

Anesthesia and Sedation Outside the Operating Room

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KEYWORDS

- Pediatric • Anesthesia • Sedation • Procedure suite • Pediatric radiology
- Quality improvement

KEY POINTS

- The volume and clinical complexity of patients requiring procedures outside the operating room (OR) continues to increase.
- The demand for pediatric sedation is too great for pediatric anesthesiologists to exclusively deliver procedural sedation for healthy children outside the OR.
- The decision to deliver a general anesthetic with a secured airway versus deep sedation for most procedures outside the OR is based on special requirements for the procedure, the pain of the procedure, the child's comorbidities, and the experience and comfort of the anesthesiologist with deep sedation techniques.
- Risk related to sedation and anesthesia outside the OR can be broken down into inadequate sedation, oversedation/adverse response to sedatives, and failure to rescue.
- Hospital systems are benefited by anesthesiology participation and leadership of a sedation committee, whose charter is the oversight of effective, efficient, and safe sedation throughout the institution.

INTRODUCTION

The provision of anesthesia and sedation for children undergoing procedures outside the operating room (OR) continues to evolve. The volume of invasive and noninvasive procedures is increasing, as is the clinical complexity of patients requiring these procedures.¹ Practices strive to eliminate the use of physical restraints for painful and frightening procedures. In addition, the requirements for appropriate personnel to administer and monitor sedation have dramatically changed. It is no longer acceptable to administer a cocktail of meperidine, promethazine, and chlorpromazine in an unmonitored environment. As an example of growth, at our institution, 2578 patients

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received anesthesia or deep sedation outside the OR in 2003, representing 11% of total cases; by 2012, that number had increased to 8695 (24% of cases).

In contrast to OR anesthesia, the approach to providing sedation and anesthesia outside the OR varies among institutions and even among different providers in the same institution.²⁻⁷ Anesthesia providers are commonly requested to care for children who need sedation, but have significant comorbidities, such as obstructive sleep apnea, obesity, craniofacial abnormalities, and significant pulmonary or cardiac disease. Many (nonanesthesia) pediatric specialists provide procedural sedation, with similar goals of analgesia and immobility to optimize procedural conditions. In order to accomplish these goals, pediatric sedation practitioners administer sedative and anesthetic medications that produce deep sedation. There is controversy about the training and qualifications of sedation specialists. There is also controversy about the types and doses of anesthetic medications that they administer. Anesthesia departments have a responsibility to their institutions to ensure the safe and effective delivery of sedatives and anesthetics, no matter the location or the personnel, and federal authorities dictate that anesthesiologists should provide oversight and credentialing of sedation practices.^{8,9} Failed sedations frustrate families and add cost, and therefore, sedation services must also develop practices to minimize this occurrence. The demand for pediatric sedation is too great for pediatric anesthesiologists to exclusively deliver this care. In addition, fellowship trained pediatric anesthesiologists are skilled in providing anesthetic management of children with life-threatening medical conditions undergoing complex surgical procedures (eg, a child undergoing repair of a diaphragmatic hernia while supported with extracorporeal membrane oxygenation). Using such highly trained specialists to provide sedation for an otherwise healthy child could be considered a wasteful use of resource.

GOALS

The goals for procedural sedation/anesthesia are⁷:

- First, ensure safety.
 - The anesthesia provider should be trained in administration of sedative medications and rescue from adverse events.
 - The anesthesia provider is not the individual performing the procedure.
 - The anesthesia provider administers medications and monitors and records vital signs.
 - Careful monitoring should continue after the procedure until discharge criteria have been met.
- Minimize pain and discomfort.
- Minimize psychological discomfort and anxiety for both the patient and family.
- Control movement to optimize imaging studies and to improve safety for invasive procedures.
- Develop systems that are efficient and cost effective for the patient and for the health care system.

ANESTHESIA VERSUS SEDATION

The decision to deliver a general anesthetic with a secured airway versus deep sedation for most procedures outside the OR is based on special requirements for the procedure (breath holding), the pain of the procedure, the child's comorbidities, and the experience and comfort of the anesthesiologist with deep sedation techniques. Even though strong evidence supporting a particular technique is lacking, anesthesiologists

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