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Sedation and Anesthesia Care in Dentistry

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There has been a renewed and great interest over the last 25 or more years from within the dental profession for providing dental patients with new options for their dental treatment needs through the use of sedation. This interest had been brought to the forefront by activities such as the American Society of Dentist Anesthesiologist's application to the ADA for recognition of specialty status and dental groups promoting new ways to get rich and retire early through oral sedation (pills) taken before and during dental treatment. Changes in the sources of healthcare dollars and other economic factors also negatively impacted having staff privileges and treating patients in hospitals.

In response to this, many dentists opened their doors to outside anesthesia providers (dentists, physicians, and certified registered nurse anesthetists), found training courses in some legitimate and some less legitimate places to learn to administer sedative pills in multiple doses over time, and even opened dental surgical centers to care for patients with general anesthesia. This has resulted in good outcomes for patients as well as some very bad ones that led to some high-profile news reports and court cases. State regulatory agencies responded as expected with major changes to the Dental Practice Acts and new educational, inspection, and continuing education requirements to provide sedation services to patients in dental offices. The ADA also revised their teaching and practice guidelines for anesthesia in dentistry.

Even though the majority of office sedation morbidities and mortalities could have been prevented, it is important to know there are always some additional risks with sedation, such as patient response variability, drug interactions or medical comorbidities. Unfortunately, our society does not seem to accept anything other than good outcomes. It has been found that better education, training, and vigilance will reduce poor performance and ultimately poor outcomes. The good news is that overall, sedation and general anesthesia in dental offices can be practiced very safely with positive results for patients and doctors.

History of Anesthesia in Dentistry

Modern dental care in the U.S. has been promulgated by anesthetic and sedative techniques. In the mid 1800's, dentists Horace Wells provided nitrous oxide for tooth extractions, and William Morton utilized ether. Later, with the discovery of local anesthetics and newer IV sedative agents and techniques mastered by Langa, Jorgensen, Allison, and Monheim, and others, dental care options became more acceptable. Today we have seen advances in new drug development and off label usage of medications that have been applied to dental office care increase the options for care to more people. Success in dentistry has been recognized for many years to be based on pain and anxiety control.

Fear and Anxiety Toward Dentistry

Data provide clear evidence that fear and anxiety toward dentistry are common in our culture as well as others, and that this usually originates in childhood, persists through life, can lead to avoidance of dental care and contribute to diminished oral health. Although it has been argued that dental anxiety should be decreasing, a recent review of published studies concluded that anxiety toward dentistry has remained stable over the past 50 or more years. A 1985 NIH Consensus Development Conference Statement says "Pain is a major factor that brings patients to the dental office, while fear and anxiety about pain are common reasons patients fail to seek dental care. The magnitude of this public health problem is indicated by the fact that there are 35 million Americans who avoid dental treatment until forced into the dental office with a toothache. The control of pain and anxiety is therefore an essential part of dental practice." The persistence of dental fears and phobia, despite improvements in pain control, prevention of dental diseases, and dental materials that result in less-invasive procedures still suggests a continued need for anesthesia and sedation services to deliver care to 15% to 20% of the population.

Who Are our Candidates for Anesthesia and Sedation?

Anesthesia and sedation services are primarily indicated for the management of anxiety, fear, and phobia. Other indications for sedation include patients who are cognitively impaired and not able to cooperate during a dental procedure, young or emotionally challenged children and adults who cannot cooperate, or patients with motor dysfunction (ex. gagging, cerebral

palsy, spasticity) that make it difficult to perform an intraoral procedure. Perceived invasive and extensive or prolonged procedures where pain might not be adequately controlled with local anesthesia alone also are considered clinical indications for outpatient sedation. Of course some medical conditions (e.g., hypertension, diabetes, angina, anxiety attacks) can be an appropriate indication for sedation to avoid exacerbation from stressful procedures.

"Dental Phobia" warrants some further discussion as it can range along a continuum of mild to severe. Many people with this phobia can also have other psychologically diagnosed conditions which may associate with it. The etiology is sometimes complex and can present a major inhibition to comprehensive dental care. The mouth and face have great psychological impact on behavior and are very much protected emotionally. Importantly, listening to patients will give you much insight into the causes and extent of the fears. Patients who are initially convinced they wish to be asleep for treatment are usually not candidates for minimal to moderate sedation, whatever the route. Trying to convince them otherwise or to minimize the discomfort associated with your planned procedure will lead you to be untrustworthy in their eyes. These patients do not sedate well when there is any awareness during a procedure and will most likely be a failure in your chair to accomplish treatment properly. Many of these patients will describe being "let down" by previous dentists, and are very skeptical of the next. These patients need deep levels of sedation or general anesthesia to fully manage the care provided. Sometimes after a positive experience or two with deep sedation, they can be weaned and will accept lesser levels of sedation for future visits. I have seen some patients become fully independent of sedation for future dental visits.

After obtaining the patient's "story" about his or her dental fears, determine your assessment of the severity of them and the procedures planned. You should give the patient their sedation options, both what you can capably provide and what would need a referral. Explain the expectations for the type of sedation and how it will make them feel. If they are going to be awake, let them know. Unknowns, such as how a patient's regular medications will affect the sedative should also be disclosed. The first visit will test the patient's response to a dosage you choose based on your assessment's multiple factors. You will use this information for future visits.

Anesthetic and Sedation Options

Sedation options beyond local anesthesia will vary based on a patient's level of cooperation, fears, anxiety, and phobias. The physical needs, duration and skill level of the dental practitioner performing the procedure may dictate the level of sedation required. There is a recognized continuum of Anesthesia and Sedation that begins with minimal sedation and progresses through moderate, deep sedation, and finally general anesthesia (See Table 1). For the patient with minimal to moderate anxiety, good "bedside manner" and listening techniques may help, along with proper local anesthetic techniques and possibly nitrous oxide. For those who require additional anxiety assistance, a dose of an antianxiety medication (orally or sublingual) may be given just prior to the procedure, or both the night before and prior to the procedure. The most commonly used oral preparations are diazepam (Valium), triazolam (Halcion), lorazepam (Ativan), and oxazepam (Xanax). You should know your own limitations in prescribing and administering these medications, as well as abiding by your respective state dental board regulations when using these medications.

Patients who will not be able to tolerate dental procedures comfortably with minimal sedation techniques as above, will need more advanced sedating techniques requiring a higher level of training and skill. If the operating dentist does not have the training and the appropriate state board sedation permit, then, depending on what resources are available in your community, another provider with the appropriate level of permitted sedation anesthesia may come to your office, or you may have to refer or take the patient to another facility where you can treat with assisted sedation.

Risk Management Points

There are two important details you must know. First is whether you are abiding by your state's dental regulations when you invite a provider of anesthesia into your office or you go to another's office. Second is the skill and history of your anesthesia provider. This is needed to protect you and your patients. Verify the provider's credentials and reputations, as they can change. Check to ensure that permits, licenses, certifications, and insurances are up to date. If you wish to use a non dentist provider, use your dental board's regulations for equipment, emergency drugs, and certifications for dental anesthesia providers to critique and verify his or her preparedness.

Anesthesia and Sedation Guidelines and Regulations

Current practice of anesthesia and sedation in dentistry in the United States is regulated by individual state dental boards. These boards look to the various dental and medical associations and societies for guidance when composing their laws and may even enforce some of their guidelines. Many states defer to the guidelines of the ADA, American Association of Oral and Maxillofacial Surgeons, and American Academy of Pediatric Dentistry/ American Academy of Pediatrics. These guidelines and regulations cover the necessary training, equipment and supplies, staffing, emergency preparedness. There are further requirements - inspections, administration, monitoring, and continuing education. Keep in mind that physicians and other anesthesia providers outside dentistry may not have to abide and are not regulated by state dental boards.

CONTINUUM OF DEPTH OF SEDATION: DEFINITION OF GENERAL ANESTHESIA AND LEVELS OF SEDATION/ANALGESIA[1]

Committee of Origin: Quality Management and Departmental Administration

Table 1. (Approved by the ASA House of Delegates on October 13, 1999, and last amended on October 15, 2014)

	Minimal Sedation Anxiolysis	Moderate Sedation/Analgesia ("Conscious Sedation")	Deep Sedation/ Analgesia	General Anesthesia
Responsiveness	Normal response to verbal stimulation	Purposeful [2]response to verbal or tactile stimulation	Purposeful [2]response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

[1]Monitored Anesthesia Care does not describe the continuum of depth of sedation, rather it describes "a specific anesthesia service in which an anesthesiologist has been requested to participate in the care of a patient undergoing a diagnostic or therapeutic procedure."

[2]Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

[3]Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

[4]Rescue of a patient from a deeper level of sedation than intended is an intervention by a practitioner proficient in airway management and advanced life support. The qualified practitioner corrects adverse physiologic consequences of the deeper-than-intended level of sedation (such as hypoventilation, hypoxia and hypotension) and returns the patient to the originally intended level of sedation. It is not appropriate to continue the procedure at an unintended level of sedation.

Minimal Sedation (Anxiolysis) is a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and physical coordination may be impaired, airway reflexes, and ventilatory and cardiovascular functions are unaffected.

Moderate Sedation/Analgesia ("Conscious Sedation") is a drug-induced depression of consciousness during which patients respond purposefully[2] to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

Deep Sedation/Analgesia is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully[3] following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

General Anesthesia is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Hence, practitioners intending to produce a given level of sedation should be able to rescue[4] patients whose level of sedation becomes deeper than initially intended. Individuals administering Moderate Sedation/Analgesia ("Conscious Sedation") should be able to rescue[4] patients who enter a state of Deep Sedation/Analgesia, while those administering Deep Sedation/Analgesia should be able to rescue[4] patients who enter a state of General Anesthesia.

Models of Sedation Care in Dentistry

Dentistry, which is primarily an office based procedural practice, boasts two practice models of anesthesia care. One is the anesthesia care team approach, already commonplace in dental practice. It consists of the dentist who simultaneously operates and administers the sedation. Another member of the team is the trained dental assistant who assists in the monitoring of the patient while helping with the surgical procedure. Some requirements demand two assistants depending on the level of sedation being utilized. The second model, which mirrors that which is most commonly practiced in medicine is the single dedicated anesthesia provider. This provider only administers anesthesia/sedation and monitors the patient, but does not participate in the surgery. Some dentists prefer to practice one way or the other and these practice modes have been controversial over the years in relation to patient safety and what is considered good practice.

Office, Staff, and Patient Preparation

Practicing high quality and safe anesthesia/sedation at any level begins with well planned policies, procedures, and guidelines for the entire staff and office operations. Anyone in the office (dentists, staff, host doctors) who uses sedatives should be knowledgeable about their effects and managing and/or assist-

ing with complications. Periodic drills and in-service training are strongly encouraged and may be required beyond certifications.

Do not underestimate the value of a trained staff in a crisis. For example, most sedation related complications involve over sedation and airway (breathing) compromise. Everyone should recognize the signs and symptoms of this condition and know how to render aid. Each staff members should know their respective roles. Records must be kept of times of drug administrations and amounts, patient vital signs and other monitoring, as well as adverse events.

Doctors and staff must understand the importance of having patients properly prepared for a sedation appointment. Discussions must take place pre-treatment about anesthesia and sedation options, risks/benefits, expectations for treatment and recovery, and the importance of following fasting, medication, and escort requirements. This all is to be documented. Written forms should cover pre- and post-sedation instructions, as well as sedation consents. The doctor must have these discussions with the patient, and the staff should reinforce the policies and procedures when confirming appointments and reviewing instructions.

Pre-Sedation Assessment

It is important to know your patient's medical history well. A good pre- sedation assessment will give you clues as to whether your patient is likely to be at risk for airway compromise with sedatives or other complications. Use of the American Society of Anesthesiologists (ASA) Physical Status Classification (Table 2), will provide information about overall health of the patient.

You can additionally ask:

- If they have been diagnosed with sleep apnea
- Use CPAP
- Snore heavily
- Are tired throughout the day
- Fall asleep in the afternoon
- Wake up with headaches
- Do they have high blood pressure?
- Are they overweight
- Do they have a neck circumference of greater than 16.5 inches?
- Do they have the appearance of having no neck, large tongue and uvula?

ASA PHYSICAL STATUS CLASSIFICATION SYSTEM
Last approved by the ASA House of Delegates on October 15, 2014

Table 2. Current definitions (NO CHANGE) and Examples (NEW)

ASA PS Classification	Definition	Examples, including, but not limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity (30 < BMI < 40), well-controlled DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Examples include (but not limited to): poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA < 60 weeks, history (>3 months) of MI, CVA, TIA, or CAD/stents.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Examples include (but not limited to): recent (< 3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	

*The addition of "E" denotes Emergency surgery: (An emergency is defined as existing when delay in treatment of the patient would lead to a significant increase in the threat to life or body part)

Does your Cone Beam x-ray show a narrow airway? Ask about previous anesthetic history and any known complications that especially involves breathing or airway. Look at possible medication interactions with the sedatives you plan to give. Some interactions can potentiate sedatives and some can decrease effect. Does the patient say she is very sensitive to medications? If the patient is older than 65, you may need to decrease dosages. Always ask if that is the case for this patient.

Anesthesia and Sedation Complications and Management

There is not enough time to give an entire emergency recognition and management course here. The most common issue related to sedation mishaps involves either procedural or post procedural airway compromise or obstruction. This is common to all levels of the anesthesia continuum and dental treatment. Patients can become over-sedated and obstruct their ability to exchange air, which can lead to hypoxia and cardiac arrest. This can be due to over-dosage, drug interactions leading to synergistic effects, and hyper-responders to sedative agents. This phenomenon is seen during procedures, while recovering after procedures in the office, and after discharge at home the evening after the procedure.

You will only be effective if you recognize the situation occurring and respond appropriately. This is where good monitoring by the team and training comes into play. You must be prepared to intervene if airway compromise and respiratory depression occurs and rescue the patient with simple airway opening maneuvers. These include suctioning the throat, ventilating manually with or without airway adjuncts, and if necessary, using reversal agent drugs. Always check the mouth and throat area for loose dental and tooth objects before performing any airway maneuvers as they could worsen the situation. It is important to use throat packs and screens, and tie a long floss tail around cotton rolls, dam clamps, and bite blocks for easy removal and identification. Rubber dams are always preferred. Never use 2x2 gauze, only 4x4.

Post treatment, it is always good practice to closely monitor sedation patients until fully conscious when not being stimulated. After the procedure is finished and no one is stimulating the patient by working in their mouth, they may fall into a deep sleep and have airway compromise. Vigilance in monitoring continues into recovery.

After discharge, the escort who will be monitoring the patient at home should be advised of the need to observe for airway or breathing problems due to lingering sedation effects and pain medications. If you believe that your patient may have sleep apnea as evidenced during the procedure or recovery by heavy snoring or obstruction, do not prescribe an opioid narcotic pain medications in the 24-hour period after sedation. Manage the pain with long acting local anesthesia, Tylenol and Ibuprofen combinations. Some patients have succumbed to opioid pain medications in combination with lingering sedative agent effects who had sleep apnea undiagnosed and untreated. If a patient owns a CPAP machine, remember to advise that they use it at home when sleeping that night.

You will learn that a hyper-responder will need less sedative agents the next time you treat them and the hypo-responder will need a larger dose. However, don't feel pressured to treat anyone you may feel uncomfortable with. Refer the patient to another provider and explain your limitations to the patient. They will understand.

Rarely will you see compromising medical events other than airway issues with minimal to moderate sedation technique. The deep sedation and general anesthetic levels have greater risk, although other medical comorbidities such as diabetes should be considered when faced with patient loss of consciousness or poor arousability. However, one needs to recognize when a patient has progressed to a greater than expected level of sedation and respond appropriately to rescue the patient. One should never hesitate to call 911 for assistance.

In Summary

There are millions of Americans for dentists to treat who do not enter into the system or who refuse treatment without some level of sedation. These patients are of all ages, have had previous negative dental treatment experiences, medical and psychological conditions, motor disorders, can be hyperactive gaggers, poor local anesthesia responders, or are just uncooperative. The use of sedation can be an important tool in providing these patients comprehensive care. It can be a rewarding experience for all.

It is important to obtain appropriate and adequate training for all involved doctors and staff, know state regulations, and obtain all applicable equipment and supplies for monitoring and emergencies. There must be a continual review of procedures and training for adverse events. If you will not perform your own sedations and choose to hire another anesthesia provider, verify their credentials and reputation as well as abide by state regulations.

Know your patients and their full medical histories, including medications, anesthesia/sedation history, and predisposition to airway compromise when sedated. Collect the physical information you need to know to properly assess your candidates for the level of sedation needed (ASA Physical Status classification). Determine, based on this information, if you are comfortable treating this patient with the sedation you need for them. Know your limitations based on the patient, the drugs to be used, and procedural factors. Consider post procedural care and recovery.

Mild to moderate dental phobics will be easiest to treat. The severe phobics might be better left to those who can provide deep sedation and general anesthesia for you. The last thing you want is to be struggling with these patients or aborting procedures.

Make sure your patients understand risks and possible complications of the procedures, and the importance of following pre- and post-operative instructions. Obtain consents. Always be compassionate.

Finally, appropriately prepare yourself and your staff to recognize adverse occurrences and timely react to rescue the patient. It is mandatory to record vital sign sedation data, drugs administered, and any adverse events.

Don't hesitate to look to additional sources of information such as the American Dental Association Guidelines for Sedation and General Anesthesia as well as your State Dental Board Regulations. ■

Author Biography

Dr. Heleniak is a Dentist Anesthesiologist, Board Certified by the American Dental Board of Anesthesiology, and Fellow of the American Dental Society of Anesthesiology. Currently, he is Assistant Professor in the Department of Oral and Maxillofacial Pathology, Medicine, and Surgery at Temple University Kornberg School of Dentistry. Dr. Heleniak is also the Assistant Professor in Anesthesiology at the Lewis Katz School of Medicine Temple University and Director of the Temple Dental Sedation Center. Dr. Heleniak previously held a part-time position as Clinical Assistant Professor in the Department of Periodontics and Pediatric Dentistry at the University of Pennsylvania School of Dental Medicine. He continues to maintain a 30 year private practice part-time in Lansdale, Pennsylvania specializing in treatment of dental patients with sedation and general anesthesia.