Royal Cornwall Hospitals
NHS Trust

Ketamine Procedural Sedation for Paediatric Patient Patients in the Emergency Department Clinical Guideline

V2.0

June 2025

Summary

STOP does this child need sedation?
Have all the alternatives including distraction, play, analgesia, intranasal Fentanyl, Entonox been considered?

Paediatric sedation checklist

Staff, location, equipment, Documentation.

- Staffing: minimum of three staff required for all procedural sedation. Sedation only to be performed by trained clinicians.
- Location: All paediatric sedation with ketamine to be performed in resus.
- Equipment: Paediatric resus equipment available.
- Documentation: Paediatric ED sedation Pro-forma.

Patient assessment.

- Pre-sedation assessment including co-morbidities, medications, allergies, previous sedation or anaesthetics, ASA grade documented on sedation checklist.
- Patient>1 year and if 1-5 years clinician relevant experience in use of ketamine.
- No contraindications to Ketamine sedation.
- Procedure expected to last <20 minutes

WHO checklist.

During Sedation

- Monitoring Including ECH, BP, pulse oximetry, end-tidal CO2.
- Oxygen 15l via non re- breath mask.
- Ketamine dos 1.-0mg/kg slow IV injection over at least 1 minutes.
- Documentation observations every 5 minutes, degree of dissociative sedation, adverse events.

Recovery and discharge

- Recovery in a quiet observed monitored area.
- Discharge when all criteria for safe discharge are met.
- Written sedation leaflet for parents/ carers.

1. Aim/Purpose of this Guideline

1.1. Procedural sedation aims to alleviate distress during painful procedures. Procedural sedation in children can be used to facilitate procedures in the emergency department that would otherwise not be tolerated due to pain or distress. Performing paediatric procedural sedation in the emergency department allows point of care treatment for injuries that reduces the need for theatre space, prevents the needs for general anaesthetic and hospital admission. Ketamine sedation should only be used when all options have been considered.

1.2. This guideline is based on the Royal College of Emergency Medicine (RCEM) guideline on ketamine procedural sedation for children in the emergency departments (February 2020). The guideline sets training standards and requirements for the safe sedation of paediatric patients with ketamine in the emergency department.

1.3. This version supersedes any previous versions of this document.

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2. The Guidance

2.1. Ketamine

2.1.1. Ketamine is a phencyclidine derivative that acts as a dissociative sedative through binding to N-methyl-d-aspartate (NMDA) receptor. It has anxiolytic, analgesic, amnesic and dissociative properties. Ketamine causes dissociative sedation, with patients in a trace like state. Unlike other sedation agents ketamine does not conform to the sedation continuum, dissociation is either present or absent.

2.1.2. Ketamine has a wide safety margin. The recommended dose for sedation is 1.0mg/kg given by slow intravenous injection over at least one minute. At this dose the patient should be able to protect their own airway. Clinical onset of action is approximately 1 minute. Ketamine provides effective sedation for 10 – 20 minutes. If procedures are likely to last longer than 20 minutes, then general anaesthetic should be considered. The average time to discharge following ketamine sedation is 90 minutes.

2.1.3. The Royal College of Emergency Medicine recommends the use of intravenous ketamine, rather than intramuscular ketamine. Intravenous ketamine means that intravenous access is in place prior to the sedation and is available to help manage complications and allows delivery of repeated dosing if required. Intramuscular ketamine is associated with higher rates of vomiting and longer recovery time.

2.1.4. Ketamine sedation can be used for short painful procedures such as suturing and fracture manipulation. Before ketamine procedural sedation is used all other options should be explored including analgesia, nitrous oxide/ Entonox, intranasal fentanyl/ diamorphine, local anaesthetic, distraction and play specialists.

2.1.5. Adverse Effects

- Most adverse effects are mild and self-resolving.
- Mild agitation (20%).
- Hypersalivation and lacrimation (<10%), no evidence of the need to co-administer anti-cholinergic agents.
- Involuntary movements and ataxia (5%).
- Vomiting (5-10%) most common in recovery period.
- Transient rash (10%).

2.1.6. Complications

- Apnoea (rare 0.3%) can occur after rapid bolusing of ketamine. Managed with airway positioning and bag-valve mask ventilation. **Risk of apnoea is reduced by following the recommendation to slowly administer ketamine boluses over 60 seconds.**
- Airway obstruction/ noisy breathing (<1%) managed with basic airway repositioning.
- **Laryngospasm** is a rare transient event (0.3%) with incidence of intubation for laryngospasm 0.02%. There is a higher risk of laryngospasm in active respiratory distress and procedures involving the posterior pharynx, ketamine sedation is therefore contraindicated in these groups. Laryngospasm can usually be managed with airway positioning and bag valve mask ventilation.

- **Emergence phenomena** causing agitation and hallucinations during the recovery period. Emergence phenomena is less common in children under 10 (1.6%). Risk of emergency phenomena can be reduced by positive psychology prior to administration. If emergence phenomena occurs during the recovery phase benzodiazepines can be given but prophylactic benzodiazepines are not necessary.

2.2. Indications

2.2.1. Ketamine can be used to facilitate short painful or frightening procedures. Examples of procedures where ketamine sedation may be used in the emergency department.

- Wound suturing.
- Fracture manipulation.
- Joint reduction.
- Chest drain placement.
- Foreign body removal.
- Wound exploration or irrigation.

2.2.2. If a procedure will last longer than 20 minutes, then consideration should be given to performing in theatre under general anaesthetic.

2.2.3. **Ketamine should not be used if there is a clear need for the child to go to theatre.**

2.3. Contraindications

- Age < 12 months due to increased risk of airway complications and laryngospasm. For patients aged 1 – 5 years clinicians must have significant relevant experience in performing ketamine sedation.
- High risk of laryngospasm due to active asthma or respiratory infection.
- Abnormal airway, tracheal surgery or stenosis.
- Active upper or lower respiratory tract infection.
- Pulmonary hypertension.
- Procedure in the mouth or pharynx.
- Severe psychological, cognitive or motor delay, or behavioural problems.
- Significant cardiac disease (angina, heart failure, malignant hypertension).
- Intracranial hypertension with CSF obstruction.

- Intra-ocular pathology (glaucoma, penetrating injury).
- Previous psychotic illness.
- Uncontrolled epilepsy.
- Hyperthyroid or thyroid medication.
- Porphyria.
- Previous adverse reaction to ketamine.
- Altered conscious level due to injury or acute illness.
- Drug or alcohol intoxication.

2.4. Education and Training

2.4.1. Ketamine sedation should only be performed by clinicians experienced in its use and capable of managing its complications particularly airway obstruction, apnoea and laryngospasm.

2.4.2. Training requirements for clinicians performing paediatric ketamine procedural sedation in the emergency department.

- Current APLS certificate.
- Completion 6 months anaesthetics/ intensive care.
- Attendance at theatre sessions to maintain airway skills. Recommended minimum requirement 1 theatre session per year.
- Complete RCEM eLearning module on paediatric procedural sedation.
- Perform 5 supervised paediatric procedural sedation cases using ketamine. The number of supervised procedures required to be deemed competent will be a discretion of the supervising emergency department consultant.
- Completion of paediatric sedation logbook.

2.5. Pre-Sedation Patient Assessment, Consent and Fasting

2.5.1. Pre-Sedation Patient Assessment

The paediatric sedation checklist must be completed before all cases of ketamine sedation (appendix 3). Pre-sedation patient assessment must include assessment and documentation of co-morbidities, regular and acute medications, airway assessment, allergies, previous sedation and anaesthesia, and ASA grade.

2.5.2. Consent

Written consent should be obtained with the parent or guardian. Explain to parent/ caregiver that nystagmus and purposeless movements are normal with ketamine sedation. Risks of ketamine to be included in consent.

- Mild agitation (20%).
- Moderate and severe agitation (1.5%).
- Rash (10%).
- Vomiting (7%).
- Transient clonic movements (<5%).
- Airway problems (<1%).

2.5.3. Fasting

There is no evidence that complications are reduced if a child is fasted. Fasting status should be considered in relation to the urgency of the procedure and the child's co-morbidity, but recent food intake is not a contraindication to ketamine sedation.

2.6. Procedure for Ketamine Sedation

2.6.1. Staff

At least three dedicated members of staff are required for ketamine sedation.

- A clinician to manage the sedation and airway. **Another middle grade or consultant should be available to cover the rest of the department while sedation is performed.** If a sedation is being performed by a grade other than ED consultant, then the ED consultant should be present in the department.
- A clinician to perform the procedure.
- A nurse to monitor and support the patient, family and clinical staff.

2.6.2. Environment and Equipment

Ketamine sedation should be performed in the resuscitation area of the emergency department with full access to paediatric resuscitation equipment.

Monitoring should include ECG, blood pressure, pulse oximetry and capnography. Observations including heart rate, blood pressure, respiratory rate, saturations, capnography, sedation level should be recorded every 5 minutes.

2.6.3. Oxygen

Supplemental oxygen should be given prior to and during ketamine sedation. During certain procedures (facial suturing) it may not be possible to use an oxygen mask and there is evidence that ketamine sedation is safe using room air.

2.6.4. Drug Dose

- Recommended ketamine dose is 1.0mg/kg by slow intravenous injection over at least one minute. Faster administration is associated with increased risk of respiratory depression. Lower doses 0.6 – 0.8mg/kg may be sufficient for short procedures.

- Supplemental doses 0.5mk/kg by slow intravenous injection may be required after 5-10 minutes to maintain dissociative state.

2.6.5. Procedure

- Pre-procedure resuscitation calculations made and WATCH emergency drug sheet printed, ensure drugs are readily available.

- During the procedure parents should be encouraged to stay with the child until sedation is achieved and while the child is recovering. Warn parents that nystagmus, purposeless movements and dissociation are normal during ketamine sedation.

- WHO safety list completed.

- Ketamine dose to be given as slow intravenous injection over at least one minute. Onset of action is 1 - 2 minutes. Adequate sedation is indicated by loss of response to verbal stimuli and nystagmus. Heart rate, blood pressure and respiratory rate may increase. Lacrimation and salivation mat be observed.

- Local anaesthetic should be used when indicated during procedures.

- Following the procedure child should recover in a quiet monitored area. The child may be moved from the resuscitation area and monitoring removed when the sedating clinician is satisfied vital signs are normal for the child. Children can then be observed in the paediatric emergency department until safe for discharge.

- The paediatric sedation pro-forma (appendix 3) should be completed, and all adverse events documented.

2.6.6. Recovery and Discharge

Recovery time for ketamine sedation is usually 60 – 120 minutes.

Criteria for safe discharge following ketamine sedation:

- Vital signs within normal limits.

- No respiratory compromise.
- Nystagmus resolved.
- Return to normal conscious level.
- Able to walk unassisted (older children).
- Pain and discomfort addressed.

All patients should be discharged with a written advice leaflet for parents on ketamine sedation (appendix 4).

2.7. Management of Complications

2.7.1. Severe Emergence Phenomena

- Midazolam 0.05-0.1mg/kg increments.

2.7.2. Intractable vomiting

- Ondansetron 0.1mg/kg (maximum 4mg) IV.

2.7.3. Laryngospasm

- If the child develops stridor attempt airway re-positioning, gentle suctioning of any secretions, and continue high flow oxygen with reservoir bag.
- If the child is saturating normally continue the procedure.
- If stridor gets worse or the child desaturates STOP the procedure, allow child to breath via bag valve mask/ waters circuit, call for help (4th on call and anaesthetic consultant on call).
- If the child desaturates <92% start ventilation via bag valve mask/ waters circuit, apply PEPP, prepare for RSI, ensure anaesthetic help coming.
- If stridor worsens proceed to RSI.

3. Monitoring compliance and effectiveness

Information Category	Detail of process and methodology for monitoring compliance
Element to be monitored	Adverse events during paediatric procedural sedation.
Lead	ED paediatric lead Dr Bareham. ED clinical governance led.
Tool	Periodic ED audit of paediatric procedural sedation. Serious adverse events reported using DATIX.
Frequency	Within 6 months of guideline publication. As serious events, adverse events occur.
Reporting arrangements	Reported to ED, paediatric led.
Acting on recommendations and Lead(s)	Required changes to practice will be identified and actioned in as rapid timeframe as possible.
Change in practice and lessons to be shared	Required changes to practice will be identified and actioned within as rapid timeframe as possible. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders.

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the Equality Diversity And Inclusion Policy or the Equality and Diversity website.

4.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Information Category	Detailed Information
Document Title:	Ketamine Procedural Sedation for Paediatric Patients in the Emergency Department Clinical Guideline V2.0
This document replaces (exact title of previous version):	Ketamine Procedural Sedation for Paediatric Patients in the Emergency Department Clinical Guideline V1.0
Date Issued/Approved:	May 2025
Date Valid From:	June 2025
Date Valid To:	June 2028
Directorate / Department responsible (author/owner):	Dr J Bareham, Emergency Department
Contact details:	01872 252452
Brief summary of contents:	The aim of this guideline is to improve patient safety and quality of care by setting standards for the safe sedation of paediatric patients in the emergency department using ketamine. The guideline sets training standards and requirements for ketamine procedural sedation of children in the emergency department.
Suggested Keywords:	Procedural sedation, sedation, ketamine, emergency department
Target Audience:	**RCHT:** Yes **CFT:** No **CIOS ICB:** No
Executive Director responsible for Policy:	Chief Medical Officer
Approval route for consultation and ratification:	Emergency Department Governance group. Paediatric anaesthetic leads Dr T Beavir and Dr D Mclaughlin.
Manager confirming approval processes:	Rachael Pearce
Name of Governance Lead confirming consultation and ratification:	Paul Evangelista

Information Category	Detailed Information
Links to key external standards:	None required
Related Documents:	The Royal College of Emergency Medicine Ketamine Procedural Sedation for children in the Emergency Department (Feb 2020)
Training Need Identified?	See Section 2.4
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet and Intranet
Document Library Folder/Sub Folder:	Clinical/Emergency Department

Version Control Table

Date	Version Number	Summary of Changes	Changes Made by
October 2021	V1.0	Initial issue	Dr J Bareham, EM Consultant
2024	V2.0	Transposed to new template. Full update.	Dr J Bareham, EM Consultant

All or part of this document can be released under the Freedom of Information Act 2000.

All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.

This document is only valid on the day of printing.

Controlled Document.

This document has been created following the Royal Cornwall Hospitals NHS Trust The Policy on Policies (Development and Management of Knowledge Procedural and Web Documents Policy). It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Equality Impact Assessment

Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity, and Inclusion Team rcht.inclusion@nhs.net

Information Category	Detailed Information
Name of the strategy / policy / proposal / service function to be assessed:	Ketamine Procedural Sedation for Paediatric Patients in the Emergency Department Clinical Guideline V2.0
Directorate and service area:	Acute Emergency Medicine
Is this a new or existing Policy?	Existing
Name of individual completing EIA (Should be completed by an individual with a good understanding of the Service/Policy):	Dr J Bareham, ED Consultant.
Contact details:	01872 252452

Information Category	Detailed Information
1. Policy Aim - Who is the Policy aimed at? (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)	To promote the practice of safe sedation of paediatric patients in the emergency department.
2. Policy Objectives	To identify standards required for safe procedural sedation with ketamine for paediatric patients in the emergency department.
3. Policy Intended Outcomes	• To improve patient safety and quality of care by setting standards for the safe sedation of paediatric patients in the emergency department with ketamine. • To identify training standards and requirements for emergency department clinicians delivering sedation.
4. How will you measure each outcome?	• Audit process. • Investigation of serious adverse events.

Information Category	Detailed Information
5. Who is intended to benefit from the policy?	• Paediatric patients aged 1 – 16 years who require procedural sedation in the emergency department. • All staff involved in paediatric procedural sedation in the emergency department will be aware of the standards expected of their practice.
6a. Who did you consult with? (Please select Yes or No for each category)	• Workforce: Yes • Patients/ visitors: No • Local groups/ system partners: No • External organisations: No • Other: No
6b. Please list the individuals/groups who have been consulted about this policy.	**Please record specific names of individuals/ groups:** Representatives in the emergency department and anesthetics.
6c. What was the outcome of the consultation?	Approved
6d. Have you used any of the following to assist your assessment?	**National or local statistics, audits, activity reports, process maps, complaints, staff, or patient surveys:** No.

7. The Impact

Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

Protected Characteristic	(Yes or No)	Rationale
Age	No	
Sex (male or female)	No	
Gender reassignment (Transgender, non-binary, gender fluid etc.)	No	
Race	No	

Protected Characteristic	(Yes or No)	Rationale
Disability (e.g. physical or cognitive impairment, mental health, long term conditions etc.)	No	
Religion or belief	No	
Marriage and civil partnership	No	
Pregnancy and maternity	No	
Sexual orientation (e.g. gay, straight, bisexual, lesbian etc.)	No	

A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

Name of person confirming result of initial impact assessment: Dr J Bareham, ED Consultant.

If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here:
Section 2. Full Equality Analysis

Appendix 3. Paediatric Sedation Pro-Forma

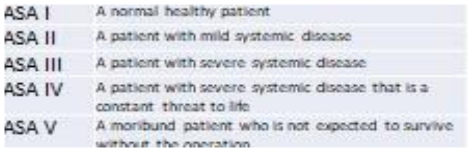
RCHT Emergency Department Paediatric Procedural Sedation Pro -Forma

Patient Label	Age		Weight	
	Date		Time	

Planned procedure	
STOP! Think! Does this child need sedation? Consider analgesia and distraction. Is this procedure appropriate to perform in the ED?	

The Team	
Name of person performing the procedure	
Name of person performing sedation	
Name of nurse	
Is the ED consultant in the department?	Y / N (if no consultant present stop)
Parent/ carer present and briefed what to expect	Y / N

The Patient					
Written parental consent	Y / N	Time last ate		Time last drank	
Previous sedation/ GA	Y / N	Complications?			
Current medication reviewed	Y / N	Allergies			
Any airway difficult anticipated? Y / N **If yes difficult airway do not sedation in ED**		Co-morbidities **(any contraindications to ketamine)**			
		ASA Grade (**grade III or higher do not sedate in ED**			



ASA I	A normal healthy patient
ASA II	A patient with mild systemic disease
ASA III	A patient with severe systemic disease
ASA IV	A patient with severe systemic disease that is a constant threat to life
ASA V	A moribund patient who is not expected to survive without the operation

Pre-Sedation Checklist			
Sedation pro-forma	**Y / N**	**WATCH emergency drug chart printed out**	**Y / N**
Age related airway kit identified	**Y / N**	**3 members of staff available**	**Y / N**
Trolley capable of head down tilt	**Y / N**	**Suction available and functioning**	**Y / N**
Monitoring in place (HR, BP, sats, ETCO2)	**Y / N**	**WHO checklist completed**	**Y / N**

Nurse recovering patient:
Drugs and doses used:

Name
D.O.B Affix label
Hosp Number

			PRE	5	10	15	20	25	30
Date:									
Time:									
Respiratory rate (bpm)									
SpO2 %									
Oxygen delivered (l/min or %)									
Blood pressure: Systolic/ Diastolic (mmHg)		240							
		230							
		220							
		210							
		200							
		190							
		180							
		170							
		160							
		150							
		140							
		130							
Heart Rate (bpm)		120							
		110							
		100							
		90							
		80							
		70							
		60							
		50							
		40							
		30							

Adverse Events [Yes / No]

Oxygen desaturation either <75% at any time or< 90% for > 60s? [Y / N]
Apnoea >60s [Y / N]
Shock requiring fluids/postural manoeuvres [Y / N]
Cardiac arrest [Y / N]
Other [Y / N]

Aftercare Patient: Discharged / admitted

Criteria for discharge:

Return to baseline level of consciousness [Y / N]
Vital signs normal for patient [Y / N]
Absence of respiratory compromise [Y / N]
Absence of significant pain [Y / N]
No significant nausea or vomiting [Y / N
Written advice leaflet given [Y / N]

Time of discharge:

Name and signature of sedating doctor:

Name and signature discharging nurse:

Appendix 4. Ketamine Sedation Information for Parents

Patient information leaflet

Ketamine Sedation: Information for Parent/ Caregiver

ABOUT KETAMINE

Ketamine is a medication used for sedating patients who require brief, painful or unpleasant procedures. It lasts about half an hour.

Ketamine is injected into a vein via a drip.

Under sedation, patients may appear awake but they are unaware of their surroundings. They may drool, have watering of the eyes and may breathe loudly. Occasionally they can make purposeless movements or have twitching movements of their eyes.

SAFETY AND SIDE EFFECTS

Ketamine is very safe when used appropriately. Less than 1 in 100 children experience serious side effects. Rarely some patients will require help with their breathing while sedated, in 1 in 5000 cases a child may need to be given a general anaesthetic with a breathing tube placed in their windpipe to help with their breathing.

Occasionally some patients may experience bad dreams during or after sedation. This is transient and has no lasting effects. It is helpful to encourage your child to imagine positive things before they have the injection.

AFTER THE PROCEDURE

Children can generally go home 90 minutes after sedation. This is when they are alert, talking and walking unaided. Vomiting may occur but this will resolve quickly.

Children may be mildly sleepy or clumsy afterwards. They should be closely supervised for the first 8 hours after discharge. For 24 hours after discharge children should not:

- Get involved in strenuous or sporting activities
- Use play equipment such as climbing frames or monkey bars, ride a bicycle, or swim
- When using the bathroom, the door should be left unlocked

Do let your child sleep. Encourage your child to only eat and drink small amounts to reduce the risk of vomiting.

If you have any concerns that your child may be experiencing problems related to sedation, please contact the emergency department on 01872 253115.