Pediatric Substance Abuse in the Perioperative Setting

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Goals

Upon completion of this learning activity, participants should be able to:

1. Describe the incidence of substance abuse with age, race, cultural, regional, and socioeconomic correlations in the pediatric population.
2. Delineate the pharmacology of the most common substances abused by those in the pediatric population.
3. Define the perioperative implications of the most common substances abused by those in the pediatric population.
4. Recognize the barriers, such as stigma that prevent perioperative healthcare providers from asking about substance abuse and pediatric patients from reporting substance abuse to their healthcare providers.
5. Summarize the ethical and legal concerns of pediatric perioperative substance abuse.

Case Description

A 15-year-old male presents as the first case of the day for elective tonsillectomy and adenoidectomy for obstructive sleep apnea. You confirm he is otherwise healthy during your pre-anesthesia evaluation and exam in the holding room with the patient and his parents. You also speak with the student nurse anesthetist about the anesthetic plan.

1. How often do you explicitly ask pediatric and/or adolescent patients about illicit substance abuse?
2. What about tobacco use?
3. How does the presence or absence of parents/guardians alter your pre-anesthesia interview and evaluation?

A few minutes later, just after the patient’s parents exit the holding room, the patient reveals to the student nurse anesthetist that last night he snuck out to go to a friend’s house. He states that he was so nervous about the surgery that around 11pm he drank alcohol, snorted cocaine, and smoked marijuana. He also took several pills but wasn’t sure if they were ecstasy or oxycodone. He passed out for a few hours but took some more of the same pills in the early morning (he thinks around 2am) as he was heading home, although he isn’t as sure about what he took this second time.

4. What is the pharmacology and physiology of acute intoxication with:
   a. Alcohol
b. Cocaine
c. Marijuana
d. Ecstasy (MDMA)
e. Opiates
f. Methamphetamine

He swears this is the first time he has ever done this. He says he doesn’t want his parents to know, but he said something because now he is really scared about these actions and undergoing anesthesia.

5. *Do the implications change if he reveals that this is his typical behavior several nights per week?*

6. *How does chronic substance abuse physiologically differ from acute intoxication?*

7. *How might withdrawal from the following manifest:*
   a. Alcohol
   b. Cocaine
   c. Methamphetamine
   d. Ecstasy
   e. Marijuana
   f. Opiates

The SRNA immediately comes to you with this new information.

8. *Do you cancel the case?*

9. *What if this is not elective surgery?*

10. *What are the risks, implications, and fundamental principles of perioperative management in these scenarios if you proceed to the operating room?*

11. *How might perioperative pain control be affected if you proceed to the operating room?*

12. *Do you reveal this information to the parents?*
The fact that children, and more infamously, adolescents, engage in recreational substance use should come as no surprise to a pediatric physician. According to the most recent statistics from the Federal Interagency Forum on Child and Family Statistics, just less than 10% of eight graders reported using an illicit drug in the last 30 days. That number climbed to around 25% by the senior year of high school. How often do pediatric anesthesiology providers actually ask their pediatric patients about illicit substance usage or even tobacco or alcohol use? How often is the question asked without parental presence? Do providers realize or acknowledge the wide range of perioperative health care implications from these behaviors?

Most illicit substances fall into one of 3 categories: stimulants, depressants, or hallucinogens. However, some do have properties that may span several categories and make rigid classification more complex.

Alcohol or ethanol might be the most commonly-abused substance in the pediatric population due to its high availability in the average American home. It is an orally (usually) ingested depressant, mediated principally through GABA receptors. It also has properties which alter human perception and consciousness that are believed to be mediated through NMDA antagonism. It undergoes zero-order elimination from the body. An acutely intoxicated patient should be considered to have a full stomach and be at high risk for aspiration. They will also likely have lower anesthetic requirements. Chronic ethanol usage can have a wide range of effects on the entire body and its organ systems, including altered hepatic pharmacology of other substances, dehydration, electrolyte deficiencies, and anesthetic resistance.

Cocaine is an alkaloid stimulant that can be consumed just about every way imaginable. It can act as a topical sodium channel blocker with local anesthetic properties and as a systemic serotonin-norepinephrine-dopamine reuptake inhibitor. These properties produce local anesthesia and vasoconstriction with a systemic upswing in the sympathetic nervous system. Frank psychosis is common at higher doses. Acute intoxication can last upwards of 6 hours and predisposes even young healthy adolescents to myocardial ischemia, infarction, and arrhythmia in the perioperative setting. Cerebrovascular accidents and severe hyperthermia have also been reported. Beta blockers are contraindicated due to beta-2 blockade and unopposed alpha-1 mediated vasoconstriction. Even succinylcholine can have a
prolonged effect due to both drugs being metabolized by pseudocholinesterase. Acute intoxication and its systemic effects are best treated with a systemic depressant, classically a benzodiazepine, and direct vasodilators such as nitroglycerin. Chronic usage can have a wide range of effects on the body and its organ systems, as well as reduce anesthetic requirements. Notably, the freebase form, known as “crack cocaine”, offers a more intense but shorter lived (~10-15 minutes) intoxication characterized by a severe low. Amphetamines and methamphetamines have very similar pharmacology to cocaine by increasing release of serotonin, norepinephrine, and dopamine from neurons, but the wide range and number of available compounds makes each one unique.\cite{3,4,7,8}

Ecstasy or methylenedioxymethamphetamine (MDMA) is a common synthetic stimulant and hallucinogen which resembles chemically a combination of amphetamine and mesecin. The effects can last upwards of 6 hours. Idiosyncratic reactions resemble acute overdoses of amphetamines, serotonin syndrome, or malignant hyperthermia, with sympathetic nervous system overstimulation, hyperthermia, muscle rigidity and tremulousness, and dehydration.\cite{1,3,4}

Marijuana is the most commonly abused illegal drug (in most of the United States). It is a plant-based drug that is usually smoked or eaten. The primary active ingredient is tetrahydrocannabinol or THC. At low doses it produces euphoria and a shift towards the sympathetic nervous system. At higher doses parasympathetic effects predominate. Acute intoxication decreases anesthetic dosage requirements to a small degree. Probably the most important aspect to the pediatric anesthesia provider is airway reactivity due to the direct effects of smoke.\cite{3}

Opiate abuse among adolescents has recently taken on a new life due to the easy availability of prescription opiates. “Pill parties” are a recently-described adolescent activity where the home medication cabinet is raided and the contents dumped into a bowl, for random consumption. Acute intoxication can present with euphoria and obtundation, as well as respiratory depression. Long-term effects can create problems with perioperative anesthetic and analgesic management due to opioid tolerance, hyperalgesia, and addictive behaviors.\cite{3,9}

Strong consideration towards cancelling elective procedures in the setting of acute or subacute substance abuse is the general recommendation. However, not all procedures are elective, and the risks and benefits of delay to the operating room for
substance abuse issues is a conversation that must involve the patient, parents/guardians, anesthesiologist, and the surgeon.

Is the confidential admission of preoperative substance abuse by an adolescent to an anesthesia provider protected information? Do you have a responsibility to preserve your patient’s confidence, or a responsibility to inform the parent? In the event of threat to self, others, or child abuse, the physician has the duty to break confidentiality and report. In the event of emergency, the physician has the right to proceed without consent. In the event of confidential revelation of substance abuse prior to elective surgery, there is no requirement to report as well as there is no protection for the physician who divulges. It is advisable in this situation, if the usage is concerning for untoward anesthetic reactions or perioperative course, to cancel the surgery until the child is out of acute intoxication stages or has received treatment for chronic drug abuse. It is not incumbent upon the anesthesiologist to divulge the reasons to the parent but it is best to advise the adolescent to seek guidance from parents or other role model such as the pediatrician.

References