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KEY ADVANCES
PRACTICE ADVANCE

Adult Procedural Sedation in the Emergency Department

New July 2024

Why is this topic important? Procedural sedation (PS) is often needed in the emergency department (ED) when analgesia or anxiolysis alone is not adequate to perform necessary procedures. It is a critically important component of comprehensive emergency care and a required core competency for emergency physicians.

How will this change my practice? PS can be associated with both minor and catastrophic adverse outcomes. Knowing the evidence, best practices, and provider responsibilities when performing PS will assure emergency physicians provide the highest quality and safest patient care.

Synopsis Focus Points:

1. **PS is a critically important component of comprehensive emergency care and a required core competency for emergency physicians, including rescue airway interventions, sedation agent selection, and support and monitoring of patient cardiovascular and respiratory status.(1,2)**
2. **Alternative options to PS should be considered when feasible and appropriate (e.g., hematoma blocks and regional nerve blocks) to reduce risks of adverse events.(3)**
3. **While it is well established that emergency physicians can perform all levels (i.e., moderate, deep, and dissociative) of PS in the ED, targeting one versus another does not reliably result in the intended level of sedation.(1,4)**
4. **Nothing by mouth (NPO) status has not been shown to reduce the risk of adverse events.(1,2,3)**
5. **Commonly used agents for PS in adult emergency departments include, but are not limited to: opioids, benzodiazepines, barbiturates, ketamine, propofol, remifentanil, alfentanil, dexmedetomidine, etomidate, and nitrous oxide. (See Table 1.)**
6. **No agent, alone or in combination, can be uniformly recommended over another due to safety or efficacy profiles. Emergency providers should weigh relative needs for analgesia,**

sedation, and potential risks and benefits when developing an individual patient's sedation plan.(1,2)

7. **Adverse events are rare when performing PS in the emergency department. Vomiting, hypoxia, and hypotension are the most common.(5) See Table 2.**

Background:

American College of Emergency Physicians Policy Statement on Procedural Sedation in the Emergency Department (2023) recommendations (1):

- Emergency physicians who have received the appropriate training and skills necessary to safely provide procedural sedation, such as board certification (ABEM/ABOEM) in emergency medicine or graduates of an ACGME-accredited emergency medicine program, should be credentialed without additional requirements for procedural sedation.
- The decision to provide sedation and the selection of the specific pharmacologic agents should be individualized for each patient by the emergency physician and should not be otherwise restricted.
- Emergency physicians and staff are expected to be familiar with the pharmaceutical agents they use and be prepared to manage their potential complications.
- To minimize complications, the appropriate drugs and dosages must be chosen and administered in an appropriately monitored setting. Patient evaluation should be performed before, during, and after their use.
- Institutional and departmental guidelines related to the sedation of patients should include the selection and preparation of patients, informed consent, equipment and monitoring requirements, hospital staff training and competency verification, criteria for discharge, and continuous quality improvement.
- ED physician and nursing leadership should have ongoing collaboration to develop institutional policy regarding nursing roles in sedation and the ability of nurses to administer sedatives. Emergency nurses with demonstrated competencies are qualified and capable to safely administer propofol, ketamine, and other sedatives.

The Royal College of Emergency Medicine Best Practice Guideline on Procedural Sedation in the Emergency Department (2022) recommendations (2):

- Every emergency department should have a sedation lead responsible for ensuring the appropriate governance structures are in place in relation to procedural sedation.
- Emergency departments undertaking paediatric procedural sedation should have a nominated paediatric sedation lead and specific paediatric guidelines.
- The use of a sedation proforma (e.g., template, checklist, process) or similar electronic equivalent is strongly recommended.
- Processes should be in place for adverse incident reporting arising from procedural sedation as well as rapid investigation of significant events.
- Emergency departments should have clear policies with regards to competencies for the provision of procedural sedation in both adults and children as well as up-to-date lists of those clinicians fulfilling the competencies.

- Simulation training sessions should be used to promote safe and effective procedural sedation in line with local policies.
- Procedural sedation should take place in a designated area of the emergency department with the requisite staffing levels and equipment (e.g., resuscitation room).
- Procedural sedation should not take place without careful consideration of the analgesic requirement for the procedure, taking into account any analgesics already administered.
- The clinician who will be responsible for providing the procedural sedation should undertake a pre-procedure Safety Brief with the other members of the team.
- The use of oxygen during procedural sedation is encouraged especially for at risk patient groups (e.g., ischemic heart disease) and those undergoing deep sedation procedures (increased risk of short periods of apnea).
- Monitoring during procedural sedation should include: three lead ECG, oxygen saturations, continuous capnography, and non-invasive blood pressure.
- The use of a patient advice leaflet (i.e., written patient educational information) is encouraged.

American College of Emergency Physicians Clinical Policy on Procedural Sedation and Analgesia in the Emergency Department (2014) recommendations (3):

- Do not delay procedural sedation in adults or pediatrics in the ED based on fasting time. Preprocedural fasting for any duration has not demonstrated a reduction in the risk of emesis or aspiration when administering procedural sedation and analgesia. (**Level B recommendation**)
- Capnography* may be used as an adjunct to pulse oximetry and clinical assessment to detect hypoventilation and apnea earlier than pulse oximetry and/or clinical assessment alone in patients undergoing procedural sedation and analgesia in the ED. *Capnography includes all forms of quantitative exhaled carbon dioxide analysis. (**Level B recommendation)**
- During procedural sedation and analgesia, a nurse or other qualified individual should be present for continuous monitoring of the patient, in addition to the provider performing the procedure. Physicians who are working or consulting in the ED should coordinate procedures requiring procedural sedation and analgesia with the ED staff. (**Level C recommendation)**
- Ketamine can be safely administered to children for procedural sedation and analgesia in the ED. Propofol can be safely administered to children and adults for procedural sedation and analgesia in the ED. (**Level A recommendation**)
- Etomidate can be safely administered to adults for procedural sedation and analgesia in the ED. A combination of propofol and ketamine can be safely administered to children and adults for procedural sedation and analgesia. (**Level B recommendation**)
- Ketamine can be safely administered to adults for procedural sedation and analgesia in the ED. Alfentanil can be safely administered to adults for procedural sedation and analgesia in the ED. Etomidate can be safely administered to children for procedural sedation and analgesia in the ED. (**Level C recommendation**)

Table 1. Common Agents for PS in the ED (6)

Agent	Starting Dosage, Adult and Pediatric Patients	Onset (min)	Duration (min)	Advantages	Disadvantages
Fentanyl	1 mcg/kg IV	1-2	30-40	•Rapid onset •Short duration •Minimal Cardiovascular effects	•Chest wall rigidity (when given rapidly in large doses) •Analgesic properties only
Remifentanil	0.05-0.1 mcg/kg/ min IV infusion with supplemental 0.5-1 mcg/kg IV boluses	< 1-3	3-10	•Short duration •Can be titrated	•Respiratory depression •Analgesic properties only
Midazolam	0.05-0.1 mg/kg IV	1.5	60-120	•Rapid onset •Short duration •Multiple routes	•Respiratory depression •Moderate duration •Sedative properties only
Nitrous Oxide	30%-70% concentration	1-2	3-5	•Rapid onset •Minimal CV effects	•Emesis •Expansion of gas-filled structures
Propofol	0.5-1 mg/kg IV	< 1	3-10	•Rapid onset •Antiemetic •Short duration	•Hypotension •Respiratory depression •Injection pain •Sedative properties only
Ketamine	•1-1.5 mg/kg IV •4-5 mg/kg IM	~1 (IV) ~5 (IM)	10-15 (IV) 15-30 (IM)	•Preserved airway reflexes •Predictable •Provides analgesia and sedation	•Emergence phenomena •Emesis •Laryngospasm •Hypertension •Tachycardia •Increased secretions
Ketofol Ketamine + propofol	0.5 mg/kg ketamine IV and 0.5 mg/kg propofol IV administered simultaneously	1-3	10-15	•Airway preservation •Hemodynamic stability •Rapid recovery •Use together offsets hemodynamic effects of each individual agent •Provides analgesia and sedation	Same as for each individual

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Agent	Starting Dosage, Adult and Pediatric Patients	Onset (min)	Duration (min)	Advantages	Disadvantages
Etomidate	0.15 mg/kg IV	< 1	5-10	•Rapid onset •Minimal CV effects	•Respiratory depression •Myoclonus •Sedative properties only

Table 2. Adverse Event for PS in the ED (5)

Adverse Event	Studies	Overall Incidence (Per 1,000 Sedations)	Meds with Highest Rate of Adverse Event
Agitation	33 Studies / 6,631 Sedations	9.8 (95% CI 6.1-13.5)	Ketamine Ketamine / Propofol
Apnea	22 Studies / 3,264 Sedations	12.4 (95% CI 7.9-233.5)	Midazolam Midazolam / Opiate
Aspiration	10 Studies / 2,370 Sedations	1.2 (95% CI 0-2.6)	
Bradycardia	5 Studies / 837 Sedations	6.5 (95% CI 1.1-11.8)	Etomidate Midazolam / Opiate
Hypotension	27 Studies / 5,801 Sedations	15.2 (95% CI 10.7-19.7)	Propofol Midazolam / Opiate
Hypoxia	42 Studies / 7,116 Sedations	40.2 (95% CI 32.5-47.9)	Propofol Midazolam / Opiate
Intubation	19 Studies / 3,636 Sedations	1.6 (95% CI 0.3-2.8)	---
Laryngospasm	5 Studies / 883 Sedations	4.3 (95% CI 0-8.5)	---
Vomiting	25 Studies / 3,319 Sedations	16.4 (95% CI 9.7-23.0)	Ketamine

Adapted from Rebel EM, Bellolio et al.[5]

References:

1. American College of Emergency Physicians. Policy statement: Procedural Sedation in the Emergency Department. https://www.acep.org/siteassets/new-pdfs/policy-statements/procedural-sedation-in-the-emergency-department.pdf
2. Royal College of Emergency Medicine. Best Practice Guideline on Procedural Sedation in the Emergency Department. https://rcem.ac.uk/wp-content/uploads/2022/08/RCEM_BPC_Procedural_Sedation_Final_Aug_22.pdf
3. Godwin SA, Burton JH, Gerardo CJ, Hatten BW, Mace SE, Silvers SM, Fesmire FM; American College of Emergency Physicians. Clinical policy: procedural sedation and analgesia in the emergency department. *Ann Emerg Med.* 2014;63(2):247-58.e18. doi:10.1016/j.annemergmed.2013.10.015. Erratum in: *Ann Emerg Med.* 2017;70(5):758. PMID: 24438649.
4. Schick A, Driver B, Moore JC, Fagerstrom E, Miner JR. Randomized clinical trial comparing procedural amnesia and respiratory depression between moderate and deep sedation with propofol in the emergency department. *Acad Emerg Med.* 2019;26(4):364-374.

5. Bellolio MF, Gilani WI, Barrionuevo P, Murad MH, Erwin PJ, Anderson JR, Miner JR, Hess EP. Incidence of adverse events in adults undergoing procedural sedation in the emergency department: a systematic review and meta-analysis. *Acad Emerg Med.* 2016;23(2):119-134. doi:10.1111/acem.12875. Epub 2016 Jan 22. PMID: 26801209; PMCID: PMC4755157.
6. Kern J, Guinn A, Mehta P. Procedural sedation and analgesia in the emergency department. *Emerg Med Pract.* 2022;24(6):1-24. Epub 2022 Jun 1. PMID: 35616493.

Resources for Additional Learning:

ACEP Policy Statement: Unscheduled Procedural Sedation: A Multidisciplinary Consensus Practice Guideline

Procedural sedation in adults: Medication selection, dosing, and discharge criteria - UpToDate

Clinical Practice Guideline for Emergency Department Procedural Sedation With Propofol: 2018 Update (acep.org)

Procedural Sedation Guide: A Reference for Your ID Badge (aliem.com)

Procedural Sedation - WikEM

Complications of Procedural Sedation - REBEL EM - Emergency Medicine Blog

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