Sedation Manual

Paediatric Procedural Sedation

Emergency Department

Cork University Hospital, Cork

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Objectives and Limitations

The Emergency Department (ED) Paediatric Procedural Sedation Programme has been developed to minimise risks associated with procedural sedation of children in Cork University Hospital (CUH) ED. As a risk reduction strategy this programme strives to ensure that doctors and nurses are familiar with the theoretical background and have the practical skills to participate in safe procedural sedation of children in the ED setting.

The programme is multifaceted: in addition to this manual, the programme includes lectures, a multiple choice examination, simulations and direct bedside sedation training. Standardised materials are used, including an ED Sedation Record (checklist and risk assessment), parent handout and consent form. The programme requires the completion of basic life support (BLS), paediatric life support (PLS) and, for staff assisting in ketamine sedations, advanced paediatric life support (APLS) training. The programme does not specifically include airway training. Paediatric airway training is provided as part of ED teaching for junior doctors and nurses.

The materials were specifically developed for use in the ED at CUH, and are closely based on the ED Sedation Programme of Our Lady's Children's Hospital, Crumlin, Dublin. The agents used, staffing and training background of doctors and nurses and the back-up systems available are specific to the ED where this programme was originally developed. Transferring this programme into other settings or other hospitals will require the adjustment of the materials and processes outlined and co-ordination with relevant hospital departments such as Anaesthesia. The methods described in this manual cannot be guaranteed to be safe and efficacious in all circumstances. Unexpected adverse events are possible even in healthy children. Sedative agents should only be used by those with appropriate training and experience in a hospital environment with facilities and back up to the standards recommended by the American Academy of Pediatrics(1) and other relevant bodies.(2, 3)

Sedation Competency: The Process

All doctors and nurses working in CUH ED must be sedation 'accredited' prior to administering or assisting with the administration of any sedative agents. The process of accreditation is as follows:

- Read sedation manual;
- Attend sedation lecture;
- Complete online MCQ – "***General Sedation and Nitrous oxide***" and "***Ketamine administration***". This is located at the following address: www.classmarker.com
    - A pass mark of 90% is required for the multiple choice questions
- Practical demonstration of nitrous oxide delivery systems;
- Practical competency assessment of nitrous oxide delivery system undertaken by one of the sedation education team;
- Practical competency assessment of ketamine sedation through a simulated sedation
- Demonstration of a current Basic Life Support (BLS) certification. Paediatric Life Support (PLS) or Advanced Paediatric Life Support (APLS) certification is expected for junior doctors and nurses.

Module One

General Sedation

Overview

Children experience a more intense physical and emotional reaction to painful or threatening procedures than adults. The goals of sedation of children in the ED include:

- minimising pain, anxiety, the patient's movement which may jeopardise the procedure;
- maximising the chances of success for the procedure performed; and
- returning the patient to his or her pre-sedated state as quickly as possible while assuring the patient's safety.(4)

In addition to minimising the negative psychological experience for the child, sedation will reduce fear and distress in subsequent presentations to health care facilities.

Sedation for diagnostic, interventional medical and surgical procedures includes the administration by any route or technique of all forms of drugs that result in depression of the central nervous system. Sedation is not without risk because of the potential for unintentional loss of consciousness, depression of protective airway reflexes, depression of respiration, depression of cardiovascular system, potential for drug interactions due to the variety and combination of drugs used, the possibility of excessive amounts of drugs being used to compensate for inadequate analgesia, individual variations in response to the drugs used, particularly in children, and the wide variety of procedures performed. However, studies have shown that sedation of children in the ED can be performed safely.(5-10)

The purpose of this education and guideline module is to reduce the risks associated with sedation in children and establish standardised practice in the ED (11-14). It attempts to incorporate guidelines and recommendations developed by paediatric, emergency and anaesthesiology societies (1, 2, 15-17) as well as existing CUH ED clinical guidelines. The general sedation module applies to all paediatric sedations in the ED irrespective of the drug used.

Learning Objectives

To reduce clinical risk by the implementation of this learning package and achieve clinical competency for sedation use in the following four areas:

1. Pre-procedure

- Decreasing need for sedation e.g. appropriate analgesia where required
- Alternatives to pharmacological sedation
- Risk assessment
- Assessment of contraindications
- Consultation with a senior doctor
- Fasting status
- Consent and parent information
- Equipment & drug preparation
- Staff required for sedation
- Observations
- Communication with parents and other staff
- Completion of the sedation check list

2. During procedure

- Drug administration
- Monitoring of child

3. Post procedure

- Monitoring of child
- Discharge criteria
- Discharge instructions

4. Documentation

- Ensure the 'Sedation Record' has been completed and filed in medical notes
- Ensure that all related procedure and sedation codes are recorded on the ED administrative system.

Introduction

The goal for sedation is to minimise physical discomfort or pain for procedures, to control behaviour, particularly movement, to minimise psychological disturbance and distress, to maximise the potential for amnesia and to guard patient safety. The reduction of a child's stress and anxiety and the completion of a successful sedation may subsequently reduce any fear or distress surrounding future presentations to the ED.

The following education modules and guidelines for sedation are intended for use in the ED in patients who are generally healthy (ASA Class I & II).

KEY LEARNING POINT
Patients with complex medical problems, more severely ill patients and very young children (< 1 year) should not be sedated in the ED

It is unreasonable to expect sedation to be effective for extremely painful or prolonged procedures. Patients who are extremely anxious prior to the procedure need special consideration and might also be more suitable for general anaesthesia.

Sedation is a continuum from minimal anxiolysis to a state of deep sedation but not including general anaesthesia. The response to sedative drugs is not always predictable for an individual patient and staff members need to be prepared to deal with a patient who becomes much more sedated than intended.

The goal for safe and successful sedation can be maximised by excluding patients at high risk for failure and preparing the patient, the family, the environment, and staff as best as possible to handle both expected and unexpected outcomes and ensure a safe discharge from the ED.

The record of sedation on the following page lists all important considerations prior to, during and after sedation in the ED. The form is completed for all sedations and

should be regarded as a crucial checklist to ensure safe sedation. The completed form is filed in the patient history (Appendix 1). All sedations are audited for quality assurance, based on the record of sedation checklist. All topics noted on the form will be discussed in the subsequent sections of this manual.

CUH

CUH EMERGENCY DEPARTMENT PAEDIATRIC PROCEDURAL SEDATION CHECKLIST

MRN:

Surname:

Forename: AFFIX LABEL

DOB: Gender:

Address:

Type of procedure

Date: _____ Sedation start time: ____
End time ____

BEFORE PROCEDURE

Pre-Procedure assessment

- ☐ Required staff available *(2)
- ☐ Risk assessment and exclusion criteria checked *(3)
- ☐ Patient fasted if required *(4)
- ☐ Sedation handout discussed with patient/parent + informed consent obtained
- ☐ Baseline observations recorded *(5)
- ☐ Medication charted *(6)

Preparation SOAPME

- ☐ **S**uction working with Yankauer sucker attached
- ☐ **O**xygen available by mask
- ☐ **A**irway equipment
  - o Bag/Valve/Mask
- ☐ Appropriate size guedel airway
  - o **P**harmacological agents
- ☐ **M**onitoring equipment
- ☐ **E**TCO2 (If required) and extra equip.
- ☐ Resuscitation trolley available

TIMEOUT

- ☐ Positive Identification
- ☐ Allergies / Previous adverse reactions
- ☐ Team member introduction and role allocation
- ☐ Confirm or mark site if applicable
- ☐ Procedure to be performed
- ☐ Essential imaging reviewed / available if applicable
- ☐ Sedation plan including
  - o Non pharmacological adjuncts
  - o Rescue strategy for hypoxia
  - o Criteria for aborting attempt

PROCEED

AFTER PROCEDURE

- ☐ Patient returned to baseline Sedation Score
- ☐ Observations within normal limits
- ☐ Discharge criteria met *(7)

Post Procedure Documentation:

- ☐ Procedure recorded
- ☐ Adverse events recorded *(8)

Summary of Sedation:

- ☐ Deepest level of sedation:
  - UMSS _____ *(1)
- ☐ Sedation used:
  - ☐ Nitrous oxide ☐ Ketamine

  Fasted for: Solids ___ hrs Liquids ___ hrs

  Vomited: Yes / No (Delete as appropriate)
- ☐ Additional Anaesthesia:
  - ☐ Fentanyl ____mcg ; Morphine ____mg
  - ☐ Needle infiltration with lignocaine
  - ☐ LAT
- ☐ Total dose:
  - Ketamine _____mg
  - Nitrous Oxide (Max) _____% for _____minutes
  - Duration of using Penthrox _____min
- ☐ Adverse events *(8)
  - ☐ Yes ☐ No

Sedation not performed ☐

- ☐ Department not safe
- ☐ Staff not available
- ☐ Not credentialed
- ☐ Other: _____

Sedationist:
Assistant:
Proceduralist:
Assistant:
Checklist completed by:

Prior to the Procedure: Decreasing the Need for Sedation

Factors that may decrease sedation requirements of the paediatric patient include:

Systemic pain relief

- Administration of simple analgesia: paracetamol, ibuprofen. Removal or adequate management of pain may decrease patient anxiety and thus can decrease the need for sedation. For severe pain intranasal fentanyl (INF) or intravenous morphine may be required. Analgesia should never be administered intramuscularly.

Local pain relief

- Topical use of lignocaine/adrenaline/tetracaine (LAT) to provide local topical anaesthesia into open wounds, typically head/forehead lacerations:
    - For application you should soak a cotton ball in the gel, apply directly to the wound and cover with an *Opsite*/*Tegaderm* for 30 minutes. This will cause vasoconstriction, blanching the surrounding skin. Effective skin anaesthesia will last approximately 4hours.
- Local *Ametop*® (tetracaine 4%) cream applied to skin prior to IV insertion, blood taking or lumbar puncture. The cream should cover the area you wish to use and must only be applied onto intact skin. *Ametop* cream takes 30-45 minutes to provide local anaesthesia. Effective skin anaesthesia will last approx 4-6 hrs after removal.

Sucrose for Infants

- Small amounts of sweet solutions (oral sucrose) on a dummy can reduce procedural pain (1-2mls). The analgesic effect of sucrose can last from 5-8 mins, making it ideal as an adjunct strategy for the management of short-term pain (18, 19).

Non-painful wound repair

- Consider the use of tissue adhesive/glue (e.g. Derma+flex® (n-butyl 2-cyanoacrylate) or Steristrips® or both in place of sutures. It is often quick, painless and has similar cosmetic outcomes when used appropriately.

Prior to the Procedure: Non-Pharmacological Approaches

Non-pharmacological approaches will, in some children, reduce or avoid the need for sedation; in many instances it will make procedures less distressing for patients, family and staff.

The integration of non-pharmacological techniques will help achieve the goals of sedation by:

- decreasing the anticipatory anxiety of the child and his/her family before the procedure;
- reducing the pain and anxiety of the child and distress of his/her parents during the procedure; and
- promoting effective coping with subsequent medical procedures.

In essence, any simple intervention that is intended to reduce the child's fear and anxiety will positively affect the child's experience. This is done by;

- Creating a sense of **control**
    - Offer choices (within reason)
    - Explain, explain, explain
- Creating a sense of **safety;** examples
    - Parental presence
    - presence of laughter and fun from the ED team
    - touch such as gentle stroking
- **Distraction/diversion**; examples
    - Stories
    - Distraction equipment
    - Guided imagery

Non-pharmacological techniques described here can be used by staff in the ED with little training, who can then model them for the parents and other primary caregivers.

These approaches and techniques will be more difficult to apply in children who are <3 years of age, children who are cognitively impaired, children who have a significant behavioural disorder and especially children who have been previously traumatised by medical procedures (many of these patients will be unsuitable for ED procedural sedation anyway).

It is best to think of the procedure in four stages: preparation, immediately before, during and after the procedure.

Staff Preparation (20)

Examine your own beliefs around pain and be aware how this could influence your interaction with a patient. (For example: Do you believe non-pharmacological techniques are helpful, even possible? How do you personally cope with pain and anxiety?).

All staff team members need to know who is responsible for what during the procedure, in particular who can function as a "safe" person for the child and is providing emotional/social support to the child and the family.

Role of the Parents (21)

Think of parents as allies who can interact with their child and relax/distract them. Invite parents and the child to be part of the team as active participants and not just passive recipients. Most children want their parents to be present and most parents want to be there. Evidence is mixed as to whether parents' presence is helpful during painful procedures; it appears to depend on what they do.

Research has identified behaviours which promote coping and behaviours which promote distress (see below). It is effective for staff to model coping promoting behaviours, especially if there is not enough time or resources to coach parents directly.

Coping promoting behaviours

- Non-procedural talk and distraction

- Prompting children to use coping behaviours
- Breathing techniques (for example slow deep breathing)
- Humour

Behaviour to be avoided

- Apologising, criticising, bargaining with the child
- Giving the child control over when to start the procedure
- Catastrophising and becoming agitated

Prepare the Child

Find out a bit about them, their likes and dislikes. Ask them what they would rather be doing right now. Find out about their knowledge and expectations about the procedure. Let them ask questions. Be honest about what will happen and correct any misconceptions (see language section regarding discussing pain). Find out child's previous experiences with medical procedures and any coping skills. Instil confidence (see language). Provide age-appropriate information about the procedure, including any sensations to expect (smells, noises, and physical sensations). Children need to know what they will look and feel like afterwards (e.g. if there will be a bandage, tube, IV). Use books, drawings or a doll if necessary. Tell the child when the procedure will happen, with enough time to prepare but not so long that increases anticipatory anxiety.

Agree on goals and interventions with the child (e.g. breathing to feel calm and talking about last birthday party). Tell the child how they can be helpful to increase his/her sense of competency. For example, get them to hold mask.

Environment

Remember children may see you as big and threatening, thus the child should be attended to by calm, friendly adults. Do not get equipment ready in front of children but they may need to see and touch it to feel less anxious. Keep unexpected events to a minimum and explain any surprises, like a loudspeaker noise.

Holding

Use “positioning for comfort” and avoid forceful restraint. Have the child sitting rather than lying wherever possible. Do not use parents for restraint, only comfort hold (Refer to Parent Handout – Appendix 2).

Language including choice and control

Choices of words/phrases/imagery in the first seconds of the therapeutic encounter may set the stage for the child’s response to the procedure. It is very important to comment positively on some aspect of the child’s physical state. Be very careful with your choice of words. Use language to suggest that the child will get well and will return home.

Acknowledge what is happening and suggest its positive side. This indicates some control over something. Make positive suggestions related to treatment procedures and imply change, possibly for the better e.g. “as I wash the cut, the hurt can wash away”. Emphasise the qualitative sensation that children may experience such as cold, tingling and pressure so that the child focuses on what he/she is feeling and not just on a hurting aspect.

If the procedure is likely to cause some pain, describe the pain in familiar terms that he/she will understand. The parents will have some examples of pain that their child has experienced during play or pain that their child may have observed someone else experience without distress.

Avoid deceptive statement such as “this shouldn’t hurt”. Children do not forget dishonest statements easily. Rather provide suggestions for coping e.g. “I wouldn’t be surprised if this hardly bothers you, especially when you see what’s happening in the video cartoon.”

Immediately before the Procedure

Remain calm and firm. Do not focus on feelings once the procedure is imminent. Do not bargain, negotiate or apologise, as it increases distress. Give children a sense of control by letting them make choices e.g. where to sit for the procedure, which hand to use for the IV insertion or the flavour for the nitrous oxide mask. Do not give the child a choice about when to start the procedure as it increases anticipatory anxiety. Just before the procedure, stop talking about the procedure or focusing on it in any way and encourage the use of relaxation and distraction.

During the Procedure

Distraction involves actively engaging the child onto a positive focus away from the negative focus without tricking the child. Find out from the child what he or she likes doing best: if sport, which one; if the Xbox, which game; if playing with a pet, what name (so you can engage them).

Use age-appropriate distraction such as bubbles, windmills, stories, music, toys, electronic games, non-procedural talk or imagery. To promote relaxation encourage breathing exercises, muscle relaxation and imagining a favourite place, sport or activity (see table below).

Continue the verbal distraction/imagery. Prompt the child to use coping behaviours and praise all attempts.

Table: Age-appropriate distraction techniques

INFANTS	TODDLERS	PRE-SCHOOLERS	SCHOOL-AGE	ADOLESCENTS
Dummy	Bubbles	Bubbles	Deep breathing	Deep breathing
Rattle/Shaker	Sound books	I Spy	TV/tablet/smartphone	TV/tablet/smartphone
Bubbles	Singing	Counting	I Spy	Music
Interactive Toys		Singing	Non–Procedural talk	I Spy
		Big belly breaths		Non-Procedural Talk
		TV/tablet/smartphone		

Post-procedure

Only say “it is finished” at the very end of the procedure. Focus on positive coping efforts and continue distraction. Allow the child time to recover. Instil a sense of achievement no matter what happened. Use pain medication as required. Avoid focusing on any further procedures till nearer the time.

Health Evaluation

Health evaluation prior to sedation includes standard history and physical examination as documented on the standard ED medical record as well as health issues specific for children undergoing procedural sedation.

The weight should be recorded on the ED medical record to allow easy calculation of any medications used during the sedation or in case of an emergency. Allergies should also be recorded on this form.

A risk assessment should be performed using the risk assessment prompt on the back of the sedation checklist and listed below. The list intends to identify children at higher risk of complications who might be unsuitable for sedation in the ED. The list includes features indicating a higher risk of airway complications and cardiovascular instability during sedations.

Risk Assessment

Increased risk of airway compromise leading to obstruction

- ***Snoring, stridor or history suggestive of sleep apnoea***
- ***Obesity***
- ***Moderate to severe tonsillar hypertrophy***
- ***Craniofacial abnormalities / cleft palate***
- ***History that may predict airway difficulties – eg Macroglossia / Down syndrome***
- ***History of airway difficulties***
- ***Children < 1 year or less than 10kg***

Increased risk of hypoventilation

- ***Medication that may decrease level of consciousness or respiratory effort – eg opioids, anti-epileptics or benzodiazepines***
- ***Chronic lung disease – eg Ex-premature infants, cystic fibrosis***
- ***Central neurological abnormalities – eg brainstem tumours***
- ***Neuromuscular disorders – eg Cerebral palsy***
- ***Developmental disability (threefold increased risk of desaturation)***

Increased risk of bronchospasm or laryngospasm

- ***Asthma, recent upper or lower respiratory tract infection***
- ***Intraoral procedure***

Increased risk of Cardiovascular compromise

- ***Cardiac disease***
- ***hypovolaemia***
- ***sepsis***

History of sedation failure

Increased risk of aspiration

- ***Prior episodes of aspiration***
- ***Recent ingestion of food or fluid***
- ***Procedure that involves oral or pharyngeal stimulation***
- ***Bowel obstruction, gastro-oesophageal reflux or vomiting***
- ***Cerebral palsy or bulbar dysfunction***

Moderate or severe systemic disease which limits the activity of the child

Exclusion Criteria

In addition there are drug specific contraindications that need to be considered as part of a sedation plan. Drug specific contraindications are addressed in detail in the drug modules and are also listed on the back of the sedation checklist.

KEY LEARNING POINT

Any positive finding on risk assessment or any drug specific contraindications precludes sedation in the ED and should be discussed with a Consultant in Emergency Medicine.

Fasting Pre-Procedure

The minimum fasting times for sedation are under debate. Some recent data indicate that fasting and adverse events in emergency department sedation in children are not closely linked.(22-24). Several emergency department studies have reported a low to zero incidence of aspiration despite variable fasting times, however these studies have clearly balanced the risks and benefits of deviating from standard fasting times. In general emergency medicine studies and guidelines support a less restrictive approach to fasting for brief urgent or emergency procedures further research is required to define the relationship between various fasting intervals and sedation complications. As a reminder the recommended fasting times are listed on the back of the sedation checklist.

The recommended minimum fasting times are as follows:

Nitrous oxide

- No fasting required

Ketamine

- 3 hours fasting status for solids or milk & 1 hour for clear liquids

KEY LEARNING POINT

Please note that after an injury even prolonged fasting does not guarantee an empty stomach.

In circumstances where the child's fasting status is not assured, the increased risks of vomiting during sedation must be carefully weighed against its benefits, and the lightest effective sedation should be used. (4)

Consent and Parent Information

Written consent must be obtained from the parent or legal guardian of the child before proceeding with any drug administration. An advanced nurse practitioner or doctor may obtain the consent for nitrous oxide. However, consent for ketamine or IV midazolam must be obtained by a physician.

An explanation must be provided to the responsible adult with reference to the type of sedation considered, an explanation of the procedure and the associated risks of the sedation as well as the procedure itself. The elements which should be discussed with the parent or guardian are outlined in the parent handout for procedural sedation. The relevant section of the handout explaining what sedation is and outlining the risks associated with sedation is included below.

Like the sedation parent handout, the consent form itself is part of the sedation package and requires the signature of parent or legal guardian at the bottom of the form after the necessary explanations have been provided. The Procedural Information leaflets are agent specific and are given to each individual part as a part of their sedation documentation (See Appendix 3).

Preparation Prior to Procedure

Staff

Doctor


Nurse


Consultant


Doctor or Nurse

Nitrous oxide

	One doctor or nurse to perform the procedure
	One doctor or nurse, trained in nitrous oxide use

Ketamine

	One doctor or nurse to perform the procedure
	One doctor to administer the sedation. This doctor must be credentialed in ketamine sedation and PLS/APLS certified
	One registered nurse capable of supporting airway management and advanced monitoring of patients. This nurse must be trained in ketamine sedation and PLS/APLS certified
	Consultant in Emergency Medicine available and present

All required staff must be present before any drug is administered. One staff member must be continuously responsible for observation of the patient's vital signs, airway patency, adequacy of ventilation, oxygen saturation, heart rate, blood pressure and level of sedation for all of the sedation. A consultant may not be present if the registrar has been accredited as a ketamine sole practitioner – this competency is beyond the scope of this course. An emergency medicine consultant should be consulted prior to any ketamine sedations in the department.

Location

Sedations with nitrous oxide are performed in the Procedure Room or the paediatric isolation/procedure room. Sedations with ketamine can be performed in either Procedure Room or the resuscitation area. This will ensure that resuscitation equipment is available in case of adverse events.

Equipment

Equipment must be checked and readily available ***prior*** to commencing procedural sedation. A reminder of the necessary equipment is listed on the back of the record of sedation:

- **S**uction working with a Yankauer sucker attached
- **O**xygen tubing attached to oxygen source with appropriate size mask
- **A**irway equipment
    - appropriate size Guedel airway.
    - Bag / valve / mask set up for appropriate size and able to deliver O2 with O2

tubing attached. Appropriate range of masks. The correct mask size must be used. It should fit snugly on the child's face over nose and mouth.

- **P**harmacological agents. Doses calculated for resuscitation drugs ie IM adrenaline for anaphylaxis, Suxamethonium IV/IM
- **M**onitoring Equipment
    - ECG monitoring
    - Blood-pressure
    - Pulse oximetry
    - End tidal capnography is to be used if supplemental oxygen is given.
- **E**quipment: Resuscitation trolley with full intubation equipment setup (ETT, laryngoscope, introducer, McGill's forceps, ties)

Note: If the child is very unsettled pre-procedure it may be helpful to apply the BP cuff, oxygen saturation probe or attach the ECG leads once sedation is taking effect.

Observations

An initial set of observations must be obtained within one hour prior to the administration of the sedation and must be documented on the ED nursing observation chart. If the child is agitated and unsettled prior to the procedure consider the accuracy of observations due to distress.

Observations include:

- Pulse
- Respiratory Rate
- Blood Pressure (ketamine)
- Oxygen saturation
- Pain Scale
- Depth of sedation (measured using the University of Michigan Sedation Scale; UMSS (25))
- Capnography (May use with Ketamine)

University of Michigan Sedation Score

Sedation Score	Depth of Sedation
0	Awake and alert
1	Minimally sedated: may appear tired/sleepy, responds to verbal conversation &/or sound
2	Moderately sedated: sleeping, easily roused with light tactile stimulation or simple verbal command
3	Deep sedation: deep sleep, rousable only with deep or significant physical stimuli
4	Unrousable

Medication Orders

All medications used in sedations, including nitrous oxide, require written orders on the medication chart:

- The full generic name of the agent must be written in **BLOCK** capitals
- Calculate the correct dose of sedation medication for the child based on the correct patient weight;
- Write the dose, route, and time of administration on the observation chart (**legibly**).

Time Out

5. **"TIME OUT" OR POSITIVE IDENTIFICATION"**	Both staff involved in the procedure will confirm the following: • the patient's identity checked by ID band or positive identification with parent/guardian • introduction and role allocation • Previous adverse reactions • confirm or mark site (if applicable) • procedure to be performed and essential imaging reviewed / available if applicable • Sedation plan including; non pharmacological approaches, strategy for treating/avoiding hypoxia and criteria for aborting the sedation attempt

Completion of the Record of Sedation form

All sedations require the completion of the sedation checklist. It lists the main issues to be considered before the procedure on the front and more detailed explanations on the back of the form.

A patient label sticker should be placed at the top of the sedation checklist and the boxes for the type of procedure, sedation used, time and date should be completed. All pre-sedation tick boxes on the front of the form should be checked prior to commencing the sedation. The sedation checklist is written in the form of a treatment order. It should be signed at the bottom of the page by the doctor ordering the sedation and by the nurse administering or assisting in the sedation. Additional staff participating in the procedure should also be listed.

All patients sedated in the ED should have their completed sedation records must be put in the collection box found in the either Procedure Room. This is important to assure the safety and overall quality of the sedation programme.

During the Sedation

Drug Administration

Intravenous sedation drugs are only to be administered by a doctor. Drugs should always be checked with a second person prior to administration. Drug syringes should be labelled with the drug content and concentration. Nitrous oxide can be administered by trained nurses or doctors.

Monitoring of Child

Communication between all staff involved with the procedure is essential to ensure safe practice and detection of possible complications. The treating doctor must be informed of any observations that fall outside normal values to ensure appropriate interventions.

Normal Observation Values Guide

Respiratory Rate Values [1]

Age	≤ - 2 S/D	- 1 S/D	Normal	+ 1 S/D	+ 2 S/D	> + 2 S/D
0 – 3 months	< 20	20 – 30	30 - 60	60 – 70	70 – 80	> 80
4 – 6 months	< 20	20 – 30	30 – 60	60 – 70	70 – 80	> 80
7 -12 months	< 17	17 – 25	25 – 45	45 – 55	55 – 60	> 60
1 – 3 years	< 15	15 – 20	20 – 30	30 – 35	35 – 40	> 40
4 – 6 years	< 12	12 – 16	16 – 24	24 – 28	28 – 32	> 32
> 7 years	< 10	10 – 14	14 – 20	20 – 24	24 – 26	> 26

Heart Rate Values [2]

Age	≤ - 2 S/D	- 1 S/D	Normal	+ 1 S/D	+ 2 S/D	> + 2 S/D
0 – 3 months	< 65	65 – 90	90 – 180	180 – 205	205 – 230	> 230
4 – 6 months	< 63	63 – 80	80 – 160	160 – 180	180 – 210	> 210
7 -12 months	< 60	60 – 80	80 – 140	140 – 160	160 – 180	> 180
1 – 3 years	< 58	58 – 75	75 – 130	130 – 145	145 – 165	> 165
4 – 6 years	< 55	55 – 70	70 – 110	110 – 125	125 – 140	> 140
> 7 years	< 45	45 – 60	60 – 90	90 – 105	105 – 120	> 120

Pulse oximetry should be continuously monitored in all sedations. Heart rate, oxygen saturation, respiratory rate and conscious state (using the UMSS sedation score) should be recorded 5-minutely following the administration of the sedation medication until the child is beginning to rouse following the procedure. During ketamine sedations continuous cardiac monitoring should be employed and blood pressure should be obtained and recorded 5-minutely until the patient begins to rouse.

Any change in vital signs, change in the sedation scores or oxygen saturation should be immediately communicated with the doctor responsible for the sedation and might require immediate intervention for airway compromise or cardiovascular depression. After the procedure is complete, the stimulation (e.g. pain) associated with the procedure is reduced, and this may cause children to become more sedated than during the procedure.

Post Procedure

The child must be observed by a member of nursing staff until full recovery.

Following the procedure, observations and sedation scores should be taken and recorded every 15 minutes.

If the child remains deeply sedated (UMSS 2+) following the procedure, then they should have observations and sedation scores recorded every 5 minutes until they are more awake, show age appropriate activity and respond to the parents.

All side effects or adverse events should be documented on the observation chart and the sedation record.

Keep the child nil orally until fully alert.

The deepest level of sedation should also be recorded on the record of sedation. Please note that sedation with ketamine (a dissociative agent) does not fit the standard depth of sedation scores. Therefore the patient sedated with ketamine can be described and documented as being “dissociated”.

Discharge Criteria

The child cannot be discharged until all discharge criteria are met. It is impossible to set a specific ‘discharge time’ post administration of the drug. Each patient responds to sedation on an individual basis. It is essential to assess each patient individually by using the following discharge criteria as listed on the back of the sedation checklist:

- Return to baseline/pre-sedation level of consciousness
- Resumption of purposeful neuromuscular activity
- Ability to ambulate (if appropriate) or able to sit without support
- Ability to verbalise appropriate for age
- Final set of vital signs are within normal limits for the child’s age
- Ability to tolerate oral fluids (initial fluids offered can include water, an ice pop or cordial)

For a very young child, the aim is to achieve return to pre-sedation level of responsiveness or as close as possible to the normal level of functioning for the particular child. This should be achieved by communicating with the parent or guardian to establish what is normal for that child.

In addition, a responsible adult needs to be available to accompany the patient home.

Discharge Instructions

A parent or guardian will be advised on discharge instructions as per section 3 of the parent handout shown below.

Part three: Care of your child on your way home and for the next 24 hours

Sometimes the delayed effects of the medicines may make your child a bit confused, sleepy or clumsy for a while after the procedure. You need to be extra careful in caring for and supervising your child for the next 24 hours.

- If your child falls asleep in the car seat, watch them to make sure that they do not have any difficulty breathing. DO NOT leave your child alone in a car seat or alone in the car;
- Let your child sleep. Children may go to sleep again after getting home from the hospital. Sometimes children may sleep more because of the sedation medicine;
- Check on your child's sleeping pattern the night after getting home. If their sleeping seems heavy or strange then wake them up gently. If you cannot wake them or something seems wrong in their appearance or breathing, call an ambulance and return to the hospital immediately;
- Sometimes children may feel sick or vomit if they eat a big meal too soon after sedation. Give your child clear liquids such as diluted fruit juice, ice pops, jelly, clear soup, etc;
- Supervise all playing and bathing for the next 8 hours after getting home. DO NOT let your child swim or use play equipment (bikes, monkey bars, etc) that might cause an accident (for the next 24 hours).

Key points to remember

- Sedation is commonly used in children for procedures;
- You need to give consent before your child has sedation;
- Make sure you understand the reasons for and the risks of sedation;
- Be as open and honest as you can with your child about what is going to happen and it helps not to be too upset yourself.

When to return to the Emergency Department

Please return to the ED at CUH if your child:

- Vomits more than twice;
- Has strange or unusual behaviour;
- If you have any concerns.

The name of the doctor or nurse who performed the sedation is:

Dr _____ Nurse_____

It is essential that all points on the information sheet are discussed by either medical or nursing staff and the parent/guardian verbalise an understanding of discharge instructions. A discharge letter to the child's local medical practitioner will be required detailing any follow up instructions related to the diagnosis or procedure.

Adverse Events

Unplanned interventions and adverse events should be recorded on the nursing observation chart as they occur. Unplanned interventions and adverse events should also be recorded on the sedation checklist after the procedure.

Unplanned interventions include:

- Airway interventions; Positive pressure ventilation, oral airway eg guedel, Tracheal intubation, neuromuscular blockade eg with suxamethonium
- Circulation ; IV fluid bolus, vasoactive drugs, Chest compression
- Neurological; antiepileptic administration

Adverse events and complications include:

- Failure to achieve adequate sedation*
- Unintentional loss of consciousness
- Prolonged or excessive sedation*
- Hypoxaemia (O_2 saturation <94%)*
- Depression of protective airway reflexes – airway obstruction requiring airway adjunct or sustained jaw lift manoeuvre
- Respiratory depression and apnoea – requiring oxygen administration, bag-mask-ventilation or intubation
- Laryngospasm, bronchospasm and increased airway secretions*
- Depression of cardiovascular system - hypotension, bradycardia*
- Vomiting*
- Aspiration
- Allergic reaction*
- Unscheduled admission related to sedation.
- Sedation quality issues; family/patient/provider dissatisfied, Sedation insufficient

Summary of Documentation

Documentation of sedations includes the following elements:

- History and physical examination on the standard medical record by the sedation doctor
- Recording of weight, allergies, risk assessment, contraindications and fasting times on the sedation checklist.
- Checkmarks on the sedation checklist for all other issues listed pre-, during and post-procedure as a joint responsibility of sedation doctor and nurse
- Consent form signed by parents and countersigned by the sedation doctor
- Medication order on the observation chart signed by the sedation doctor
- Recording of observations before, during the procedure and during recovery on the observation chart by the sedation nurse
- Placing the sedation checklist into the procedural sedation folder.

Module Two

Nitrous Oxide

Background

Nitrous oxide is an anaesthetic gas, which is delivered in variable concentrations with oxygen. The exact mechanism of nitrous oxide is unknown. It has modest analgesic and sedative properties, with minimal respiratory and cardiovascular depression (26).

Studies in children have shown nitrous oxide to be an effective agent for reducing pain during painful procedures (27), and it can be delivered painlessly through inhalation. Its quick onset of action and recovery makes it ideal for use in the ED.(28) It is being used in a number of countries and has been shown to be a safe agent in several large series (5, 28-34). In the past it was mainly used as 50% nitrous oxide (*Entonox*) or less; more recently 70% nitrous oxide (with 30% oxygen) has been shown to have a similar safety profile as 50% (34, 35).

Nitrous oxide has a short duration of action. Onset is within minutes and peak effect is at 3-5 minutes to induce these effects with a nitrous oxide-oxygen mixture and a few minutes for them to wear off.

Nitrous oxide in the ED is generally available in two different forms. It is available as *Entonox* in a premixed cylinder of 50% oxygen and 50% nitrous oxide and via the Porter MXR machine which allows nitrous oxide to be administered in a concentration varying between 0% and 70% (further details are explained below).

It is not clear for how long patients who receive nitrous oxide as a single agent should be fasted for. In a study on nitrous oxide sedation from RCH Melbourne ED the frequency of vomiting was not associated with the duration of pre-procedural fasting (23). Current guidelines from the Royal Australasian College of Physicians recommend a fasting period of 2 hours if a concentration of nitrous oxide of more than 50% is used (36). Consensus seems to be that fasting is not typically required for nitrous oxide use. If, however, nitrous oxide is used in conjunction with other sedative agents (and this should not be encouraged), then a fasting time is required.

Indications for use

Nitrous oxide can be used where short acting analgesia is required for procedures that may cause pain, discomfort or anxiety.

Useful for:

- Suturing (with topical anaesthesia)
- IV insertion (with topical anaesthesia)
- Removal of foreign bodies from ear / soft tissues
- Minor fracture manipulation/moulding of plaster
- Burns dressings
- Injection of local anaesthetic
- Other painful procedures

Limitations:

- Very painful procedures (manipulation of significantly displaced fracture or abscess incision and drainage)
- Facial (peri-oral) lacerations
- Procedures requiring immobility

Adverse Reactions

Nitrous oxide is usually well tolerated by children in the ED. Most children only have mild side effects such as vomiting, nausea, dizziness, light-headedness and occasionally nightmares. Parents should be warned that vomiting occurs relatively frequently both during and after the procedure and even after arrival home (37). In a series of 762 patients from RCH Melbourne ED who received nitrous oxide alone (35), 6% of patients vomited, 1% became agitated and less than 5% became light headed, hyperventilated, or had hallucinations. One patient desaturated after the sedation and required oxygen administration. He was admitted for observation and discharged without further sequelae. No patient aspirated or required airway support. Children who received 70% nitrous oxide had deeper sedation levels than children who

received 50% but there was no significant difference in adverse events.

One possible adverse event is aspiration, if the vomiting occurs while the patient is deeply sedated. With deeper sedation airway patency can be lost. Patients with underlying airway problems or acute respiratory infections or illnesses are particularly vulnerable. In the RCH series 3% of patients were deeply sedated, mainly after receiving 70% nitrous oxide (35).

Nitrous oxide is known to increase intracranial pressure and increase pulmonary vascular pressure. Nitrous oxide diffuses more rapidly than nitrogen and can expand air-containing spaces within the body (27). If the cavity does not have rigid walls, the volume increases. Therefore it is contraindicated in all patients with the possibility of closed air spaces such as in the gastrointestinal tract, middle ear, sinus cavities, pneumocephalus, pneumothorax or after diving accidents (decompression sickness).

Nitrous oxide oxidizes the cobalt ion in the vitamin B12 dependent enzyme methionine synthetase resulting in the formation of hydroxyl radicals which are responsible for the inactivation and destruction of this enzyme and the subsequent depletion of vitamin B12 stores (38). Methionine synthetase is required for DNA synthesis and therefore the production of rapidly dividing tissues such as bone marrow and gastrointestinal mucosa. Methionine is necessary for the formation of myelin, a key building block for nerves. Nitrous oxide-induced bone marrow toxicity is progressive but reversible and can be prevented by the administration of folinic acid. Neurotoxicity associated with nitrous oxide is rare but can be rapid and irreversible, even after brief exposure (38). Those at risk of vitamin B12 deficiency include some vegetarians, the newborn of vegetarian mothers, patients with gastrointestinal pathology, the elderly or patients taking proton pump inhibitors and H2 blockers (38). Nitrous oxide-induced inactivation of methionine synthetase can also affect homocysteine metabolism, although the significance of this is unknown. Information about these rare adverse events comes from case reports only. There are no data to guide the appropriate maximum duration or number of times a patient can be safely exposed to nitrous oxide. If nitrous oxide is to be used repeatedly it may be reasonable

to administer methionine, vitamin B12 and possibly folic or folinic acid (38). Nitrous oxide should be avoided in patients with metabolic diseases such as methionine synthetase deficiency, homocystinuria and methylmalonic acidemia. Patients with an oncoical history should be screened for the current use of bleomycin chemotherapy. Bleomycin produces a pseudo-enzyme that reacts with O_2 (nitrous oxide is delivered with a minimum of 30% O_2) to produce a superoxide and hydroxide free radicals that cleave DNA causing a bleomycin associated-pulmonary toxicity (33).

Occupational exposure should be kept to a minimum by ensuring a suitable scavenging system is used and a consistent and adequate mask seal to the patient's face is maintained. The scavenging system should be connected directly to piped wall suction only (never portable) and turned to a medium flow.

Exposure to nitrous oxide should be avoided during pregnancy. The data on fertility risks of nitrous oxide are unclear, even in staff exposed to the agent repeatedly (39). However, it is recommended that exposure to nitrous oxide not occur in the first trimester of pregnancy. Repeated exposure should be avoided in the 2nd and 3rd trimesters as well (29, 40).

Contraindications for use

Nitrous oxide should not be used in the following situations:

Increased risk of airway loss

- Less than 1 year of age
- Acute respiratory infection (URTI) or exacerbation of asthma
- Airway obstruction or history of difficult airway management

Risk of expansion of air filled closed space

- Chest injury, suspicion of pneumothorax or lung cyst
- Abdominal distension or bowel obstruction
- Head injury
- Decompression sickness or air embolism

- Middle ear disease

Increase in pulmonary vascular pressure

- Pulmonary Hypertension

Patients at risk for nitrous oxide induced bone marrow suppression, neurotoxicity or increased homocysteine levels

- History of B12 or folate deficiency
- Nutritionally compromised patients, vegetarians, patients on H2 blockers or proton pump inhibitors
- Concurrent underlying serious illness, severe infection or extensive tissue damage
- Patients with metabolic diseases associated with homocysteine metabolism (methionine synthetase deficiency, homocystinuria and methylmalonic acidaemia)
- History of Bleomycin chemotherapy administration

Nitrous oxide administration requires:

- Health Evaluation and Risk Assessment
- Written consent

Fasting prior to procedure

No fasting required.

Equipment

All the equipment should be in the room, functioning and turned on for the sedation.

For nitrous oxide sedation the additional equipment required:

- Separate oxygen source with mask other than the nitrous oxide oxygen source
- Bacterial filters for use in the nitrous oxide circuit
- Scented essences for diversion therapy (e.g. chocolate, strawberry essence etc). Please note that the essence should be applied to the inside of the mask, not to the filter, as it decreases the filter's efficiency.

It is important that the child is familiarised with the equipment prior to its use. This will result in improved cooperation and decrease anxiety.

Staffing requirements

A minimum of two staff members present

	One doctor or nurse to perform the procedure
	One doctor or nurse, trained in nitrous oxide use

Observations

There should be continuous monitoring and 5 minutely documentation of:

- Respiratory rate
- Oxygen saturation (including 5 minutes post procedure)
- Heart rate
- Conscious state/UMSS

On completion of the procedure and administration of nitrous oxide the child needs to be monitored until their conscious state returns to the baseline. Please note that if the patient is developmentally impaired, the parents can aid in the assessment of when the child returns to normal mental status.

Cautions

- Staff or parents thought to be pregnant should avoid being present during nitrous oxide administration.
- A scavenging unit should be used at all times when administering nitrous oxide to decrease the exposure to staff.

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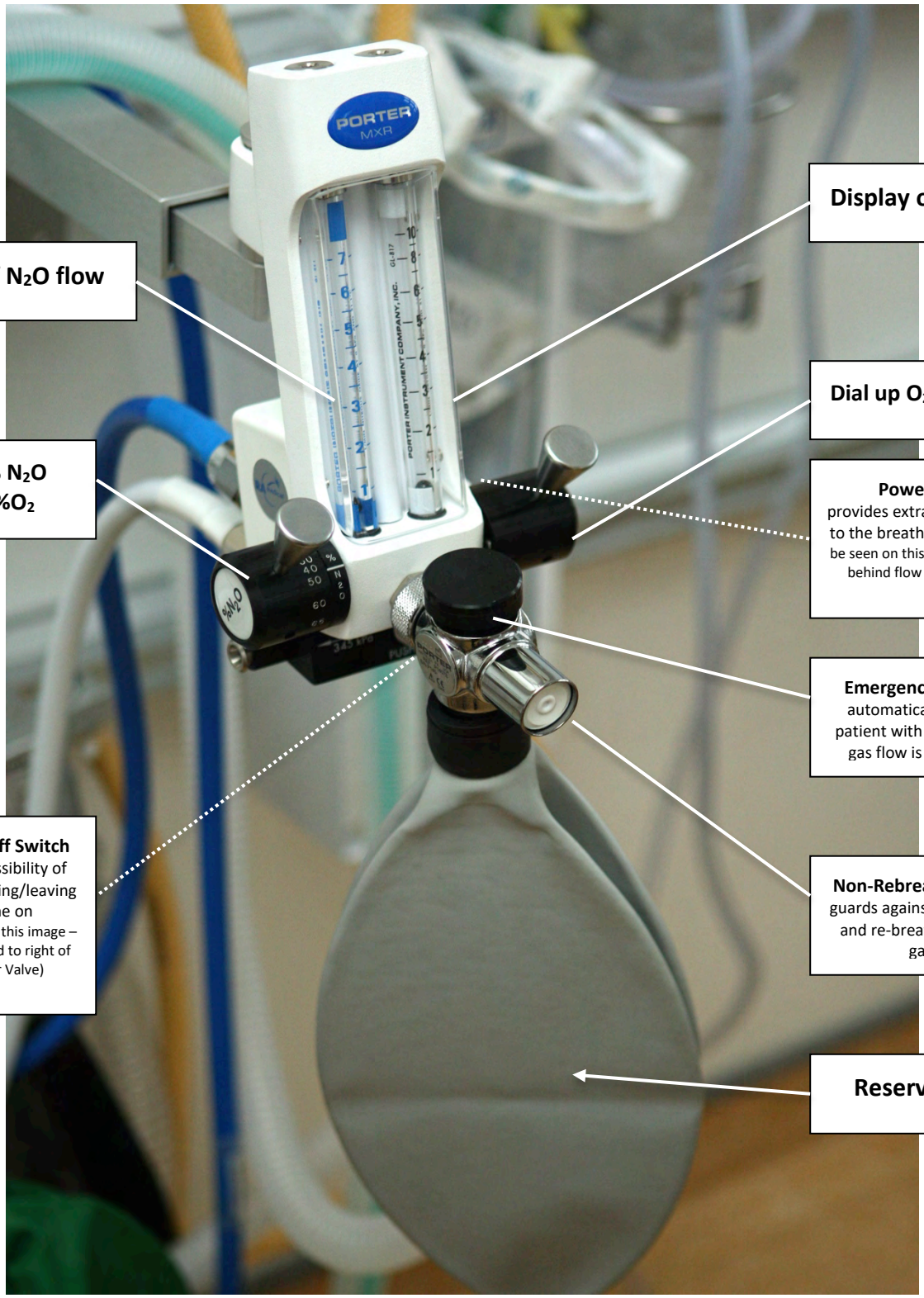
PORTER
MXR
Display of N_2O flow
Display of O_2 flow
Dial up % N_2O and/or %O_2
Dial up O_2 flow rate
Power Flush provides extra delivery of O_2 to the breathing bag (cannot be seen on this image – located behind flow control knob)
Emergency Air Valve automatically provides patient with ambient air if gas flow is interrupted
Positive On-Off Switch reduces the possibility of accidentally turning/leaving the machine on (cannot be seen on this image – located behind and to right of Emergency Air Valve)
Non-Rebreathing Valve guards against CO_2 build-up and re-breathing of used gases
Reservoir Bag

Prior to the procedure (room and equipment preparation)

- Prepare the Procedures Room for the patient – ensure adequate space is available for the procedure to be safely carried out and move other patients / relatives from the room.
- Check wall suction is in working order with a Yankauer suction catheter attached.
- Check wall oxygen is in working order with an appropriate size non-rebreather face mask available.
- Check appropriate size bag-valve-mask (BVM) with oxygen tubing and appropriate size face mask are available.
- Check pulse oximetry is available and operating.
- Turn on the scavenging system at the wall – ensure green light remains on.
- Check that the oxygen (white), nitrous oxide (blue) and scavenging (clear) hoses are securely connected to the wall outlets.
- Check the scavenging cylinder via the clear windows at the top of the cylinder; you will be able to see a green platform, if this platform is elevated the scavenging is working (see Figures 1 & 2). If the scavenging is not working check that the switch on the wall is turned. If a problem persists contact Biomedical Engineering (Ext. 22849).

Figure 1: OFF

Figure 2: ON

- Source a new 2-litre breathing circuit (Bain), bacterial filter, appropriate size face mask/delivery device and syringe (for inflating face mask) from the scan module in the room.
- Attach the breathing circuit to the Porter MXR system as shown in Figure 3.
- Attach the scavenging hose to the breathing circuit as shown in Figure 4.
- Using the syringe, inflate the cuff of the face mask to ensure a good seal is maintained when used on the patient (Figure 5).
- Attach the L-piece from the breathing circuit to the face mask / delivery device (Figure 5).
- Attach a bacterial filter to the L-piece and connect to breathing circuit (Figure 6).
- Turn on the Porter MXR system.
- Occlude the end of the breathing circuit (either remove the mask and replace with the red cap or cover the mask opening) and check the oxygen power flush by pressing and holding for 8-10 seconds – both reservoir bags (grey and green) should inflate.
- Commence oxygen flow at a rate of 5 L/minute and check system for leaks – both reservoir bags should remain inflated.
- Commence nitrous oxide flow at 50% and check levels on meter are approximately equal (i.e. 5 L/minute on both oxygen and nitrous oxide readings).
- Turn off the oxygen only – the nitrous oxide should also stop (room air will be drawn into the system and the reservoir bags will remain inflated).

Figure 3

Figure 4

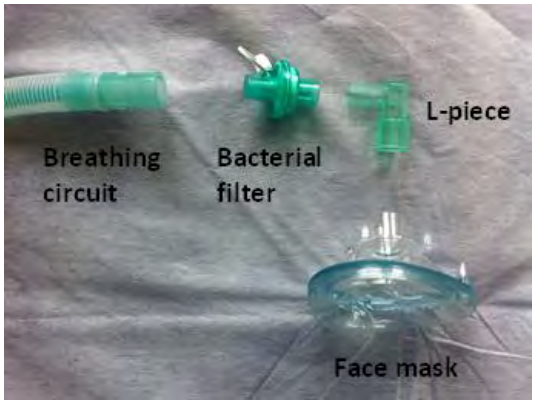

Figure 5

Figure 6

Prior to the procedure (documentation and patient preparation)

- Identify yourself to the patient and his/her family.
- Check the patient's identity – ensure a hospital ID band is present.
- Begin to fill out the ED Sedation Record.
- Perform a risk assessment and check exclusion criteria to ensure the patient is suitable for nitrous oxide sedation.
- Provide parents and patient with written and verbal information concerning nitrous oxide sedation allowing time for all questions to be answered. Discuss the importance of pregnant/potentially pregnant family members leaving the room for the duration of the procedure.
- Obtain written consent for nitrous oxide administration from the parents.
- Ensure nitrous oxide is appropriately prescribed in the ED record.
- If appropriate, administer other analgesic agents.
- Plan the use of non-pharmacological/distraction techniques with the patient and his/her family.
- Attach oxygen saturation probe to the patient and perform an initial set of observations (pulse, respiratory rate, oxygen saturation and UMSS).
- Ensure adequate staff are available.
- Time out – confirm patient ID and confirm procedure
- Allow the patient to breathe oxygen only for 1-2 minutes prior to introducing nitrous oxide (allows patient to get used to system and allows operator to establish if adequate flow rate to maintain appropriate reservoir bag inflation). This approach may sometime be impractical, therefore nitrous oxide may need to be introduced within seconds of applying the face mask.
- Ensure adequate seal if using face mask or correct technique if using delivery device.

During the procedure

- Adjust the flow of nitrous oxide to achieve desired concentration (usually 50-70% nitrous oxide).
- Observe the reservoir bags to ensure there is a supply of oxygen and nitrous oxide for the patient to breathe and to ensure that the bag does not deflate or overextend (adjust oxygen flow rate as necessary).
- Nitrous oxide/oxygen mix should be applied for at least 3 minutes prior to the start of any procedure to ensure maximum analgesic effect.
- The patient should continue to breathe nitrous oxide/oxygen mix for the duration of the procedure, however the nitrous concentration can be reduced rapidly or discontinued after all painful stimuli have finished eg changing to 100% O2 after infiltration of wound with local anaesthetic.
- Encourage the use of non-pharmacological pain relief (e.g. play, distraction, visualisation).
- Monitor sedation levels and adjust percentage of nitrous oxide as required.
- Continuously monitor and assess vital signs throughout the procedure (see observation recommendations).

After the procedure

- Administer oxygen for 2 minutes after the procedure is finished to avoid diffusion hypoxia.
- Document the use of nitrous oxide on the observation chart.
- Turn off Porter MXR system.
- Disconnect and dispose of the breathing circuit and filter and discard – the scavenging hose must be left attached. Please do not discard the scavenging hose.
- Turn off scavenging system at the wall.
- Monitor the child until their conscious state returns to baseline – patient must meet discharge criteria prior to discharge.
- Ensure the ED Sedation Record is completed, patient details are entered into the Sedation Log Book and discharge code is entered on iPIMS.

Discharge Criteria

For post-procedural discharge criteria and documentation please refer to the general sedation section of this manual.

Module Three

Ketamine

Background

Ketamine is a dissociative anaesthetic agent. The unique "dissociative state" resulting from ketamine can be described as a general trance-like state characterised by profound analgesia, sedation, amnesia and immobilization (41, 42). Protective airway reflexes and spontaneous respiration as well as cardiovascular stability are maintained. This trance-like state has been described by the expression, "the lights are on, but no one's home", as the eyes remain open with a "disconnected" stare and nystagmus. Ketamine acts by binding to N-methyl-D-aspartate (NMDA) receptors and creates dissociation (disconnection) between the cortex and the limbic system and prevents the higher centres from perceiving visual, auditory or painful stimuli (38, 43). Ketamine "dissociative" sedation is different from moderate or deep sedation or general anaesthesia and cannot be described in these terms to assess sedation depth. It also does not follow the typical dose response relationship of sedative agents on a continuum of gradually increasing levels of sedation and concurrent cardiorespiratory depression (44, 45).

Ketamine is an ideal agent to facilitate short painful procedures, especially in children, who might otherwise require other general anaesthesic agents. It has many features that are attractive in the ED setting: rapid onset (about 1 minute for IV, 3-5 minutes for IM – see table page 56), consistently effective analgesia and amnesia, and airway stability.

Its safe use in children has been documented in numerous case series (46, 47). A study by Green *et al* of ketamine use in 1,022 children in the ED produced acceptable sedation in 98% of patients; airway complications occurred in 1% but were transient, quickly identified and did not require intubation. Vomiting occurred in 7% and emergence reactions, mostly mild, in 19%. Another study of 266 children receiving IV ketamine reported an adverse respiratory event in 5%, vomiting in 19% and emergence reactions, mostly mild, in 27% (48). In a series of 229 patients from RCH Melbourne ED 72% had no adverse events (49). The most frequent adverse event was vomiting, mainly during the recovery phase, in 14%. Ten patients had airway

complications and required oxygen and airway repositioning. One patient required bag mask ventilation. No patient required intubation, suffered an aspiration or needed to be admitted.

It is also used extensively in developing countries for major and minor surgery and in disaster and battlefield settings where no anaesthetist or facilities are available.

In the emergency setting ketamine is used via IM or IV injection. Both routes seem safe and effective but there are only limited data directly comparing IM and IV use (50, 51). A randomised controlled trial of 225 patients comparing IM and IV ketamine for orthopaedic procedures in children found that IM ketamine sedation at 4mg/kg was significantly longer than IV sedation at 1mg/kg (median 129 minutes vs 80 minutes) (52). In RCH Melbourne and Our Lady's Children's Hospital Crumlin (OLCHC), IV is used preferentially. Time to discharge from drug administration is 30 minutes shorter with IV ketamine administration compared to IM, but time from triage to discharge is not significantly shorter (IM 5.7 hours, IV 5.3 hours; p=0.66) (49). In both studies IM administration was associated with more vomiting than after IV administration (50, 51). An IV cannula should be used if an IV is already in situ, if it can be inserted quickly and with minimal distress to the child or for prolonged procedures (50). Some physicians may feel more comfortable with IV access in case of an adverse event. However, there are no reported cases in which prophylactic IV access averted a ketamine associated adverse event (41).

Recommended ketamine dosing for IM injection is 4mg/kg, for IV injection 1mg/kg slowly over 1 minute (53). Younger children (< 3 years old) require higher doses of ketamine (1.5mg/kg) per bodyweight than older children.

Fasting times for sedation have traditionally been as recommended by the American Society of Anesthesiologists and the American Academy of Pediatrics for general anaesthesia, at 6 hours for solids and infant formula (1, 4). Ketamine, however, is an agent which maintains protective airway reflexes and there have been no documented reports of clinically significant ketamine-associated aspiration in patients

without contraindications (54). In the UK, a 3-hour fast is recommended for ketamine sedation in the ED (3).

In OLCHC and CUH EDs a 3-hour fast for solids and milk and 2 hours for clear liquids is required.

Indications for use

- Very painful procedures
- Laceration repair in young children
- Reduction of fractures or dislocations
- Abscess incision and drainage
- Wound exploration for foreign body
- Removal of foreign bodies from eye, ear, nose and skin

Adverse Reactions

- Respiratory depression
- Airway malposition
- Hypersalivation
- Laryngospasm
- Cardiovascular stimulation
- Musculoskeletal effects
- Seizures
- Intracranial pressure elevation
- Ataxia
- Emergence reaction
- Vomiting

Respiratory depression

Ketamine may cause mild respiratory depression. Severe respiratory depression is rare but is increased in frequency if ketamine is pushed by rapid IV bolus, when CNS abnormalities are present or in young infants. Neonates and small infants have greater

difficulty maintaining a patent airway with any sedative agent. Therefore, in CUH ED ketamine is contraindicated in infants less than 1 year of age. Ketamine IV must be given slowly (over 1 minute) (3, 41).

Airway Malposition

Malposition of the airway can occur. It is critical to continuously pay attention to airway patency and reposition head or jaw if snoring respirations or stridor develop.

Hypersalivation

Ketamine stimulates salivary and tracheobronchial secretions. Atropine or glycopyrrolate have been recommended as adjunctive agents to be co-administered with IV or IM ketamine. A randomized controlled trial of 83 paediatric patients showed a lower hypersalivation rate with atropine (11% vs 31%; p=0.03) (55). However, since then a large prospective series of 947 patients without atropine use showed a low rate of hypersalivation (56). In RCH Melbourne ED 91% of ketamine sedations are undertaken without atropine (49). In OLCHC, atropine is not used in any ketamine sedations.

Laryngospasm

In a series of 1,022 paediatric patients who received IM ketamine four episodes of laryngospasm occurred; all were transient and without further sequelae (57). Generally with anaesthesia, young age and respiratory infections increase the risk of laryngospasm. Clinicians need to be prepared to treat laryngospasm with oxygen and assisted ventilation until the episode subsides.

Cardiovascular stimulation

Ketamine is sympathomimetic and can produce mild to moderate increases of blood pressure, heart rate, cardiac output and oxygen consumption. In patients with maximal sympathetic drive (e.g. severe hypovolaemia, pericardial tamponade) the intrinsic cardiac depressant effects of ketamine may be revealed.

Musculoskeletal effects

Skeletal muscle hypertonicity and random movement of head and extremities are often observed. Parents might interpret this as lack of sedation and need to be forewarned.

Seizures

There are case reports of brief seizures related to ketamine in patients with underlying seizure disorders. In a series of 229 children from RCH Melbourne ED there was one brief, self-resolving seizure (49).

Intracranial pressure elevation

There is inconclusive evidence that ketamine increases intracranial and intraocular pressure (58, 59). Therefore any patient with hydrocephalus or CNS lesions or with glaucoma or acute globe injury should not receive ketamine sedation. Head-injured patients have conventionally not received ketamine for the same reason, but this dogma is increasingly challenged and many practitioners now use ketamine in head injury.

Ataxia

With ketamine ataxia can be pronounced during recovery. Ambulation must be avoided until full equilibrium is restored.

Emergence reactions

Ketamine usually stimulates hallucinations and dreaming during recovery. Their frequency is age-dependent. They are more frequent in adults than in adolescents and rare in children under 10 years. In a study of 1,022 children, 18% had mild agitation and 2% had more pronounced agitation but only 2 children required treatment. Both responded rapidly to small dosages of midazolam (57). Although evidence is limited a number of strategies have been used to reduce emergence reactions (41). They include planned topics for dreaming, guided imagery, dim lighting and maintaining a quiet environment. Patients with psychosis or behavioural abnormalities should not

be given ketamine due to the risk of increased recovery reactions.

Co-administration of low dose benzodiazepines has been used to prevent and treat ketamine emergence reactions. However, these agents slow ketamine metabolism, which may prolong recovery time and may lead to respiratory depression. Two randomised controlled trials of ketamine used in children with or without low dose midazolam failed to show any difference in the rate of recovery agitation (48, 60). Therefore, midazolam should not be used routinely as an adjunctive agent for ketamine sedation.

Vomiting

Vomiting may occur in late recovery phase when the patient is already alert. There are no documented reports of clinically significant ketamine associated aspiration syndrome (24). A recent large randomized controlled trial of IV ketamine sedation plus ondansetron versus IV ketamine sedation plus placebo showed a significantly lower rate of vomiting with ondansetron (5% vs 13%; p=0.02) (61). If a patient experiences vomiting (1 episode) post-ketamine sedation a single dose of ondansetron IV (0.1mg/kg slow bolus) or PO (8-15kgs body weight = 2mg; 15-35kg = 4mg; >35mg = 8mg) can be administered.

Contraindications

There is insufficient data to safely administer ketamine to children under 1 year in the ED setting. These children are at increased risk of airway complications. Procedures requiring sedation in infants should take place in the operating theatre. Children over 12 years of age experience an increase in emergence reaction. Therefore, while it may be reasonable (and safe) to use ketamine in this age group, alternative sedation agents e.g. combination of N_2O and topical/local anaesthesia, should be considered.

Table: Contraindications for a use (relative and absolute)

Contraindications	**Potential adverse effects of ketamine**

Children < 1year	Increased risk of airway complications
Previous adverse reaction to ketamine	
Any respiratory complaint: active asthma, active respiratory tract infection or disease, pneumonia, procedures involving the airway or pharynx	Increased bronchospasm, airway secretions & laryngospasm
Significant Cardiovascular disease	Increases heart rate, oxygen consumption and workload of the heart.
Head Injury: Recent significant head injury or a reduced level of consciousness	Altered conscious state
CNS mass lesions, hydrocephalus other conditions associated with raised intracranial pressure	Increased intra-cranial pressure
Glaucoma or acute globe injury	Increased intra-ocular pressure
Bowel obstruction	Increase incidence of vomiting as a result of the bowel obstruction & potential airway complications when sedated
Psychosis and cognitive or motor delay or severe behavioural problems.	More severe emergence reaction / recovery agitation
Porphyria, thyrotoxicosis, unstable epilepsy	Anecdotal evidence of enhanced sympathomimetic responses [31] Brief seizures

Fasting state prior to procedure

The recommended fasting times for ketamine IV and IM are:

- 3 hours fasting status for solids & 1 hours for liquids

  however a reduced fasting time can be used after the beneifts and risks of the procedure are considered by the duty EM consultant, in particular as fasting times have not been proven to be correlated with an increased incidence of vomiting or aspiriation.

Ketamine administration requires:

- Health Evaluation and Risk Assessment
- Written consent

For further information on these topics please refer to Module 1 “General Sedation Module”.

Additional information on obtaining consent for Ketamine

The trance-like state, open eyes and occasional random movements seen during ketamine administration can be frightening for parents. Therefore it is important to explain the effects of ketamine to the parent. The sedation handout provides good talking points in the discussion with parents about the expected events during the sedation and possible sequelae after the procedure.

Observations

Observations should be continuously monitored and documented every 5 minutes until the child returns to normal conscious state:

- Pulse
- Respiratory rate
- Blood pressure
- Oxygen saturation
- Sedation score (as measured by UMSS)
- Continuous 3-lead ECG
- If using supplemental O2, capnography must also be used to aid in early identification of airway and breathing concerns.

For more detailed information please refer to Module 1: General Sedation Module.

Location

Sedations with ketamine can only be performed in the Procedure Rooms or the Resuscitation area.

Staff required for procedure

A minimum of three staff members:

	One doctor or nurse to perform the procedure
	One doctor to administer the sedation. This doctor must be credentialed in ketamine sedation and PLS/APLS certified
	One registered nurse capable of supporting airway management and advanced monitoring of patients. This nurse must be trained in ketamine sedation and PLS/APLS certified
	Consultant in EM available and present unless the sedation doctor has been credentialed as a sole ketamine operator by the EM Consultant group

All required personnel must be present and equipment checked and available prior to the administration of ketamine.

Ketamine must only be administered by the sedation doctor.

Ketamine dose

There is no reversal agent for ketamine. The following table explains the differences between administration of ketamine IV and IM. Ketamine IV must be given as a slow IV push over 1 minute, to avoid transient respiratory depression.

Route of administration	**Intramuscular (IM)**	**Intravenous (IV)**
Advantages	No IV necessary	Ease of repeat dosing Slightly faster recovery
Clinical onset	3-5 minutes	1 minute
Duration of Effective sedation	15 – 30 minutes	15 minutes
Recovery	90-150 minutes	60 minutes
Initial dose	3-4mg/kg	1- 1.5 mg/kg
Subsequent dose	Insert IV and give further doses 0.5 mg/kg IV Or give 1-2mg/kg IM	0.5 mg/kg
Maximum dose	5mg/kg	5 mg/kg

Drug preparation

IV administration

Ketamine should be diluted with 0.9% NaCl to facilitate slower IV bolusing e.g. dilute ketamine to 10mls total volume of injection.

IM administration

Give 'neat' into a large muscle e.g. thigh.

Administration of a 'top-up' dose

The decision to administer a 'top-up' will be at the discretion of the sedation doctor. Two is the maximum number of 'top-ups' that should be administered in the ED. If further doses are required then the appropriateness of continuing the sedation procedure in ED should be questioned and consideration made of referring the patient for general anaesthesia.

Equipment

- Bag / valve / mask set up for appropriate size and able to deliver O_2 with O_2 tubing attached
- Resuscitation area (or trolley) with full intubation equipment setup (ETT, laryngoscope, introducer, McGill's forceps, ties)
- Appropriate size Guedel airway
- Suction with a yankauer sucker attached
- Oxygen tubing attached to oxygen source with appropriate size mask
- Pulse oximetry operative – to monitor oxygen saturation pre, during & post procedure
- ECG monitoring equipment
- Blood pressure monitoring

A three-lead cardiac monitor, saturation probe and non-invasive BP monitoring should be applied for the duration of the procedure and recovery period.

Prior, During and Post Procedure Management

See Module 1: General Sedation.

Discharge Criteria

See Module 1: General Sedation.

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Appendix 1 – Sedation Record

CUH

CUH EMERGENCY DEPARTMENT PAEDIATRIC PROCEDURAL SEDATION CHECKLIST

MRN:

Surname:

Forename:

AFFIX LABEL

DOB: Gender:

Address:

Type of procedure

Date: _____ Sedation start time: ____
End time ____

BEFORE PROCEDURE

Pre-Procedure assessment

- ☐ Required staff available *(2)
- ☐ Risk assessment and exclusion criteria checked *(3)
- ☐ Patient fasted if required *(4)
- ☐ Sedation handout discussed with patient/parent + informed consent obtained
- ☐ Baseline observations recorded *(5)
- ☐ Medication charted *(6)

Preparation SOAPME

- ☐ **S**uction working with Yankauer sucker attached
- ☐ **O**xygen available by mask
- ☐ **A**irway equipment
  - o Bag/Valve/Mask
- ☐ Appropriate size guedel airway
  - o **P**harmacological agents
- ☐ **M**onitoring equipment
- ☐ **E**TCO2 (If required) and extra equip.
- ☐ Resuscitation trolley available

TIMEOUT

- ☐ Positive Identification
- ☐ Allergies / Previous adverse reactions
- ☐ Team member introduction and role allocation
- ☐ Confirm or mark site if applicable
- ☐ Procedure to be performed
- ☐ Essential imaging reviewed / available if applicable
- ☐ Sedation plan including
  - o Non pharmacological adjuncts
  - o Rescue strategy for hypoxia
  - o Criteria for aborting attempt

PROCEED

AFTER PROCEDURE

- ☐ Patient returned to baseline Sedation Score
- ☐ Observations within normal limits
- ☐ Discharge criteria met *(7)

Post Procedure Documentation:

- ☐ Procedure recorded
- ☐ Adverse events recorded *(8)

Summary of Sedation:

- ☐ Deepest level of sedation:
  - UMSS _____ *(1)
- ☐ Sedation used:
  - ☐ Nitrous oxide ☐ Ketamine
  - Fasted for: Solids ___ hrs Liquids ___ hrs
  - Vomited: Yes / No (Delete as appropriate)
- ☐ Additional Anaesthesia:
  - ☐ Fentanyl ____mcg ; Morphine ____mg
  - ☐ Needle infiltration with lignocaine
  - ☐ LAT
- ☐ Total dose:
  - Ketamine _____mg
  - Nitrous Oxide (Max) _____% for _____minutes
  - Duration of using Penthrox _____min
- ☐ Adverse events *(8)
  - ☐ Yes ☐ No

Sedation not performed ☐

- ☐ Department not safe
- ☐ Staff not available
- ☐ Not credentialed
- ☐ Other: _____

Sedationist:
Assistant:
Proceduralist:
Assistant:
Checklist completed by:

1. UMSS SEDATION SCORE	0 = Wake and alert 1 = Minimally sedated : may appear tired/sleepy, responds to verbal conversation and/or sound 2 = Moderately sedated : sleeping, easily aroused with light tactile stimulation or simple verbal command 3 = Deep sedation : deep sleep, rousable only with deep or significant physical stimulation 4 = Unrousable		
	Nitrous Oxide	**Ketamine**	
2. STAFF	Two staff (1 with PALS/APLS) • Sedationist • Proceduralist	Three staff (2 with PALS/APLS) • Sedationist • Proceduralist • Assistant	Consultant present unless sole operator credentialed doctor present
3. RISK ASSESSMENT	Increased risk of airway obstruction Snoring, Stridor, Sleep apnoea, Obesity, Tonsillar hypertrophy, Craniofacial abnormalities, Down syndrome, Hx of airway difficulty Increased risk of hypoventilation Chronic lung disease, neuromuscular disorders, Brainstem tumor, Altered mental status, Cerebral Palsy	Aspiration risk Vomiting, bowel obstruction, GERD, Hx of aspiration, Developmental disability Increased risk of bronchospasm or laryngospasm Asthma, Recent LRTI, Intra-oral procedure Increased risk of cardiovascular compromise Eg. Cardiac disease, Hypovolaemia, Sepsis	
EXCLUSION CRITERIA	• <1yr • Acute RTI or exacerbation of asthma • Airway obstruction of hx of difficult airway mx • Recent significant head injury or altered level of consciousness • Bowel obstruction (or suspicion thereof)		
	• Chest injury, suspicion of pneumothorax or lung cyst • Severe Middle ear disease • Pulmonary hypertension • Hx of B12 of folate deficiency • Nutritionally compromised patients • Patients with metabolic diseases associated with homocysteine metabolism	• Prior adverse reaction to ketamine • Significant cardiac disease (angina, heart failure, malignant hypertension) • Intracranial hypertension with CSF obstruction • Glaucoma or acute globe injury • Patients with severe psychological problems such as cognitive or motor delay or severe behavioural problems • Porphyria • Uncontrolled epilepsy • Proposed procedure within the mouth or pharynx	
4. FASTING: FOR URGENT PROCEDURES ASSESS RISK VS BENEFIT	No fasting required	1 hour for clear fluids 3 hours for solids or milk	
5. OBSERVATIONS	**Pulse oximetry** Then every 5min until UMSS ≤ 1	**Pulse oximetry, Cardiac & BP monitoring** Then recorded every 5min until UMSS ≤ 1	
6. MEDICATION	30-70%	1 – 1.5mg/kg/IVI or 3-4mg/kg/IMI Subsequent dose 0.5mg/kg IV	
7. DISCHARGE CRITERIA	• Resumption of pre-sedation level of consciousness • Resumption of purposeful neuromuscular activity • Ability to ambulate (if appropriate) or able to sit without support • Ability to verbalise appropriate for age • Final set of vital signs are within normal limits for the child's age • Ability to tolerate oral fluids		

8. ADVERSE EVENTS

	Intermediate	Sentinel	Suspected Aetiology
Airway /Breathing	☐ Positive pressure ventilation ☐ Neuromuscular blockade ☐ Oral airway	☐ Tracheal intubation ☐ Pulmonary aspiration	☐ Apnoea ☐ Respiratory depression ☐ Upper airway obstruction ☐ Laryngospasm
Circulation	☐ IV fluid bolus	☐ Vasoactive drug ☐ Chest compressions ☐ Death	☐ Hypotension ☐ Bradycardia ☐ Cardiac arrest

Neuro	☐ Anticonvulsant administration	☐ Neurological deficit	☐ Seizure or seizure-like movements	
Sedation Quality & Patient experience	☐ Sedation insufficient ☐ Escalation of care or hospitalization ☐ Provider dissatisfied ☐ Patient / Family dissatisfied		☐ Patient active resistance or need for restraint ☐ Sedation complication ☐ Paradoxical response ☐ Unpleasant recovery reaction/agitation ☐ Unpleasant recall	
Other				

Appendix 2 – Nitrous Oxide Patient/Parent Information Leaflet

NITROUS OXIDE SEDATION OF CHILDREN FOR PROCEDURES IN THE EMERGENCY DEPARTMENT

This information sheet is for parents of children undergoing sedation with nitrous oxide for a procedure while in the Emergency Department (ED) at Cork University Hospital (CUH).

About sedation

Sedation is a medicine given to children to make them feel sleepy and relaxed. When nitrous oxide is used for sedation it is given as a gas that your child breathes in through a mask – it is otherwise known as 'laughing gas'.

Reasons for having sedation

Your child may become distressed and afraid when having certain tests or treatments. Fear can make his/her pain worse. Procedural sedation (sedation for procedures) aims to reduce your child's anxiety and fear. Children do not always sleep with sedation medicines. The sedation may make them feel sleepy and/or make them unable to remember the procedure. The procedure can then be done without causing too much distress for you and your child.

Permission to give sedation

As the parent or legal guardian we cannot sedate your child without your consent. You need to understand the reasons for sedation and the following risks:

What you need to know before consenting for sedation

1. A staff member will remain with your child until they are awake and if required, we will give your child oxygen through a mask or breathing tube;
2. Children may vomit. Very rarely, they may breathe the vomit into their lungs, which may require some specific treatment;
3. They may need to be treated with extra medicines such as anti-allergy medicine;
4. For your child's safety, do not take your child home until staff tell you it is safe to do so. Expect to wait for an hour or more after the procedure;

ABOUT NITROUS OXIDE

Nitrous Oxide is an anaesthesic gas commonly used for minor procedures in children in the ED. Nitrous Oxide is frequently referred to as 'laughing gas'. This gas will cause your child to become sleepy, dazed and easier to manage for procedures that require co-operation from the patient such as suturing (stitches). It may also cause some minor memory loss, which is generally related to the procedure itself (and is considered a good thing). The most common side effects related to Nitrous Oxide are vomiting or nausea, and this occurs in approximately 1 in 10 children. In the event of any side effect, your child will be managed by the ED staff until it is deemed safe for you and your child to be discharged home.

Helping your child

Helping your child before the procedure

- Check with the nurse or doctor before giving your child anything to eat or drink;
- Ask the doctor/nurse to explain the procedure to you and to your child;
- Before the procedure the ED staff (e.g. nurses and doctors) will try to help your child using interactive games, toys, playing with equipment, etc;
- Talk to your child about some ways to cope (for example – looking at an interactive book, using their imagination to be in a nice place, blowing bubbles);
- It helps not being too upset or nervous yourself – your child will notice this.

Helping your child during the procedure

- There will always be an ED staff member present during the procedure to help;
- Having a parent (or another adult) who knows the child stay with them is usually helpful;
- The level in which you will be able to engage/involve your child will depend on how deeply sedated your child becomes. Your child may need reminders of the coping methods you decided upon earlier (for example, "blow away the hurt"). This sort of distraction is very helpful;
- Giving your child a sense of control with some simple choices is helpful. We can allow them to choose things they may like e.g. music or video options, which finger the oxygen probe may be placed on;
- It is not helpful to allow your child to decide the exact moment the procedure is going to occur.

Helping your child after the procedure

- Remain with your child. They may not remember where they are or why they are in hospital;
- Focus on the good things your child did. For example "*you did a great job blowing away the hurt."*
- You will be required to remain in the ED until fully awake and the doctor has discharged you.

Care of your child on your way home and for the next 24 hours

Sometimes the delayed effects of the medicines may make your child a bit confused, sleepy or clumsy for a while after the procedure. You need to be extra careful in caring for and supervising your child for the next 24 hours.

- If your child falls asleep in the car seat, watch them to make sure that they do not have any difficulty breathing. DO NOT leave your child alone in a car seat or alone in the car;
- Let your child sleep. Children may go to sleep again after getting home from the hospital. Sometimes children may sleep more because of the sedation medicine;
- Sometimes children may feel sick or vomit if they eat a big meal too soon after sedation. Give your child clear liquids such as diluted fruit juice, ice pops, jelly, clear soup, etc;
- Supervise all playing and bathing for the next 8 hours after getting home. DO NOT let your child swim or use play equipment (bikes, monkey bars, etc) that might cause an accident (for the next 24 hours).

Key points to remember

- Sedation is commonly used in children for procedures;
- The overwhelming experience we have (and internationally) is that it is very safe and very effective;
- You need to give consent before your child has sedation;
- Make sure you understand the reasons for and the risks of sedation;
- Be as open and honest as you can with your child about what is going to happen and it helps not to be too upset yourself.

When to return to the Emergency Department

Please return to the ED at CUH if your child:

- Vomits more than twice;
- Has strange or unusual behaviour;
- If you have any concerns.

Appendix 3 – Ketamine Patient/Parent Information Leaflet

KETAMINE INFORMATION SHEET FOR PARENTS

This information sheet is for parents of children undergoing sedation with ketamine for a procedure while in the Emergency Department (ED) at Cork University Hospital.

About sedation

Sedation is a medicine given to children to make them feel sleepy and relaxed. When ketamine is used for sedation, it is given by injection through a drip or into the leg.

Reasons for having sedation

Your child may become distressed and afraid when having certain tests or treatments. Fear can make his/her pain worse. Procedural sedation (sedation for procedures) aims to reduce your child's anxiety and fear. The sedation may make your child feel sleepy and relaxed, meaning the procedure can be performed more easily and with less distress for you and your child. Your child may not remember the procedure. This is normal.

Permission to give sedation

As the parent or legal guardian we cannot sedate your child without your consent. You need to understand the reasons for sedation and the following risks:

What you need to know before consenting for sedation

5. A staff member will remain with your child until they are awake and if required, we will give your child oxygen through a mask or breathing tube;
6. Children may vomit. Very rarely, they may breathe the vomit into their lungs, which may require some specific treatment;
7. They may need to be treated with extra medicines such as anti-allergy medicine;
8. For your child's safety, do not take your child home until staff tell you it is safe to do so. Expect to wait for an hour or more after the procedure;

ABOUT KETAMINE

Ketamine is commonly used internationally in EDs for sedation in children. When we give your child ketamine, they get sleepy and do not remember what happened. There are some special features about sedation with ketamine for you to know:

- It is given by injection into a vein, through a drip (cannula) or directly into the muscles of the thigh;
- Your child may seem to be awake after receiving ketamine – this is because ketamine causes a 'trance-like' state;
- Your child may move and need someone to hold them still;
- Your child may drool more than usual;
- Sometimes, as your child wakes up they may have some agitation, hallucinations or nightmares. These sensations usually improve if you comfort your child in a quiet dark area until they are fully awake.
- One in ten children develop a rash
- One in ten children vomit
- One in ten children will drool or have eye watering
- One in twenty children have some twitching movements
- Rarely (0.3%) there can be laryngospasm (vocal cords close).
- In less than 0.02% of cases your child may need to be given a general anaesthetic with a breathing tube placed in their windpipe[SEP]

Helping your child

Helping your child before the procedure

- Check with the nurse or doctor before giving your child anything to eat or drink;
- Ask the doctor/nurse to explain the procedure to you and to your child;
- Talk to your child about some ways to cope (for example – looking at an interactive book, using their imagination to be in a nice place, blowing bubbles);
- It helps not being too upset or nervous yourself – your child will notice this.

Helping your child during the procedure

- There will always be an ED staff member present during the procedure to help;
- Having a parent (or another adult) who knows the child stay with them is usually helpful;
- The level in which you will be able to engage/involve your child will depend on how deeply sedated your child becomes. Your child may need reminders of the coping methods you decided upon earlier (for example, "blow away the hurt"). This sort of distraction is very helpful;
- Giving your child a sense of control with some simple choices is helpful. We can allow them to choose things they may like e.g. music or video options, which finger the oxygen probe may be placed on;
- It is not helpful to allow your child to decide the exact moment the procedure is going to occur.

Helping your child after the procedure

- Remain with your child. They may not remember where they are or why they are in hospital;
- Focus on the good things your child did. For example "*you did a great job blowing away the hurt"*;
- You will be required to remain in the ED until your child is fully awake and the doctor has discharged you.

Care of your child on your way home and for the next 24 hours

Sometimes the delayed effects of the medicines may make your child a bit confused, sleepy or clumsy for the next 24 hours. You need to be extra careful in caring for and supervising your child for the next 24 hours.

- If your child falls asleep in the car seat, watch them to make sure that they do not have any difficulty breathing. DO NOT leave your child alone in a car seat or alone in the car;
- Let your child sleep. Children may go to sleep again after getting home from the hospital. Sometimes children may sleep more because of the sedation medicine;
- Sometimes children may feel sick or vomit if they eat a big meal too soon after sedation. Give your child clear liquids such as diluted fruit juice, ice pops, jelly, clear soup, etc;
- Supervise all playing and bathing for the next 8 hours after getting home. DO NOT let your child swim or use play equipment (bikes, monkey bars, etc) that might cause an accident (for the next 24 hours).

Key points to remember

- Sedation is commonly used in children for procedures;
- The overwhelming experience we have (and internationally) is that it is very safe and very effective;
- You need to give consent before your child has sedation;
- Make sure you understand the reasons for and the risks of sedation;
- Be as open and honest as you can with your child about what is going to happen and it helps not to be too upset yourself.

When to return to the Emergency Department

Please return to the ED at CUH if your child:

- Vomits more than twice;
- Has strange or unusual behaviour;
- If you have any concerns.