Procedural Sedation for Inpatient Infants Under 1 year of Age

Training Session
Procedural Sedation for Inpatient Infants Under 1 year of Age

- Sedation:
  - Sedation is an intrinsic part of many invasive and non-invasive procedures. Because sedation is a continuum, it is not always possible to predict how the individual patient receiving sedation will respond. Applicable regulations may be cited to provide guidelines for patient management of all procedures requiring the use of sedation throughout the facility and in affiliated locations.
  - Infants may undergo procedures which require minimal movement of the patient to limit testing artifact as well as provide a safe and effective environment for the procedure to be completed. Procedural sedation involves the delivery of sedating medications to produce a state of depressed consciousness.
Procedural Sedation for Inpatient Infants Under 1 year of Age

- The purpose of the Procedural Sedation Guideline is to provide a policy for the management of procedural sedation for *inpatient* infants at Exempla Saint Joseph Hospital.
- It includes all infants from birth to one year of age.
- The policy does not apply to infants in *outpatient* settings including infant patients in the Emergency Department.
Procedural Sedation for Inpatient Infants Under 1 year of Age

Who can order procedural sedation medications?

- Only Medical Staff Members (physicians) and Neonatal Nurse Practitioners (NNP) who have been privileged to perform procedural sedation for inpatient infants can order procedural sedation medications.

- Qualified NNPs must maintain prescriptive authority through the Colorado State Board of Nursing and also maintain DEA certification.
Procedural Sedation for Inpatient Infants Under 1 year of Age

- Exceptions to the Procedural Sedation Guideline are:
  - Medications administered strictly for pain control do NOT constitute procedural sedation.
  - Patients who require sedation for non-procedural reasons (i.e. post-op, seizures, etc.).
  - Patients in the NICU who receive analgesia or sedation during mechanical ventilation.
  - Patients undergoing surgical procedures in the NICU or Newborn Nursery who receive analgesia per the surgeon’s request without the intent to alter level of consciousness (i.e. circumcision, rectal biopsy, etc.).
  - General anesthesia cases.
Pre-Sedation Requirements

- Sedating drugs to be given for the purpose of performing a test or procedure may be ordered only by physicians and NNPs that are credentialed at ESJH.
- All staff involved in sedations or recovery of sedated patients must be NRP certified, according to their unit requirement.
- Physician or NNP must discuss risks, options and benefits of the procedure and selected sedatives with at least one parent or guardian of the infant.
- Physician or NNP should assess the need for NPO status prior to medication administration, according to clinical indication for procedure.
- Physician or NNP must assign ASA classification prior to procedure and document classification on Form ES-FR-OR-1133-0209.
- Assessment of clinical stability should be obtained and documented in physician or NNP’s physical exam in progress note and nursing Head To Toe assessment in ESummit. Physician or NNP also documents on Form ES-EF-OR-1133-0209 “ESJH Procedure Notes”.
- Complete “Time-Out” prior to procedure.
- Monitoring – A minimum of continuous pulse oximetry. Documentation of complete set of vital signs should be done at baseline prior to medication administration and post-procedure. In addition, minimum of pulse oximetry should be documented every 15 minutes throughout the procedure, including one-hour post-procedure. Subsequent documentation should be done per unit standard.
- Equipment: Intubation box, appropriately-sized anesthesia bag/mask, oxygen source, newborn stethoscope, bulb syringe, pulse oximeter.
Monitoring Requirements

- Monitoring – A minimum of continuous pulse oximetry. Documentation of complete set of vital signs should be done at baseline prior to medication administration and post-procedure. In addition, minimum of pulse oximetry should be documented every 15 minutes throughout the procedure, including one-hour post-procedure. Subsequent documentation should be done per unit standard.
ASA Physical Status Classification

The **ASA physical status classification system** is a system for assessing the fitness of patients before surgery or a procedure. In 1963 the *American Society of Anesthesiologists* (ASA) adopted the five-category physical status classification system.
<table>
<thead>
<tr>
<th>Level</th>
<th>Classification</th>
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<tbody>
<tr>
<td>1</td>
<td>A normal healthy patient.</td>
</tr>
<tr>
<td>2</td>
<td>A patient with mild systemic disease.</td>
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<tr>
<td>3</td>
<td>A patient with severe systemic disease.</td>
</tr>
<tr>
<td>4</td>
<td>A patient with severe systemic disease that is a constant threat to life.</td>
</tr>
<tr>
<td>5</td>
<td>A moribund patient who is not expected to survive without the procedure.</td>
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</tbody>
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MD or NNP Documents ASA Status & Time Out on Form ES-FR-OR-1133-0209

MD or NNP completes Time Out documentation here

MD or NNP documents ASA Status here
Based on the level of ASA classification the following staff members must accompany and monitor patient throughout procedure:

<table>
<thead>
<tr>
<th>ASA Level(s)</th>
<th>Staff</th>
</tr>
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<tbody>
<tr>
<td>1 &amp; 2</td>
<td>NICU RN</td>
</tr>
<tr>
<td>3</td>
<td>NICU RN with either NICU RT or NNP</td>
</tr>
<tr>
<td>4</td>
<td>Neonatologist and/or NNP, NICU RN &amp; NICU RT</td>
</tr>
<tr>
<td>5</td>
<td>Neonatologist, NNP, NICU RN &amp; NICU RT</td>
</tr>
</tbody>
</table>
The Neonatal Code Blue Cart must be taken to the area of the procedure for all ASA Level 4 and 5 patients.

FYI: Code Blue Cart must be kept outside of the MRI room.
Post Sedation Requirements

- Infants who have received sedation medication for a procedure or test must be monitored a minimum of 24 hours post procedure in the NICU.

- Infants must achieve pre-sedation level of stability prior to discharge.
Potential Complications of Infant Sedation

Most common complication is:
Respiratory compromise including hypoventilation, hypoxemia, apnea, & airway obstruction.

Other complications include:
- Cardiovascular compromise (hypotension, bradycardia, arrhythmias)
- GI complications (gastric irritation, vomiting, aspiration)
- Neurologic (paradoxical excitement, seizures, stupor)
Signs and Symptoms of Airway Obstruction Include:

- Increased respiratory efforts
- Inspiratory stridor
- Absence of breath sounds
- Hypoxemia
Free-flow oxygen can be delivered reliably using:

- Flow-inflating “anesthesia” bag with mask held close to the face
- Oxygen tubing held in a cupped hand over the baby’s face
- An oxygen mask
Sedation Medications and Reversal Agents

- Chloral hydrate
- Lorazepam (Ativan)
- Midazolam (Versed)
- Fentanyl
- Morphine
- Naloxone
- Flumazenil
Chloral Hydrate

- **Action**
  - Short-term sedative/hypnotic

- **Dose**
  - PO or PR 25 to 75 mg/kg/dose

- **Onset**
  - 10 to 20 minutes

- **Duration**
  - Peak effect within 30 to 60 minutes

- **Adverse Effects/Precautions**
  - Bradycardia, respiratory depression, apnea, prolonged sedation, gastric irritation, paradoxical excitement
  - Possible effects more commonly associated with repeated doses: cardiac arrhythmias, ileus, bladder atony, increased indirect bilirubin
  - Residual sedation may persist for up to 24 hours in former premature infants.
  - Caution with hepatic/renal disease
Lorazepam

- **Action**
  - Short to moderate acting benzodiazepine

- **Dose**
  - IV/PO/IM: 0.05 to 0.1 mg/kg/dose

- **Onset**
  - IV: 5 min
  - PO: within 60 min
  - IM: 30 to 60 min

- **Duration**
  - Peak effect within 45 minutes
  - Duration of action is 3 to 24 hours

- **Adverse Effects/Precautions**
  - Respiratory depression, apnea, rhythmic myoclonic jerking motions
Midazolam

- **Action**
  - Relatively short acting benzodiazepine

- **Dose**
  - IV/IM: 0.05 to 0.15 mg/kg/dose
  - Intranasal: 0.2 to 0.3 mg/kg/dose using 5 mg/ml injectable form
  - PO: 0.25 mg/kg/dose using Versed oral syrup

- **Onset**
  - IV: 1 to 5 min
  - Intranasal: within 5 min
  - PO: within 10 to 20 min

- **Duration**
  - Peak effect 5 to 7 minutes IV; 15 to 30 minutes IM; 10 minutes intranasal; 30 to 60 minutes PO
  - Duration of action 2 to 6 hours
  - Full recovery may take more than 24 hours

- **Adverse Effects/Precautions:**
  - Respiratory depression, respiratory arrest, apnea, hypotension, seizures, myoclonus, over-sedation, effects potentiated if infant has also received narcotics
Fentanyl

- **Action**
  - Synthetic opioid narcotic analgesic. Also used as sedative. 50 to 100 times more potent than morphine.

- **Dose**
  - 0.5 to 4 mcg/kg/dose IV

- **Onset**
  - Almost immediate

- **Duration**
  - Peak effect within 30 to 60 minutes
  - Duration 2 to 4 hours

- **Adverse Effects/Precautions**
  - Chest wall rigidity associated with rapid IV infusion, respiratory depression, apnea, laryngospasm, bradycardia, hypotension
Morphine

- **Action**
  - Opioid narcotic analgesic. Also used as sedative.

- **Dose**
  - 0.05 to 0.2 mg/kg/dose IV, IM, SQ, or PO

- **Onset**
  - 5 minutes

- **Duration**
  - Peak effect 20 minutes IV; 30 to 60 minutes IM; 60 minutes PO
  - Duration is 3 to 5 hours

- **Adverse Effects/Precautions**
  - Respiratory depression, apnea, bradycardia, hypotension, transient hypertonia, ileus, delayed gastric emptying, urine retention
Naloxone (Narcan)

- **Action**
  - Narcotic antagonist. Reverses CNS and respiratory depression.

- **Dose**
  - 0.1 mg/kg/dose IV or IM
  - Dose needed to reverse narcotic induced depression may be as low as 0.01mg/kg/dose

- **Onset**
  - 1 to 2 minutes IV
  - Within 2 to 5 minutes IM if good perfusion

- **Duration**
  - 20 to 60 minutes
  - Analgesia/sedative effect may recur. Be prepared to redose Narcan as needed.

- **Adverse Effects/Precautions**
  - Seizure activity may occur if given to a neonate with maternal history of chronic narcotic use prior to delivery
Flumazenil (Romazicon)

- **Action**
  - Reversal of sedative effect of benzodiazepines

- **Dose**
  - IV: 5 to 10 mcg/kg/dose. May repeat dose every 45 seconds to max total dose of 50 mcg/kg.
  - Intranasal: 40 mcg/kg divided equally between both nostrils. Administer using TB syringe.
  - Rectal: 15 to 30 mcg/kg/dose. May repeat if sedation not reversed within 15 to 20 minutes.

- **Onset**
  - 1 to 3 minutes IV

- **Duration**
  - Peak effect at 6 to 10 minutes after IV or intranasal dose.
  - Duration 1 hour

- **Adverse Effects/Precautions**
  - Limited pharmacokinetic data in neonates. Hypotension reported in adults. Re-sedation has been reported in pediatric patients, occurring 19 to 50 minutes after initial dosing.
  - Caution use in patient with known seizure disorder
References

- The Children’s Hospital Procedural Sedation Guidelines, Sedation/Invasive Procedures/Cor Sub-Committee, Revised 3/08. Aurora, Colorado.
- Exempla Good Samaritan Medical Center. Procedural Sedation – EGSMC. Patient Care Manual; 2/27/08.
- Exempla Saint Joseph Hospital. Sedation – ESJH. Patient Care Manual; 3/10/09
- The Joint Commission: Hospital Accreditation Program. 2009 Chapter: Provision of Care, Treatment, and Services. Standard PC.03.01.01-PC.03.01.07.