

Management of Children Receiving Conscious or Deep Sedation

Practice Guideline



June 2002

Background

Management of Children Receiving Sedation for procedures and diagnostic tests was identified as a priority for clinical practice guideline development by members of the Child Health Network for the Greater Toronto Area during a 2001 consensus forum.

An expert panel¹ was established, the guideline was developed and distributed throughout the membership for input. The final draft was approved by the Coordinating Committee in April 2002. Implementation throughout the Child Health Network will be accomplished through the following process:

1. Network organizations will facilitate a supportive environment for adoption of CHN Practice Guidelines by incorporating the guidelines into their existing guideline process (order sets, intranet availability, etc).
2. Network organizations will identify a "champion" to take the lead in ensuring implementation at the organization.
3. The CHN guideline will proceed through the organizational process for "approval" (MAC, Pharmacy, etc).
4. Education sessions will be provided for staff. CHN will provide a Power Point Presentation for organizational use.
5. CHN will monitor implementation through a variety of methods and report to members (surveys, chart audits, etc).

Introduction

Sedation for some children undergoing procedures and diagnostic tests is necessary in order to achieve immobility during procedures, reduce fear and anxiety, and to provide a level of amnesia. The decision about which children require sedation rests with the child, his or her family and the physician involved in the procedure.

Sedation must be provided in an environment that can support its safe use. If unavailable, the child should be transferred to an organization that can support the safe use of sedation for children. This guideline applies to hospitals and ambulatory care settings where children receive care.

¹ Appendix 1 – Members of CHN Expert Panel for Sedation for Children

Components of a Sedation Program for Children

- Safe administration
- Monitoring during the sedation period
- Recovery after the procedure and sedation
- Safe discharge

Definition of Sedation

Sedation occurs along a continuum and is described as follows²:

Figure 1 Continuum of Sedation

Level of Sedation	Definition
Minimal Sedation (Anxiolysis)	<ul style="list-style-type: none"> • Drug-induced state • Patients respond normally to verbal commands • Cognitive function and co-ordination may be impaired • Ventilatory and cardiovascular functions are unaffected
Moderate Sedation/Analgesia (Conscious Sedation)	<ul style="list-style-type: none"> • Drug-induced depression of consciousness • Patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation • No interventions are required to maintain a patent airway • Spontaneous ventilation is adequate • Cardiovascular function is usually maintained
Deep Sedation/Analgesia	<ul style="list-style-type: none"> • Drug-induced depression of consciousness • Patients cannot be easily arouse • Patients 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 • Spontaneous ventilation may be inadequate • Cardiovascular function is usually maintained
General Anaesthesia	<ul style="list-style-type: none"> • Drug-induced loss of consciousness • Patients are not arousable even by mild painful stimulation • Ability to independently maintain ventilatory function is often impaired • Patients often require assistance to maintain a patent airway • Positive pressure ventilation may be required due to depressed spontaneous ventilation and drug-induced depression of neuromuscular function • Cardiovascular function may be impaired

² American Academy of Pediatrics. (1992). "Guidelines for Monitoring and Management of Pediatric Patients During and After Sedation For Diagnostic and Therapeutic Procedures". Pediatrics, 89 (6), 1110-1115.
American Society of Anesthesiology website: <http://www.asahq.org/Standards/20.htm>

Analgesia

Analgesia is the relief of pain without intentional production of a sedated state. Altered mental status may be a secondary effect of medication administered for this purpose.

Assessing the Level of Sedation

Moderate/conscious sedation, deep sedation and general anaesthesia are distinct entities by definition, however, in practice they must be viewed as existing along a continuum. Regardless of the intended level of sedation or route of administration, sedation represents a continuum and protective reflexes may be lost and the patient may move from light sedation to obtundation rapidly and unpredictably.

In moderate/conscious sedation, drugs must be used that have a wide margin of safety, and that have a highly unlikely incidence of unintended loss of consciousness. A minimally depressed level of consciousness should be employed for the very young or developmentally challenged individual incapable of the usually expected verbal response. It is important to note however, that most paediatric procedures that are painful or need the child to be completely immobile will require the child to be deeply sedated.

The following guidelines are helpful in determining the level of sedation:

- The only way to really assess the level of sedation is to observe the child's response to verbal and physical stimulation
- Assess level of sedation by stimulation at times during the procedure when movement/verbalizations is not critical
- Pre-verbal and developmentally and hearing impaired children may not comprehend verbal commands, thus need to rely on physical stimulation
 - A consciously sedated child must respond to stimulation in a purposeful manner (e.g., open eyes, talks back, pushes away)
 - If the child only responds by wincing or physically withdraws (e.g., reflex response) in response to a painful stimulus, such as a pinch or sternal rub, the child is deeply sedated and is at risk of not being able to maintain his or her airway
- If verbal stimulation does not elicit a response, then use graded physical stimulation until there is a response (e.g., light touch, pinch skin, jaw thrust)

Sedation Scale

The level of sedation should be documented and reported using the following sedation scale: (or a similar scale as adopted by the organization)

Figure 2 Bromage Sedation Scale

- | |
|---|
| 0 - awake |
| 1 - occasionally drowsy, easily arousable |
| 2 - frequently drowsy, easily arousable |
| 3 - somnolent, difficult to arouse |
| S - normal sleep |

Caution: The sedation of a patient via any route may result in the loss of the patient's protective reflexes; a patient may easily move from a light level of sedation to obtundation. Patients receiving sedation must be vigilantly monitored for over-sedation. Personnel administering and monitoring the patient must be able to manage the patient if a deeper level of sedation occurs.

Risks associated with sedation include:

- Aspiration
- Hypoventilation
- Apnea
- Airway obstruction
- Cardiopulmonary depression
- Falls and other injuries

General Recommendations

1. Drugs such as Ketamine and Propofol should only be administered in the presence of an Anaesthesiologist or a physician experienced in advanced airway management (such as an ER physician) and with access to the full range of resuscitative equipment in the room.
2. Consent for the sedation procedure can be obtained verbally from the parent or guardian and should be carefully documented in the chart.
3. Availability of a registered nurse for monitoring of the patient during recovery must be assured.
4. The following guidelines have been developed by the Hospital for Sick Children (as adapted) and are endorsed for use throughout the Child Health Network.

Specific Recommendations

Responsible Person

1. The paediatric patient shall be accompanied to and from the hospital by a parent, legal guardian, or other responsible person.

Facilities and Back-up Emergency Services

1. The registered nurse must have immediately available the facilities, personnel and equipment to manage potential and actual emergency situations

Possible complications that can result from sedation are outlined in Figure 3.

Figure 3 Complications of Sedation

- Vomiting
- Seizures
- Falls and other injuries
- Anaphylaxis
- Anaphylactoid reactions
- Cardiorespiratory impairment, which may lead to a cardiopulmonary arrest.

Personnel

Practitioner

1. The registered nurse who is responsible for the ordering (using a medical directive) and/or administration and monitoring the patient, must be competent in administration techniques, ability to monitor the patient and to manage the potential complications
2. RNs administering sedation and or monitoring patients who have received sedation for procedures and diagnostic testing should successfully complete a sedation educational session leading to competency verification or must have the knowledge, skill and judgement in the use of sedative and or analgesic agents
3. The RN must have paediatric basic life support (BCLS) training
4. Those individuals who are sedating patients to a deep level are strongly encouraged to have paediatric advanced life support (PALS)
5. A responsible physician must be identified and immediately available for the assessment, administration and monitoring phases of sedation should the need arise.

Support Personnel

1. The use of conscious sedation may include the assigning of another health care professional in addition to the practitioner, whose responsibility it is to monitor the appropriate physiological parameters and to assist in supportive or resuscitation measures as needed. This person should be trained in BCLS.

Emergency Equipment

Emergency equipment must be readily available and be suitable for all ages and sizes being treated.

Figure 4 indicates the equipment that must be available for sedation of children.

Figure 4 Emergency Equipment for Sedation of Children

- Emergency cart and drug box
- Defibrillator readily available in areas providing deep sedation
- Pulse oximeter readily available
- ECG monitor (deep sedation or with underlying cardiac problem)
- Sphygmomanometer and appropriate size cuff
- Oxygen functioning with proper sized mask
- Positive-Pressure oxygen delivery system capable of administering > 90% oxygen (e.g., AMBU bag)
- Suction set-up with appropriate sized tubing and Yaunker attachment
- Other equipment, as deemed necessary for individual patient
- Reversal agents for narcotics (e.g. naloxone) and benzodiazepines (e.g., flumazenil) must be readily available. The dose of reversal agents should be precalculated prior to sedation
- All equipment and drugs must be checked and maintained on scheduled basis. Suction and oxygen set-ups must be checked just prior to each sedation and documented to that effect

Pre-Sedation Care and Documentation

1. Informed Consent

- An informed verbal consent/assent must be obtained by the R.N. from the patient (usually greater than 8 years) and his or her responsible person/caretaker (e.g., parent) prior to the sedation being administered. This consent should include the following information:
 - Drug name and action
 - Method of administration (e.g., PO or IV)
 - Desired behaviour or expected response

- Expected duration and recovery period
- Possibility of adverse reactions, such as, restlessness, agitation, decreased motor function, vomiting, failure to sedate, aspiration and respiratory depression
- Possible alternatives to sedation
- Verbal consent/assent must be documented on the sedation record indicating who obtained from, time and level of understanding

2. Preparation of the Child and Family for the Procedure

- The R.N. will provide developmentally appropriate preparation to the child or adolescent
- The R.N. shall also provide verbal and or written instructions to the responsible person (e.g., parent) that must be documented on the sedation record.
- The following information must be included:
 - Objectives of the sedation
 - Anticipated changes in behaviour before and after sedation (e.g., drowsy, disoriented, unstable on feet, may become agitated, combative or hyperactive)
 - 24 hour telephone number for responsible person to contact a physician or nurse regarding the sedation or adverse reactions should the need arise
 - Discharge instructions should include the name of the medication given, common side effects of the sedation, limitations of activities, and appropriate dietary precautions

3. NPO Guidelines

- An assessment and documentation of food and fluid intake must be completed prior to any sedation because the level of sedation is unpredictable. Children who intentionally or unintentionally become deeply sedation may lose their protective airway reflexes and gastric contents may be regurgitated into the airway.
- It is important to assess for patients who may be at risk for pulmonary aspiration of gastric contents (e.g., history of gastroesophageal reflux, esophageal dysfunction, extreme obesity, or pregnancy)

Figure 5 NPO Guidelines

- No solids after midnight or at least **8 hours** prior to procedure.
- Milk or formula up to **6 hours**
- Breast milk up to **4 hours**
- Clear fluids (water, apple juice, ginger ale) up to **2 hours** prior to the procedure.
- An exception, may be those patients with an NJ tube who require long term nutritional support (e.g., burn patients).

- For the emergency patient, the use of sedation must also be preceded by an evaluation of food and fluid intake. For the emergency patient who does not meet the NPO guidelines, such patients may benefit from delaying the procedure and or administration of appropriate pharmacological treatments to reduce gastric contents and increase gastric pH. When proper fasting cannot be assured, the increased risks of sedation must be carefully weighed against its benefits, and the lightest sedation should be used.

4. Candidate Selection

- The classification system of patient physical status by the American Society of Anaesthesiologist (ASA) is commonly used to determine the appropriate patient categories for RN administered sedation.
- Patient's with ASA I and II are appropriate candidates for nurse administered sedation.
- Selected patients in ASA level III may be appropriate for RN sedation and monitoring after consultation with anaesthesia.

Table 1 American Society of Anaesthesiologists Physical Status Classification System

ASA CLASS	DESCRIPTION
I	Healthy, no underlying organic disease
II	Mild or moderate systemic disease that does not interfere with daily routines (e.g. well controlled asthma, essential hypertension)
III	Organic disease with definite functional impairment (e.g., severe steroid dependent asthma, insulin dependent diabetes, uncorrected congenital heart disease)
IV	Severe disease that is life threatening (e.g., head trauma with increased intracranial pressure)
V	Moribund patient, not expected to survive
E (suffix)	Physical status classification appended with an "E" connotes a procedure undertaken as an emergency (e.g., an otherwise healthy patient presenting for fracture reduction is classified as ASA physical status I E)

5. Health Evaluation

- The nurse/physician will assess and document the following:
 - Age and current weight
 - Fasting status (e.g., may not apply to emergency patients)
 - Health history, including:
 - Allergies and previous allergic or adverse drug reactions
 - Current medications: drug, dose, time last taken
 - Past medical history: noting illnesses, diseases and any physical abnormalities (e.g. pulmonary, cardiovascular, neuromuscular, liver, renal, diabetes,

- seizures), communication or sensory deficits, substance abuse, smoking
 - Summary of previous relevant hospitalizations
 - History of sedation or general anaesthetics and any complications
 - Relevant family history
 - Past use of non-pharmacological coping strategies
 - Review of Systems, including:
 - Vital signs, including heart rate, blood pressure, respiratory rate and temperature, as well as noting level of consciousness (using Glasgow Coma Scale)
 - Pulse oximetry reading prior to the procedure for deep sedation
 - Current Medical History including:
 - Presence of URTI, cough, nasal discharge
 - Nausea, vomiting, diarrhea
 - Coryza (e.g., rhinitis)
 - Fever
 - Rash
 - Acute or chronic otitis media
 - Acute pain
 - Focused Physical Examination, including an evaluation of the airway
 - Physical Status evaluation (ASA classification)
 - Laboratory information is not routinely needed. However, certain procedures such as lumbar punctures or bone marrow aspirates, the nurse may discuss with the responsible physician the need to check the patient's haemoglobin and platelets

6. **Consultation**

- After speaking with the responsible physician, following a careful history and focused physical examination, it may be appropriate to seek consultation from the Department of Anaesthesia, prior to providing sedation

Nursing Care Guidelines During the Procedure

Conscious/Moderate Sedation Care

- Vital signs (HR, RR, BP) and level of consciousness Q5min
- Based on nursing judgement, the frequency of BP monitoring may be adjusted so that the patient is not disturbed during crucial periods of the test or procedure
- if the patient becomes deeply sedated BP monitoring will be done and documented every 5 minutes
- Oxygen saturation monitor must be readily available. Use is determined based on underlying health problems that may place the child at higher risk of complications or adverse outcomes
- Children who are lightly or "consciously" sedated should be monitored by an R.N. The nurse may assist with minor interruptible tasks
- Based on the nurse's judgement of suitability, the R.N. may assign the monitoring to another health care professional. The R.N. must be immediately available to the other health care professional should the need arise
- Monitor patient's response to medication (Sedation Scale)
- Provide emotional support throughout the procedure e.g., touch, distraction, slow rhythmic breathing
- Observe for and report any changes to the responsible physician, such as signs and symptoms related to: over- or under-sedation, respiratory depression, allergic reaction, cardiac or hemodynamic disturbances

Deep Sedation Care

- Vital signs (HR, RR, BP) will be done and recorded every 5 minutes
- Continuous oxygen saturation, ECG and BP monitoring
- Based on nursing judgment, the frequency of BP monitoring may be adjusted so that the patient is not disturbed during crucial periods of the test or procedure
- Children who are sedated to a deep level must be continuously observed by the R.N. The R.N. must remain with the child at all times during the test or procedure. The R.N. should have no other responsibilities other than monitoring the patient
- IV access should be established for children requiring deep sedation
- For those children being sedated with PO sedatives such as chloral hydrate, the nurse will assess the patient for IV access prior to sedation and will have the equipment readily available should the need arise
- Observe for and report any changes to the responsible physician, such as signs and symptoms related to: over- or under-sedation, respiratory depression,

Restraining Devices

- Restraining devices should be used when appropriate to ensure patient safety. Check to ensure that the device is not obstructing the airway or restricting chest movement.

Nursing Care Guidelines Post Procedure

Post Procedure Care

- Place patient in recovery position (lateral decubitus) until fully awake
- Patient should be recovered in an area that has immediate access to emergency equipment and oxygen
- Vital signs Q 5 minutes until the patient is awake
- Observe for signs of difficulty breathing
- It may be necessary to support the patient's airway by doing a modified jaw thrust until she/he is able to maintain an open airway independently
- Do not leave patient unattended until fully awake!
- If or when the patient is awake, vital signs (pulse, respirations and blood pressure) will be done Q 15 minutes until the patient's signs have returned to pre-sedation levels, usually about an hour
 - Pulse oximeter attached until awake and saturation levels stable at pre-sedation levels
 - Administer 100% oxygen if the saturation is less than 95% (or 10 % below pre-sedation baseline) or until the child is awake and is taking deep breaths
- Follow physician's orders for any additional monitoring that may be needed after the procedure
- The patient may eat and drink when fully awake, alert, and when protective reflexes (cough, gag) have returned to pre-sedation levels
- Document the patient's vital signs, level of consciousness, reaction and response to treatment and sedation outcome, as well as discharge instructions that were given. The documentation must include evidence that the patient is physiologically stable
- If a reversal agent is administered to a patient, the child must be closely monitored for a minimum of 3 hours

Transportation of Deeply Sedated Patients

The following precautions are required for the transportation of deeply sedated patients to recovery areas:

- Accompanied by an RN
- Oxygen
- Portable suction
- Self-inflating bag
- Oxygen saturation monitor

Hospitalized Patients (In-Patients)

If a patient is sedated off the unit, the patient must meet the following criteria in order to return to a unit where there may be a lower level of observation:

- Patients need to be easily arousable and oriented
- Cardiovascular function and airway patency are satisfactory and stable

- Once the child has met the above criteria, he or she may be transported back to their unit with transport personnel

Discharge Criteria

- The time and condition of the patient upon discharge from the treatment area or facility must be documented. This includes evidence that the patient's level consciousness has returned to a state that is safe for discharge by the following criteria:

Figure 6 Discharge Criteria

- Cardiovascular function and airway patency are satisfactory and stable
- Patient is easily arousable, oriented and protective reflexes are intact
- Patient can talk (e.g., if age/developmentally appropriate)
- Patient can sit up unaided (e.g. if appropriate)
- Very young or handicapped children, pre-sedation level of responsiveness, or a level as close as possible to the normal level for that child should be achieved
- State of hydration is adequate (e.g., able to keep down clear fluids such as water, apple juice, breast milk or a freezie)
- Minimal or no nausea and vomiting at the time of discharge

Length of Stay

- In addition to the aforementioned criteria, the following length of stay guidelines should be followed:

Figure 7 Length of Stay Guidelines

- 2 hours for infants <6.5 kg
- 4 hours for infants <4.5 kg
- 2 hours for infants <6 to 12 months (corrected)
- 4 hours and overnight admission for ex-premature infants <50 to 52 weeks post-conceptual age

Discharge Instructions

Written post-sedation, post-procedure instructions must be provided to the parents before the child is discharged home. These instructions should include:

- Names of the drugs used, including dose (mcg or mg/kg) and time given
- 24-hour contact telephone number of a designated health care professional (e.g., R.N., M.D.) should be provided to the patient/family to call if problems arises both during and after hours

- Common problems and what to do if they occur, such as, nausea and vomiting, sleep disturbances (e.g., night terror, inability to sleep, prolonged sleepiness), changes in behaviour (e.g., regression), pain, delayed or difficulty voiding
- Transportation safety (e.g., parent sits beside infant in car seat to ensure airway is protected, recommend not to take public transport)
- Appropriate rest/activity level (e.g., avoid skill activities such as swimming, gymnastics, bicycle riding for 12 - 24 hours)
- Children may require assistance with ambulation
- Teens should be instructed not to operate a motor vehicle or make important decisions for at least 24 hours after receiving sedation
- When and what to eat and drink
- The patient or a responsible adult accompanying the patient must sign the discharge instruction form

Complications of Sedation

Staff must be prepared to manage the complications of sedation including airway, breathing, and cardiovascular problems.

Rapid cardiopulmonary assessment should be used to quickly assess the child in the event of deterioration in condition due the effects of sedation.

Figure 8 Rapid Cardiopulmonary Assessment

<p>Airway</p> <p>Breathing</p> <ul style="list-style-type: none"> ▪ adequate ventilation ▪ oxygenation <p>Circulation</p> <ul style="list-style-type: none"> ▪ perfusion of vital organs
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Emergency Interventions

Immediately initiate emergency interventions if the following patient conditions are identified:

Figure 9 Emergency Interventions

- 1. Decreased Oxygen Saturation** < 94% (or based on individual baseline oxygen saturation) with minimal respiratory distress that does not return to baseline
 - Look, listen and feel
 - Assess colour and chest wall movement
 - Check for proper placement of oxygen saturation probe
 - Check airway patency (e.g., look, listen, feel) and reposition (airway/jaw holding) if necessary
 - Apply oxygen by facemask at 100 %, and notify M.D.
- 2. Dyspnea or Cyanosis**
 - Determine patency of airway and reposition, suction if necessary
 - Apply oxygen per mask or ambu bag at highest concentration (e.g.,100%)
 - Notify M.D.
 - Call Code Pink if condition does not improve
- 3. Inability to Maintain Patient Airway Related to Copious Secretions**
 - Suction patient
 - Oral airway
 - Notify physician
- 4. Laryngospasm**
 - Determine airway patency
 - Reposition, head tilt/chin lift, jaw thrust
 - Apply oxygen per mask at 100% when airway patent
 - Provide artificial ventilation with a bag and mask if necessary
 - Call anaesthesia STAT, anticipate intubation
- 5. Respiratory Depression**
 - Reposition airway, head tilt/chin lift, jaw thrust
 - Ventilate with ambu bag/MIE set using 100% oxygen
 - If no response, call a Code Pink
 - Anticipate use of reversal agent
- 6. Symptomatic Bradycardia**
 - Ensure patent airway
 - Ventilate with ambu bag with 100% oxygen
 - If not corrected or leads to asystole, initiate CPR and call a code
- 7. Excessive Sedation**
 - Inability to rouse easily
 - Support airway by jaw holding and bagging if no air exchange
 - Call responsible physician STAT
- 8. Persistent Agitation**
 - Paradoxical response
 - If patient is agitated remain at bedside and constantly assess airway and level of consciousness, protect patient from injury
 - Notify responsible physician (e.g., possibility of using a reversal agent)

Signs and Symptoms of Respiratory Distress

Staff must be alert to the signs and symptoms of respiratory distress in children. These are outlined in the following table:

Figure 10 Signs and Symptoms of Respiratory Distress in Children³

	MILD	MODERATE	SEVERE	RESPIRATORY FAILURE
Appearance / LOC	Alert	Alert or may be confused	Lethargic	Unresponsive
Skin/Mucous Membrane Colour	Pink	Pink or cyanotic	Cyanotic	Cyanotic
Respiratory Rate	Mildly increased	Mild-moderate increase	Marked increase	Decrease or apneic
Work of Breathing	Subcostal retractions	Subcostal/intercostal retractions	Subcostal, intercostal and sternal retractions	Decreased respiratory effort or none
Heart Rate	Mildly increased	Mild – moderate increase	Marked increase	Decreased

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APPENDIX 1

Expert Panel for Sedation of Children

Members

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