doctor, or the doctor in the procedure area, will prescribe the type and amount of sedative. Some of the time, the sedative is a liquid that your child swallows. However, it may also be given as a suppository in your child's bottom or as an injection. If your child has had problems with sedatives in the past, talk with the doctor. He or she may be able to order a different medicine.

How can I prepare my child for what will happen?

Do not let your child eat or drink anything before the test or procedure. If your child has had anything to eat or drink recently, the test may be delayed.

Tell your child what he or she will see and feel. Preschoolers and older children may want to know:

- where they are going
- if it will hurt
- what they will see afterward (like bandages or an IV)
- if you will be with them when they wake up
- what they will see before and after the test.

Telling children what will happen while they are asleep can be confusing. Be careful not to use the words "put to sleep"; children may have heard about pets being put to sleep, which means something completely different.

How will my child react to the sedative?

Children react to sedatives in different ways. No one can predict how your child will react. Your child may fall asleep quickly with no problems. Some children do not fall asleep at all. Some children become upset or act differently after getting the sedative. For example, a child who usually cooperates might have a tem-

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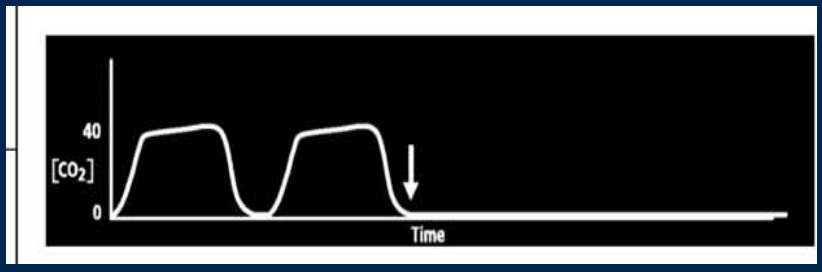
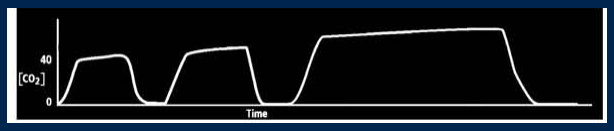
Capnography Case



Case 1: "Spider Bite"

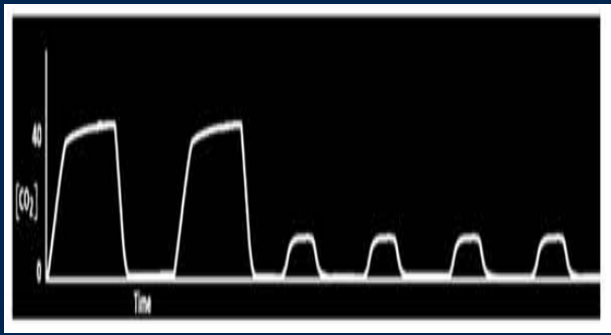
- A 4 year old male with an abdominal wall abscess is sedated for incision and drainage procedure. In setting up for the procedure you note the following on the end-tidal CO2 monitor. What is your next step?



Case 2:

- A 20 month old female is sedated with intranasal dexmedetomidine for a neck CT. After receiving 6 mg/kg, her oxygen saturation dropped to 86%.

Capnograph



Case 3: A 4 year old female sustained a lip laceration after a fall. You administer IV Ketamine for procedural sedation. While repairing the laceration she develops stridor with suprasternal retractions. Her oxygen saturation is 84%, with no improvement after airway interventions and oxygen administration

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Capnograph

Pediatrics

Case 4: 15 year old male receives sedation for a lumbar puncture. After the procedure is over he becomes very agitated and begins yelling. He believes that there are "bugs" crawling all over him. What medication did he receive?

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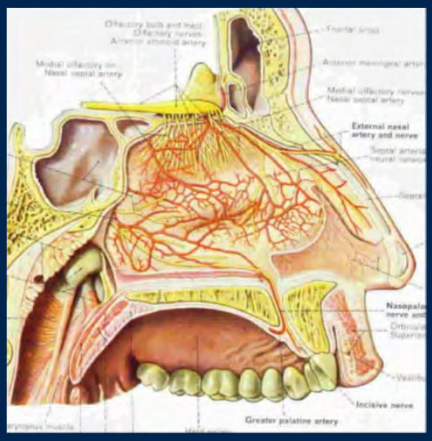
SOME OTHER OPTIONS…..

Intranasal Medications

- Bypasses first pass metabolism
- Nose-brain pathway



Nitrous Oxide

- Anxiolysis, sedation, and analgesia
- Rapid onset and recovery
- Administered from 30%-70% with oxygen
- Continuous flow systems now available
- Commercially available units have combined delivery/scavenger systems

Disadvantages

- Labor-intensive
- Relatively high emesis rate (5/51 [10%], 95% confidence interval 3% to 21%)
- Mask position
- Cost
- Must include a scavenging system

Summary

- Careful selection and knowledge of drug dosing and potential side-effects permits anticipation/prevention of complications
- End Tidal Monitoring is mandatory, unless not possible or would force the deepening of sedation

https://perthzoo.wa.gov.au/schools

Thanks!

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Hospital Anesthesia Services: Interpretive Guidelines

- *Monitored anesthesia care (MAC): anesthesia care that includes the monitoring of the patient by a practitioner who is qualified to administer anesthesia as defined by the regulations at §482.52(a). Indications for MAC depend on the nature of the procedure, the patient's clinical condition, and/or the potential need to convert to a general or regional anesthetic. Deep sedation is included in MAC.*

CMS.gov
Centers for Medicare & Medicaid Services

Hospital Anesthesia Services: Interpretive Guidelines

- §482.52(a) Standard - Organization and Staffing: *General anesthesia, regional anesthesia and monitored anesthesia, including deep sedation/analgesia, may only be administered by:*
  1. *A qualified anesthesiologist;*
  2. *An MD or DO (other than an anesthesiologist);*
  3. *A dentist, oral surgeon or podiatrist who is qualified to administer anesthesia under State law;*
  4. *A CRNA who is supervised by the operating practitioner or by an anesthesiologist who is immediately available if needed; or*
  5. *An anesthesiologist's assistant under the supervision of an anesthesiologist who is immediately available if needed.*

Hospital Anesthesia Services: Interpretive Guidelines