

SUBJECT: Sedation for Procedures

SEE ALSO: Hospital policies HP06-09, Consent; HP06-31, Use of Restraints; HP08-07, Patient Care Orders; HP08-25, Inpatient Drug Distribution; Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists, American Society of Anesthesiology (*Anesthesiology* 96: 742-752, 2002); Kentucky Board of Nursing Advisory Opinions on Nursing Practice 95-32 Intravenous Administration of Medications for Sedation by Nurses; and KBN Summary Opinion 10-02 Monitoring of Patients Receiving Ketamine Hydrochloride [http://kbn.ky.gov/Documents/prac\\_summary\\_02-03.rtf](http://kbn.ky.gov/Documents/prac_summary_02-03.rtf)

## INFORMATION

Sedation and analgesia comprise a continuum of states ranging from minimal sedation through general anesthesia. Sedation may be administered by various routes. When administered for the performance of diagnostic or therapeutic procedures, sedation may produce loss of protective reflexes.

This policy applies to all age groups of patients requiring *moderate* or *deep sedation* for diagnostic or therapeutic procedures. The policy applies to all age groups of patients receiving sedation.

This policy does *not* apply to:

- patients receiving local or topical anesthesia;
- patients receiving a single sedative or analgesic medication administered in doses appropriate for unsupervised treatment of insomnia, anxiety, or pain;
- patients receiving therapeutic management of seizures.
- patients being maintained on mechanical ventilation as part of a treatment protocol;
- patients receiving less than 50% nitrous oxide in oxygen with no other sedative or analgesic medication by any route;
- patients receiving light sedation;
- patients receiving peripheral nerve blocks; or
- patients receiving general or major conduction anesthesia (e.g., spinal or epidural/caudal block).

These guidelines are systematically developed recommendation to assist with the provision of safe patient care. They are not intended to be standards or absolute requirements, and cannot guarantee any specific outcome. They may be modified by a physician member of the medical staff according to special clinical needs or constraints. These guidelines are subject to revision as warranted by the evolution of medical knowledge, technology, and practice.

## DEFINITIONS

Definitions of levels of sedation/analgesia are as defined by the American Society of Anesthesiologists Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists.

**Light sedation** (anxiolysis) is a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

**Moderate sedation** is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained. **Moderate sedation is usually inadequate in children to achieve the level of sedation necessary to perform procedures.**

**Deep sedation** is 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** is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation.

**Continuum of Depth of Sedation**

	<i>Minimal Sedation</i>	<i>Moderate Sedation</i>	<i>Deep Sedation</i>	<i>General Anesthesia</i>
Responsiveness	Normal response to verbal stimulation	Purposeful response to verbal or tactile stimulation	Purposeful response following repeated or painful stimulation	Unarousable, even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

**Differences between Moderate Sedation and Deep Sedation Techniques**

<i>Moderate Sedation</i> depressed level of consciousness	<i>Deep Sedation</i> more significantly depressed level of consciousness
follows commands	unable to consistently follow commands
protective reflexes expected to be maintained	protective reflexes can be affected
vital signs expected to remain stable	vital signs may be labile
short post-procedure stay	occasional prolonged post-procedure monitoring
infrequent sedation-related complications	more frequent sedation-related complications
less effective with uncooperative patients	may be useful in providing care to uncooperative patients

Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Practitioners intending to produce a given level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended. Individuals administering moderate sedation/analgesia should be able to rescue patient who enter a state of deep sedation/analgesia, while those administering deep sedation/analgesia should be able to rescue patients who enter a state of general anesthesia.

**PRE-PROCEDURE ASSESSMENT AND PLAN**

Pre-procedure assessment **will be** performed and recorded before beginning moderate or deep sedation. Assessment must include medical history including response to previous sedation and

anesthesia, physical examination of the heart, airway, and lungs, diagnosis, psychosocial assessment, weight, vital signs, and plan. The written pre-procedure assessment must be complete and present before the procedure begins. Medical history, physical examination, and plan must be completed by a physician.

### **Medical History**

Appropriate medical history includes response to previous sedation and anesthesia. Aspects of the patient's medical history may alter the patient's response to sedation/analgesia. These include:

- Abnormalities of the major organ systems;
- Previous adverse experience with sedation/analgesia as well as regional and general anesthesia in the patient or family;
- History of allergies, regular medications, specific drugs taken within the past 24 hours of the day of the procedure, including over-the-counter (OTC), herbal, and illicit drugs, and potential drug interactions;
- Time and nature of last oral intake; and
- History of tobacco, alcohol, or substance use or abuse

### **Airway History**

- Previous problems with anesthesia or sedation;
- Stridor, snoring, or sleep apnea;
- Advanced rheumatoid arthritis
- Chromosomal abnormality (e.g., trisomy 21); and
- Ability to lie flat.

### **Physical Examination**

The physical examination must include examination of the heart, airway, and lungs.

Positive pressure ventilation by mask, with or without tracheal intubation, may be necessary if respiratory compromise develops during sedation/analgesia. This may be more difficult in patients with atypical airway anatomy. Also, some airway abnormalities may increase the likelihood of airway obstruction during spontaneous ventilation.

Some factors which may be associated with difficult airway management are:

- **Habitus:** Significant obesity (especially involving the neck and facial structures);
- **Head and neck:** Short, thick neck, limited neck extension, decreased hyoid-mental distance (<6 cm in an adult), neck mass, cervical spine disease or trauma, tracheal deviation, dysmorphic facial features (e.g., Pierre-Robin syndrome), beard, and nasogastric tube;
- **Mouth:** Small opening (<3cm in an adult); edentulous (mask ventilation more difficult, intubation easier); protruding incisors; loose or capped teeth; dental appliances; high, arched palate; macroglossia; tonsillar hypertrophy; non-visible uvula;
- **Jaw:** Micrognathia, retrognathia, trismus, significant malocclusion; and
- Inability to cover upper lip with lower incisors.

### **Psychosocial Assessment**

- Pre-procedure teaching needs;
- For outpatients, planned method of transport from the Hospital, presence of a responsible adult to provide post-hospital care, and understanding of the procedure to be performed;

Demonstration by the patient or responsible adult accompanying the patient of their understanding of discharge instructions (a copy of signed discharge instructions will be placed in the medical record).

### Weight and Vital Signs

- Patient weight in kilograms, height
- Baseline data to include heart rate, blood pressure, respiratory rate, oxygen saturation, level of consciousness, and comfort level

### Plan

- Procedure to be performed;
- Agents to be used for sedation;
- Assignment of American Society for Anesthesiology (ASA) physical status classification:
  - P1 A normal healthy patient;
  - P2 A patient with mild systemic disease;
  - P3 A patient with severe systemic disease;
  - P4 A patient with severe systemic disease that is a constant threat to life;
  - P5 A moribund patient who is not expected to survive with or without the procedure;
  - P6 A declared brain-dead patient whose organs are being removed for donor purposes.

### Consultation in Special Situations

In patients with significant underlying medical conditions (e.g., extremes of age; severe cardiac, pulmonary, hepatic, or renal disease; pregnancy; drug or alcohol abuse) pre-procedure consultation with an appropriate medical specialist (e.g., cardiologist, pulmonologist) may be helpful.

In patients with significant sedation-related risk factors (e.g., uncooperative patients, morbid obesity, potentially difficult airway, sleep apnea), pre-procedure consultation may be helpful with an intensivist or anesthesiologist.

For severely compromised or medically unstable patients (e.g., anticipated difficult airway, severe obstructive pulmonary disease, coronary artery disease, or congestive heart failure), or if it is likely that sedation to the point of unresponsiveness will be necessary to obtain adequate conditions, practitioners who are not trained in the administration of general anesthesia should consult an intensivist or anesthesiologist.

### Consent for Procedures and Sedation

Procedure and sedation risks, benefits, and alternatives are discussed with the patient and family, and signed consent is obtained.

### Pre-Procedure Fasting Guidelines

<i>Ingested Material</i>	<i>Minimum Fasting Period</i>
Clear liquids	2 hours*
Breast milk	4 hours*
Infant formula	6 hours*
Non-human milk	6 hours*
Light meal	6 hours*
Regular meal	8 hours*

- \* without conditions that may prolong gastric emptying or impair function of esophagogastric juncture.

These recommendations apply to healthy patients who are undergoing elective procedures. They are not intended for women in labor. Following the guidelines does not guarantee complete gastric emptying has occurred. Fasting periods apply to all ages.

Examples of clear liquids include water, fruit juices without pulp, carbonated beverages, clear tea, and black coffee. Since non-human milk is similar to solids in gastric emptying time, the amount

ingested must be considered when determining an appropriate fasting period. A light meal typically consists of toast and clear liquids. Meals that include fried or fatty foods or meat may prolong gastric emptying time. Both the amount and type of foods ingested and risk factors for delayed gastric emptying (e.g., diabetes, pregnancy, and obesity) should be considered when determining an appropriate fasting period.

### **Pre-Procedure Communication between Practitioners**

The purpose of the medical record is to facilitate communication between practitioners. For inpatients who are being sent from their nursing unit for a procedure in another area, the inpatient medical record, including nursing records of vital signs, and the current medication administration record, must be sent with the patient to the procedure area. The pre-operative nursing checklist, when required, must also accompany the patient. A verbal report should be given as appropriate before patients are transferred to procedure areas.

### **Intravenous Access**

Vascular access shall be maintained throughout the procedure and the post-anesthesia recovery period. In patients who have received sedation by non-intravenous routes, or whose intravenous line has become dislodged or blocked, practitioners should determine the advisability of establishing or reestablishing intravenous routes on a case-by-case basis. In all instances, an individual with the skills to establish intravenous access must be immediately available.

### **Immediate Pre-Procedure Assessment**

The patient must be reevaluated immediately before moderate or deep sedation induction. Evaluation must include vital signs.

### **Administration of Medications**

Sedation medications may be administered by a physician, dentist, or a registered nurse, or by a radiologic technologist in the presence of and under the direct supervision of the person privileged to perform procedures under sedation.

Medications should be given as small, incremental doses titrated to the desired endpoints of sedation. Sufficient time must elapse between doses to allow the effect of each dose to be assessed before subsequent doses are administered.

Specific antagonists should be available whenever opioid analgesics or benzodiazepines are administered. Following pharmacological reversal, patients should be observed long enough (up to two hours) to ensure that sedation and cardiorespiratory depression does not recur once the effect of the antagonist dissipates. The use of sedation regimens which include routine reversal of sedative **or** analgesic agents is discouraged.

Even if moderate sedation is intended, patients receiving etomidate, propofol or methohexital by any route should receive care consistent with that are required for deep sedation.

### **Minimum Staffing for Deep Sedation**

For patients receiving deep sedation, a competent provider, other than the person performing the procedure, must be present to monitor the patient throughout the procedure. This individual's only responsibility must be to monitor the patient. This individual *may not* assist other practitioners with minor or interruptible tasks.

### **Minimum Staffing for Moderate Sedation**

For patients receiving moderate sedation, a designated individual, other than the practitioner performing the procedure, must be present to monitor the patient throughout procedures. This individual *may not* assist the practitioner performing the procedure with other tasks. If this individual is not a physician or registered nurse, a physician or registered nurse must be available in the immediate physical vicinity to the person performing monitoring activity.

## **Competency of Clinical Staff**

House staff and Hospital staff shall demonstrate competency to perform activities for which responsibility is assumed. Because it is not always possible to predict how a specific patient will respond to sedative and analgesic medications, practitioners intending to produce a given level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended. For moderate sedation, this implies the ability to manage a compromised airway or hypoventilation in a patient who responds purposefully following repeated or painful stimulation.

For deep sedation, this implies the ability to manage respiratory or cardiovascular instability in a patient who does not respond purposefully to painful or repeated stimulation. Faculty must be granted privileges by the Hospital Board of Directors to administer moderate or deep sedation for procedures.

Individuals responsible for monitoring patients must be trained in recognizing complications associated with sedation/analgesia. At least one person trained in basic life support skills (CPR, bag-valve-mask resuscitation) as well as a means for summoning additional assistance, must be present whenever sedation is administered. A person with advanced life support skills (e.g., tracheal intubation, defibrillation, and use of resuscitation medications) must be immediately available for moderate sedation and in the procedure room itself for deep sedation.

## **Equipment, Supplies, and Assistance**

The following equipment and supplies appropriate to the age and size of the patient must be immediately available:

- cardiac monitor;
- pulse oximeter;
- oxygen, including equipment for administration;
- bag/valve/mask device;
- oral and nasal airways;
- intubation tray;
- intravenous supplies;
- emergency cart;
- defibrillation equipment;
- pharmacologic reversal agents;
- suction apparatus and supplies;
- blood pressure monitor;
- thermometer;
- ready access to a practitioner qualified and available to evaluate and resuscitate

## **PATIENT MONITORING**

### **Pulmonary Ventilation**

The primary causes of morbidity associated with sedation are drug-induced respiratory depression and airway obstruction. Ventilatory function (tidal volume or respiratory rate) must be continuously monitored by observation and/or auscultation. Pulse oximetry does not reliably measure adequacy of ventilatory function but may alert practitioners to inadequate ventilation. Pulse oximetry is not a substitute for monitoring ventilatory function. For patient undergoing deep sedation, capnography is recommended.

### **Oxygenation**

Early detection of hypoxemia decreases the likelihood of adverse outcomes such as cardiac arrest and death. Pulse oximetry with appropriate alarms must be used on all patients undergoing sedation. Unless contraindicated, the alarm should emit a variable pitch "beep."

Supplemental oxygen should be considered for moderate sedation and should be administered during deep sedation unless specifically contraindicated for a particular patient or procedure. If hypoxemia is anticipated or develops during sedation/analgesia, supplemental oxygen should be administered. Hypoxemia should be considered and ruled out if bradycardia occurs.

## **Hemodynamics**

Regular monitoring of arterial blood pressure and heart rate reduces the likelihood of adverse outcomes. Vital signs must be monitored and recorded at five-minute intervals once a stable level of sedation is established. Blood pressure must be determined before sedation is initiated and at five minute intervals during the procedure unless monitoring interferes with the procedure (e.g., pediatric MRI).

## **Electrocardiography**

Continuous electrocardiographic monitoring is required for all patients undergoing deep sedation and for patients undergoing moderate sedation who have significant cardiovascular or pulmonary disease or are undergoing procedures where dysrhythmias are anticipated. In pediatric patients undergoing deep sedation, continuous ECG monitoring may be discontinued during the procedure if it interferes with performance of the procedure (e.g., MRI).

## **Level of Consciousness**

The response of patients to commands during procedure serves as a guide to their level of consciousness. Spoken responses also provide indication that patients are breathing. Patients whose only response is reflex withdrawal from painful stimuli are deeply sedated, approaching a state of general anesthesia, and should be treated accordingly.

Monitoring of patient response to verbal commands should be routine during moderate sedation except in patients who are unable to respond appropriately (e.g., young children, mentally impaired or uncooperative patients) and during procedures where movement could be detrimental. During deep sedation, patient verbal response to more profound stimulus should be sought unless contraindicated to ensure the patient has not drifted into a state of general anesthesia.

During procedures where a verbal response is not possible (e.g., oral surgery, upper endoscopy), the ability to give a “thumbs up” or other indication of consciousness in response to verbal or tactile (tap) stimulation suggests the patient will be able to control their airway and take deep breaths if necessary, corresponding to a state of moderate sedation.

A response limited to reflex withdrawal from painful stimulus is NOT considered a purposeful response and thus represents a state of general anesthesia.

## **Monitoring Requirements**

In summary, moderate sedation monitoring must include at least:

- continuous oxygen saturation
- ventilatory function (tidal volume or respiratory rate)
- heart rate
- blood pressure
- respiratory rate
- level of consciousness and purposeful response to stimuli
- cardiac rhythm, if patient has cardiac or pulmonary disease
- sedation/analgesia comfort level

## **Deep sedation monitoring must include all of the above *and*:**

- cardiac rhythm via electrocardiography; in pediatric patients, continuous ECG monitoring may be discontinued during the procedure if it interferes with the performance of the procedure (e.g., MRI)
- temperature (if procedure is expected to last longer than one hour, and obtaining temperature will not interfere with the procedure)
- monitoring per specific unit guidelines
- capnography is recommended

## **Documentation**

Monitoring variables are to be recorded prior to initiating sedation, during the procedure, during recovery, and immediately prior to discharge.

## **Intra-Procedure Monitoring**

Intra-procedure monitoring shall begin with initiation of sedation. Frequency of monitoring shall be continuous and individualized. Monitoring variables will be documented at least every five minutes, or more frequently if appropriate based on the patient's condition.

## **POST-PROCEDURE RECOVERY**

There should be ready access to a physician qualified and available to evaluate and resuscitate the patient during the post-procedure period. The physician's name and pager number should be available during the post-procedure period.

## **Post-Procedure Monitoring**

Patients should be observed in an appropriately staffed and equipped area until they are near their baseline level of consciousness and are no longer at increased risk for cardiorespiratory depression. Post-procedure monitoring must continue for at least 30 minutes after the last sedating agent was administered. Oxygenation should be monitored periodically until patients are no longer at risk for hypoxemia. Ventilation and circulation should be monitored at regular intervals until patients are suitable for discharge. Following pharmacological reversal of sedation/analgesia, patients should be observed long enough (up to two hours) to ensure that sedation and cardiorespiratory depression does not recur once the effect of the antagonist dissipates.

Infants less than 49 weeks gestational age who have received any sedational agents must be observed in a monitored environment for 12 hours post sedation.

Documentation of continuous pulse oximetry, cardiac rhythm; heart rate, ventilatory function, respiratory rate, blood pressure, level of consciousness, and sedation/comfort level shall occur as follows:

### ***moderate sedation***

every 15 minutes until the patient's vital signs return to the pre-procedure baseline or if a significant event occurs.

### ***deep sedation***

every 5 minutes X 3, and then every 15 minutes until the patient returns to the pre-procedure baseline. The patient must meet discharge or transfer criteria. Monitoring shall continue beyond the 45-minute post-sedation interval until discharge or transfer criteria are met, or if a significant event occurs.

Note: If only propofol, and no other sedative/analgesic drug, was used during deep sedation, post-procedure monitoring may be discontinued 15 minutes after the patient's vital signs have returned to the pre-procedure baseline, patient is awake and alert, and patient meets other discharge criteria. Note special requirements for premature infants.

Regardless of the type of sedation, observation of the patient (and monitoring as needed) must continue until the patient meets all criteria for discharge or transfer.

Transfer or discharge should be delayed until sufficient time (up to two hours) has elapsed after the last administration of reversal agents (e.g., naloxone, flumazenil) to ensure that the patient does not become re-sedated after reversal effects have abated.

### **Documentation Requirements**

- Pre-procedure assessment as described in this policy
- Physiologic data from established monitoring standards and at any significant event
- Dosage, route, time, and effect of sedative medications
- Interventions and patient response
- Untoward or significant reactions and resolutions
- Transfer or discharge criteria met
- A responsible adult present to accompany the patient from the Hospital
- Signed discharge instructions

All documentation must be filed in the Hospital medical record.

### **Criteria for Transfer or Discharge**

The patient may be transferred or discharged from the area in which sedation was administered after at least 30 minutes of post-procedure monitoring for moderate sedation (as described in previous paragraph) or 60 minutes for deep sedation, *and* when the following criteria are met:

- vital signs are within acceptable limits or within the pre-procedure range;
- the patient is conscious or has returned to the pre-procedure level of consciousness;
- psychosocial status has been ascertained to include planned method of transport and understanding of the procedure;
- there is an order by a physician for the patient to be discharged or transferred, or
- there is documentation that the person performing post-procedure monitoring has assessed that the patient meets discharge or transfer criteria; and
- a responsible adult is present to accompany the patient from the Hospital; if no responsible

adult is present to accompany the patient, the patient must be monitored for eight hours post-procedure or longer if pre-procedure level of consciousness has not been reached in eight hours. The patient must still not drive home. Sufficient time (up to two hours) should have elapsed after the last administration of reversal agents (e.g., naloxone, flumazenil) to ensure that the patient does not become re-sedated after reversal effects have abated.

Note: If only propofol, and no other sedative/analgesic drug, was used during deep sedation, post-procedure observation may be discontinued 15 minutes if other discharge criteria have been met

### **Transfer Instructions**

A verbal report must be given to the individual assuming care of the patient.

### **Discharge Instructions for Outpatients**

A copy of written discharge instructions shall be given to and understanding demonstrated by the patient or the responsible adult accompanying the patient before sedation is administered. These instructions and any additional instructions will be reinforced before discharge. The patient or the responsible adult accompanying the patient will sign the written discharge instructions. A copy of the signed discharge instructions will be placed in the medical record.

Written discharge instructions regarding the sedation process and procedure will include at least the following:

- Restrictions to diet, including the use of alcohol
- Restrictions to activity, including driving and operation of machinery, position in car seat
- Use of prescribed medications

- Signs and symptoms of complications
- Conditions that require calling a physician
- How to contact a physician for post-procedure problems, including the name and day/after-hours telephone numbers

Caregivers assuming responsibility for pediatric patients post discharge should be instructed that children may be at risk for airway obstruction should the head fall forward while the child is secured in a car seat. It is advisable for **another** adult (in addition to the driver) to accompany a child being transported by car.

Approved by Richard Lofgren, M.D., Chief Medical Officer  
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## Appendix 1 Medication Guidelines for Sedation

### Agents

<b>Agents Used for Adults</b>	<b>Dose</b>	<b>Frequency</b>
Diazepam	1-2 mg	q3-10 minutes
Midazolam	0.25-1 mg	q1-5 minutes
Lorazepam	0.04 mg/kg	q5-10 minutes
Fentanyl	1 mcg/kg, then 12-5-50 mcg	q5-10 minutes
Morphine	1-4 mg	q2-15 minutes
Meperidine	12.5-25 mg	q2-15 minutes

<b>Agents Used for Pediatric Patients</b>	<b>Dose</b>	<b>Frequency</b>
Midazolam (IV, IM)	0.05-0.1 mg/kg (IV, IM)	q3-5 minutes maximum 6 mg / age 0-5 maximum 10 mg / over age 5
Diazepam (IV, IM)	0.05-0.1 mg/kg (IV, IM)	q3-10 minutes (max <0.25 mg/kg)
Fentanyl (IV)	0.5-1 mcg/kg (IV)	q5-10 minutes
Ketamine (IV, IM)	0.5-2.0 mg/kg (IV)	30 minutes before procedure
	3-7 mg/kg (IM)	30 minutes before procedure
	6-10 mg/kg PO	30 minutes before procedure
Morphine (IV, IM)	0.05 mg/kg	q5-15 minutes
	(0.05-0.1 mg/kg) (IV, IM)	(max 15 mg/dose or 100 mg/dose)
Meperidine (IV)	0.5 mg/kg (IV)	q5 minutes (max 2 mg/kg) or 100 mg/dose
Chloral hydrate	50-100 mg/kg PO/PR	Once (may be divided as two doses of 25 mg/kg) up to a maximum of 2 g/dose per 24 hours
Pentobarbital (IV) (under 18 months)	2 mg/kg IV push over 2 minutes;	may repeat with 1.5 mg/kg after 5-10 minutes to a maximum of 3 mg/kg
Pentobarbital (IV) (over 18 months)	2-3 mg/kg IV push over 2 minutes; 150 mg initial dose, 200 mg total dose	may repeat with 1.5 mg/kg after 5-10 minutes to a maximum of 4.5 mg/kg

### Sedation Antagonists

<b>Agents Used for Adults</b>	<b>Dose</b>	<b>Frequency</b>
Naloxone	40-400 mcg	q5-10 minutes
Flumazenil	0.2 mg	q 1 minute, up to 1 mg

<b>Agents Used for Pediatrics Patients</b>	<b>Dose</b>	<b>Frequency</b>
Naloxone	2-10 mcg/kg	q5-10 minutes
Flumazenil		

### Major Drug-Drug Interactions with Midazolam (Versed)

#### **Azole Antifungals (fluconazole, itraconazole, ketoconazole)**

When taking the drug history, special attention should be given to patients taking azole antifungals who are candidates to receive midazolam (Versed) for sedation. Azole antifungals

interfere with the metabolism of midazolam, which can lead to a doubling of the peak serum level and prolongation of the half-life. This could adversely affect patients who receive midazolam.

### **Amprenavir (Agenerase)**

Because of the potential for serious and/or life-threatening prolonged sedation that can occur with increased plasma concentrations of midazolam, the concurrent use of amprenavir and midazolam is contraindicated. Amprenavir and midazolam are both metabolized by cytochrome P450 3A4 enzymes, and the competition for metabolism could result in an increased plasma concentration of midazolam. The concurrent use of amprenavir and midazolam is contraindicated.

### **Atazanavir (Reyataz)**

Coadministration of atazanavir is contraindicated with drugs that are metabolized by cytochrome P450 3A for clearance and for which elevated plasma concentrations are associated with serious and/or life threatening events. Side effects may include prolonged or increased sedation or respiratory depression. Coadministration of atazanavir and benzodiazepines is contraindicated.

### **Barbituates (phenobarbital, thiopental)**

When used in combination, these drugs may have additive CNS and respiratory depressant effects. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be warranted.

### **Centrally Acting Muscle Relaxants**

When used in combination, these drugs may have additive CNS and respiratory depressant effects. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be necessary.

### **Chloral Hydrate (Noctec)**

Chloral hydrate, with a limited therapeutic index, can produce acute intoxication and respiratory depression. When used in combination with benzodiazepines, these drugs may have additive CNS and respiratory depressant effects. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be necessary.

### **Efavirenz (Sustiva)**

Midazolam and efavirenz are both metabolized by the cytochrome P450 3A4 enzyme system. Competition for this pathway could result in inhibition of midazolam metabolism, creating the potential for midazolam toxicity (excessive sedation, confusion). Concurrent administration of efavirenz and midazolam is contraindicated.

### **Erythromycin and Clarithromycin (Biaxin)**

Two of the macrolide antibiotics, Erythromycin and Clarithromycin (Biaxin) interact with the benzodiazepine midazolam (Versed) by increasing the peak blood concentration and increasing the area under the serum concentration curve. When either erythromycin or clarithromycin are given with midazolam (Versed), increased clinical effects (prolonged duration of sleep and deepened sensation) have been reported.

### **Ethchlorvynol (Placidyl)**

When used in combination, these drugs may have additive CNS and respiratory depressant effects. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be necessary.

### **Indinavir (Crivivan)**

Concomitant administration of midazolam and indinavir is contraindicated. The manufacturer of indinavir suggests that combined use of these agents could produce a decrease in the metabolism of midazolam resulting in midazolam toxicity and potentially severe adverse events like prolonged sedation.

**Nelfinavir (Viracept)**

Nelfinavir is metabolized by the cytochrome P450 3A system, as is midazolam. Competition for CYP3A could result in the inhibition of midazolam's metabolism, creating the potential for prolonged sedation. Therefore, the concurrent administration of nelfinavir and midazolam is contraindicated.

**Opioid Analgesics**

When used in combination, these drugs have additive CNS and respiratory depressant effects. Hypotension, profound sedation or coma may result when meperidine and benzodiazepines are used concomitantly. Administration of reduced doses of meperidine is recommended. Severe hypotension has been reported with coadministration of midazolam and fentanyl in neonates, including those maintained on an infusion of either drug who subsequently received rapid injections of either fentanyl or midazolam. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be necessary.

**Ritonavir (Norvir)**

Coadministered ritonavir may increase serum concentrations of midazolam, causing a potential risk of extreme sedation and respiratory depression. Ritonavir may be expected to significantly decrease midazolam metabolism, thereby producing increased serum levels of this agent. Therefore, the concurrent use of midazolam and ritonavir is contraindicated.

**Saquinavir (Fortovase)**

Because of the potential for serious and/or life-threatening prolonged sedation and respiratory depression that can occur with increased plasma concentrations of midazolam, the concurrent use of saquinavir and midazolam is contraindicated. Saquinavir and midazolam are both metabolized by cytochrome P450 3A4 enzymes, and the competition for metabolism could result in an increased plasma concentration of midazolam.

**Sodium Oxybate (Xyrem)**

In trials involving sodium oxybate, respiratory depression was reported. When used in combination with benzodiazepines, these drugs may have additive CNS and respiratory depressant effects. Monitor for respiratory depression when these drugs are used in combination. A reduction in dose of one or both drugs may be necessary.

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**PACU Discharge Criteria**

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**PACU Discharge Criteria**

Fast Tracking (Phase I-II)	Time	Time	Time
<b>Level of Consciousness</b>			
2 - Awake and Oriented			
1 - Arousable with minimal stimulation			
0 - Responsive only to tactile stimulation			
<b>Physical Activity</b>			
2 - Able to move all extremities on command			
1 - Some weakness in movement of extremities			
0 - Unable to voluntarily move extremities			
<b>Hemodynamic Stability</b>			
2 - Blood pressure < 15% of baseline MAP value			
1 - Blood pressure 15% - 30% of baseline MAP value			
0 - Blood pressure > 30% below baseline MAP value			
<b>Respiratory Stability</b>			
2 - Able to breathe deeply			
1 - Tachypnea with a good cough			
0 - Dyspneic with a weak cough			
<b>Oxygen Saturation Status</b>			
2 - Maintains SpO <sub>2</sub> > 93% on room air or pre op baseline			
1 - Requires supplemental oxygen (nasal prongs)			
0 - Saturation < 90% with supplemental oxygen			
<b>Post Anesthesia Pain Assessment</b>			
2 - None or mild discomfort			
1 - Moderate to severe pain controlled with IV analgesics			
0 - Persistent moderate to severe nausea and vomiting			
<b>Total Score</b>			

Patient Name

**Requires Score  $\geq$  12 to discharge from Phase 1 recovery**

RN Signature \_\_\_\_\_

Date \_\_\_\_\_

**Post Anesthesia Discharge Scoring System**

**Fast Tracking (Phase I-II) Level of**

**Consciousness**

Arousable with minimal stimulation 0 - Responsive only to tactile stimulation 2 - Awake and Oriented

Patient Name 1 -

**Physical Activity**

2 - Able to move all extremities on command 1 - Some weakness in movement of extremities 0 - Unable to voluntarily move extremities

**Hemodynamic Stability**

2 - Blood pressure < 15% of baseline MAP value 1 - Blood pressure 15% - 30% of baseline MAP value 0 - Blood pressure > 30% below baseline MAP value

**Respiratory Stability**

2 - Able to breathe deeply 1 - Tachypnea

with a good cough 0 - Dyspneic with a weak cough

**Oxygen Saturation Status**

2 - Maintains vaule > 93% on room air or pre op baseline 1 - Requires supplemental oxygen (nasal prongs) 0 - Saturation < 90% with supplemental oxygen

**Post Anesthesia Pain Assessment**

2 - None or mild discomfort 1 - Moderate to severe pain controlled with IV analgesics 0 - Persistent moderate to severe nausea and vomiting

**Total Score**

Modified PADSS (For patients being discharged home)	Time	Time	Time
<b>Vital Signs</b>			
2 - BP and pulse within 20% of preoperative baseline			
1 - BP and pulse 20 - 40% of preoperative baseline			
0 - BP and pulse > 40% of peroperative baseline			
<b>Activity Level</b>			
2 - Steady gait, no dizziness, or meets preoperative level			
1 - Requires assistance			
0 - Unable to ambulate			
<b>Nausea and Vomiting</b>			
2 - Minimal			
1 - Moderate			
0 - Severe			
<b>Pain</b>			
Acceptable to patient Yes - 2			
No - 0			
<b>Surgical Bleeding</b>			
2 - Minimal: does not require dressing change			
1 - Moderate: up to two dressing changes required			
0 - Severe: more than three dressing changes required			
<b>Total Score</b>			

**Requires Score  $\geq$  9 to discharge home**

RN Signature \_\_\_\_\_

Date \_\_\_\_\_

Pilot (12/05)