Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	1:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

PURPOSE:	To outline the care and monitoring of the patient being treated with Continuous Ketamine Infusion.
SCOPE:	Pain and Palliative Care Physicians, Anesthesia, Sedation Credentialed Providers, and, RNs that have completed Continuous Infusion for Pain Management competency, and Pharmacy.

POLICY:

DEFINITIONS:

CIKI: Continuous intravenous ketamine infusion

PCA: Patient controlled analgesia

RRA: Respiratory Rate Acoustic Monitor

PROCEDURE:

I. Ketamine at sub-anesthetic doses has shown significant benefits as an adjunct to other pain control measures in the management of acute and chronic pain. Ketamine is reserved for select patients to include the following:

- A. Patients having serious and excessive adverse effects from opioids
- B. Patients having inadequate pain control due to opioid tolerance/ resistance
- C. Patients with previous history suggestive of significant opioid related inadequate analgesia and or serious side effects
- D. Neuropathic pain
- E. Patients at risk for compromised airway patency, hypoventilation, or hemodynamic instability
- F. Perioperative and Postoperative Pain, particularly thoracic, orthopedic, abdominal procedures
- G. End of Life/ Palliative Care

II. CIKI will be ordered by a qualified provider utilizing the order set in the electronic medical record.

- A. Continuous infusion: typical effective dose range is 0.05 mg- 0.2mg/kg/hr. Some patients with severe pain may require up to of 0.3mg/kg/hr maximum.
- B. Verbal orders will not be accepted for the initiation of therapy
- C. Dose adjustments may be entered into the EMR by the prescriber or via verbal orders from the provider to the pharmacist.
- D. Bolus orders require 15-minute observation at the bedside by the prescribing provider.

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	2:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

E. Nurses may change the rate of the infusion on the PCA pump as prescribed. (RNs DO NOT TITRATE)

III. Continuous intravenous ketamine infusion will be infused on an Alaris PCA pump set to continuous infusion.

IV. Ketamine will be picked up from the pharmacy by the registered nurse or delivered to the unit by Pharmacy.

V. The medication will be signed in on the unit and placed in the secure refrigerated lock box until ready to administer.

VI. CIKI initiation and rate changes will be independently double-checked by two registered nurses and documented on the MAR see High Risk Medication C00150

VII. Acute and Chronic Pain Monitoring

A. Monitoring will begin prior to infusion and remain in place one hour after completion of therapy.

B. See table below for monitoring frequency, more frequent monitoring may necessary for patient's condition and/or provider order.

C. Notify provider if:

1. Sedation score less than -2 (See Appendix A)
2. Change in systolic blood pressure >20mmHg from baseline
3. Heart rate > 30 beats per minute from baseline
4. Heart rate <60 beats per minute form baseline
5. Respiratory rate < 12 per minute
6. Abnormal Vital signs for age see Vital Sign Policy N00105
7. Increased secretions or tracheal secretions
8. Agitation
9. Hallucinations
10. Oxygen saturation <92%

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	3:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

Ketamine Infusion Monitoring							
Assessment of Tolerance	**Vital Signs**					**Pain**	**Sedation**
	BP*	**HR***	**RR***	**Respiratory Quality**	**SpO2***		
Baseline Assessment before Infusion	X	X	X	X	X	X	X
Initiation or Medication Change Q 15 minutes x 1 hour Q 1 hour x 2 hours Then Q 2 hours	***BP Q 1hr x 2hr then Q 4hr*	X	X	X	X	X	X
Increase in dose or Bolus administered Q 1 hour x 2 hours Then Q 2 hours	***BP Q 1hr x 2hr then Q 4hr*	X	X	X	X	X	X
Decrease in rate, discontinuation of Ketamine Q 1 hour x 1 hour Then Q 2 hours						X	
Adverse Event or Patient Deterioration (e.g. adverse change in sedation scale) Q 15 minutes x 1 hour Q 1-hour x 4 hours Then follow physician orders	X	X	X	X	X	X	X

This table has been modified from the Institute for Safe Medication Practices (ISMP) for East Tennessee Children's Hospital (ETCH) Policy. ISMP, Medication Safety Alert - Fatal PCA Adverse Events Continues to happen; Better Patient Monitoring is Essential to Prevent Harm. May 30, 2013 ISMP adapted these recommendations from the San Diego Patient Safety Council.

*Rate: 2nd, 3rd, and 4th floor use the Respiratory Rate Acoustic (RRA) monitor
*SpO2: Saturation of peripheral oxygen via pulse oximetry
*BP: Blood Pressure
*HR: Heart Rate

VIII. End of Life and Palliative Care with an active Life Support Note in place.

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	4:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

A. Monitoring will be determined by the provider after consultation with the family.

B. Continuous infusion: recommend 0.05 mg- 0.2mg/kg/hr with a max of 0.5mg/kg/hr

C. Oral: 0.2-0.4 mg/kg/dose 3-4 times per day (max dose 50mg TID)

IX. Contraindications

A. Less than 3 months of age

B. Intracranial hypertension

C. Congestive heart failure

D. Thyroid replacement therapy

E. Poorly controlled systemic hypertension

F. Hypersensitivity to ketamine

G. Seizures

H. Psychotic disorders

I. Caution in liver or kidney disfunction

X. Side Effects

Increased side effects can be seen with dose increases. Ketamine dose may be decreased or stopped to alleviate uncontrolled side effects.

A. IV site irritation

B. Fatigue, drowsiness, dizziness, vivid dreams, misperception or confusion, feelings of inebriation or hallucinations

C. Long-term use may lead to elevated hepatic enzyme profiles.

D. Cardiovascular: hypertension, tachycardia, increased cardiac output, paradoxical direct myocardial depression, hypotensions

E. Central Nervous System: tremor, tonic-clonic movements, fasciculation, increased intracranial pressure

F. Gastrointestinal: hypersalivation, vomiting

G. Neuromuscular: increased skeletal tone

H. Ocular: diplopia, nystagmus, increased intraocular pressure

I. Respiratory: depression of couch reflex, respiratory depression or apnea with large doses or rapid infusions, laryngospasm

J. Endocrine/Metabolic: increased metabolic rate

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	5:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

PRECAUTIONS:

Upward titration of ketamine will not be ordered in the setting of troublesome side effects such as unpleasant or distressing psychomimetic effects, excess secretions, nausea, vomiting, sedation scale of less than -3

Consider recommending treating psychomimetic side effects with diazepam

Consider recommending treating excess secretions with glycopyrrolate

SUPPORTIVE DATA:

Ketamine may be used in combination with opioids to obtain a synergistic effect and to help reduce the development of opioid tolerance. Ketamine has an opioid sparing effect, therefore potentially enabling a decrease dosage of opioid

Policy Owner:	Pain and Palliative Care Coordinator
References:	Buck, M.L." Ketamine Infusions for Pediatric Sedation and Analgesia". Pediatric Pharmacotherapy. (2016), 22(6). Finkel, J., Pestieau, S., Quezado, Z. (2007) Ketamine as an adjuvant for treatment of cancer pain in children and adolescents. *Journal of Pain,* 8(6), 515-521. Hocking G., Cousins M.J. "Ketamine in Chronic Pain Management: An Evidence-Based Review," Anesth Analg 2003, 97(6): 1730-9. Institute for Safe Medication Practices (ISMP), Medication Safety Alert - Fatal PCA Adverse Events Continues to happen…Better Patient Monitoring is Essential to Prevent Harm. May 30, 2013 ISMP adapted these recommendations from the San Diego Patient Safety Council. Sheehy, K., Muller, E., Lippold, C., Nouraie, M., Finkel, J., & Quezado, Z.M. (2015). Subanesthetic ketamine infusions for the treatment of children and adolescents with chronic pain: a longitudinal study. *BMC Pediatrics, 15, 198*
Related Policies:	C00150 High Risk Medications MM.01.01.03 C00346 Pain Assessment and Management Policy PC.01.02.07 N00320 Propofol, Ketamine and Midazolam Use for Palliative Treatment of Pain and Symptom Management of 2 E (Outside of the critical care Unit) N00105 Vital Signs Policy GL00124 Guideline- Patient Controlled Analgesia (PCA)

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	6:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

Related Documents:	
Keywords:	Pain, Infusion, Ketamine, PCA
Origination Date:	09/20
Revision Dates:	
Last Review Date:	09/20
Next Review Date:	09/23
Date Retired:	
Reviewed By:	Chair, Clinical Practice and Standards Committee –10/22/20 Sedation Committee –10/19/20 Department of Medicine –11/10/20 Department of Surgery –11/11/20 Medical Executive Committee –11/24/20 Chair, Pharmacy and Therapeutic Committee –11/11/20
Approved By:	Vice President for Patient Care Services/CNO – 12/14/20 Policy Review Committee – 010/08/2021

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	7:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

Appendix A: Richmond Agitation- Sedation Scale (**RASS)**

Score	Term	Description
+4	**Overly combative**	combative, violent, immediate danger to staff
+3	**Very agitated**	Pulls or removes tubes or catheters or is aggressive
+2	**Agitated**	Frequent non-purposeful movement or fights ventilator
+1	**Restless**	Anxious or apprehensive but movements not aggressive vigorous
0	**Alert and calm**	
-1	**Drowsy**	Drowsy, but sustains more than 10 seconds awake with eye contact or verbal command
-2	**Light sedation**	Briefly awakens (<10 seconds) with eye contact to verbal command
-3	**Moderate sedation**	Any movement or eye opening to voice (but no eye contact)
-4	**Deep sedation**	No response to voice, but movement or eye opening to physical stimulation
-5	**Unarousable**	No response to voice or physical stimulation

Category:	Clinical
Organizational or Department:	Organizational
Policy No.:	C00365
Former Policy No.:	
Page:	8:8

TITLE: CONTINUOUS LOW DOSE INTRAVENOUS KETAMINE INFUSION FOR PAIN MANAGEMENT

To prevent opioid over sedation, follow these rules:

Considerations for rules:

- Consider patient population such as end of life care
- Established airway or use in ICU, such as endotracheal tube

RED (RASS -3, -4, -5)

- **Stop opioid or other sedating analgesic infusion**
- Monitor continuously and support airway as needed
- Call provider immediately
- Activate reversal, rapid response team, or code blue team if indicated

Yellow (RASS -2)

- Consider stopping or contacting the provider to decrease dose
- Consider increase frequency of monitoring to maintain RASS at -1 or above

Green (RASS 0, -1)

- Safe to administer opioid and other medication that may cause sedation
- Continue frequency of monitoring