Guideline: Paediatric Procedural Sedation Guideline

Note: This Guideline is not to be used outside of Emergency Care unless Specialist or Anaesthetic oversight is involved.

Notify on-call Consultant before starting any procedures
***3225 or *3703**

Purpose

This guideline is provided to guide the clinical team in the management of a child requiring procedural sedation.

Responsibility

The clinical team responsible for patient management.

Index

Medications:
Gas
LET

Oral:
Midazolam
25% Sucrose
Chloral Hydrate

IV:
Ketamine
Fentanyl (in appendix)
Midazolam (in appendix)
Propofol (in appendix)

Guideline

Caution:

While defined end-points in analgesia or sedation are chosen for different procedures and patients, and prudent practice makes unintended deep sedation unlikely, it must be recognised that there is a continuum between conscious sedation and deep sedation, and unanticipated over-sedation may occur. Safe practice demands that the use of any sedative procedure includes the ready availability of personnel, drugs and equipment appropriate for managing the deepest levels of sedation. (5).

1 Definition

Analgesia	Relief of the perception of pain. May occur together with sedation.
Minimal Sedation/ Analgesia	Minimally altered conscious state, as may be induced by oral agents or 50% nitrous oxide.
Conscious Sedation	Minimally depressed level of consciousness from which the patient is easily aroused, with preservation of airway patency and reflexes, and response to verbal commands.
Deep Sedation **AVOID in this guideline**	Depressed level of consciousness from which the patient is not easily roused. May be associated with partial or complete loss of airway protective reflexes and the inability to independently maintain airway patency and respond to physical or verbal stimulation.

2 Goals of Procedural Sedation

a] Adequate prevention/relief of pain and anxiety.

b] Facilitate a necessary procedure.

c] Patient safety.

3 Indications

Clinical Indication	Indications	Procedure	Strategies
Non-invasive procedures.	CT scan Ultrasound MRI	Motion control	Ketamine IV (preferred route)/IM. Midazolam IV. 25% sucrose. Anaesthetist input
Procedures: Low level pain High anxiety	Simple FB removal. IV insertion. Lumbar puncture. Phlebotomy. Simple laceration. Simple wound exploration. MCU.	Sedation. Anxiolysis. Motion control.	Play Specialist with topical anaesthetic. Local anaesthetic. Entonox. Continuous nitrous Midazolam IV
Procedures: High level pain. High anxiety. Or both.	Abscess I and D. Fracture reduction. Thoracostomy tube. Complex laceration. Complex FB removal. Dislocation reduction. Wound exploration. Consultant's discretion.	Sedation. Anxiolysis. Analgesia. Amnesia. Motion control.	Ketamine IV(preferred route)/IM Or Midazolam and Fentanyl IV Or Call the Anaesthetists. Table adapted from Krauss (2).
Non ED elective procedures.	Echocardiography. Radiology procedures. Dressing changes.		Chloral Hydrate PO. Midazolam PO. 25% sucrose.

4 Contraindications

- Any contraindication to the particular drug being used.
- Inadequate staff availability.
- Any procedure which the on-call consultant feels is best done in theatre under anaesthetist supervision/general anaesthetic.
- Complicated patients with severe systemic disease i.e. ASA III, IV, V.
- Multi trauma.
- Infants younger than three months. (Caution in under 6 months. Discuss with ED SMO)
- Haemodynamic instability.
- Pre existing respiratory depression.
- GCS less than 15/15.

5 Preparation for IV/IM Sedation

Not to be used outside of Emergency Care unless an anaesthetist or specialist oversight is involved.

For oral sedation, please go to 6.

[a] **Prepare Parent and Child**

(i) Pre-procedural evaluation.

History:

- Allergies.
- Medications.
- Past Medical History (ASA I and II – normal or mild systemic disease).
- Last meal.
- Event.

Examination:

- Airway anatomy.
- Cardiorespiratory examination.
- Baseline observations.
- Level of consciousness/Baseline Sedation Score

(ii) Written informed consent (discussion of likely risks, benefits, expected effects and alternatives). Do not forget to consent for the procedure as well.

(iii) Play Therapy (if time permits/dependent on availability). Play Specialists are able to use a wide variety of techniques to help reduce the anxiety component and pain perception of children.

These include distraction therapy, role playing, and comfort positioning.

(iv) Secure IV access is mandatory (using topical anaesthesia if time permits).

IV sedation is the preferred option. If for any reason, IM is used, rapid access to IV insertion equipment should be available.

(v) FASTING is not mandatory (1, 3, 4, 6, 8, 10), however the sedating clinician must balance the potential for vomiting and aspiration with the timing and urgency of the procedure and the required depth of sedation. (1).

ACEP clinical policy for sedation in ED:

Level B recommendation: Do not delay procedural sedation in adults or pediatrics in the ED based on fasting time. Preprocedural fasting for any duration has not demonstrated a reduction in the risk of emesis or aspiration when administering procedural sedation and analgesia.

Sedation can be performed despite fasting status for emergent situations, however it is generally recommended that one needs to focus on preparedness, monitoring and vigilance as we would for all patients to ensure their ongoing safety.

(vi) Monitoring
Pre sedation (oxygen, BP, HR, RR).
Post-sedation.
Completion of procedure.
Recovery - early and at completion.

[b] Prepare Staff

Notify On-call Consultant before starting any procedures:
***3225 or *3703**

- IV Procedural sedation requires three members of staff. If a procedure if simple and can be abandoned immediately should complications arise, then only two members of staff are required. This should be at the discretion of the ED SMO.

- Availability will depend on immediate on floor commitments.

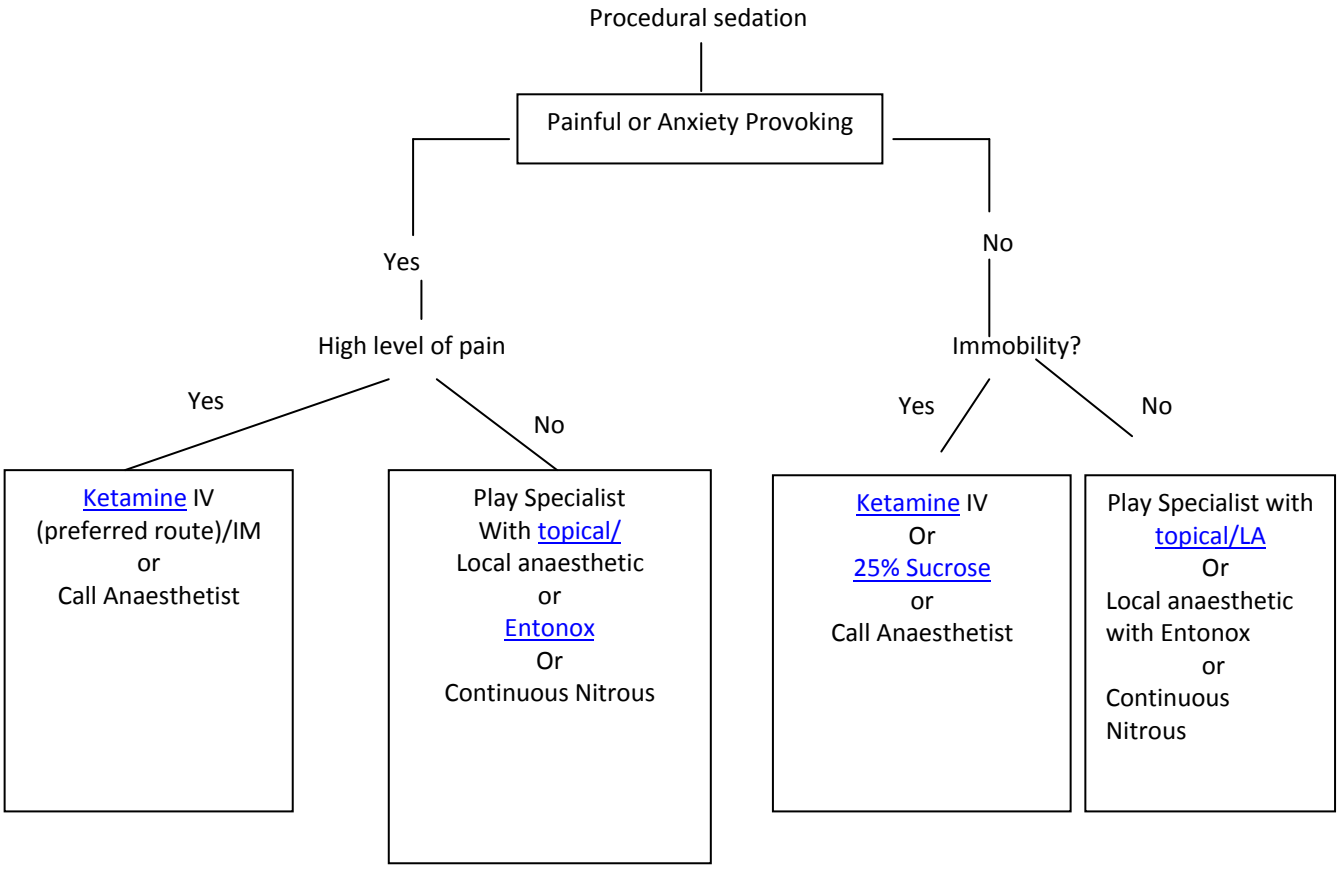
- **A dedicated airway doctor**
  - Skills necessary to recognise and manage all potential complications/airway skills/life support.
  - In depth knowledge of the drug pharmacology.
  - Skilled to monitor a patient's response.
- **Person performing procedure**
  - Skilled to perform the necessary procedure and its potential complications.
- **Procedure nurse**
  - Credentialled to assist the necessary procedure and monitoring.

[c] Prepare Equipment

- Oxygen supply and mask.
- Suction.
- Paediatric resuscitation equipment (wall mounted or portable trolley).
- Continuous monitoring of oxygen saturation is mandatory. ECG monitoring is not mandatory (3) but encouraged (2).
- Capnography

[d] Prepare Medication

- Doses of medications must be calculated, drawn up and labelled prior to the procedure. Appropriate antagonists must be available with doses pre-calculated (5).
- Choice of medication



- Sedation medications have cumulative effects. Extreme caution should be taken with the concurrent use of multiple sedation medications. (which includes Opiates).

6 Preparation for Oral Sedation

For IV/IM sedation, please go to 5

In ED, oral sedation is rarely used. Oral sedation has a slow onset and variable recovery time. This makes it less suitable for ED sedation.

[a] Prepare Parent and Child

(i) Pre-procedural evaluation

History:

- Allergies.
- Medications.
- Past Medical History (ASA I and II: Normal or mild systemic disease).
- Last meal.
- Event.

Examination:

- Airway anatomy.
- Cardio-respiratory examination.
- Baseline observations.

(ii) Written informed consent (discussion of likely risks, benefits, expected effects and alternatives). Do not forget to consent for the procedure as well.

(iii) Play Therapy (if time permits and dependent on availability). Play Specialists are able to use a wide variety of techniques to help reduce the anxiety component and pain perception of children. These include distraction therapy, role-playing, and comfort positioning.

(iv) IV access is not necessary for ORAL SEDATION – but rapid access to IV insertion equipment should be available.

(v) **FASTING** is not mandatory (1, 3, 4, 6,10), however the sedating clinician must **balance the potential for vomiting and aspiration, with the timing and urgency of the procedure and the required depth of sedation** (1).

[b] Prepare Staff

- Oral Procedural sedation requires 2 members of staff.
- Availability will depend on immediate on floor commitments.
- Procedure doctor — Skilled to perform the necessary procedure.
- Procedure nurse — Credentialled to assist the necessary procedure and monitoring.

[c] Prepare Equipment

- Oxygen supply nearby.
- Monitoring

[d] Prepare Medication

- Doses of medications must be calculated, drawn up and labelled prior to the procedure. Appropriate antagonists must be available with doses pre-calculated.
- Consider Oxygen.
- Sedation medications have cumulative effects. Extreme caution should be taken with the concurrent use of multiple sedation medications (which includes Opiods analgesics).

7 Recovery

Close observation and monitoring by appropriately trained staff in a suitable clinical area with immediate availability of oxygen, suction, resuscitation drugs and equipment should continue until the

patient returns to their pre-sedation state of consciousness and cardio-respiratory function.

8 Documentation

Document	History
	Examination
	Investigation
	Medications and fluids
	Any resulting complications
	Staff involved
	Monitoring used and data measured
	Recovery data

9 Discharge

The patient may leave the recovery area or be discharged when:

- Vital signs and level of consciousness have returned to the pre-sedation level. **Minimum of 1 hour after the last dose** (12).
- An appropriate accompanying person and transport is available.
- Appropriate further care has been arranged.
- Provision of appropriate discharge advice needs to be given to both the patient and the accompanying adult.

This guideline should never supersede a Consultant's judgement in individual clinical cases.

ENTONOX

Drug: 50% Nitrous 50% Oxygen.

Dose: **Continuous inhalation for effect.**

Actions: Rapid onset - 3-5 minutes (take at least 15 breaths before procedure).
Short Duration 3-5 min

Advantages	Disadvantages
• Rapid onset. • Short duration. • Weak analgesic. • Patient is empowered.	• No prolonged analgesic effect. • Euphoria. • Nausea and Vomiting. • Vertigo. • Numbness and tingling. • Headache.

Contraindications: Significant respiratory disease/acute asthma.
Bowel distension or obstruction/Facial trauma/ Chest trauma.
Pneumothorax/pulmonary bullae/air embolism/ pneumo-cephaly.
Cardiac disease or shock.
First trimester pregnancy.
Decompression sickness.
Vomiting.
Alcohol intoxication.

Preparation:

- Parents and Child: History and cardiorespiratory examination and consider fasting status.
  Baseline observations.
  Consent discussing the alternatives and above disadvantages.
  Play Therapy (dependant on time/availability and appro-priateness).
- Staff: Procedure doctor.
  Procedure nurse +/- Play Specialist.
- Equipment: Oxygen Saturation monitoring.
- Medication: Entonox and mask (mix first by inverting the cylinder several times).

Post–procedure recovery - Usually in a few minutes.
Documentation.
Discharge: When baseline recovery parameters are met and discharge advice given.

- Adverse reactions: Are extremely rare. Should local anaesthetic toxicity occur, transfer them to Resuscitation and attach oxygen with full monitoring. Get senior help, ABCs and treat seizures.

Post–procedure Recovery.
Documentation.
Discharge: When baseline recovery parameters are met and discharge advice given.

Continuous Nitrous Sedation

Continuous nitrous sedation guideline

25% SUCROSE

Drug: Stimulates release of endogenous Opiods up to 3 months of age.
Effects are reversible with Naloxone.
Non-nutritive sucking enhances the analgesic effect of sucrose.

Dose: **0.25 – 2 ml orally.** Max 2 ml (term infants and older).
There is no effect if given via a nasogastric tube.

Actions: Rapid Onset: 2-5 minutes.
Short Duration: 5minutes.

Advantages	Disadvantages
• Rapid onset. • Short duration. • Does not increase blood sugar levels.	• Must be kept in the fridge.

Indications: Sedation for CT head.
Venepuncture or heel prick.

Preparation:

- Parents and Child: History and cardiorespiratory examination and consider fasting status.
  Consent discussing the alternatives and above disadvantages.
  May be more effective if given with
  - A dummy - non-nutritive sucking.
  - Feeding (if allowed).
  - Cuddling.
  - Wrapping.
- Staff: Procedure doctor/nurse.
- Equipment: A dummy if this is part of the infant's care.
  Blanket or sheet to wrap the child.
- Medication Sucrose.

Post–procedure Recovery.
Documentation and Audit forms.
Discharge: When baseline recovery parameters are met.

CHLORAL HYDRATE – PO

Rarely indicated for use in ED. Discuss with SMO prior to using this.

Drug: Sedative/hypnotic – useful for those less than 3 years of age.

Dose: **25-75 mg/kg/dose (max. 1000 mg/dose) PO**
Dilute with water, milk or juice to disguise the taste and reduce gastric irritation.

Actions: Onset: 20-60 minutes.
Duration: 1-8 hours.

Advantages	Disadvantages
• Good Motion control.	• Paradoxical agitation. • Respiratory failure. • Arrythmias in overdose. • No analgesic effect. • Extended recovery and observation time. • Prolonged effect.

Contraindications: Specific hypersensitivity.
Liver failure.
Clinically significant cardiac or renal disease.

Preparation

- Parents and Child: History and cardiorespiratory examination and consider fasting status.
  Baseline observations and monitor.
  Consent, discussing the above disadvantages and alternatives.
  Play Therapy (dependant on time/availability and appro-priateness).
- Staff: Notify the Consultant on-call *3703 to be available for emergencies.
  Procedure doctor.
  Procedure nurse.
- Equipment: Oxygen mask or nasal cannulae/oxygen saturation monitoring/ suction.
  Paediatric resuscitation trolley with appropriated sized equipment.
- Medication: Chloral Hydrate in labelled pre-calculated doses.
  Oxygen.

Post–procedure recovery likely to be prolonged with this drug.

Observation: By trained staff in clinically suitable area and resuscitation equipment immediately available.

Documentation and Audit forms.

Discharge: When baseline recovery parameters met and discharge advice given.
Discharge prior to full recovery to their pre-sedation state of consciousness and cardiorespiratory function has resulted in poor outcomes.

KETAMINE – IV/IM

Ketamine Sedation:

This guideline is intended for use in Kidz First EC only

Drug: NMDA receptor antagonist – amnesic/analgesic.
For procedural sedation aged 6 months-12 years old.
This guideline does not recommend use of ketamine under the age of 6 months

Dose: **1 mg/ Kg IV +/- 0.25 mg/Kg (max 2 mg/Kg)**
IV is the preferred route of administration as onset is more predictable and dose can be titrated
2-4 mg/ Kg IM +/- 0.25 mg/Kg IV (max 5 mg/Kg)
You may need further doses for prolonged procedures >15 minutes.

Actions:

Rapid Onset:	30-60 seconds (IV)	2-5 minutes	(IM)
Short Duration	5-15 minutes (IV)	15-30minutes	(IM)

Advantages	Disadvantages
• Rapid Onset. • Short duration. • Motionless. • Amnestic. • Analgesic. • No loss of airway reflexes.	• Hypersalivation. • Transient respiratory events. • Vomiting. • Purposeless movements. • Emergence Phenomenon. • This is more common in the following patient: - Age >10 years. - Female sex. - Psychiatric or personality disorder. - Vivid dreamers. - Fast bolus injections of Ketamine. - Agitated state prior to procedure. - Physical stimulation on wakening. Therefore patient selection is very important.

Indications: Brief, painful procedures which require patient to be cooperative and not moving.

Contraindications:
Type of procedure not amenable to it being performed in ED eg complex wounds, anticipated difficult to reduce fractures.

1. Environment related
    - Inadequate staffing, busy department
2. Drug related
    - Age-under 1
    - Mental state
    - Laryngeal stimulation
3. Patient related
    - Anatomy
    - Upper respiratory infection
    - Asthma
    - Cardiac history
    - Psychiatric or personality disorders
    - Age<3/12-increased risk of airway obstruction
    - Thyroid or liver disease
    - Procedures involving stimulation of the posterior pharynx
    - Glaucoma or acute globe injury

Preparation:
- Patient selection
- Pre-sedation assessment
- Preparation of Patient and Family
- Preparation of Staff
- Preparation of Facilities and Equipment

Patient selection
- Age
- Procedure
- Any contraindications

Pre-sedation assessment
- Type of procedure
- Agent of choice
- Patient selection-use sedation form for
- presedation checklist
- State of department-liaise with ED SMO and charge nurse

Patient preparation

- Presedation info sheet
- Play therapist
- IV line
- Consent

Preparation of staff

- Minimum of 3 staff present
    - Person performing sedation
    - Person performing procedure
    - Person aiding

Monitoring

- Capnography
- Saturations probe
- 3 lead cardiac monitoring
- Baselin blood pressure

Equipment and drug preparation

- Suction turned on and checked
- Correct size mask and bag for BVM attached and checked
- Oropharyngeal airway sized and available
- Intubation drug “lunchbox” in the room
- Resus drug sheet printed out with dose of suxamethonium noted

Ketamine Credentialling

- Selected group
    - Airway job
    - APLS
    - Middlemore Airway Workshop
- Simulation
- Watch 3, 3 done under direct supervision, 3 indirectly supervised
- If credentialed at another hospital regionally, 1 directly supervised

PROCEDURAL SEDATION DISCHARGE ADVICE FOR CHILDREN

PATIENT STICKER

Your child was given medications that cause drowsiness so the doctors could perform a procedure on your child with minimal discomfort. The medicines that were given to your child in the Emergency Department may still be active for the next 24 hours. They may cause temporary clumsiness and poor judgement leading your child to do things that they normally wouldn't do.

The medications were .....
.....
.....
.....

Your doctor was .....

We Recommend:

- Avoid food and drinks for two hours or until the child is fully awake, alert and not vomiting. Young infants should start with half their normal feed an hour after arriving home.

- Watch closely for the next eight hours. They should be supervised at all times especially those children who normally play outside.

- Your child should not bathe, swim or go into a hot tub unsupervised for eight hours.

- Your child may be sleepy, but do not leave them unattended especially in a car seat. They should be awoken every hour for the next four hours. If you are unable to wake them or your child's breathing does not look normal, please call 111 or return to hospital immediately.

- Restrict your child's activities to quiet playing, watching TV or colouring. Avoid bikes, skates, swings, climbing monkey bars or handling hot drinks as these activities might result in your child injuring themselves over the next 24 hours.

If you notice anything unusual or have any questions please contact the Emergency Department on 276-0044 extension 7411.

APPENDIX 1

FENTANYL - IV

Drug: Short-acting potent Opiod often used with Midazolam.

Dose: **0.5-1 mcg /kg/dose** (slow push). Titrate to max 5 mcg/kg.
Effects more pronounced and prolonged <6 months – reduce the dose.

Actions: Rapid Onset: 2 minutes.
Short Duration 30-60minutes (IV).

Advantages	Disadvantages
• Rapid onset. • Short duration. • Reversible with Naloxone. • Potent analgesic.	• Respiratory depression. • Hypotension. • Increased side effects when used with Benzodiazepines. • Chest wall rigidity, partially reversed by naloxone but may require neuromuscular blockade associated with large fast boluses of Fentanyl. • Nausea and vomiting and constipation. • Safety data is lacking in <2 years old – consider morphine as an alternative.

Contraindications: Specific hypersensitivity.
Pre-existing hypotension or respiratory depression.

Preparation:

- Parents and Child: History and cardiorespiratory examination and consider fasting status.
  Baseline observations and monitor.
  Consent discussing the alternatives and above disadvantages.
  Play Therapy (dependant on time/availability and appropriateness).
  IV access. (Topical anaesthetic if time allows).
- Staff: Notify the Consultant on call *3703 to be available if complications.
  Procedure doctor.
  Airway doctor.
  Procedure nurse.
- Equipment: Oxygen mask/oxygen saturation monitoring/suction.

Paediatric resuscitation trolley.

- Medication: Fentanyl – labelled with pre-calculated doses.
  Naloxone – 0.1 mg/kg/dose (max 2 mg/dose) Ampoule present.
  Oxygen**.**

Post–procedure Recovery.

Observation: By trained staff in clinically suitable area and resuscitation equipment immediately available.

Documentation and Audit forms.

Discharge: When baseline recovery parameters are met and discharge advice given.

MIDAZOLAM – IV/IM

Drug: Short acting Benzodiazepine – sedative/hypnotic.

Dose: **0.05 – 0.1 mg/kg/dose** (6/12 to 6 years old) **Max 0.6 mg/kg.**
0.025-0.05 mg/kg/ dose (6 to 12 years old) **Max 0.4 mg/kg.**
Not for use under 6 months of age.

Actions: Rapid Onset: 2 minutes.
Short Duration 30-60minutes (IV) 1-2 hours (IM).

Advantages	Disadvantages
• Rapid onset. • Short duration. • Reversible with Flumazenil. • Amnestic.	• Paradoxical agitation – which may require higher dosing. • Respiratory depression. • Hypotension. • No analgesic effect. • Increased side effects when used with Opiods.

Contraindications: Specific hypersensitivity.
Pre-existing hypotension or respiratory depression.

Preparation:

- Parents and Child: History and cardiorespiratory examination and consider fasting status.
  Baseline observations and monitor.
  Consent discussing the above disadvantages and alternatives.
  Play Therapy (dependant on time/availability and appropriateness).
  IV access. (Topical anaesthetic if time allows).
- Staff: Notify the Consultant on call *3703 to be available if complications.
  Procedure doctor.
  Airway doctor.
  Procedure nurse.
- Equipment: Oxygen mask/oxygen saturation monitoring/suction.
  Paediatric resuscitation trolley.
- Medication: Midazolam – labeled with pre-calculated doses.
  Flumazenil – 10-20 mcg/kg/dose (max dose 200 mcg) (max 40 mcg/kg).
  Ampoule present and dose pre-calculated: VERY RARELY NEEDED.

Post–procedure Recovery.

Observation: By trained staff in clinically suitable area and resuscitation equipment immediately available.

Documentation and Audit forms.

Discharge: When baseline recovery parameters are met and discharge advice given.

PROPOFOL (IV)

Should be performed in the Resuscitation room due to high risk of apnoea. Should only be given under supervision of ED SMO

Drug: Short acting general anaesthetic

Dose: 0.5-1 mg/kg over 1-5 minutes. May administer up to 1 mg/kg additional IV bolus dose.

Action: Rapid onset: 1-2 minutes
Short acting: 5-10 minutes

Advantages:	**Disadvantages:**
• Rapid onset • Short duration of action	• Causes apnoea especially when used in combination with opiates • Respiratory depression • Hypotension • Minimal analgesic effect • Side effects increased if used in conjunction with steroids

Is the procedure suitable to be performed in ED? This agent is very short-acting. Complex wounds and difficult to reduce fractures are probably better performed in the OR. Consider using ketamine.

Contraindications:

Environment related
- Inadequate staffing, busy department

Drug related
- Age-under 3

Patient related
- Potentially difficult airway
- ASA class 3 and 4-consider OR unless time critical
- Hypersensitivity to egg, soya, peanut protein

Preparation:

– Patient selection

- Pre-sedation assessment
- Preparation of Patient and Family
- Preparation of Staff
- Preparation of Facilities and Equipment

Patient selection

- Age
- Procedure
- Any contraindications

Pre-sedation assessment

- Type of procedure
- Agent of choice
- Patient selection-use sedation form for
- presedation checklist
- State of department-liaise with ED SMO and charge nurse

Monitoring

- Capnography
- Saturations probe
- 3 lead cardiac monitoring
- Blood pressure

Equipment and drug preparation

- Suction turned on and checked
- Correct size mask and bag for BVM attached and checked
- Oropharyngeal airway sized and available
- Resus drug sheet printed out

References

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Definitions

Terms and abbreviations used in this document are described below:

Term/Abbreviation	Description

Associated Documents

Document ID:	A10525	**Version:**	3.0
Department:	Kidz First EC and Paediatrics	**Last Updated:**	01/06/2015
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Counties Manukau District Health Board			

Other documents relevant to this guideline are listed below:

NZ Legislation	Health Practitioners Competency Assurance Act (2003) Privacy Act (1993) Health Information Privacy Code Revised (2008) Health and Disability Code of Consumers Rights (1996) Accident Rehabilitation and Compensation Insurance Act (1992) Humans Right Act (1993) Official Information Act (1982)
CMDHB Clinical Board Policies	Use of Abbreviations in the Clinical Record (A5540) Informed Consent (Children and Youth) Policy (A5529) Standing Orders for Delegated Medical Authority Policy (A7344) Policy; Medication – requirements, administration, certification and registration (A5554)
NZ Standards	Health and Disability Sector Standards (2008)
Organisational Procedures or Policies	
Other related documents	