GUIDELINE FOR THE MANAGEMENT OF SEDATION IN CHILDREN

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<tr>
<th>Reference:</th>
<th>Sedation</th>
<th>Version No:</th>
<th>1</th>
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| Applicable to | Children under 16 in CHfW, Paeds ED, UHW |

Classification of document: Guideline

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Group Consulted: Practitioners within the Children’s Hospital for Wales, Paediatric Anaesthetists, Current literature

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<tr>
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Disclaimer

These have been ratified at the Child Health Guideline Meeting, however clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.
This guideline is intended only for sedation on the general paediatric wards, children investigations unit (CIU) and paediatric emergency department for painless diagnostic radiology procedures (less than 45 min duration) and common painful procedures.

The aims of sedation during diagnostic or therapeutic procedures include reducing fear and anxiety, augmenting pain control and minimising movement. The importance of each of these aims will vary depending on the nature of the procedure and the characteristics of the patient. Currently there is no ideal sedative agent that is safe, effective and easy to administer. Excessive sedation can cause unintended loss of consciousness and dangerous hypoxia. Sedation is not always effective enough and so occasionally the procedure has to be delayed until the child or young person can be anaesthetised. This may need to take place in a different healthcare setting or on another day. Consequently, sedation failure can be distressing for the children and their parents.

Definitions

Levels of sedation

The definitions of minimal, moderate, conscious and deep sedation used in this guideline are based on those of the American Society of Anesthesiologists (ASA)

- **Minimal sedation**: A drug-induced state during which patients are awake and calm, and respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

- **Moderate sedation**: Drug-induced depression of consciousness during which patients are sleepy but respond purposefully to verbal commands (known as conscious sedation in dentistry) or light tactile stimulation (reflex withdrawal from a painful stimulus is not a purposeful response). Spontaneous ventilation is adequate but may need interventions to maintain a patent airway. Cardiovascular function is usually maintained. Consider a doctor separate to the person doing the procedure to monitor airway

- **Deep sedation**: Drug-induced depression of consciousness during which patients are asleep and cannot be easily roused but do respond purposefully to repeated or painful stimulation. The ability to maintain ventilatory function independently may be impaired. Patients may require assistance to maintain a patent airway. Spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

A separate doctor / trained practitioner is essential to monitor airway in addition to the person doing the procedure
Pre-sedation assessment, communication, patient information

- Junior doctor or nursing staff (trained in sedation) carry out pre-sedation assessments and document the results in the healthcare record.
- Establish suitability for sedation by assessing all of the following:
  - current medical condition and any surgical problems
  - weight (growth assessment)
  - past medical problems (including any associated with previous sedation or anaesthesia)
  - current and previous medication (including any allergies)
  - physical status (including the airway)
  - Psychological and developmental status.
- Seek advice from senior consultant or anaesthetist before delivering sedation:
  - if there is concern about a potential airway or breathing problem
  - if the child or young person is assessed as American Society of Anaesthesiologists (ASA) grade 3 or greater
  - if sedation for infants, including neonates.
- Ensure that both the following will be available during sedation:
  - a healthcare professional and assistant trained in delivering and monitoring sedation in children and young people
  - immediate access to resuscitation and monitoring equipment

ASA Grades

<table>
<thead>
<tr>
<th>Grades</th>
<th>Definition</th>
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<tbody>
<tr>
<td>I</td>
<td>Healthy individual with no systemic disease</td>
</tr>
<tr>
<td>II</td>
<td>Mild systemic disease not limiting activity</td>
</tr>
<tr>
<td>III</td>
<td>Severe systemic disease that limits activity but is not incapacitating</td>
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<tr>
<td>IV</td>
<td>Incapacitating systemic disease which is constantly life-threatening</td>
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<tr>
<td>V</td>
<td>Moribund, not expected to survive 24 hours with or without surgery</td>
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Psychological preparation

Ensure that the child or young person is prepared psychologically for sedation by offering information about:

- the procedure
- what the child or young person should do and what the healthcare professional will do
• the sensations associated with the procedure (for example, a sharp scratch or numbness)
• How to cope with the procedure.

Ensure that the information is appropriate for the developmental stage of the child or young person and check that the child or young person has understood the information.

Offer parents and carers the opportunity to be present during sedation if appropriate. If a parent or carer decides to be present, offer them advice about their role during the procedure.

**Choosing sedation method**

Choose the most suitable sedation technique based on all the following factors:

- what the procedure involves
- target level of sedation
- contraindications
- side effects
- patient (or parent or carer) preference
- staff training with drugs chosen

**Contraindications to sedation**

In general the following conditions are contraindications to sedation in children

<table>
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<tr>
<th>1. Abnormal airway</th>
<th>7. Cardiovascular instability</th>
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<tr>
<td>2. Raised intracranial pressure</td>
<td>8. Bowel obstruction</td>
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<tr>
<td>3. Depressed conscious level</td>
<td>9. Active respiratory tract infection</td>
</tr>
<tr>
<td>4. Sleep apnoea</td>
<td>10. Known allergy or adverse reaction to sedative in past</td>
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<tr>
<td>6. Neuromuscular disease</td>
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**Painless radiology imaging**

Examples- CT scan, MRI, Bone scan, skeletal survey

- For children and young people who are unable to tolerate a painless procedure consider one of the following drugs, which have a wide margin of safety:
  - chloral hydrate for children under 15 kg
  - midazolam oral/IV
- For children and young people who are unable to tolerate painless imaging with the above drugs discuss with consultant Paediatrician or Anaesthetist.

**Painful procedures**

- For all children and young people undergoing a painful procedure, consider using a local anaesthetic as well as a sedative.
- For children and young people undergoing a painful procedure (for example, suture laceration, long line, lumbar puncture) when the target level of sedation is minimal or moderate, consider:
  - nitrous oxide (in oxygen) and/or
  - midazolam (oral or buccal)
• For children and young people undergoing a painful procedure (for example orthopaedic manipulation, intercostal chest drain, bronchoscopy) in whom nitrous oxide (in oxygen) and/or midazolam (oral or buccal) are unsuitable consider:
  - intravenous midazolam with or without opiates *(to achieve moderate sedation) or
  - IM/IV ketamine*

* Special training and experience required prior to using above methods

Fasting

Before starting sedation, confirm and record the time of last food and fluid intake in the healthcare record. Fasting times should be as for general anaesthesia: 2 hours for clear fluids; 4 hours for breast/formula milk; 6 hours for solids. Apply the 2-4-6 fasting rule for elective procedures using any sedation technique (that is, apply the 2-4-6 fasting rule for deep sedation and moderate sedation during which the child or young person might not maintain verbal contact with the healthcare professional).

For an emergency procedure in a child or young person who has not fasted, base the decision to proceed with sedation on the urgency of the procedure and the target depth of sedation. Fasting is not needed for:
• minimal sedation
• sedation with nitrous oxide (in oxygen)

Consent

Obtain informed consent for all sedation procedures and document in the medical record

Clinical monitoring during sedation

Continuously monitor, interpret and respond to changes in all of the following.

<table>
<thead>
<tr>
<th>For moderate (excluding for nitrous oxide) and deep sedation</th>
<th>For deep sedation only</th>
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<tbody>
<tr>
<td>Depth of sedation</td>
<td>Pain</td>
</tr>
<tr>
<td>Respiration</td>
<td>Coping</td>
</tr>
<tr>
<td>Oxygen saturation</td>
<td>Distress</td>
</tr>
<tr>
<td>Heart rate</td>
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Ensure data from continuous monitoring during sedation are clearly documented in the medical record.

Discharge criteria

Ensure that all of the following criteria are met before the child or young person is discharged:
• vital signs (usually body temperature, heart rate, blood pressure and respiratory rate) have returned to normal levels
• the child or young person 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.

Guideline for the management of Sedation in Children
Drugs and doses
It is the prescribing doctor’s responsibility to ALWAYS confirm the doses and routes with latest BNFc as doses might change.

Chloral Hydrate:
Sedative and hypnotic, unpredictable onset and duration.

Oral/Rectal
Dose: 50 mg/kg (<5kg or 6 months age) and maximum dose of 75-100mg/kg as single dose.
Time at least 45 to 60 min before the procedure

Full dose may be given or give an initial dose of 75mg/kg then an additional (25mg/kg) in twenty minutes if level of sedation is not achieved. Do not exceed maximum dose.

Side effects:
- Hyperactivity occurs in 1-2 % of patients. Abort procedure and seek help.
- Liver failure (rare).
- Impaired liver function; chloral hydrate should not be used.
- Respiratory depressant activity is less common than with other sedatives

Midazolam:
Anxiolytic and sedative. Central nervous system depressant. No analgesic properties.

Intravenous
Onset: 5-10 minutes
Midazolam intravenous should be titrated until the desired level of sedation is achieved. Administration should not exceed the total maximum dose (age/weight)

1month to 6 years – 50micrograms/kg increased in small steps if required as 50mcg/kg every 5min (maximum total dose 6mg)
Above 6years 100micrograms/kg to 300micrograms/kg (maximum total dose 10mg)
Always give slowly over 5min and titrate until desired level of sedation

Reversal agent: Flumazenil dose should be calculated, prepared and kept ready to administer

Oral midazolam
Onset 30-60 min
500mcg/kg (0.5mg/kg) maximum dose of 20mg at least 30 min before the procedure

Buccal midazolam
Onset 10-15min
6months-10yrs age: 200-300micrograms/kg (max 5mg)
10yrs-18yrs: 6-7mg (max8mg)

Side effects: cardiac depression, apnoea and respiratory depression.

Rapid administration of IV midazolam increases the risk of cardio respiratory depression.
- Excessive sedation
- Airway obstruction
- Hypotension- especially in patients with impaired cardiovascular stability.
- Delirium, paradoxical agitation
- Hiccups and impaired balance and coordination- patients at risk for falls.
Nitrous Oxide

Nitrous oxide will diffuse into gas filled spaces causing increased volume and increased pressure within a closed cavity. Therefore nitrous oxide is not to be used in patients where there is a risk of expansion of trapped gas e.g.

- Pneumothorax
- Bowel obstruction
- Middle ear disease
- Decompression sickness

Opiates

**Intravenous**
- **Morphine sulphate** 50-60micrograms/kg
- **Pethidine** hydrochloride (Meperidine) 0.5-1mg/kg (max50mg)

Reversal agents: If Opiates used then Naloxone should be kept ready prior to administration

Side effects - Opiates in combination with benzodiazepines increase the risk of apnoeas

**Note:** Avoid drug combinations for sedation and always discuss with consultant or associate specialist doctor prior to considering other drugs especially when one chosen method fails to provide adequate sedation.

For example
1. If chloral hydrate used to maximum dose and still inadequately sedated after appropriate time interval
2. If oral midazolam is used and child vomits within 5-10 min carefully consider the other methods of administration and further doses

FLOW CHART – See next page

References:

1. NICE guideline for sedation in children CG112
   CEC guideline from college of emergency medicine

Guideline for the management of Sedation in Children
Children’s Hospital for Wales

**Guideline for the management of Sedation in Children**

**FLOW CHART**

- **Assess the child**
  - Current medical condition and any surgical problems
  - Weight
  - Past medical problems
  - Current medication and any allergies
  - Physical status (including airway)
  - Developmental and psychological status
  - Fasting status

- **Anticipated any cautions for sedation?**
  - **Yes**
  - **No**

- **Obtain informed written consent**
  - Select the drug and method of sedation for intended procedure (oral/buccal/IV)

- **Anticipated any of the cautions below**
  - Concern about potential airway or breathing problem
  - Is the child assessed as ASA grade 3 or greater?
  - Neonates and infants
  - Seek advice from consultant paediatrician or associate specialist doctor or anaesthetist. If agreed to proceed further?

- **Review with play therapist**
  - Consider local/infiltrative anaesthetic

- **Does the procedure involve pain?**
  - **Yes**
  - **No**

- **Obtain peripheral venous access after topical anaesthetic**
  - Arrange monitoring, resuscitation equipment and quiet environment
  - Oral sedation requires constant nurse supervision
  - IV sedation requires constant doctor supervision
  - Consider if appropriate to have a doctor separate to the proceduralist to monitor the airway

- **Is target sedation minimal or moderate for painless procedure?**
  - **Yes**
  - **No**

- **Oral/PR Chloral hydrate (If child weight <15Kg)**

- **If the child weight is >15Kg or anxious or unco-operative or any other behaviour concerns?**
  - Oral/buccal Midazolam
  - IV Midazolam

- **Avoid drug combinations if one method fails especially drugs with narrow margin safety (discuss with Consultant)**
  - If deep sedation than intended occurs, seek help immediately (arrest call 2222), maintain airway and give oxygen
  - Once the procedure completed send home only if all discharge criteria satisfactory and reviewed by doctor

- **Is target sedation minimal for painful procedure and child co-operative?**
  - **Yes**
  - **No**

- **Use inhaled nitrous oxide (Entonox) 50:50 check contraindications OR Oral/buccal midazolam**

- **IV midazolam along with IV analgesic* OR IV/IM Ketamine* *Only if trained to use it and agreed with consultant**