EDUCATIONAL MODULE
PHMG PEDIATRIC SEDATION CREDENTIALING

SEDATION OF THE PEDIATRIC PATIENT
Objectives

• Define moderate sedation, identifying the differences between moderate and deep sedation.
• To understand the systematic approach towards performing a safe sedation for children.
• To understand the pre-procedure assessment.
• To understand how to monitor the patient correctly during and after the procedure.
• To understand and use appropriate sedation medications for children.
• To become skilled in assessing and maintaining a pediatric airway.
• To understand the post-procedural monitoring of patients receiving moderate sedation and their discharge criteria.
Credentialing for Pediatric Sedation

- Study and read the pediatric sedation written module.
- Complete post-module sedation quiz.
- Spend a day with an anesthesiologist reviewing airways (Leslie Parker, MD)
- Perform a sedation with supervision “see one, do one, teach one.”
Weighing the risks and benefits of moderate sedation

- Minimize pain and discomfort.
- Control anxiety and psychological trauma to the child and family.
- Control behavior and movement to allow safe completion of a diagnostic or therapeutic procedure.
Examples of procedures which may be more optimally done with sedation

- Irrigation and debridement of a wound or painful wound dressing changes
- Burn I&D and/or dressing change
- Orthopedic procedures (reductions)
- Central Line placement (PICC, CVLs)
- Imaging- MRI, bone scan, CT
- Lumbar puncture
- Arthrocentesis, pleurocentesis, or abdominocentesis
- Biopsy
- Complex laceration repair
- EMG
- Bronchoscopy & Upper Endoscopy *
Levels of sedation

- Minimal sedation - an example is an anxiolytic dose (0.05 mg/kg) of Versed.
- Moderate Sedation (older term was conscious sedation) - examples are Ketamine, Fentanyl, with or without Versed.
- Deep Sedation - an example is Propofol.
- General anesthesia.
Comparing types of sedation
It’s a continuum

Minimal Sedation
- “A drug induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, respiratory and cardiovascular functions are not affected.”

Moderate sedation
- “A drug induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light to moderate tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.”
Comparing types of sedation

It’s a continuum

Deep Sedation

- “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 in maintaining a patent airway and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.”

General anesthesia

- “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 or drug induced depression of neuromuscular function. Cardiovascular function may be impaired.”
Key Point

- It is not particularly the medication, the specific amount, or dose of that medication administered that constitutes “moderate sedation”. Rather, it is the patient’s individual response to the medication that denotes the level of sedation. Clinical error occurs when focus is given to the specific medication or dose rather than to the patient’s response.
Preparation

- One should always be prepared to support a level of sedation higher than what is being done. For example, if you a physician is credentialed for moderate sedation, they should be knowledgeable and know how to support deep sedations. General pediatricians as hospitalists should not be routinely doing deep sedations unless properly trained and credentialed to do so.
Why Moderate Sedation is so effective

- Minimal variation of vital signs
- Safe, fast recovery
- Maintenance of airway (protective reflexes intact)
- Amnesia usually present.
- Pain eliminated by local anesthesia.

Why moderate sedation still requires a safety net of medical supervision.

- Sedation of a pediatric patient represents a continuum and may result in respiratory depression
How to plan a successful pediatric sedation

- Pre-sedation evaluation
- Who else is involved (personnel)? Sedation nurse, different physician for the diagnostic procedure.
- What monitors do you need?
- Select an agent(s)- for our purposes this will almost always be Ketamine and Versed.
- Who is recovering the patient?
The pre-sedation evaluation

- Know your patient- why are they hospitalized, pertinent ROS, PMH, medication list, and allergies. Are there other medications that may act synergistically with your sedation medications?
- Obtain informed consent and educate the family and patient regarding the sedation. A signed consent needs to be placed on the chart.
- Know pertinent past anesthesia/sedation history.
- Know your patient’s NPO status.
- Know your patients baseline vital signs and pre-sedation physical exam.
- Know the patient’s ASA classification.
Personnel

- A sedation is at least a two person job.
- As part of your pre-sedation evaluation, meet with the patient’s nurse and the sedation nurse (they are not always the same person).
- Verify NPO status, time and place of sedation, type of monitors to be used, obstacles to overcome, patient weight, & agents to be used and pre-order them from the pharmacy so they are on-hand and drawn up.
Pre-sedation evaluation

- Meet with your sedation nurse beforehand and review SOAPME.
  1) Suction
  2) Oxygen- have a nasal cannula set-up ready, PPV bag on hand.
  3) Airway- have appropriate sized masks on hand, oral airways, LMA’s, ETT’s, blades.
  4) Pharmacy- what drugs are we using? Do we have reversal agents readily on hand? NS flushes.
  5) Monitors- continuous Pox and cardiac monitors, stethoscope.
  6) Equipment- crash cart in nearby, emergency contact numbers (anesthesia).
Obtaining written consent

• Explain the risks, benefits, and alternatives to the procedure.
• Benefits again are minimal variation of vital signs, safe and fast recovery, maintenance of airway, purposeful responses to stimulation.
• Risks include ineffective sedation/analgesia, apnea, laryngospasm, aspiration, allergic reaction, emergence reaction.
• Alternatives might include using anxiolitics or a local for the procedure, having a critical care physician or anesthesiologist perform a deep sedation in a more controlled or monitored setting (OR, PICU).
Consent for Intravenous Conscious and/or Deep Procedural Sedation

My signature constitutes my acknowledgement that I, ___________, consent to and authorize the University Hospital, UNM Health Science Center and Dr. ___________ (Print Patient Name) (Print Physician's Name) or designee to perform conscious or deep sedation and any other operation(s) or procedure(s) that in the judgment of the physician may be advisable on the basis of the findings during the course of the sedation.

1) The nature and purpose of conscious or deep sedation is to use intravenous (IV) medications (through a needle in a vein) to provide pain relief during operation(s) or procedure(s).

2) During sedation an IV will be inserted in my vein (if this has not already been done). Devices will be placed on my skin to monitor my heart rate, blood pressure and the amount of oxygen in my blood. When the medications are given, I will become drowsy. I may or may not remember having the procedure performed. It may become necessary to help me breathe and/or give me additional oxygen. After the procedure is over I will remain sleepy and possibly confused for a period of several hours. During this period I should not operate an automobile or other dangerous equipment and I should not make important decisions. During the entire procedure, one medical person will be in charge of my sedation. Full resuscitative equipment will be available. This includes equipment to intubate me (put a tube in my airway) to help me breathe if this is needed and drugs to treat the effects of the sedative agents (when appropriate).

3) The risks, benefits and alternatives to conscious or deep sedation have been adequately explained to me by my physician(s) or surgeon(s) and I have all the information that I desire.

4) I understand that conscious or deep sedation may involve known risk of complications including: inadequate pain relief, nausea, vomiting, inhaling vomit, slowing or stopping breathing, hypoxia (inadequate oxygenation), brain damage or death. Sedation entails the possibility of other injuries from both known and unknown causes.

5) Alternative means of treatment have been explained to me including giving less pain medication or going to the operating room for general anesthesia. I understand that general anesthesia has similar risks to conscious or deep sedation but these occur more frequently with general anesthesia. Going to the operating room would delay the procedure.

6) No guarantee or assurance has been made to me as to the results that may be obtained.

7) I understand I have the right to refuse to have conscious or deep sedation.

8) I certify that I have read or had read to me this authorization and consent, that all ___________ (Blank) requiring completion were filled in before I signed and that I understand and agree to the foregoing.

Patient/Person Authorized to Consent: ____________________________

Date/Time: _____________ a.m./p.m.

Physician: ____________________________

Witness: ____________________________

Interpreter: ____________________________
# Pediatric NPO Guidelines

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<th>Ingested Material</th>
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<td>Most Clear liquids (i.e. water, fruit juices without pulp, clear tea, coffee, soda)</td>
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<td>Formula or Cow’s milk</td>
<td>6 hours</td>
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<td>Light meal/solids</td>
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*In some emergent cases, it may not be possible to verify or ensure an appropriate time for being NPO. If so, document and verify the reason why a sedation needs to occur.*
ASA Physical Status classification
(ASA is American Society of Anesthesiologists)

- Class I- a normal, healthy patient with no known systemic disease
- Class II- A patient with mild or well-controlled systemic disease.
- Class III- A patient with moderate or multiple types of systemic disease.

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- Class IV- A patient with severe or poorly controlled systemic disease that is a constant threat to life.
- Class V- A moribund patient who is not expected to survive without the procedure.
- Class VI- Clinically dead patients being maintained for harvesting organs.
- Class E- connotes an emergency operation of any kind.
Monitoring

- You will need continuous cardiac and pulse oximetry monitoring.
- Have a nasal cannula and oxygen set-up and working. Consider pre-procedural oxygenation *as appropriate* to prevent ‘quick hypoxia.’
- End tidal CO₂ detection is more optimal than pulse oximetry monitoring as there is no delay in noting changes in status. It is optimal for MRIs and highly recommended for most other procedures.
- Have a functioning IV with IV pump and flushes.
- The sedation nurse will document q1-5 minute vital signs on her sedation flow sheet. It is ideal to monitor vitals q1-2 minutes during induction of sedation.
Other equipment
Be prepared

- Suctioning capability.
- BP monitor/cuff.
- A fully stocked crashcart needs to be nearby.
- PPV or bag-valve-mask in each room.
- Oral or nasal airways.
- The patient’s code sheet (dosing for emergency drugs like Flumazenil or Narcan).
**PROFORM** Procedure Form

1. Date: [ ] Time: [ ] MD Responsible for Evaluation: [ ]

2. Home Medications: [ ] See Med Rec/Rx Pad

3. Patient Teaching: [ ] To patient [ ] To family

4. Equipment: [ ] Ready available; [ ] must be suitable for the size and age of patient per Moderate Sedation Policy

5. [ ] Consent signed

6. ENPC 8 hours of solids, 2 hours clear liquids

ASA Score: [ ]

ASA Source: [ ]

### Initial Assessment

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### Next Steps

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### Physician Signature

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### ENPC

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- Patient Identification

Sacred Heart Medical Center

Moderate Sedation Procedure Record

[ ] of 2
Before pushing drugs

- Remember to perform your “time out” – your last opportunity to minimize medical errors.
- Confirm patient identity, purpose of sedation, weight, and initial drug and dose to be used.
- It is ideal that the physician performing the procedure is different from the one performing the sedation.
Sedation drugs

- Midazolam or Versed
- Ketamine
- Fentanyl
- Dexmedetomidine or Precedex
- Propofol

- Remember that the potential for an adverse outcome may be increased when 3 or more sedating medications are administered.
Midazolam or Versed

- Often used as an anxiolytic before the procedure or before moving into the procedure room.
- Dose- 0.05 mg/kg IV.
- Peak is ~3 minutes; duration ~30 minutes.
- Advantages: short-acting, excellent amnesia (antero/retrograde), easy to titrate, more predictable levels.
- Disadvantages: paradoxical agitation, synergistic with other agents, hallucinations, respiratory depression.
- The reversal agent is Flumazenil.
Ketamine

“The lights are on but nobody is home”

- A PCP derivative that works as a dissociative agent and thus as an indirect analgesic and sedative.
- It is the most widely used moderate sedation drug with children because of its extremely safe and well studied profile.
- Has a consistent dose response.
- Adverse effects: vomiting 1-5%, hypersalivation 2%, laryngospasm and respiratory depression <0.5%, increased ICP, temporary hypertension and tachycardia, dysphoria, emergence reactions (more common in teenagers). Nearly all cases of laryngospasm and respiratory depression are transient and responded to positive pressure ventilation.
Ketamine (IV)
“The lights are on but nobody is home”

- Initial dose is 1-2 mg/kg IV.
- Onset is usually within 30-60 seconds (for IV), usually physically manifested by nystagmus.
- Effects last 5-15 minutes.
- Can re-dose 0.5-1 mg/kg IV as needed. Can use for procedures up to 30-60 minutes long.
- Can co-administer with Versed.
- Can give glycopyrrolate or atropine for hypersalivation (usually not clinically significant).
- There is no reversal agent (only time and maybe hydration).
Ketamine (IM)

- Initial dose is 2-5 mg/kg IM.
- Onset is much more variable, ~5 or more minutes.
- Effect can also be more variable and last up to 20-30 minutes.
- A recent study showed a higher rate of laryngospasm with IM administration.
- Requires longer monitoring & recovery.
- Can co-administer with nasal Versed
Fentanyl

- Has fallen out of favor at most Children’s Hospitals for moderate sedations, at least for children (vs. teenagers).
- A potent synthetic narcotic analgesic (100x morphine)
- Dosing: 1-2 mcg/kg IV bolus then 1 mcg/kg increments thereafter.
- Onset effect in 30 seconds, peaks 2 minutes, duration ~20 minutes.
- Benefits: rapid onset, short duration, no histamine release like morphine, less emergence reactions than Ketamine.
- Risks: over-sedation or respiratory depression, synergistic with other agents, rigid chest syndrome (usually associated with rapid push), nausea and vomiting, flushing.
- Reversal agent: Narcan or Naloxone.
Dexmedetomidine or Precedex

The future of pediatric sedation?

- Used typically for MRIs where prolonged motionless sedation is needed.
- Increasing body of evidence regarding safety.
- Increasingly used at Children’s Hospitals across the nation.
- It is considered somewhere between moderate and deep sedation.
- Usually augmented with Versed for motion or arousals.
- Usually given as a 1-3 mcg/kg bolus over 10 minutes, then 1-2 mcg/kg/hour infusion.
Propofol
aka Diprivan
aka MJ’s Sleeper

• Considered deep sedation
• Usually given by qualified intensivists & anesthesiologists. There are some pediatricians nationwide that utilize this but it requires more intense training & credentialing.
• Active airway management skills sometimes needed (oral/nasal airway, CPAP) especially during induction.
• Onset of action is within a few seconds.
• Usually given as a bolus then as a continuous IV infusion
• Benefits: very rapid on/off effects, antiemetic.
• Risks: Not a good analgesic, potential allergy as contains egg products.
Airway management

What to look out for

- Oropharyngeal muscle tone can be decreased leading to upper airway obstruction. Signs include increased respiratory effort, retractions, stridor, hypoxemia.

- Effective interventions include stimulation (take a deep breath!), head tilt, chin lift, jaw thrust, suctioning, nasal/oral airway.
Airway management
What to look out for

- Laryngospasm - causes may include mucus, blood, or saliva irritating the vocal cords resulting in partial or complete closure.
- Respiratory depression, apnea.
- Management includes positive pressure ventilation with 100% oxygen, reversal drugs if applicable, intubation.
Recovery (to presedation level of consciousness)

- The medication peak has passed but the patient is not yet fully awake.
- 1:1 observation and monitoring should continue until the patient is responding to verbal stimuli and has normal airway reflexes.
- Transitions of care in sedation are vulnerable periods.
- If reversal agents were used, suggested recovery monitoring time is 2 hours or more.
- Minimize external stimulation (lights and sounds).
- Have parents present for emergence reactions.
- For hallucinations, agitation (i.e. emergence reaction), can use Versed. Data shows concominant use of Versed does not help you avoid an emergence reaction but it may help decrease symptoms once they are occurring.
- Not allowed to eat or drink until the patient is fully awake, alert, and oriented.
Discharge criteria

- Fully oriented to time, person, place or return to baseline documentation.
- No sign of respiratory distress or impairment.
- Age-appropriate ambulation.
- Stable vital signs for 30 minutes.
Writing a sedation note

“To each their own”

I was asked by Dr. Dunphy to perform a procedural sedation on this child for an I&D of a large buttock abscess. The benefits & risks of the moderate sedation were discussed with the parents, they signed the consent form, which has been placed on the chart. A brief time out was then performed, the patient was identified, confirmed NPO x 6 hours, weight confirmed as 20 kg. The child was premedicated with 0.05 mg/kg or 1 mg IV Versed. Afterwards, he was taken to the procedure room where he was placed on cardiac and Pox monitors. Baseline vital signs include HR 100, BP 110/70, RR 18, Pox 99% RA. Induction of sedation began with 20 mg IV Ketamine with good effect. Dr. Dunphy then performed the I&D over 10 minutes. The child tolerated the procedure and sedation well. Vital signs remained stable on room air (see sedation RN flow sheet). The patient will be fully recovered by Sara F. Medication totals used were Versed 1 mg, Ketamine 20 mg. Total time spent: 60 minutes.

**Don’t forget to write orders for the totals for your drugs used and may resume diet.**
Coding for sedation

• To bill you need to be directly responsible.
• Time based (ALWAYS indicate the total time spent on the sedation - this includes your pre-sedation preparation, time to obtain consent, time you spent with recovery, etc.)
• There are no specific ICD-9 codes for moderate sedation yet.
• Code by using the diagnosis that was necessary for the sedation (for example debridement skin partial thickness 32-11040 or MRI brain with contrast 32-75045).

• CPT Codes developed through the AAP; RVUs currently not assigned.
  99143 - less than five years old
  99144 - greater than, or equal to, five years old
  99145 - for each additional 15 minute increment

• Anesthesia codes are used with deep sedation which are paid at a significantly higher rate.
Pediatric Case Studies  
Case #1

• A 5 year old boy fell off the monkey bars at school and had immediate R arm pain and subsequent swelling. There was no LOC. He was bought to the local ER and found to have a R angulated distal radial fracture. PMH: T&A in 2007. Meds: None NKDA but has an egg allergy. Weight: 25 kg.

• You are consulted for sedation so the orthopod can re-align the arm and splint it.

• As part of your pre-sedation assessment, you find out he ate some graham crackers and milk 3 hours before the fall.
Case Study #1

- What sedation drug(s) would be ideal for this child?
- Are there any contraindications to sedation drugs?
- When would be an ideal time to perform the sedation?
- Starting dose for Versed & Ketamine?
Pediatric Case Studies
Case #2

- A 18 month old previously healthy male fell off the top bunk a bunk bed. He was noted to lose consciousness for about 5 minutes. Afterwards, he threw up several times as he was being taken to the local ER. You are called to perform procedural sedation for a CT scan of his head.
Case Study #2

- What sedation drug(s) would be ideal for this child?
- Are there any contraindications to sedation drugs?
- Conclusions?
Case Study #3

- It’s 10am. Riverbend Pavilion calls. John Dunphy has a 3 y/o female with a large, taut gluteal abscess. He wants to admit the child to your hospitalist service for a sedated I&D and IV abx. PMH: RAD/asthma Meds: None ALL: NKDA. She last nursed (it’s Eugene) at 7am but has not had anything else since the night prior.

- What sedation drug(s) would be ideal for this child? Are there any contraindications to sedation drugs?
Case Study #3

- George Wadie is not available as he is doing an “all day case” to fix a newborn with gastroschisis.
- Should you do the I&D yourself?
Case Study #3

- Because of high patient and parental anxiety, you give a pre-sedation dose in the room of Versed .05 mg/kg IV and then repeat this in the procedure room. You also decide to use the bigger 2mg/kg dose for Ketamine because you don’t want her moving at all for the I&D.

- During the sedation, her pulse oximetry drifts down from 98% to 91%, she starts having some moderate amount of upper airway secretions with occasional subtle subcostal retractions.

- What do you do?
A 16 y/o male with classic autism who is nonverbal but otherwise healthy is admitted to your hospitalist service with a first-time GTC seizure. He will not allow anyone to approach him to even take vitals, such as a BP or Pox. The consulting Neurologist wants a EEG and head MRI done before he sees the child.

- How do you approach a sedation?
- The mother is opposed to anything that “will make him hallucinate and totally freak out.”
Case Study #4

- What would sedation drug(s) would be ideal for this child?
- Are there any contraindications to sedation drugs?
- What route(s) would you use for medications?
- Conclusions?
Goodnight