Ujuzi
Practical Pearl/Perle Pratique

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Ujuzi means skills in Swahili and is intended to be a regular feature for colleagues to share practical interventions, innovations and novelties that have proved useful in the management of patients in the prehospital environment or Emergency Centre. You can let Ujuzi know about your practical ideas by emailing practicalpearl@afjem.com.

Ketamine procedural sedation in low resource settings

Procedural sedation and analgesia (PSA) is a core competency in emergency medicine (EM). As EM develops in low resource settings, it is incumbent upon the emergency medicine community to ensure that evidence based trainings are developed to enable providers in these setting to safely provide PSA. This will avert unnecessary delays and patient suffering from inadequate pain management and sedation during painful procedures.

In addition to lack of providers trained in PSA, the other usual limiting factors in low resource settings are lack of proper monitoring equipment and supplemental oxygen.1 This makes ketamine the ideal choice for PSA in these settings. Ketamine is a dissociative anesthetic that has both amnestic and analgesic properties. Its effects do not fit into the typical continuum of sedation discussed for other agents. If administered properly, ketamine is associated with exceedingly low risk of respiratory depression or hemodynamic instability. Additionally, patients under ketamine anesthesia maintain protective airway reflexes.

Ketamine has a long history of extensive use in low resource settings.1–3 However, ketamine can cause adverse events if used incorrectly or administered to an improperly selected patient. Practical pearls for ketamine use can be divided into patient selection, administration and rescue from adverse events.

Patient selection:

1. In terms of severity, the major adverse event is laryngospasm (incidence 0.3%).4 Patients with active upper respiratory tract infections may be at increased risk, although the evidence for this is not strong.5 Given the difficulty of managing prolonged laryngospasm in resource limited settings, providers without advanced airway expertise should strongly consider alternatives to ketamine in patients with upper respiratory tract infections.

2. Concerns about ketamine increasing intracranial pressure (ICP) are likely overstated and some evidence exists that ketamine actually lowers ICP.4,6 We do not restrict ketamine use in patients with possible intracranial pathology in our setting.

3. In some settings there was hesitancy to administer ketamine to adults for fear of unacceptably high rates of emergence reaction. This has also been disproven.2 Emergence reaction is a risk with ketamine, but the overall benefits of the drug usually far outweigh these risks.

4. There is an increased rate of adverse events from any anesthetic agent in very young patients (i.e. less than 3 months). However, if a small child needs a painful procedure and

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there are no practical alternatives for pain control, PSA may proceed with extra caution after explaining the risks to the parents.

Administration

1. Intravenous: The starting dose should be 1.5 mg/kg. If there is inadequate sedation after 30 s, another 0.5–1.0 mg/kg should be administered.
2. Intramuscular: The starting dose should be 5 mg/kg and it will take approximately 4 min to take effect.
3. While some providers choose to administer supplemental oxygen during ketamine PSA, most experts agree it is not necessary. We do give concentrated oxygen if available, but concur it is not mandatory in cases where the patient has a normal saturation before sedation.
4. Ketamine can cause respiratory depression if given in a rapid bolus. Therefore, slowly administer the dose over 45–60 s.
5. Some hospitals only stock ketamine in concentrations of 50 mg/mL. In children this concentration is hard to administer slowly. We recommend diluting the ketamine with sterile water or normal saline to bring the volume to be administered up to 2 or 5 mL for ease of administration.
6. There is no benefit to routinely administering anticholinergic agents with ketamine, as it has not been shown to decrease the rate of laryngospasm or other respiratory adverse events. Additionally, atropine can compound the tachycardia seen with ketamine alone and can cause arrhythmias.
7. In children, evidence is clear that prophylactic benzodiazepines should not be given to prevent emergence reactions. Some controversy still exists regarding this practice in adults. Given the respiratory depressive effects of benzodiazepine and limited monitoring equipment in low resource settings, we do not recommend routine administration of benzodiazepines with ketamine.

Rescue from adverse events

1. The main adverse event of concern with ketamine administration is laryngospasm. Providers administering ketamine should be able to recognize and competently manage laryngospasm. The main rescue technique is bag valve mask (BVM) ventilation. Additionally, the laryngospasm “point” has been described and can be used in addition to BVM to rescue patients with this adverse event. This maneuver is accomplished by placing firm pressure, directed inward toward the base of the skull, on a point behind the pinna bounded by the mandibular ramus anteriorly and the mastoid posteriorly.
2. Although ketamine does not decrease respiratory drive, desaturation can occur due to patient positioning. Providers should be familiar with proper patient position to maintain and open the airway.
3. If the patient’s attendants will be present or within close proximity during the procedure, they should be forewarned that the patient will experience nystagmus, may yell, talk, or move while sedated, but is not experiencing pain and will not remember the procedure.
4. A portion of patients (up to 10–20% in some reports) will experience hypersalivation. The airway can be cleared with gauze and by turning the head to the side if suction is unavailable. In more extreme cases (which will be rare), atropine or other anticholinergic agent can be given if this complication occurs.
5. If an unpleasant emergence reaction occurs, a standard dose of any benzodiazepine can be administered. However, this scenario will be rare if the patient is recovered in a quiet area with an attendant at the bedside.

Ketamine has a long history of safe use for PSA in a variety of settings. Given the low risk of major adverse events, its hemodynamic stability and lack of respiratory depressive effects, ketamine is an ideal agent for PSA in low resource settings. As “task shifting” is employed to increase access to care in these settings, careful thought should be given to training additional providers in ketamine administration. Certainly, as the specialty of emergency medicine develops in these countries, training in the use of ketamine should be considered a core competency.

References