

POLICY & PROCEDURE

UW Health University of Wisconsin Hospital and Clinics	Effective Date: July 2003	<input checked="" type="checkbox"/> Administrative Manual <input type="checkbox"/> Nursing Manual <input type="checkbox"/> Other _____	Policy #: 8.56
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I. PURPOSE

To assure a consistent process that promotes safe and effective sedation for children undergoing procedures conducted within the University of Wisconsin Children's Hospital and the University of Wisconsin Hospital and Clinics. Please refer to University of Wisconsin Children's Hospital Admissions Policy #7.44 for the definition of a pediatric patient.

To provide procedures for personnel ordering, delivering, and monitoring sedation for children throughout the hospital and their on-site clinics. Pediatric sedation will not be administered in off-site clinics. The Department of Anesthesiology will be consulted to provide sedation/anesthesia services in off-site locations.

II. POLICY


UW Children's Hospital Pediatric Sedation Program provides direction, leadership and clinical expertise in the management and care of pediatric patients receiving sedation.

In order to provide consistent patient care, the following procedures will apply to all pediatric patients who receive a sedative drug for procedural sedation. The specific management of this patient population will be defined by the type of sedative administered, the sedative dose, the patients underlying medical condition (e.g. diagnosis, illness severity), the intended level of sedation, and the procedure conducted. Patients may receive sedative drugs for non-procedural sedation (e.g. anxiety, pain relief, agitation, etc). Sedative drugs ordered for these reasons are frequently used in doses similar to that used for procedural sedation. Therefore, until a clear dose-response effect is determined, this patient population should be managed in accordance with this policy and procedure. Once a predictable dose-response effect is noted, monitoring and management as dictated by this policy and procedure will not apply.

The goal of pediatric procedural sedation/analgesia is to promote patient safety and comfort, and to enhance successful completion of the procedure. Procedures utilizing sedation are done in both inpatient and outpatient settings. Procedures requiring sedation include, but are not limited to invasive procedures including minor surgery, endoscopy, hematology-oncology procedures, invasive radiologic procedures and non-invasive procedures including diagnostic imaging studies, electroencephalograms, and echocardiograms. Certain procedural characteristics will help guide the practitioner in choosing the most appropriate sedative agent. Similarly, characteristics of individual children (eg. temperament, psychological state, previous sedation experience, American Society of Anesthesiologists (ASA) classification, etc.) are important in considering the level of sedation intended and the sedative to be used (eg. deep sedation may be required in some children undergoing a procedure generally associated with mild sedation).

This policy is intended to promote high quality patient care during sedation, but does not guarantee specific patient outcomes. The policy is not intended as a standard order, nor to replace clinical judgment, but shall be considered minimum requirements when sedative medications are used.


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III. DEFINITIONS

- A. 1. **EVERY PEDIATRIC PATIENT IS CONSIDERED AT RISK** for losing their protective reflexes whenever sedation is given. An otherwise previously healthy pediatric patient undergoing mild to moderate sedation is at **lower risk** for losing protective reflexes than a child with comorbid conditions or other underlying health conditions that could compromise cardiorespiratory status or interfere with the metabolism of sedative agents.
2. **HIGH RISK CASES** require advanced training and expertise for delivery and management of sedation. These cases should be managed by a pediatric intensivist or other pediatric specialist specifically credentialed for moderate sedation within their area of expertise. Characteristics that may indicate a child is a **high risk** candidate for sedation include:
- The child has:
 - ⇒ received opioids, benzodiazepines, or initiated therapy with any CNS depressant within the past 6 hours; or
 - ⇒ started extended release opioids or received methadone or intraspinal/epidural narcotics within the past 24 hours; or
 - ⇒ started opioids via an implantable pump within the past 72 hours.
 - The child will receive two or more sedative drugs concomitantly or sequentially such that there is an overlap in the duration of action and/or results in moderate to deep sedation (see Appendix B).
 - The child will receive single agent drugs that are associated with a high likelihood of deep sedation. This includes pentobarbital, and ketamine by any route.
 - The child is allergic to products that may be used during the procedure (eg. latex products or iodine).
3. **VERY HIGH RISK CASES** require advanced training and expertise for delivery and management of sedation. These cases should be managed by a credentialed pediatric intensivist and may require consultation with or support from the Anesthesiology Department. Characteristics that may indicate a child is at **very high risk** with sedation include:
- The child is less than 2 months old.
 - The child is unable to handle secretions without aspiration at baseline.
 - The child is unable to maintain a patent airway independently at baseline (excludes mechanically ventilated children).
 - The child has significant systemic disturbance or disease (ASA3 or greater).
 - The child has cardiac and/or respiratory status that makes risk of cardiac or pulmonary compromise likely.
 - The child has altered mental status making assessment of level of awareness, pain, and response to administered medications difficult.
 - The child has had previous adverse experience with sedation.
 - The child will receive intravenous anesthetic agents such as propofol, etomidate, methohexital or thiopental. These agents easily and commonly produce general anesthesia.
 - The child is allergic or sensitive to sedative or analgesic drugs.

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- B. SEDATIVE DRUGS are medications which when used in commonly employed dose ranges are intended to result in central nervous system depression (see Appendix A). The use of these drugs may result in loss of protective reflexes with subsequent respiratory and/or cardiac depression.

The effects of medications administered to achieve sedation are dose related and must be assessed individually for each child. Sedative drugs may be administered orally, intranasally, rectally, parenterally, or by inhalation. Sedative drugs may result in a number of clinical effects. Below are definitions of sedative properties utilized by this institution.

- ◆ **Sedative:** decreases activity, moderates excitement and calms the patient.
- ◆ **Hypnotic:** produces drowsiness and facilitates the onset and maintenance of sleep.
- ◆ **Analgesic:** relieves pain by altering perception of nociceptive stimuli.
- ◆ **Anxiolytic:** relieves apprehension and fear due to an anticipated act or illness.
- ◆ **Amnesic (antegrade):** affects memory incorporation such that the child is unable to recall events following drug delivery.


C. LEVELS OF SEDATION

The transition from moderate sedation to deep sedation and from deep sedation to general anesthesia is a continuum. This transition can be difficult to predict and must be anticipated whenever sedation is administered. If this transition is not appreciated and appropriate interventions not taken, the child's condition can rapidly deteriorate resulting in hypoxia, hypotension, respiratory arrest, cardiac arrest and even death.

1. MILD SEDATION exists when the patient can provide appropriate response to all physical and verbal stimulation, with no loss of airway control, or cardiovascular function. There is no to minimal loss of ventilatory responsiveness. The patient is attentive to environmental stimuli with no to minimal change in orientation to person and place. There may be minimal to mild alteration in gross motor function. **Mild sedation correlates with a score of 3 on the pediatric sedation scale (see Appendix B).**
2. MODERATE SEDATION exists when the patient has a blunted response to light tactile, physical and/or verbal stimulation, is able to handle secretions without aspiration, and can maintain a patent airway independently. There may be minimal to mild alteration in ventilatory responsiveness, and cardiovascular function is usually maintained. There is significant loss of orientation to environment with mild to moderate impairment of gross motor function. **Moderate sedation correlates with a score of 4 on the pediatric sedation scale (see Appendix B).**
3. DEEP SEDATION exists when the patient can provide only blunted response to painful physical stimulation. Moderate loss of ventilatory responsiveness may occur. Spontaneous ventilation may be inadequate with potential for partial or complete loss of protective airway reflexes, and cardiovascular function may be depressed. There is moderate impairment in gross motor function with diminished muscle tone. **Deep sedation correlates with a score of 5 on the pediatric sedation scale (see Appendix B).**

Only physicians credentialed to provide deep sedation in the pediatric patient population (e.g. members of the Pediatric Critical Care Medicine Division, and Anesthesiologists) may administer and/or

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medically direct sedation administration with the goal of deep sedation.

The administration of deep sedation in the pediatric patient requires adherence to the monitoring standards for deep sedation as described in Appendix E.

4. GENERAL ANESTHESIA exists when the patient is unarousable even with painful stimulus and the ability to independently maintain ventilatory and cardiovascular function may be impaired. Patients require assistance in maintaining an adequate airway, and positive pressure ventilation may be required because of depressed ventilatory drive or drug-induced depression of neuromuscular function. Only anesthesiologists are credentialed to administer and/or supervise planned general anesthesia care. Supervised residents and supervised clinical anesthesiologists are authorized to administer general anesthesia under the medical direction of an anesthesiologist. **General anesthesia correlates with a score of >5 on the pediatric sedation scale (see Appendix B).**

D. QUALIFIED PERSONNEL (Physicians and RN's): Personnel responsible for directing and/or administering sedative drugs will be:

- ◆ Nurses who have successfully completed hospital approved core competency education to monitor and administer sedation under the direction of a qualified physician. Additional educational requirements or experience is recommended for deep sedation.
- ◆ staff physicians credentialed for directing and administering moderate/deep sedation;
- ◆ knowledgeable of the pharmacodynamics and pharmacokinetic properties of the sedative drugs given;
- ◆ skilled and knowledgeable in the assessment and management of adverse effects of the sedative, which include, but are not limited to, airway obstruction, respiratory insufficiency, cardiovascular compromise, and neuropsychiatric complications;
- ◆ knowledgeable of and capable of assembling additional assistance;
- ◆ certified in, or demonstrate skills required for Healthcare Provider CPR;
- ◆ able to demonstrate skills in oxygen delivery, use of suction equipment, and use of manual resuscitation equipment.


Physicians conducting sedation in **high risk** cases, such as for patients described in section III.A.2; when the use of ketamine, pentobarbital, or other sedation/analgesia (e.g. fentanyl) drugs generally associated with moderate sedation is anticipated; shall be:

- ◆ in compliance with the above criteria
- ◆ credentialed to provide moderate sedation for a particular procedure(s) in a specific pediatric patient population
- ◆ certified in Pediatric Advanced Life Support
- ◆ able to demonstrate successful airway management of 20 pediatric patients in the past 12 months
- ◆ able to rescue from deep sedation

Physicians conducting sedation in **very high risk** cases, such as for patients described in section III.A.3; patients with ASA classification III and greater; or when the use of propofol, etomidate, methohexital, thiopental is anticipated; shall be:

- ◆ in compliance with the above criteria
- ◆ a member of the Department of Anesthesiology or be a Pediatric Intensivist credentialed in deep sedation

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- ◆ able to rescue from general anesthesia

IV. PROCEDURE FOR PEDIATRIC PATIENTS RECEIVING SEDATION

The following will apply during procedures for pediatric patients receiving sedation. Any reason for variation in use of this policy will be recorded in the patient record.

A. PRE-PROCEDURE PHASE


1. PROVIDE PHYSICIAN OVERSIGHT AND DIRECTION. A qualified staff physician is ultimately responsible for ensuring that appropriate care is provided to the child during all phases of sedation. When the physician ordering sedation is not on site at the time of sedation, a qualified physician will be designated to be responsible for the sedation including assessment and monitoring during the pre, intra, and post sedation phases. Additionally, in the event that the physician responsible for the sedation is not available for any part of the sedation and procedural period, s/he shall delegate the care to another clearly identified credentialed physician who has accepted the responsibility and is knowledgeable about the child's condition.

The credentialed physician performing a procedure under deep sedation must be aware of and immediately able to respond to any cardiorespiratory difficulties experienced during the sedative period including direct resuscitation of the child. In cases where deep sedation is intended or likely, and the credentialed physician is able to immediately respond to airway problems, require that there be one qualified individual (see III. D.) other than the physician performing the procedure, whose only responsibilities are to consistently monitor and record the patient's vital signs, airway patency, oxygen saturation and sedation score. The qualified personnel may administer drugs under the direct supervision of the credentialed physician. In addition, another person must be readily available to assist in any supportive or resuscitative measures, as required. All personnel must be trained in, and capable of providing pediatric basic life support and at least one person must be trained in pediatric advanced life support.

A qualified physician shall:

- ◆ assess and document a child's appropriateness to receive sedation prior to receiving any sedative drugs as evidenced by his/her signature on the appropriate sedation form;
 - ◆ re-evaluate the patient immediately prior to sedation administration as evidenced by his/her signature on the appropriate sedation form.
 - ◆ order and direct the administration of sedation based on findings of the pre-procedure assessment;
 - ◆ be on site and able to respond to changing patient status and treat complications of sedation that may occur;
 - ◆ be continuously present while the patient is moderately to deeply sedated; and
 - ◆ have immediate access to support from Anesthesiology, or the Blue Cart Team.
2. DETERMINE THAT RESUSCITATIVE AND MONITORING EQUIPMENT is readily available on site and during transfer including:

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- ◆ suction apparatus with appropriately sized suction catheters (ie. Yankeur);
- ◆ oxygen delivery system capable of 15 L/min flows for greater than 60 minutes;
- ◆ appropriately sized masks, and oral and nasal airways;
- ◆ pediatric intubation tray with laryngoscope, blades, and endotracheal tubes;
- ◆ self inflating resuscitation bag;
- ◆ pulse oximeter and blood pressure monitoring equipment;
- ◆ ECG equipment and defibrillator;
- ◆ emergency medications including reversal and resuscitative agents (see Appendix C), and
- ◆ carbon dioxide monitoring device, when deep sedation is planned, unless its use is invalidated by the nature of the patient, procedure or equipment.

3. EDUCATE PARENT (CAREGIVER) AND CHILD, if appropriate, prior to administration of sedative medication regarding the risks and potential adverse effects of sedation, anticipated sedative effects, reason for sedation and potential options other than sedation. Include information about what the patient can anticipate before, during and after sedation including symptoms and side effects to report. When possible, work out a pre-established signaling system for pain. Where applicable, pre-sedation instruction will be given to the patient ie, medication adjustments, NPO requirements, designated driver post procedure, etc.
4. OBTAIN CONSENT and document if given verbally, or if emergency exception applies. See UWHC Policy #4.17, "Informed Consent." The consent statement is included on the appropriate sedation forms as part of the physician attestation statement.
5. PERFORM AND RECORD A HEALTH ASSESSMENT of the patient to determine baseline status of the patient and identify factors that may increase the patient's risk during the period of sedation. No child shall receive sedation until:
 - ◆ A pre-sedation assessment has been completed and documented,
 - ◆ The physician (attending physician or supervised resident) has attested to the patient's appropriateness to receive sedation as evidenced by his/her signature on an appropriate documentation form.
 - ◆ The plan of care has been communicated between the physician and the nurse assigned to the patient for the sedation.
 - ◆ The person administering the sedative agent has verified that the required documentation is completed prior to any sedation being given.


All non-emergent procedures will be delayed or cancelled until all pre-procedure documentation is completed.

Minimal assessment required before sedation includes, but is not limited to, the determination and documentation of:

Medical history:

- ◆ age;
- ◆ drug allergies;

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- ◆ recent or current illness;
- ◆ major illnesses or congenital defects;
- ◆ previous hospitalizations, surgeries, sedations and anesthesia;
- ◆ previous problems with anesthesia/sedation;
- ◆ current medication use (including opioid and sedative use within the past 24 hours);
- ◆ time of last PO intake (see Appendix E);

Physical exam:


- ◆ weight in kilograms
- ◆ assessment for risk of airway compromise;
- ◆ respiratory and cardiovascular status which may include findings from heart and lung auscultation and other physical findings as appropriate;
- ◆ ASA physical status classification score (see Appendix D);
- ◆ a brief neurological examination and determination of developmental status including level of awareness;
- ◆ heart rate, blood pressure, respiratory rate, oxygen saturation, and temperature where appropriate;
- ◆ baseline assessment of pain, where appropriate.
- ◆ baseline sedation score (see appendix B)
- ◆ final verification to confirm the correct patient, procedure, and site using a “time out”;
- ◆ marking of surgical site involving right/left distinction, multiple structures (such as fingers or toes) or levels (such as spine). Teeth do not require marking.

6. ESTABLISH VENOUS ACCESS, if appropriate, for the administration of intravenous sedation and ready access should additional medications or IV fluids be required during or after the procedure. The responsible physician determines the need for venous access on a case-by-case basis, and when ordered, IV catheters will be inserted by protocol. See UWHC Policy #8.18, "Vascular Catheters."
7. PROVIDE QUALIFIED PERSONNEL who will be present from the time of administration of sedative drugs until the child returns to baseline status. Qualified personnel responsible for monitoring the child:
 - ◆ require additional training and proof of competency in the assessment, monitoring, and management of pediatric patients;
 - ◆ may administer sedative drugs under the direction and supervision of the credentialed physician;
 - ◆ shall continuously assess and respond to the child’s condition; and
 - ◆ shall document assessments and findings as outlined by policy.

During procedures with mild sedation, monitoring personnel may assist with minor, interruptible tasks, but shall not leave the child unattended.

During moderate and deep sedation, monitoring personnel shall not perform tasks other than those related to sedation and airway management, and shall remain with the child continuously during the sedative period.

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8. WHEN TRANSFERRING A CHILD, at least one qualified person, with appropriate equipment and supplies, shall accompany the child during any part of the sedative period. Strollers, wagons and wheelchairs are not acceptable modes of transportation for children who are sedated to the point of sleep. Children should be transported on a cart with a flat surface that provides easy access to the child in addition to being large enough for equipment.

B. INTRA-PROCEDURE PHASE

1. DOCUMENT MEDICATIONS USED, including:
 - ◆ dosage of all medications administered;
 - ◆ time, route and site of administration of all medications
 - ◆ responsible party administering the medication; and
 - ◆ type and amount of any fluids infused including blood and blood products. See UWHC Policy #8.17, "Administration of Medications."

2. MONITOR AND DOCUMENT PATIENT STATUS. Continuously monitor throughout the sedation period and document the child's status in accordance with the level of sedation as outlined in Appendix E, including:
 - ◆ heart rate and respiratory rate;
 - ◆ oxygen saturation;
 - ◆ blood pressure, ECG, EtCO₂ and other findings where applicable

3. DIAGNOSE AND IMMEDIATELY TREAT ANY ADVERSE OR UNEXPECTED EVENTS during the sedative period such as bradycardia, apnea, oxygen desaturation, hypotension, emesis, vasovagal reaction, seizure, anaphylaxis or anaphylactoid reactions, neuropsychiatric disturbances, and any other cardiopulmonary impairment. A Pediatric Blue Cart shall be called when necessary (e.g. the child experiences apnea/bradycardia that is not responsive to immediate medical intervention). Document any events, interventions, and subsequent patient response related to an event and interventions. (See Section V.)


4. DOCUMENT PATIENT STATUS UPON COMPLETION OF THE PROCEDURE, including: heart rate, blood pressure, respiratory rate, oxygen saturation, level of awareness, and level of pain where appropriate.

C. POST-PROCEDURE PHASE

This phase is characterized by two recovery phases. Phase I and II are minimal requirements for patient discharge; additional monitoring and recovery time is at the discretion of the physician or midlevel provider.

1. PHASE I – Continuously observe and monitor the child, documenting according to level of sedation (see appendix E). Using the pediatric discharge scoring system, proceed to phase II monitoring once a minimum score of 8 is achieved, when all individual category scores greater than 0. (See appendix F.) Exceptions to this score are per MD order only. There is no minimum monitoring time requirement for this phase, and this can occur in the procedure room, designated recovery area, or inpatient room. Patients who meet phase I criteria immediately upon completion

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of the procedure may proceed to phase II.

2. PHASE II – monitoring and documentation of vital signs continues every 15 minutes using the pediatric discharge scoring system. (See Appendix F)

Use of pulse oximetry monitoring during Phase II recovery is indicated in children who are not at baseline oxygen saturation status upon completion of the procedure or phase I; otherwise, continued use of pulse oximetry monitoring is at the discretion of health care personnel monitoring the child. Monitor and document findings as outlined in Appendix E.

3. IDENTIFY CHILDREN WHO REQUIRE PROLONGED PHASE II MONITORING (Including those receiving reversal agents) due to complications and/or slow recovery. Where indicated, the responsible physician will determine further plan of care and when needed will direct patient transfer to an appropriate hospital care area until baseline condition returns.

Any child who receives naloxone or flumazenil following sedation/analgesia shall have continued monitoring with documentation of assessments and vital signs. Minimal monitoring shall include heart rate, blood pressure, respiratory rate, and pulse oximetry, following administration of the reversal agent for a **minimum of 2 hours AND until Phase II criteria are met.**

4. ASSESS THE CHILD’S READINESS FOR DISCHARGE/CESSATION OF SEDATION MONITORING based on the Phase II discharge criteria. (See Appendix F)
5. PROVIDE INSTRUCTIONS, verbal and written, to the parent (caregiver) and/or discharged child regarding diet, medications, activities, potential complications and course of action if a complication develops (See UWHC Form # 9143 *Pediatric Post Sedation Instructions* Appendix G)
6. COMMUNICATE INFORMATION to the qualified staff member assuming the child’s care, if the child is transferred to another care area.


D. EXCEPTION

The credentialed attending physician may authorize variations from these procedures in individual cases based on the specific clinical situation.

V. QUALITY REVIEW

- A. The UWCH Pediatric Sedation Program will assist in quality review pediatric sedation. Key aspects of care required by this policy shall be monitored and reported annually to the Quality Evaluation and Review Committee.
- B. A quality review process for complications shall be completed according to policy 8.48 “Operative, Invasive and Other Procedures.”
- C. Allergic and adverse reactions (ie. noxious and unintended) to any sedation medication will be reported to the Pharmacy & Therapeutics Committee. See UWHC Policy # 8.20, "Adverse Drug Experience

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Documentation."

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VII. APPENDICES

- Appendix A: UW Pediatric Sedation Medication Reference Chart
- Appendix B: Sedation Levels
- Appendix C: Equipment and Emergency Supplies
- Appendix D: ASA Physical Status Classification
- Appendix E: Monitoring According to Level of Sedation
- Appendix F: Pediatric Discharge Criteria
- Appendix G: UWHC Form # 9143 Pediatric Post Sedation Instruction

VIII. COORDINATION

Senior Management Sponsor: Sr. VP Medical Affairs
Authors: Pediatric Critical Care Medicine Division
Chair, Sedation Task Force
Review/approval committees:
Patient Care & Procedure Committee
Medical Board



Donna Sollenberger
President and CEO



Mary Schroth, MD
Chair, Patient Care & Procedure Committee

APPENDIX A
University of Wisconsin Pediatric Sedation Medication Reference Chart
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Drug	Dose	Repeat Dose	Onset of Action	Duration of Effect	Reversal	Drug of Choice For:	Absolute & Relative Contraindications	Considerations
Chloral Hydrate	30-100 mg/kg (po, pr) Doses of 75-100 mg/kg may result in deep sedation. Age guidelines: 0-6 mo: 30-60 mg/kg 6-12 mo: 60-75 mg/kg >12 mo: 75 mg/kg	20 mg/kg (25-30 min after initial dose)	15-30 minutes	60-120 minutes	None	Non-invasive (sleep) • MRI for 6 mo old • Bone scan for 12 mo old	<ul style="list-style-type: none"> • Airway instability • Gastritis or gastric ulcer • Hepatic dysfunction • Hemodynamic instability • Allergy to chloral hydrate 	<ul style="list-style-type: none"> • If repeat dose is required, assure that child is adequately alert to swallow medication. If not, administer rectally. • Monitor the child according to level of sedation achieved. • Provide calm, quiet environment, avoiding unnecessary disturbances, following administration. • Sedative effect less predictable in children >4 yrs • Sedative effect less predictable with rectal administration than oral administration • In the post sedation period explosive loose stools are common.
Diazepam	0.05-0.1 mg/kg IV per dose up to .3 mg/kg IV total dose	0.05-.1 mg/kg IV	1-2 minutes (peak effect 3-4 min)	30-45 minutes	Flumazenil 0.01 mg/kg IV	Non-invasive (Sedation) • MRI for anxious 10 yr old • Prior to IV placement • Cast change for anxious child Categories 2, 3, and 4 in combination with other agents	<ul style="list-style-type: none"> • Acute narrow angle glaucoma • Airway compromise • Cardiorespiratory compromise • Liver disease • Children < 6 mo • Allergy to diazepam 	<ul style="list-style-type: none"> • Very irritating to veins, burns with administration • Diazepam cannot be diluted due to precipitation. Administer as close as possible to IV insertion site. • Active metabolite may accumulate with repeated use. • Children may complain of dizziness.
	0.2-0.5 mg/kg po		30-60 min	2-4 hours				
EMLA (lidocaine and prilocaine) Cream	Apply 2.5 grams per site topically		60 min	60 min		<ul style="list-style-type: none"> • PIV placement • Skin puncture 	<ul style="list-style-type: none"> • Bradycardia • Methemoglobinemia or medications inducing • Infants < 4 weeks • Allergy to lidocaine or prilocaine 	<ul style="list-style-type: none"> • Use a smaller application area in younger children to minimize systemic absorption
Fentanyl	0.5-2 mcg/kg IV (infused slowly over 3-5 min)	0.5-1 mcg/kg IV every 2-3 min.	2-3 min (peak effect 3-5 min)	30-60 min	Naloxone 0.01 mg/kg IV	Invasive (Analgesic) • Fracture reduction • Pin removal • Central line placement / removal	<ul style="list-style-type: none"> • Airway instability • Cardiopulmonary compromise • Allergy to fentanyl 	<ul style="list-style-type: none"> • Chest wall rigidity and apnea can occur with rapid administration and high doses. Give Slowly! • Expect deep sedation and monitor accordingly. • Effects are accentuated by concurrent benzodiazepines. • Respiratory side effects may “reoccur” following completion of painful procedure. • At equi-potent doses, the respiratory effects and analgesic effects are the same as morphine - the only difference is the peak and duration of action. Fentanyl is the better choice for acute, procedural pain.

APPENDIX A

University of Wisconsin Pediatric Sedation Medication Reference Chart
(page 2 of 3)

Drug	Dose	Repeat Dose	Onset of Action	Duration of Effect	Reversal	Drug of Choice For:	Absolute & Relative Contraindications	Considerations
Ketamine*	0.5-1.0 mg/kg IV Concurrent Meds Midazolam 0.1 mg/kg IV Atropine .01 mg/kg IV	0.5 mg/kg IV	1-2 minutes	10-20 min	None	Painful (Sedation/analgesia) <ul style="list-style-type: none"> Fracture reduction Abscess drainage Laceration repair Wound debridement Bone marrow biopsy 	<ul style="list-style-type: none"> Increased intraocular pressure Intracranial hypertension Intracranial mass Hypertension Psychiatric hx Allergy to ketamine 	<ul style="list-style-type: none"> Expect deep sedation and monitor accordingly. In addition monitor blood pressure every 2-5 minutes. Ketamine can cause weird dreams or hallucinations. Prepare the child for a floating feeling and dreaming. Encourage the child to dream about things s/he enjoys (eg-imagine you're floating on a magic carpet.) The child may appear to be more alert than s/he really is. Some children talk/sing while sedated. IV Ketamine will need to be repeated if the procedure is greater than 10-15 minutes. Amnesia is usually obtained. Ketamine may affect short-term memory for a couple of hours. Often the first comment children make upon return to consciousness is "When are we going to start?" Nausea is a common side effect. Offer clear liquids for one hour then advance diet as tolerated. Ketamine causes nystagmus. Inform parents that this is a normal, expected effect. Oral Ketamine has a bitter taste that most children object to. Some children tolerate the oral ketamine better if mixed with a small amount of pancake syrup or grape juice
	6-10 mg/kg (oral) 4-8 mg/kg (rectal) Concurrent: Midazolam .2 mg/kg po, pr Atropine .02 mg/kg po, pr			20-30 min (oral) 15-20 min (rectal)	1-2 hours			
Methohexital*	25-30 mg/kg (rectal)		5-15 min	30-90 min	None	Non-invasive (sleep) <ul style="list-style-type: none"> MRI CT Bone scan 	<ul style="list-style-type: none"> Airway instability Respiratory distress Temporal lobe seizures Cardiovascular instability Allergy to methohexital 	<ul style="list-style-type: none"> Expect deep sedation and monitor accordingly Onset of action is variable. Remain with child immediately following administration and throughout sedation. Should be diluted to 10% solution with sterile water Airway obstruction and respiratory depression are potential side effects. Repositioning of head and neck may be required.
Midazolam	0.05-0.1 mg/kg IV per dose up to .2 mg/kg IV total dose	0.025-0.05 mg/kg IV	1-2 min (peak effect 4-5 min)	30-60 min	Flumazenil 0.01 mg/kg IV	Non-invasive (Sedation) Categories 2, 3, and 4 in combination with other agents	<ul style="list-style-type: none"> Airway instability Respiratory distress Cardiovascular compromise Allergy to midazolam 	<ul style="list-style-type: none"> Carbon dioxide responsiveness is reduced following benzodiazepine administration and the potential for respiratory depression and apnea is high. Potent amnestic Local irritation at the venous site is unusual Midazolam can be diluted in normal saline and titrated to achieve desired level of sedation. Disinhibition may occur. Oral midazolam is not palatable. May need to mix with syrup to mask taste. Children may complain of dizziness
	0.2-0.3 mg/kg intranasal		10 min	60 min				
	0.2-0.5 mg/kg (po, pr)		20-30 min (oral) 5-20 min (rectal)	60 min				

APPENDIX A

University of Wisconsin Pediatric Sedation Medication Reference Chart
(page 3 of 3)

Drug	Dose	Repeat Dose	Onset of Action	Duration of Effect	Reversal	Drug of Choice For:	Absolute & Relative Contraindications	Considerations
Morphine	0.05-0.2 mg/kg IV	0.025-0.1 mg/kg IV titrate every 10-15 min until desired effect	2-6 min (peak effect 10-20 min)	2-4 hrs	Naloxone 0.01 mg/kg IV	Invasive (Analgesia) Not a good choice for short, painful procedures due to its relatively slow onset of action and peak effect.	<ul style="list-style-type: none"> Airway instability Respiratory distress Cardiovascular compromise Allergy to morphine 	<ul style="list-style-type: none"> Somewhat difficult to titrate for procedural pain control. Expect deep sedation and monitor child accordingly Effects are accentuated by concurrent benzodiazepine use. Histamine release may result in hypotension, flushing, and itching.
Pentobarbital *	2-6 mg/kg/IV Typical initial dose is 4 mg/kg IV. Maximum single dose 160 mg IV.	1-3 mg/kg IV (4-5 min following initial dose)	1-2 minutes	45-60 minutes	None	Non-invasive (sleep) MRI scans CT scans Bone scan	<ul style="list-style-type: none"> Airway instability Respiratory distress Cardiovascular compromise Porphyria Allergy to barbiturates 	<ul style="list-style-type: none"> Expect loss of consciousness and deep sedation in minutes. Monitor child immediately following administration and throughout sedation. Airway obstruction and respiratory depression are potential effects. Obstruction is commonly caused by pharyngeal collapse. Repositioning head and placing roll under shoulders is commonly necessary and usually sufficient to open airway. Induction is best achieved in a quiet, dimly lit environment; keep stimulation to a minimum. For safety, induction should be performed with the child on the transport cart.

*Requires additional training and expertise in airway management, and specific credentialing with the use of this medication.
Contact: Gregory Hollman, MD, Medical Director, Pediatric Sedation Program, University of Wisconsin Children's Hospital

Use of propofol is restricted to members of the Department of Anesthesiology or critical care pediatric staff physicians credentialed in deep sedation.

Drug	Dose	Repeat Dose	Onset of Action	Duration of Effect	Reversal	Drug of Choice For:	Contraindications	Considerations
Propofol*	1-2 mg/kg IV bolus over 1 minute Continuous infusion of 50-100 mcg/kg/.min	1 mg/kg IV bolus over 1 minute until sleep achieved	15-45 seconds	5-10 min *Sedative effect will remain until continuous infusion off	None	Non-invasive/Invasive (Sedation/sleep) • MRI Categories 3 and 4 when used in conjunction with analgesics • Bone Marrow Biopsy	<ul style="list-style-type: none"> Airway instability Respiratory distress Cardiovascular compromise 	<ul style="list-style-type: none"> Expect loss of consciousness and deep sedation immediately Monitor child during administration and throughout sedation (BP, HR, SpO₂, ETCO₂, EKG rhythm) Potential for respiratory depression and hypoxemia is high. Preemptive O₂ administration is indicated. Potential for cardiovascular depression is high. Be prepared with supplemental IV normal saline. Propofol is painful at peripheral IV site.

*Requires additional training and expertise in airway management, and specific credentialing with the use of this medication.
Contact: Gregory Hollman, MD, Medical Director, Pediatric Sedation Program, University of Wisconsin Children's Hospital

**APPENDIX B
Sedation Levels**

Parameter	Mild	Moderate	Deep
Airway Control	<ul style="list-style-type: none"> ▪ No loss of airway control. ▪ Able to handle secretions without aspiration and maintain a patent airway independently. 	<ul style="list-style-type: none"> ▪ No to minimal loss of airway protection. ▪ Able to handle secretions without aspiration and can maintain a patent airway independently. 	<ul style="list-style-type: none"> ▪ Potential for partial or complete loss of protective airway reflexes. ▪ May lose the ability to handle secretions without aspiration or to maintain a patent airway independently (intervention may be required).
Respiratory responsiveness	<ul style="list-style-type: none"> ▪ No to minimal loss of ventilatory responsiveness. ▪ No to minimal change in oxygen saturation from baseline (<3%). 	<ul style="list-style-type: none"> ▪ Minimal to mild alteration in ventilatory responsiveness. ▪ May experience no more than a 5% reduction in oxygen saturation from baseline (usually >94%). 	<ul style="list-style-type: none"> ▪ Moderate alteration in ventilatory responsiveness. ▪ >5% decrease in oxygen saturation.
Gross motor	<ul style="list-style-type: none"> ▪ Minimal to mild alteration in gross motor function. 	<ul style="list-style-type: none"> ▪ Mild to moderate impairment in gross motor function. ▪ May be unable to sit independently. 	<ul style="list-style-type: none"> ▪ Moderate impairment in gross motor function. ▪ Diminished muscle tone.
Level of awareness	<ul style="list-style-type: none"> ▪ Attentive to environment/appropriate interactiveness. ▪ No change in orientation to person or place. 	<ul style="list-style-type: none"> ▪ Significant loss of orientation to environment and impaired ability to interact with the environment. ▪ Fall asleep. 	<ul style="list-style-type: none"> ▪ Loss of orientation. ▪ Does not interact with environment.
Responsiveness to stimuli	<ul style="list-style-type: none"> ▪ Appropriate response to all physical and verbal stimulation. 	<ul style="list-style-type: none"> ▪ May have blunted response to light tactile, physical and/or verbal stimulation 	<ul style="list-style-type: none"> ▪ Blunted response to painful physical stimulation.
Desired sedation score**	<ul style="list-style-type: none"> ▪ 3, calm 	<ul style="list-style-type: none"> ▪ 4, drowsy 	<ul style="list-style-type: none"> ▪ 5, asleep

Cardiovascular function is generally not affected during mild to deep sedation but must be monitored and continually assessed.

**** Pediatric Sedation Score**

- 1 = Agitated: Clinging and/or drowsy
- 2 = Alert: Awake, not clinging; may whimper but not cry
- 3 = Calm: Lying comfortably with eyes spontaneously open
- 4 = Drowsy: Lying comfortably with eyes spontaneously closed, but responds to mild stimulation
- 5 = Asleep: Eyes closed, does not respond to mild stimulation

APPENDIX C

Table 1
Emergency Drugs and Equipment

Emergency Drugs

- Oxygen
- Atropine
- Epinephrine (1:1000, 1:10,000)
- Diazepam
- Flumazenil
- Lidocaine (2%)
- Naloxone
- Diphenhydramine hydrochloride
- Vecuronium
- Albuterol by inhalation
- Racemic epinephrine
- D50
- Succinylcholine

Emergency Equipment

- Intravenous Equipment
 - Intravenous catheters: 24, 22, 18 gauge
 - Tourniquets
 - Alcohol wipes and sterile gauze
 - Adhesive tape
 - Syringes: 1 ml, 3 ml, 5 ml, 10 ml
 - Intravenous tubing
 - Intravenous fluid: Normal Saline, D5 ¼ NS
 - Intravenous needles: 22, 20, and 18 gauge
 - Airway Equipment
 - Face Mask
- Self – inflating resuscitation bag: 500ml, 1000ml

Table 2
Essential Supplies in the Sedation Room

1. Wall oxygen capable of delivering 15 liters per minute.
- * 2. Portable oxygen capable of delivering 15 liters per minute
3. Wall suction with Yankaur
- * 4. Portable suction with Yankaur
- * 5. Pulse oximeter
- * 6. Resuscitation bag and mask: self-inflating (500ml, 1000ml) and Anesthesia bag
- * 7. Airway equipment including oxygen tubing, nasal cannulas, and a variety of oxygen mask sizes, nasal trumpets, endotracheal tubes in a variety of sizes, and an intubation tray.
- * 8. Cardiorespiratory monitor with blood pressure measurement capabilities
- * 9. End tidal carbon dioxide monitor (if available)
- * 10. Emergency medications
- * 11. Extra doses of sedative medications
- * 12. PIV placement supplies
- * 13. Normal Saline solution and the administration tubing

* These items are also on the transport cart.

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APPENDIX D
ASA Physical Status Classification

Class I	A normally healthy patient
Class II	A patient with mild systemic disease
Class III	A patient with severe systemic disease
Class IV	A patient with severe systemic disease that is a constant threat to life
Class V	A moribund patient who is not expected to survive without the operation

American Academy of Pediatrics. (1992). Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. *Pediatrics*, 89, 1110-1115.

Appendix E Monitoring According to Level of Sedation

Level of Sedation	Mild	Moderate	Deep
Characteristics (see also Appendix B)	Normal airway control Normal respiratory responsiveness Mild to minimal change in gross motor function Normal level of awareness Appropriate response to all stimuli	Minimal to no loss of airway control Minimal to mild alteration in ventilatory responsiveness ($\leq 5\%$ decrease in O ₂ sat) Mild to moderate impairment of gross motor function Significant loss of orientation and impaired interaction with environment Blunted response to light tactile and/or verbal stimulation	Potential for partial or complete loss of airway control Moderate alteration in ventilatory responsiveness ($> 5\%$ decrease in O ₂ sat) Moderate impairment in gross motor function Loss of orientation to and interaction with environment Blunted response to painful stimuli
Resuscitation Equipment/Drug Box	Available in area	Present in sedation area including suction	Immediately available within arms length including suction
NPO status**	No NPO requirement	≤ 6 mo 4 hours milk/solids > 6 mo 6 hours milk/solids 4 hours breast milk all ages 2 hours clear liquids all ages	≤ 6 mo 4 hours milk/solids > 6 mo 6 hours milk/solids 4 hours breast milk all ages 2 hours clear liquids all ages
IV Access	Available	Immediately available	Must be present/ Immediately available
Respiratory Effort	Baseline and at 20 min	Baseline and continuous Document every 5min	Baseline and continuous Document every 3-5min
Heart Rate	Baseline and at 20 min	Baseline and continuous Document every 5min	Baseline and continuous Document every 3-5min
EKG	Not required	Not required	Required*
Blood Pressure	Baseline	Baseline	Baseline and continuous Document every 3-5min
Pulse Oximetry	Not required	Baseline and continuous Document every 5min	Baseline and continuous Document every 3-5min
Mental Status	Baseline and at 20 min	Baseline and every 5min	Baseline and every 5min
RN Attendance	Immediately available	Continuous	Continuous
MD Attendance	Readily available (on site)	Immediately available	Continuous

*Exception: May not be able to be used during MRI

Contact: Gregory Hollman, MD, Medical Director, Pediatric Sedation Program, University of Wisconsin Children's Hospital

****NPO status for patients receiving oral contrast:** Patients who receive oral contrast for diagnostic studies are not to be considered to have an empty stomach. Thus, the risk of vomiting and aspiration in a sedated patient with oral contrast is higher than for patients with an empty stomach. All attempts must be made to perform these procedures under the "lightest" sedation possible. All children must be accompanied by a physician and a nurse throughout the entire procedure. Oral contrast should be administered at the earliest time possible before the procedure (preferably > 1 hour). Timing of oral contrast administration must be arranged with the radiologist.

APPENDIX F
PEDIATRIC DISCHARGE CRITERIA
For Discharge From Sedation Monitoring

Phase I Criteria (Modified from Connecticut Children’s Medical Center Scoring System from Pediatric Procedural Sedation and Analgesia, and UWHC Pediatric Sedation Policy and Procedure Appendix E.

Vital Signs (VS)

Stable.....	1
Unstable.....	0

Respirations (Resp)

Normal/preprocedural level.....	2
Shallow respirations/tachypnea.....	1
Apnea/periodic respirations.....	0

Level of Consciousness (LOC)

Alert, oriented/returned to pre-procedure level.....	2
Arousable, giddy, agitated, disoriented.....	1
Blunted response to verbal / physical stimuli.....	0

Oxygen Saturation (O2 Sat)

94-100%.....	2
88-93%.....	1
<88%.....	0

Color

Pink/preprocedure color.....	2
Pale/dusky.....	1
Cyanotic.....	0

Activity

Normal gross motor function/moves on command/preprocedural level....	2
Altered gross motor function / uncoordinated walking.....	1
No to minimal spontaneous movement.....	0

PHASE I CRITERIA SCORE:

≥8 When score is ≥8 and no category has a score of 0, continue onto Phase II recovery (minimum of Q15 minute vital signs for 30 min)

<8 continue with vital signs as per Sedation P&P

PHASE II CRITERIA: May be discharged from Phase II after a minimum of 30 minutes (VS Q15 min) and by meeting the below requirements:

- 1) Stable respiratory status: Equal breath sounds, unlabored resp effort, or resp status at baseline
- 2) Able to maintain patent airway independently: manage oral secretions and demonstrate the ability to swallow.
- 3) No nausea/vomiting; tolerates clear liquids without emesis.
- 4) LOA: awake & alert (able to keep eyes open and converse with parents if developmentally appropriate).
- 5) Activity: Good head control, sits unaided, walks with assistance (if developmentally appropriate)
- 6) Vital Signs: Remain stable and Phase I score maintained

APPENDIX G

PEDIATRIC POST SEDATION INSTRUCTIONS

Your child has just completed a procedure requiring a significant amount of sedation. Although your child may be awake and alert at the time of discharge, the effects of the medications may be present 12-24 hours later. Some of the side effects your child may experience are irritability, drowsiness, impaired balance and reflexes, and nausea and vomiting. If your child vomits more than three times you should call your pediatrician. Due to the possibility of these side effects, your child should not attend daycare or school today. In fact, a quiet day at home is recommended. Please protect your child from falls, sharp objects, or other potentially dangerous situations. Your child may fall asleep on the drive home. If this occurs, it is important to maintain your child's head in a position that ensures adequate breathing. Remember to buckle-up!

The following additional considerations are based on the age of your child:

INFANTS (Newborn to 1 year)

Precautions: Do not allow your infant to play, sit-up, or crawl unattended.

Feedings: It is important that your baby does not become dehydrated.
Following the sedation period, your baby should return to his/her normal eating pattern.

TODDLERS and SCHOOL-AGE

Precautions: Do not allow your child to play unattended today.
Avoid activities that require coordination and balance such as bike riding, swimming, and other physical activities.
Do assist your child with stair climbing.

Nutrition: Do encourage a quiet day with indoor activities such as playdough, coloring, or movies.
After your child has been awake one hour and tolerated clear liquids, you may offer milk products and solid foods. Avoid greasy foods as this may cause nausea or vomiting. Offer fluids frequently.

ADOLESCENTS/TEENS

Precautions: Do not allow your adolescent to be unattended today.
Do not allow your adolescent to drive, swim, ride a bike, or participate in other sports today.
Do assist your adolescent with stair climbing as needed.

Nutrition: Once clear liquids have been tolerated for one hour, advance to milk products and then solids.
Avoid greasy foods as this may cause nausea or vomiting.

CONSIDERATIONS FOR CHILDREN WITH SPECIAL NEEDS:

Precautions: Your child's usual challenges may be more pronounced today.
Do not leave your child unattended today.

Help your child with his/her equipment, such as wheelchair maneuvering or orthotic positioning.
Nutrition: Once clear liquids have been tolerated for one hour, advance to "usual" diet. We recommend you do not allow your child to eat alone today.

Please call the clinic with any questions:

Mon.-Fri., 8 a.m. to 4:00 p.m. at (608) 263-8489. Ask for the sedation nurse that cared for your child. Evenings and weekends call (608) 262-0143 and ask for the pediatrician on call. Emergency dial 911.

The medication(s) your child received: _____

The appropriate instructions above have been explained to

Signature and Relationship

Nurse: _____ Date: _____