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Royal Cornwall Hospitals NHS Trust

Ketamine as an Adjuvant Post-Operative Analgesic by Anaesthetists Only Clinical Guideline

V3.0

July 2019

1. Aim/Purpose of this Guideline

1.1. Ketamine is an anaesthetic agent with analgesic properties in sub anaesthetic doses.

1.2. Its principle action is to block the action of N Methyl D aspartate which contributes to both chronic pain and the more complex, intractable acute pain states.

1.3. Ketamine infusions can be useful to treat intractable acute pain states, acute pain unresponsive to high dose opiate treatment and in known opioid tolerant patients.

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

1.5. **Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation**

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We can't rely on Opt out, it must be Opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the 'information use framework policy', or contact the Information Governance Team rch-tr.infogov@nhs.net

2. The Guidance

2.1. <u>Rationale for Use:</u>

2.1.1. NMDA (N methyl D aspartate) receptor and ion channel complexes are sited both peripherally and centrally within the nervous system: activation of receptors may increase nociceptive pain and increased in central sensitivity of nerves.

2.1.2 Ketamine is an NMDA receptor non competitive antagonist and will act as an 'anti allodynic and antihyperalgesic' drug as well as potentially decreasing opioid tolerance.

2.1.3. Ketamine should only be used as an adjuvant in acute pain control in a low dose with appropriate monitoring when normal measures are ineffective or in known opioid tolerant patients.

A low dose Ketamine infusion can be useful in treating acute pain states, usually in conjunction with opioids to either reduce the total dose or to supplement analgesia where increasing doses of opioids have failed to help the pain.

2.2. Indications for use

2.2.1. Where pain is inadequately controlled by opiates and other adjuvant drugs such as paracetamol and NSAID's(unless contraindicated) and where increasing opioids may lead to respiratory depression

2.2.2. Where opioid tolerance has developed and patient is requiring increasing doses of opioids with poor effect

2.2.3. In patients who are chronic opioid users and require larger doses to achieve analgesia

2.2.4. Where large amounts of opioids are wished to be avoided because of risk of respiratory depression.

2.3. Pre and post-operative Use of Ketamine

2.3.1. Pre operatively Ketamine may be used as a priming, de sensitisation dose prior to induction (25-50mg) or can be used in its oral form, intranasal or intravenous route post operatively in cases where there may be issues with pain control for the first 48 hours post operatively.

The bioavailability of ketamine depends on its route of administration:
IV -100%
IM and SC – 90%
Sublingual 30% and Intranasal – 45% peak plasma level achieved 30 mins
Oral – 20% - peak plasma level at 120 mins (can be used direct from vial or diluted to chosen flavour, with maximum dose being 200mg per day)

2.3.2. Ketamine preparations:10mg/ml,(20ml vial) 50mg/ml(10ml vial) and 100mg/ml(10ml vial)

2.4. Contraindications

2.4.1. Ketamine has the potential to increase blood pressure and raise intracranial and intra ocular pressures and should be avoided or used with considerable caution in the following:

- Known Ischaemic heart disease
- Significant hypertension
- Raised intracranial pressure cerebral tumour – primary or secondary
- Raised intraocular pressure

- Known psychotic state and PMH hallucinations
- Allergy

2.5. Ketamine may cause the following side effects :

Increased Blood pressure	tachycardia	Hallucinations
Double Vision	nystagmus	hypersalivation
Respiratory Depression is rare		

2.6. Monitoring

Patients receiving ketamine infusions for analgesia, particularly where the dose is being increased should be regularly monitored for BP, pulse, oxygen saturation, sedation level and respiratory rat as per guidelines for PCA with opioids and all observations recorded on the MEWS chart.

2.7. Observation frequency

Monitoring parameter	1st hour	Following 2 hours	thereafter
Respiratory Rate	Every 15 mins	Every 30 mins	Hrly for 24 hrs, then 2hrly until cessation
Blood Pressure	Every 15 mins	Every 30 mins	Hrly for 12 hrs if stable then 2hrly until cessation
Heart Rate/sats	Every 15 mins	Every 30 mins	Hrly for 12 hrs then 2hrlyif stable until cessation
Pain score at rest	Every 15 mins	Every 30 mins	Hrly for 24 hrs then 2hrly until cessation
Pain score on movement	Every 15 mins	Every 30 mins	Hrly for 24 hrs then 2hrly until cessation
Sedation Dysphoria and Hallucinations	Every 15 mins	Every 30 mins	Hrly for 24 hrs then 2hrly until cessation

2.8. Infusion Monitoring

2.8.1. Ketamine infusion rate recorded and remaining volume

2.8.2. Ketamine infusion change

2.9. Prescribing

Ketamine is controlled under 'The misuse of Drugs act 1971 (Schedule 4, Part 1, Class C) and as such is subject is subject to the Misuse of Drugs Regulations.

2.9.1. The drug should be prescribed appropriately in both words and numerical value of milligrams with clarity of concentration and volume of saline to be used.

2.9.2. The drug should be prescribed by doctors familiar with its use –i.e. anaesthetists or acting on advice of anaesthetists.

2.9.3. The drug should be checked in the appropriate way in line with Hospital Policy for controlled drugs and appropriately recorded in the controlled drug book.

2.9.4. If administered intravenously the drug should be diluted in a specific solution (usually saline)which is clearly labelled and in a locked pump with a separate infusion set with an anti-syphon and anti-reflux line, ideally with a dedicated venous line to avoid bolus doses.

2.9.5. The infusion can be set up by persons competent in iv drug administration with a second person checking the prescribed dosage and volume of saline for dilution.

2.9.6. Keys to the ketamine lock box should be with the controlled drug keys.

2.9.7. Guidelines to administration and monitoring should be followed as per specific ketamine for post operative pain relief guideline.

2.9.8. Oxygen should be prescribed as per RCHT policies.

The drug should be used in conjunction with other analgesia such as paracetamol, NSAID's, if not contra indicated, bolus local anaesthetic blockade or infusions and usually intravenous opioids, to achieve a pain score of 1 or 0

N.B. There is no advantage in combining ketamine with an opioid in a PCA as this may increase risk of hallucinations and deliver a very variable dosage.

2.10. Ketamine Infusion

2.10.1. This should be delivered via the especially adapted McKinley pumps clearly labelled for intravenous analgesic use only via the specific giving sets to avoid confusion. . The infusion range is from 1 – 5 mls/hr with dose range required usually from 0.1 – 0.5mg/kg/hr.

2.10.2. The infusion used consists of 500mg Ketamine in 100mls N Saline (5mg/ml).

2.11. Suggested mixture:

100ml 0.9% N saline with 500mg of ketamine giving a concentration of 5mg/ml.

If the infusion is run at 2ml/hr (ie 10mg/hr) this would deliver 0.14mg/kg/hr for a 70kg patient.
If the infusion is run at 5ml/hr (ie 25mg/hr) this would deliver 0.35mg/kg/hr for a 70kg patient.

2.12. Intravenous Ketamine 5mg/ml-Infusion Rates

2.12.1. The infusion rate should not be increased more frequently than hourly and should never exceed 5 ml per hour.

2.12.2. Rate should be started at 1ml per hour and pain scores together with BP, pulse and respiratory rate regularly assessed initially hourly for first 4 hours or until pain scores are satisfactory.

2.12.3. If also on PCA observations may be more frequent as per policy.

2.12.4. The infusion rate should be clearly recorded on the MEWS chart

2.12.5. Do not give bolus doses post operatively to avoid side effects of dysphoria.

N.B In exceptional circumstances

2.12.6. If the appropriate infusion Device is unavailable then the current PCA pump with the hand piece removed could be used to deliver a 5mg/ml concentration at rates1-5ml/hr.

2.12.7. (ie 250mg ketamine made up to 50ml volume).

2.12.8. This should be clearly labelled and marked Ketamine with instructions that no hand piece be attached.

2.13. Potential Problems and suggested solutions

2.13.1. Hypotension and depressed respiratory rate

- Unlikely to be ketamine related, (usually causes rise in BP), exclude all other causes prior to stopping infusion.
- If hypotension persistent and systolic pressures are less the 90mm Hg then follow algorithm on MEWS chart, look for potential other causes and call for medical assistance.

2.13.2. Nausea

- Give regular antiemetics

- If persistent PONV after 2 drugs consider addition of dexamethasone.
- Avoid the use of neuroleptic drugs such as droperidol or chlorpromazine.
- If persistent despite antiemesis stop infusion or decrease rate and review.

2.13.3. Dysphoria, hallucinations

If confusion/dysphoria:

Mild	Stop infusion
Moderate or severe	Stop infusion, call for medical assistance

2.13.3. Sedation

May be caused by ketamine, if score greater than 2, stop infusion and call for assistance, if combined with opioid infusion consider naloxone

2.13.4. Poor Pain Relief

- If ketamine infusion fails to help the pain do not exceed recommended rate of infusion
- Exclude other reasons for severe pain (e.g. surgical, tissued IV or slipped epidural)
- Call for advice from Acute Pain team or on call anaesthetist

2.14. Period of Administration of Ketamine

2.14.1. It would not be expected that intravenous ketamine be used without involvement of the Acute Pain team for review and it would be the norm that it be reviewed daily and not be used for longer than 2 days unless discussed with a member of the pain team..

2.14.2. Weaning decrease intravenous opioids first and substitute with paracetamol, NSAID's and oral opioid (e.g. Oramorph)

2.14.3. Stop ketamine

2.14.4. If pain escalates despite other analgesia seek advice form the pain team re recommencement

2.14.5. Should it be felt of benefit for the patient to continue to receive ketamine then conversion to oral or intranasal form should be considered – 25mg qds - the patient may still be nil by mouth but this is a small volume and would be tolerated orally.

2.15. Risk Management

2.15.1. Drug error

2.15.1.1. Identify source of error and take appropriate action to prevent further risk to patient.

2.15.1.2. Monitor patient for adverse effects at 5 min intervals until medical review.

2.15.1.3. Datix incident

2.15.2. Equipment Error or Failure

- Stop infusion and monitor patient as above.

2.15.3. Inappropriate Equipment Use

2.15.3.1. Ketamine should only be used with the appropriate infusion pump and line. In the event that an infusion is necessary but the equipment is unavailable the doctor involved on the patient care must make a judgement of risk versus benefit in using a different pump.

2.15.3.2. Considerations must include ability to demonstrate clarity of use, meet specifications needed for controlled drug administration and ensure that staff know how to operate pump.

2.15.3.3. Pump must be clearly labelled and separate from other infusions.

2.15.3.4. The pain Team should be contacted for both follow up and conversion to appropriate device when available and to report the lack of suitable equipment.

2.15.4. Training

2.15.4.1. Clear instructions should always be issued and documented for ward staff who may not be familiar with side effects.

2.15.4.2. Acute Pain Team to educate in line with other analgesic techniques.

2.16. NB. This document is for guidance for anaesthetists only – the use of ketamine by doctors other than palliative care would not be expected without consultation.

3. Monitoring compliance and effectiveness

Element to be monitored	Adherence to RCHT guidelines
Lead	Pain service

Tool	Regular audit of the pain service is undertaken along with daily review of complicated cases.
Frequency	See above
Reporting arrangements	The committee reviewing the cases will be the anaesthesia directorate. Cases will be discussed at audit meetings and the details will be recorded in the minutes.
Acting on recommendations and Lead(s)	See above
Change in practice and lessons to be shared	Required changes to practice will be identified and actioned within a month. 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, Inclusion & Human Rights 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

Document Title	Ketamine As An Adjuvant Post-Operative Analgesic By Anaesthetists Only Clinical Guideline V3.0		
Date Issued/Approved:	June 2019		
Date Valid From:	July 2019		
Date Valid To:	July 2022		
Directorate / Department responsible (author/owner):	Anaesthesia and Theatre Directorate Acute Pain Team Lead Clinician Dr Nicholas Marshall		
Contact details:	Pain Clinic 01872 252792		
Brief summary of contents	Ketamine is an anaesthetic agent with analgesic properties in sub anaesthetic doses. Ketamine infusions can be useful in the treatment of intractable acute pain states and pain unresponsive to high dose intravenous opiates.		
Suggested Keywords:	Acute pain, Ketamine		
Target Audience	RCHT	CFT	KCCG
	✓		
Executive Director responsible for Policy:	Medical Director		
Date revised:	June 2019		
This document replaces (exact title of previous version):	Guidelines for Use of Ketamine as an adjuvant analgesic V2.1		
Approval route (names of committees)/consultation:	Anaesthetic Department		
Care Group General Manager confirming approval processes	Roberta Fuller		
Name and Post Title of additional signatories	Not Required		
Name and Signature of Care Group/Directorate Governance Lead confirming approval by specialty and care group management meetings	{Original Copy Signed}		
	Name: Matthew Body		
Signature of Executive Director giving approval	{Original Copy Signed}		

Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet & Intranet	✓	Intranet Only	
Document Library Folder/Sub Folder	Clinical / Anaesthesia			
Links to key external standards	AAGBI, The British Pain Society			
Related Documents:	None			
Training Need Identified?	No			

Version Control Table

Date	Version No	Summary of Changes	Changes Made by *(Name and Job Title)*
24 Oct 11	V1.0	Initial Issue	Nick Marshall, Consultant Anaesthetist
18 Feb 14	V2.0	Full review and rewrite	Nick Marshall, Consultant Anaesthetist
30 June 15	V2.1	Review, update and reformatting	Nick Marshall Consulant Anaesthetist
June 2019	V 3.0	Reviewed and reformatted into the new trust template.	Nick Marshall Consulant Anaesthetist

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

This document is to be retained for 10 years from the date of expiry.
This document is only valid on the day of printing

Controlled Document

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

Appendix 2. Initial Equality Impact Assessment Form

<table>
<tr><td colspan="6">Ketamine As An Adjuvant Post-Operative Analgesic By Anaesthetists Only
Clinical Guideline V3.0</td></tr>
<tr><td colspan="3">Directorate and service area:
Anaesthetics</td><td colspan="3">New or existing document:
Existing</td></tr>
<tr><td colspan="3">Name of individual completing assessment:
Dr David Elliott</td><td colspan="3">Telephone:
01872 258195</td></tr>
<tr><td>1. Policy Aim*

Who is the strategy / policy / proposal / service function aimed at?</td><td colspan="5">The purpose of this guideline is to provide anaesthetists with a framework to prescribe ketamine for patients.</td></tr>
<tr><td>2. Policy Objectives*</td><td colspan="5">To provide information for the appropriate and safe prescription of ketamine</td></tr>
<tr><td>3. Policy – intended Outcomes*</td><td colspan="5">Appropriate and safe prescription of ketamine</td></tr>
<tr><td>4. *How will you measure the outcome?</td><td colspan="5">Monitoring through audit and case discussion at governance meetings.</td></tr>
<tr><td>5. Who is intended to benefit from the policy?</td><td colspan="5">Patients</td></tr>
<tr><td rowspan="3">6a Who did you consult with

b). Please identify the groups who have been consulted about this procedure.</td><td>Workforce</td><td>Patients</td><td>Local groups</td><td>External organisations</td><td>Other</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Anaesthetic Staff</td></tr>
<tr><td>What was the outcome of the consultation?</td><td colspan="5">Acceptance of guideline</td></tr>
</table>

7. The Impact Please complete the following table. **If you are unsure/don't know if there is a negative impact you need to repeat the consultation step**.

Are there concerns that the policy **could** have differential impact on:				
Equality Strands:	Yes	No	Unsure	Rationale for Assessment / Existing Evidence
Age		**X**		
Sex (male, female, trans-gender / gender reassignment)		**X**		
Race / Ethnic communities /groups		**X**		
Disability - Learning disability, physical impairment, sensory impairment, mental health conditions and some long term health conditions.		**X**		
Religion / other beliefs		**X**		
Marriage and Civil partnership		**X**		
Pregnancy and maternity		**X**		
Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian		**X**		

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:

- You have ticked "Yes" in any column above and
- No consultation or evidence of there being consultation- this excludes any *policies* which have been identified as not requiring consultation**. or**
- Major this relates to service redesign or development

8. Please indicate if a full equality analysis is recommended.	**Yes**		**No**	**X**

9. If you are **not** recommending a Full Impact assessment please explain why.

Not indicated

Date of completion and submission	June 2019	Members approving screening assessment	Policy Review Group (PRG) **APPROVED**

This EIA will not be uploaded to the Trust website without the approval of the Policy Review Group.

A summary of the results will be published on the Trust's web site.