

WOMEN'S HEALTH AND PAEDIATRICS
PAEDIATRIC DEPT

Sedation in Children

Amendments			
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In Consultation with:

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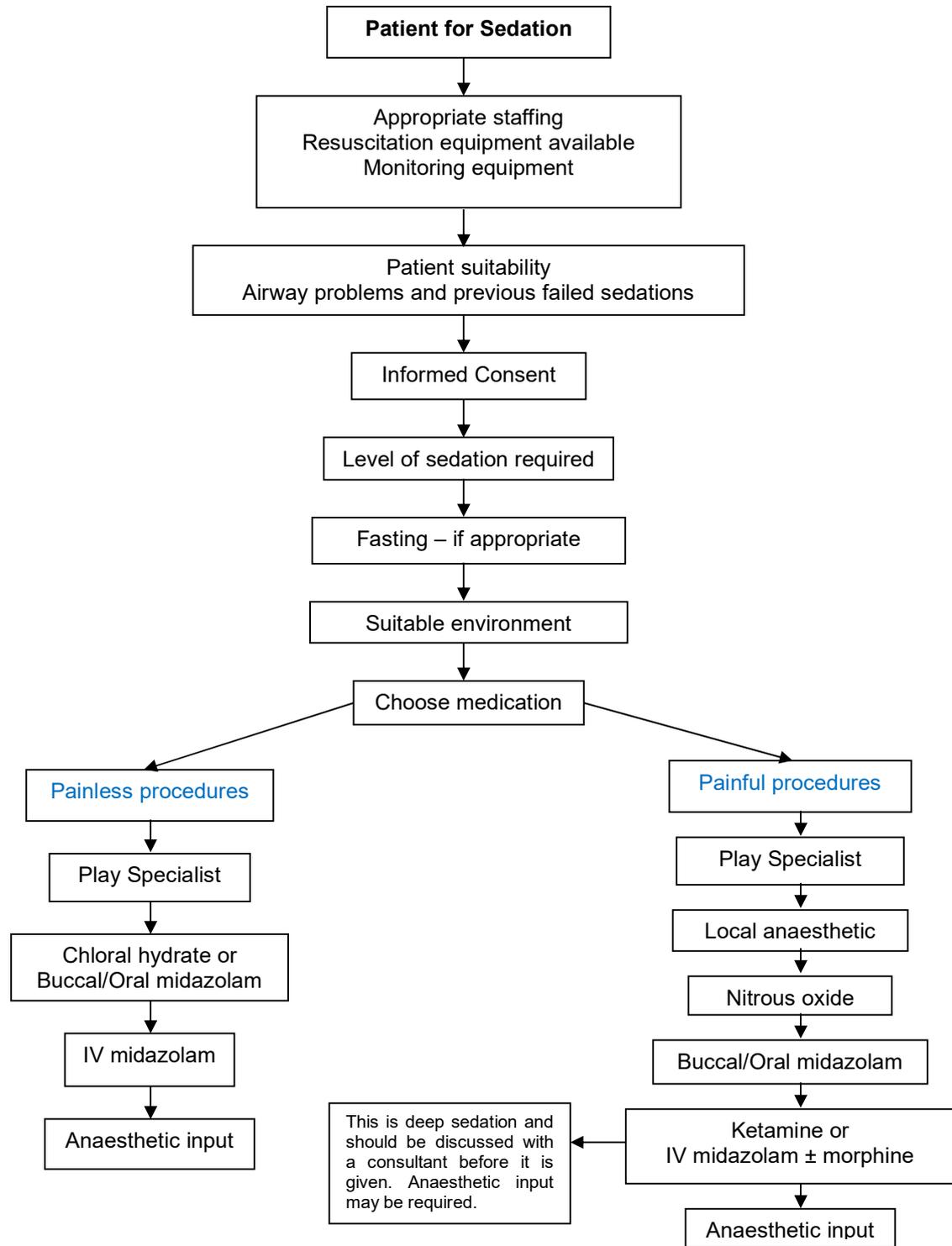
Target Audience: Doctors, nurses and support staff working in Paediatrics

Impact Assessment Carried Out By:

Comment on this document to: Dr Bhatti and Dr Baksh Consultant Paediatrician

First Ratified Nov 2014	Latest Reviewed December 2019	Version Number: 3	Page 1 of 8
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See text for full explanation and drug doses



Background

There are many more treatments and investigations available in Paediatric medicine today. Many of these can be painful or require the child to lie still. To make this possible these children may need sedation or anaesthesia. The choice between sedation and anaesthesia will depend on the type of procedure, the child and the availability of appropriately trained staff.

Key Points

- Is sedation needed?
- Are there appropriately trained staffs available for the sedation to be given safely?
- Monitoring and resuscitation equipment
- Is patient suitable for sedation?
- Informed consent
- What type/level of sedation is needed?
- Is analgesia required?
- Fasting (if required)
- Environment
- Drugs and any reversal agents

Staffing

All staff involved in giving sedation should have an understanding of the drug pharmacology and know how to assess and monitor the patient whilst they are under sedation. All staff should have basic life support skills and for moderate or deep sedation one member should have advanced life support skills.

For moderate and deep sedation there should be a doctor and a nurse with the patient to monitor them closely (the doctor may be able to do the procedure depending on the degree of sedation). For light sedation then a nurse can be with the patient but a doctor should be available to attend if there is a problem.

If adequate or suitably trained staff is not available, then the sedation should not be given.

Resuscitation Equipment

For all levels of sedation there should be immediate access to resuscitation equipment including suction and oxygen. If a patient is being transferred between departments while they are sedated, then this must accompany the child.

Monitoring

Monitoring is required for moderate and deep sedation and the following should be assessed:

- Depth of sedation
- Respiration
- Oxygen saturations
- Heart rate
- Pain
- Coping
- Distress

For deep sedation the following should also be considered

- 3 lead ECG
- Blood pressure (every 5 minutes)
- End tidal CO₂

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 3 of 8
----------------------------	-------------------------------	-----------------	-------------

Ensure that data from monitoring is documented.

Monitoring should continue until the child:

- Has a patent airway
- Shows protective airway and breathing reflexes
- Is haemodynamically stable
- Is easily roused

Patient Suitability

Assess all of the following prior to sedation:

- Current medical condition and any surgical problems
- Weight
- Past medical problems – particularly any problems associated with previous sedation or anaesthesia
- Medication and allergies
- Physical status
- Psychological and developments status

If there are any concerns regarding airway or breathing problems or any past problems with sedation/anaesthesia then sedation may not be suitable. These patients should be discussed with the consultant and anaesthetic team.

Informed Consent

The procedure and intended sedation should be explained to the parents/carers including the risks and proposed benefits. Informed consent should be obtained and recorded.

This should also be explained to the child at an appropriate level and their assent obtained. Play specialists are available and very useful to help with this.

Levels of Sedation

Minimal Sedation: Patient is awake, calm and able to respond normally to verbal commands. Cognition may be impaired but cardiac and respiratory status is unaffected.

Moderate Sedation: Patients are sleepy but respond purposefully to verbal commands. Airway is maintained and spontaneous ventilation is maintained. Cardiovascular function is usually maintained.

Deep Sedation: Patients are asleep and cannot be easily roused. The ability to maintain adequate respiratory function may be impaired and they may require assistance to maintain their airway. Cardiovascular function is usually maintained.

The level of sedation will depend on what the procedure involved and how cooperative the patient is required to be.

Fasting

Fasting is not required for minimal sedation, Nitrous oxide or moderate sedation where verbal contact will be maintained.

For all other elective procedures requiring sedation the following rules apply:

- 2 hours for clear fluids
- 4 hours for breast milk
- 6 hours for solids

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 4 of 8
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For emergency procedures in a child who has not fasted then the decision should be based on the degree of urgency and the required depth of sedation.

Environment

It is important, particularly for children having light sedation that the environment is appropriate for them to go to sleep and to stay asleep – a quiet, darkened area. This will also hold true if the child is being moved to another department (e.g. Radiology), then that department (and ideally the trip between) should be kept as quiet as possible. If a child needs to be undressed for a procedure or test, then ensure this is done before the sedation is given.

Medication

See appendix for licensing indications. Parents/guardians should be informed if a drug is being used off licence.

Before administering benzodiazepines always calculate the dose of flumazenil and ensure it is immediately available.

Painless Procedures e.g. Imaging/LP

Light sedation is all that should be routinely needed for these children. Remember to involve the Play Specialist for help with distraction techniques.

For neonates and young babies, consider using the “feed and wrap” technique. If sedation is required then do not routinely use ketamine or opioids.

Chloral hydrate or oral/buccal midazolam are safe drugs to use with a wide safety margin.

CHLORAL HYDRATE

- 100 mg/kg, maximum 2 g, given orally or rectally 1 hour before procedure

BUCCAL MIDAZOLAM

- Child 6 months – 10 years – 200–300 micrograms/kg (max. 5 mg)
- Child 10–18 years – 6–7 mg (max. 8 mg if 70 kg or over)

ORAL MIDAZOLAM

- Child 1 month–18 years – 500 micrograms/kg (max. 20 mg) 30–60 minutes before procedure

For children who are not sedated sufficiently using chloral hydrate at this doses, especially for longer procedures, then consider using **IV MIDAZOLAM**.

- Child 1 month–6 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 6 mg)
- Child 6–12 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 10 mg)
- Child 12–18 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 7.5 mg)

FLUMAZENIL(Reversal agent for benzodiazepines) – by intravenous injection over 15 seconds (question aetiology if no response to repeated injection)

- Neonate – 10 micrograms/kg, repeat at 1-minute intervals if required
- Child 1 month–12 years – 10 micrograms/kg (max. single dose 200 micrograms), repeated at 1-minute intervals if required; max. total dose of 40 micrograms/kg (1 mg) (2 mg in intensive care)

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 5 of 8
----------------------------	-------------------------------	-----------------	-------------

- Child 12–18 years – 200 micrograms, repeated at 1-minute intervals if required; max. total dose 1 mg (2 mg in intensive care)

If this is not successful then liaise with anaesthetic team for consideration of GA.

Painful Procedures

Moderate or even deep sedation are often required for these procedures. Remember to involve the Play Specialist for help with patient preparation.

Consider the use of local anaesthetics as well as sedatives if appropriate.

Also consider using nitrous oxide if the required level of sedation is minimal and the child is able to use it adequately. Oral or buccal midazolam may also be appropriate.

BUCCAL MIDAZOLAM

- Child 6 months–10 years – 200–300 micrograms/kg (max. 5 mg)
- Child 10–18 years – 6–7 mg (max. 8 mg if 70 kg or over)

ORAL MIDAZOLAM

- Child 1 month–18 years – 500 micrograms/kg (max. 20 mg) 30–60 minutes before procedure

If these are not suitable then consider the use of ketamine or IV midazolam ± fentanyl

KETAMINE

- Child 1 month–18 years – 1–2 mg/kg as a single dose

IV MIDAZOLAM

- Child 1 month–6 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 6 mg)
- Child 6–12 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 10 mg)
- Child 12–18 years – initially 25–50 micrograms/kg, increased if necessary in small steps (max. total dose 7.5 mg)

FLUMAZENIL

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- Child 12–18 years – 200 micrograms, repeated at 1-minute intervals if required; max. total dose 1 mg (2 mg in intensive care)

MORPHINE – By intravenous injection over at least 5 minutes (to be given by doctor)

- Neonate – 50 micrograms/kg

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 6 of 8
----------------------------	-------------------------------	-----------------	-------------

- Child 1month–12 years – 100 micrograms/kg
- Child 12–18 years – 2.5 mg

If adequate sedation is not achieved or there is insufficient staffing then refer to anaesthetic department for assistance and consideration of general anaesthetic.

After Sedation

Ensure that the following criteria are met before the child is discharged

- Temperature, heart rate, blood pressure and respiratory rate have returned to normal values
- The child is awake (or returned to baseline level of consciousness) and there is no risk of further reduced level of consciousness
- Nausea, vomiting and pain have been adequately managed

Off-label indications and cautions for recommended drugs

Chloral hydrate is used in UK clinical practice for sedating children and young people for painless procedures. At the time of publication (December 2010) chloral hydrate did not have UK marketing authorisation for this indication. See ‘Licensing indications’, below.

Ketamine is a dissociative agent: the state of dissociative sedation cannot be readily categorised as either moderate or deep sedation; the drug is considered to have a wide margin of safety. See ‘Licensing indications’, below.

Midazolam is used in UK clinical practice for sedating children and young people up to the age of 18. At the time of publication (December 2010) midazolam did not have UK marketing authorisation for oral or buccal administration, or for children younger than 6 months. See ‘Licensing indications’, below.

Licensing indications

The table that follows provides a summary reference guide to pharmacological treatment. It was prepared from data available in September 2010. Prescribers should refer to the ‘British national formulary for children’ (BNFc) and summary of product characteristics for each drug for full and up-to-date details of licensing. Informed consent should be obtained and documented for the use of any drug outside the licensed indications.

Drug	Indication	Licensed status and advice for use*
Chloral hydrate	Sedation	Not licensed for sedation in painless procedures However, dosing for painless procedures in children from neonates to 18 years is given in the BNFc; by mouth or by rectum
Ketamine	Anaesthesia (lower doses are used for sedation than for anaesthesia for surgery)	Licensed for use in anaesthesia for all ages; intravenous and intramuscular If deep sedation is needed ketamine may be used. It should be used only under the supervision of a specialist experienced in its use

* Taken from the ‘British national formulary for children’ (BNFc) 2010/11, correct at the time of publication.

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 7 of 8
----------------------------	-------------------------------	-----------------	-------------

Midazolam	Sedation	Not licensed for use in children younger than 6 months for premedication and conscious sedation Not licensed for use by mouth or by buccal administration Intravenous midazolam is not licensed for use in children younger than 6 months for conscious sedation No UK marketing authorisation for oral or intranasal midazolam for sedation. However, dosing for children from age 1 month is given in the BNFc
Nitrous oxide	Sedation	50% nitrous oxide licensed for use in sedation for all ages; inhalation Nitrous oxide in concentrations greater than 50% is not licensed for analgesia without loss of consciousness
Opioids	Sedation	The BNFc stipulates that if deep sedation is needed a general anaesthetic (for example, propofol or ketamine), or a potent opioid (for example, fentanyl) may be used. However, they should be used only under the supervision of a specialist experienced in the use of these drugs.

References:

1. Sedation in children and young people, NICE clinical guideline 112, December 2010
2. British National Formulary for Children 2010 – 2011.
3. Sedation for diagnostic and therapeutic procedures in children and young people: summary of NICE guidance BMJ 2010;341:c6819

First Ratified Nov 2014	Latest Reviewed March 2018	Version Number:	Page 8 of 8
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