Subdissociative-Dose Ketamine for Pain and Agitation in the Emergency Department

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Abstract #24
IRB exempt

Disclosure

- Nicole Correll
- Potential conflicts of interest: none
- Sponsorship: none
- Proprietary information or results of ongoing research may be subject to different interpretations
- Speaker's presentation is educational in nature and indicates agreement to abide by the non-commercialism guidelines provided

Learning Objectives

1. Discuss the background and potential use of ketamine in the emergency department.
2. Compare knowledge and perception surrounding ketamine use in the emergency department before and after a pharmacist-led in-service.

Reasoning

- Pain is a frequent complaint encountered in emergency departments (EDs)
- Recent drug shortages
- Ongoing epidemic of opioid-related deaths
- Antipsychotics for acute agitation is off-label
- Medication administration restriction at state level

LaPietra AM, et al. *Emerg Med Rep*. 2016;37(20):1-12.

Ketamine Background

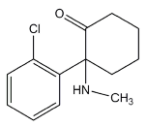
- Drug class: anesthetic agent
- Mechanism of action: NMDA receptor antagonist
- "Should be used by or under the direction of physicians experienced in administering general anesthetics and in maintenance of any airway and in the control of respiration."
- Overdose potential: "Several instances of unintentional administration of overdoses of ketamine (up to ten times that usually required) have been followed by prolonged but complete recovery."

Li L, et al. *Front Hum Neurosci*. 2016;10(612):1-15.
Ketalar [package insert]. Chestnut Ridge, NY: Par Pharmaceuticals; 2017.

NMDA: N-methyl-D-aspartate

History of Ketamine

- Phencyclidine first synthesized in 1956 at Parke Davis Company
  - Intense emergence delirium that made it undesirable
- Ketamine, a structural analog of phencyclidine, developed by Calvin Stevens in 1962
- First clinical experiences published in 1966



Li L, et al. *Front Hum Neurosci*. 2016;10(612):1-15.

Definitions

- Dissociative sedation: trance-like cataleptic state; 1 – 2 mg/kg IV ketamine
- Subdissociative: potent analgesia and amnestic effects accompanied by preservation of protective airway reflexes, spontaneous respiration, and cardiopulmonary stability; 0.1 – 0.6 mg/kg IV ketamine
- Emergence reaction: hallucinatory response that may include vivid dreams, psychedelic color visualization, suspension in space, kaleidoscopic floating, or out-of-body experience

Motov S, et al. *Ann Emerg Med*. 2015;66:222-229.

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Board of Nursing

"A licensed nurse who is not a CRNA may not administer medications or assess the level of sedation for any and all drugs used in general anesthesia or moderate (conscious) sedation <u>if the drug manufacturer's general warning advises the drug should be administered and/or monitored by persons experienced in the use of general anesthesia who are not involved in the conduct of the surgical and/or diagnostic procedure</u>"

CRNA: certified registered nurse anesthetist
Oklahoma Board of Nursing. P-06. Oklahoma City, OK: Oklahoma Board of Nursing; 2015.

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American College of Emergency Physicians

"In a 2011 statement, ACEP expressed strong support for qualified ED nurses to administer propofol, ketamine, and other sedatives under the direct supervision of a privileged emergency physician"

ACEP: American College of Emergency Physicians
ED: emergency department
ACEP Clinical Policies Committee. *Ann Emerg Med*. 2014;63:247-258.

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Study Design and Objectives

- Design
  - Retrospective, single-center study
- Inclusion Criteria
  - Age ≥ 18 years
  - Employed at SJMC between January 2018 – June 2018
  - Physicians, midlevel practitioners, nurses, paramedics, and/or pharmacists who work primarily in the ED
- Primary Endpoint
  - Change in knowledge and perception of study participants regarding ketamine following educational in-service

SJMC: St. John Medical Center
ED: emergency department

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Methods

Pre-Intervention (March 2018)
- Knowledge and perception survey

Intervention (May 2018)
- In-service presentation

Post-Intervention (June 2018)
- Repeat survey assessment

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Background Survey Questions

- What is your title?
- How many years have you practiced in emergency medicine?
- Have you ever seen ketamine administered and/or administered ketamine yourself?
- If you have seen ketamine administered and/or have administered it yourself, what was ketamine being used for?
- Via what route have you seen ketamine administered?
- What age group(s) have you seen ketamine used for?

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Perception Survey Questions

- Are you aware of any restrictions with respect to who may administer ketamine to patients?
- Do you personally think there should be restrictions on who administers ketamine to patients?
- In your opinion, should ketamine be utilized more in the emergency department?
- Does the fact that ketamine may also be a drug of abuse affect your decision to use ketamine (versus an opioid or benzodiazepine) to treat pain or agitation?

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Knowledge Survey Questions

- What is the mechanism of action of ketamine?
- What is the subdissociative IV dose of ketamine?
- What should be monitored before/after ketamine administration?
- When is ketamine absolutely contraindicated?
- What are possible side effects of ketamine?

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Results: Pre-Intervention

Survey Collection, n (%)	• Overall response, 24 (19%) • 23 web-based, 1 paper-based • 126 available participants
Role Involvement	• Nurse, 15 (62.5%) • 1 pharmacist • 2 paramedics • 7 physicians

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Results: Pre-Intervention

Administration
- 91.7% had seen ketamine administered
- 50% had administered ketamine themselves

Current Restrictions
- 87.5% were aware of administration restrictions in Oklahoma

Current Use
- 40.7% procedural sedation
- 31.5% rapid sequence intubation

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Results: Pre-Intervention

Restriction Opinion
- 12.5% think a physician/CRNA should always administer ketamine, no matter the dose
- 29.2% do not think there should be restrictions

Utilization
- 87.5% believe ketamine should be used more in the ED

CRNA: certified registered nurse anesthetist
ED: emergency department

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Results: Pre-Intervention

Mechanism of Action
- 75% correctly answered NMDA antagonist

Subdissociative IV Dose
- 58.3% correctly answered 0.1 to 0.3 mg/kg

Adverse Effects
- 75% emergence reaction
- 16.7% incorrectly chose dry mouth

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Comments

- "Expanded use would arguably demonstrate its true capacity to treat acute/chronic pain & subsequently reduce overuse of opioid-agonist medications. As a result, this would not only protect patients from the risks posed by the opioid class (e.g., respiratory depression), but allow for easier detection of internal diversion by staff due to the overall reduction in use within the ED." – Pharmacist
- "Yes, IVP should only be administered by a physician or mid-level. RN should be able to administer and titrate IV drip as these patient's are usually intubated. State should consider administration of IV Ketamine by RN if provider is also at the bedside. Ketamine does not endanger the patient any more than paralytics which OK allows RNs to administer." – Nurse

ED: emergency department
IV: intravenous
IVP: intravenous push
RN: registered nurse
OK: Oklahoma

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Comments

- "I trained and used ketamine in residency 20 years ago. Nurses were allowed to push the medications or manage drips. Since the Oklahoma Board of Nursing has taken the stance that nurses cannot administer drugs of anesthesia, physicians must administer all drugs use for procedural sedation/induction." – Physician
- "I would like for the nursing staff to become more familiar with this drug. I feel that ketamine is generally safer and more effective than some other medications that our staff are more familiar with/less afraid of." – Physician

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To Be Continued…

- Ketamine in-service planned for May 2018 open to all ED employees
  - Various times offered to cover different shifts
- Post-intervention survey given to those that attend in-service
  - Identify change in knowledge and perception

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ED: emergency department

Limitations

- Unbalanced clinical representation
- Low participation
- Unsupervised survey input
- Incomplete surveys

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Conclusions/Implications

- Growing interest in ketamine use in ED
- Ketamine is potent anesthetic, sedative, and analgesic but also allows patients to maintain cardiopulmonary stability and airway patency
- Most ED nurses felt there either should be no restrictions at all or physician/CRNA should administer dissociative doses but lower IV doses and/or alternative routes could be administered by RNs
  - Most physicians felt comfortable with stipulations (i.e., nursing education, as long as a physician is present)

ED: emergency department
IV: intravenous
CRNA: certified registered nurse anesthetist
RN: registered nurse

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Self-Assessment Question #1

What is the mechanism of action of ketamine?

a. Agonist at NMDA receptor
b. Antagonist at opioid receptor
c. Antagonist at NMDA receptor
d. Agonist at GABA receptor

NMDA: N-methyl-D-aspartate
GABA: gamma-Aminobutyric acid

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Self-Assessment Question #2

How does current Oklahoma law define who may administer ketamine (all routes)?

a. Physicians (all specialties) and/or CRNAs
b. Physicians (all specialties) only
c. Anesthesiologists only and/or CRNAs
d. Physicians (all specialties) and/or RNs
e. Anesthesiologists only, CRNAs, and/or acute care RNs

CRNA: certified registered nurse anesthetists
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References

1. LaPietra AM, Motov SM, Rosenberg MS. Alternatives to opioids for acute pain management in the emergency department: part II. *Emerg Med Rep*. 2016;37(20):1-12.
2. Ketalar [package insert]. Rochester, MI: JHP Pharmaceuticals; 2013.
3. Li L, Vlisides PE. Ketamine: 50 years of modulating the mind. *Front Hum Neurosci*. 2016;10(612):1-15. doi: 10.3389/fnhum.2016.00612.
4. Motov S, Rockoff B, Cohen V, et al. Intravenous subdissociative-dose ketamine versus morphine for analgesia in the emergency department: a randomized controlled trial. *Ann Emerg Med*. 2015;66:222–229. doi: 10.1016/j.annemergmed.2015.03.004
5. Oklahoma Board of Nursing. Moderate (Conscious) Sedation Guidelines for Registered Nurse Managing and Monitoring Patients. P-06. Oklahoma City, OK: Oklahoma Board of Nursing; 2015.
6. American College of Emergency Physicians Clinical Policies Committee. Clinical policy: procedural sedation and analgesia in the emergency department. *Ann Emerg Med*. 2014;63:247-258.
7. O'Connor RE, Sama A, Burton JH, et al. American College of Emergency Physicians. Procedural sedation and analgesia in the emergency department: recommendations for physician credentialing, privileging, and practice. Ann Emerg Med. 2011;58:365-370.

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