Chapter 6: Sedation and Airway Management in the Dental Office

5 CE Hours

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Learning objectives

- Explain the definition and different levels of sedation.
- Describe different perceptions and expectations of dental providers, patients, and parents.
- Discuss additional non-pharmacological behavior management techniques that may be used in conjunction with sedation medications.
- Describe the necessary training to obtain sedation permits and safely provide sedation in the dental office.
- Discuss the history and physical pre-sedation evaluation.
- Identify the equipment and monitors necessary for sedation in the dental office.
- Explain the role of staff members in sedation management.
- Define sedation and airway management, including management of complications.
- Describe the post-sedation monitoring and recovery process.

Introduction

The decision to use sedation to accomplish dental treatment cannot be arrived at lightly. Dentists must review and discuss the many variables. Proper diagnosis and evaluations must be made. An organized, methodical, and systematic approach is necessary to provide quality dental care.

The American Dental Association and the American Academy of Pediatric Dentistry have developed guidelines that are the standards for sedation in the dental office. The guidelines define the ethical and legal standards the community expects providers to understand and implement to maintain the standard of care in the community. Deviation from these guidelines requires additional documentation.

The definition of the word sedation is to calm or lower the excitement level of the nervous system; most likely to complete a medical or dental procedure (Webster 1986).

The goals of sedation in the office are documented in the American Academy of Pediatric Dentistry Guidelines. They are:

1. To guard the welfare and safety of the patient.
2. To minimize physical discomfort and pain.
3. To control anxiety, minimize psychological trauma, and maximize the potential for amnesia.
4. To control behavior and movement to allow safe and high-quality completion of the procedure.
5. To return to the pre-sedation level of consciousness and baseline vitals. Once patients meet these goals, they meet the discharge criteria (AAPD guidelines 2010).

Parental and patient expectations

Parents and patients will all have their own perceptions and expectations that need to be discussed before moving forward with a discussion of sedation treatment. These differences in expectations must be addressed before informed consent can be obtained.

For example: A pediatric dentist has a 2-year-old patient present with severe early childhood caries, or bottle caries, on the four maxillary anterior incisors, and the teeth are not restorable. The dentist believes the pain from extractions can be well managed with local anesthesia, and offers a conscious sedation for anterograde amnesia so the patient will not recall the treatment. This is done in conjunction with local anesthesia.

The child still requires protective stabilization, cries, and responds to the physical stimulation of treatment. A parent watching this treatment considers this barbaric and cruel, while the pediatric dentist considers it successful treatment because the child will not recall the extractions.

Here is another example: An oral surgeon is preparing to extract an impacted third molar. The surgeon makes the pre-sedation diagnosis of pain that will not be controlled with local anesthesia, and also believes that access to the surgical site will be improved if the patient is sedated.

So the surgeon plans a deep IV sedation for the dental treatment, achieved by pushing drugs in an IV that will render the patient deeply sedated. The drugs also will suppress respiration, so the surgeon expects to provide some bag-mask ventilation with oxygen when the drug bolus initially reaches the central nervous system.

A layperson watching this treatment might think the patient was overdosed and an emergency situation had developed. However, the surgeon has expected this physiologic reaction because it is the desired effect of the IV sedation drugs. When the patient starts to breathe on his own, the surgeon will proceed to inject local anesthesia and extract the tooth.

Levels of sedation

Sedation treatment is a continuum. Sedation can progress from a mild and conscious state to deep sedation or general anesthesia extremely quickly. This progression can occur without warning. Dentists must be prepared for sedation to progress at any time because people can react differently to the same dose of a sedation medication. Being prepared for this progressive advance is the only option.
The dental literature has divided sedation into three levels. These are conscious sedation or moderate sedation, deep sedation, and general anesthesia.

The state of conscious or moderate sedation is defined as a patient who is breathing on his own, has protective reflexes intact, and can be aroused with a stimulus. A patient would respond to the statement, “Open your eyes!” Most of the time, the route of medication administration will be oral, inhaled, or intramuscular (Pinkham et al 1994).

The state of deep sedation is defined as a patient who is not breathing effectively on his or her own, does not have protective reflexes intact, and might not be able to be stimulated to respond. Most of the time, the route of medication administration will be through vascular access or IV. Sometimes deep sedation cannot be distinguished from general anesthesia (Pinkham et al 1994).

The state of general anesthesia is defined as a patient in a controlled state of unconsciousness, accompanied by a loss of protective reflexes, including the ability to maintain an airway independently, and the ability to respond purposely to physical stimulation or verbal commands (AAPD Guidelines 2010).

This course will focus on conscious sedation and deep sedation rendered to accomplish dental treatment in the office setting. General anesthesia will not be discussed.

Before starting any discussion about sedation with a patient, the dental diagnosis and treatment plan need to be completed. Then pre-sedation diagnosis needs to be clearly defined and explained.

Dental diagnosis and treatment can include issues such as dental caries, planned dental restorations, the need for extractions, or implant placement. When sedation is discussed, other psychological and physiological factors should also be clearly diagnosed. These could include pain that cannot be controlled with local anesthesia, anxiety or dental phobia, behavior issues or acute stress reaction, surgical site access issues, length of time of treatment, quantity of treatment needs, and many other issues. All of these factors will be considered in the choice of sedation and type of medications to be used.

### Necessary non-pharmacological behavior management techniques

It is not possible to discuss sedation for overall patient management without including a discussion of non-pharmacological behavior management techniques. These techniques may not be directly used during sedation treatment because of the level of consciousness, but they will certainly be applied before and after the sedation.

Some behavior management techniques are described below.

- **Tell-show-do** is a behavior-shaping process that is well described in dental literature. It involves giving patients all the information necessary about a particular subject, showing them the instruments and materials, and demonstrating examples of the sensations. This needs to include all senses, such as taste, smell, sounds, and touching (push, pull, and vibrations). Honesty and slow progression are essential for this to work. Trust has to develop between the health care provider and patient, and communication has to be clear.

- **Voice control** is a behavior management technique in which people use their voice to manage behavior. A direct and clear voice is necessary; sometimes it is loud, and at other times, it is just focused and direct. The tone and pace also can be altered. Short and specific instructions are necessary when specific behaviors are desired or mandated. The tone and focus are as important as how loud a person speaks; the technique is as much a look or changes in attitude and tone. This is a precise way to direct behavior. Informed consent is needed before this is used. Some parents will not be comfortable with this technique, and others will have legitimate issues, such as history of child abuse. This also will be ineffective if the patient is hearing impaired.

- **Positive reinforcement** is the introduction of a reward after a specific behavior. This can range from a prize to verbal affirmation to a discount of the cost of a dental procedure. Facial expressions are also important. The introduction of a positive reward after a behavior significantly increases the chances of the behavior being repeated in the future. Everybody loves a prize or positive comments! This should be used often in the dental treatment setting!

- **Distraction** is making the patient’s focus of the attention a different stimulus that is not unpleasant and that keeps the person’s attention on something other than the treatment, which then can be accomplished. This can be done with music, movies, and conversation. Many examples of ways to do this can be found in dental literature. Certain songs or smells can change emotional states, which can aid greatly in management of a patient. However, professionals have to be careful about and aware of rebroadcast laws as well as which movies, songs, and other distractors are acceptable to unique individuals and cultures.

- **Systematic desensitization process** is to expose a patient to a treatment, circumstance, people, and environment on a repeated basis. This process increases the education of the patient or guardian. It takes time and an investment of personal energy, but can be very rewarding when it is successful. However, it is often not realistic because insurance or Medicaid will not pay for additional office visits where very little documented treatment is accomplished. The process can be very successful when parents or patients have extensive resources of money and time. Dentists should charge for this series of treatments because it is well documented as successful in dental literature.

- **Protective stabilization or medical immobilization** can be used to accomplish many dental procedures. This treatment is especially effective with a healthy pediatric population with a behavior or cooperation problem. The technique is also very effective with certain groups of special-needs patients. Children will certainly cry and get upset, but their movement can be managed so it does not interfere with dental treatment.

  - Parents or guardians need to have clear expectations about how the treatment will be done, and the dentist needs to identify a method to determine whether the patient is having true pain or just very upset. Parents can get very upset seeing their children restrained if their expectations are not clearly discussed.

  - To decrease risk, many pediatric and adult dentists require parents or guardians to help place their children into protective stabilization devices. And note, it should not be done as a punishment. Some medical conditions also clearly contraindicate the use of such devices, such as osteogenesis imperfecta or a patient with a history of child abuse. The time in the device should be minimal, and documentation should be similar to the way sedation is documented on a time record.

- **Psychological or psychiatric evaluations** are sometimes necessary. Separating the dental diagnosis and mental or behavioral diagnosis can help with the treatment. Psychological treatment can be effective when the root cause of the phobia or anxiety is explored. Children often can benefit from behavior shaping or modification from a psychologist. Sometimes the treatment is more effective when done by an individual other than a dental professional. Some phobias are not grounded in reality and should be referred for evaluation and treatment (AAPD Guidelines 2010).
It is important to discuss any of the non-pharmacological management techniques in informed consent discussions with adult patients and parents of minors. Some parents may not approve of more aggressive techniques, such as voice control. Other parents may have bad memories of management techniques used on them when they were children, such as “hand over mouth,” that are no longer considered acceptable by the American Academy of Pediatric Dentistry. They will want to be assured such management techniques will not be applied to their children or adolescents. (AAPD Guidelines 2010).

In summary, the dental diagnosis and treatment plans need to be determined, the accompanying psychological and physiological diagnoses need to be made, and the level of desired sedation planned. Other non-pharmacological management techniques need to be explored. When this information is completely documented and a mutual understanding achieved, the options for sedation can be further explored.

**SELECTION OF PATIENTS FOR IN-OFFICE SEDATION**

Dentist often can make a quick decision on whether patients can be sedated in the office based on their presentation, medical history, and level of anxiety. Other patients will require a more extensive evaluation, which could include multiple consultations with medical professionals. The best approach to pre-sedation evaluations is to use a systematic approach. All patients being considered for in-office sedation should complete the same processes and checklists. This will reduce errors and medical mismanagement, and aid in medical-legal protection of the providers.

This section includes in-depth evaluation of the medical history and anesthesia classifications. It also will discuss the relationships of dental and social histories to sedation, and necessary limited physical exams.

**The medical history**

The medical history is more than just a sheet of paper that dentists give to patients to complete before they begin dental treatment. The history form gives dentists information and directs or focuses their follow-up questions to develop a true review of systems. The form is a tool that gives dentists a systematic approach to learning about the medical, dental, and social histories of the patient.

When systemic treatment is to be done, such as sedation, the scope of the information gathered needs to be expanded. The medical model is the preferred method of developing a clear understanding of the specific conditions and issues of each patient. In the medical world, a comprehensive history and physical exam have to be completed when a patient is admitted to the hospital. A history and physical also has to be completed before any day-surgery or general anesthesia. This same method of information-gathering should be applied in dentistry when dentists plan systemic medications and sedation.

Dental offices that offer sedation services need to develop their own pre-sedation evaluation forms. The medical form used in your community hospital or one found through a search on the Internet are good methods to obtain samples of these history and physical forms. The forms can then be altered for the specific needs of the dental practice. Using a version of the same forms used in your medical and dental community will also provide medical-legal protection.

The medical history will encompass a majority of the information that needs to be obtained to safely sedate patients in the office. The history component must encompass a complete review of the systems.

The chief complaint should be captured. It will likely be evaluation for dental treatment with sedation. Any additional complaints should obviously be evaluated by the appropriate health care professional before elective dental treatment is attempted.

History of any present illness should include any pending dental treatment that needs sedation to be accomplished. Any transient illness, such as a cold or a virus, should be documented. Any recent attempted treatment or treatment failures should be documented. This documentation of failed treatment without sedation protects the dentist from a medical-legal perspective. Any failed sedations should also be researched and documented.

The allergies section should not be lightly skipped over. A dentist needs to take the time to discuss true allergies to medications versus adverse drug reactions. Dentists also need to know which drugs are truly not safe options to use with a patient. Allergies to drugs used in sedation or emergency situations need to be well understood, and allergies to other reactive substances, such as latex, also need to be identified.

One commonly used drug for sedation and anesthesia is propofol. There is evidence in the literature of increased allergy risk with IgE-mediated food allergies and atopy. Egg and soybean allergies are also reported to be an issue with propofol by some studies, but no higher risk in others. Most physicians and dentists will not use propofol with an allergic-profile patient or one with allergies to eggs and soybeans (Murphy et al 2011).

Patients also may report being “allergic to anesthesia” if there is a positive history of malignant hyperthermia in their family. Patients with mitochondrial diseases or muscular dystrophy diagnoses also sometimes report they are allergic to anesthesia because of known complications of certain anesthetics with these conditions. These patients should be managed in a hospital setting with an anesthesiologist.

Any patient who presents with a highly allergic profile or atypical reaction to sedation drugs should be referred to a hospital setting to have treatment under the care of an anesthesiologist. Pay close attention to patients who have had anaphylactic-type reactions. These patients would be high risk to treat in an office setting with sedation.

Current medications taken require the dentist’s review. Below is a small list of medications by system and their interactions with dental treatment. All medications a patient takes should be investigated, and when necessary, the dentist should consult with the prescribing physicians. The number and type of medications will provide extensive information about a patient.

Allergy and asthma medications, such as antihistamines, Benadryl, Claritin, Singular, albuterol and QVAR, point to an allergic profile. The frequent use of albuterol or a rescue inhaler is a red flag because it points to a condition that is not well controlled. Daily-inhaled steroids, such as QVAR, indicate the management of a chronic respiratory problem. Additional asthma medications, emergency room visits, and hospital stays also are indicators about the control and severity of the disease. This should be addressed and discussed with the health care professional managing the medical condition.

Frequent use of medications, access to higher levels of medication, and multiple medications indicate a patient who may benefit from being treated in a hospital setting. Most dentists use “having to use the rescue inhaler within the last 30 days” as a marker to not sedate a patient in the office. Sedation of any patient with the diagnosis of asthma or reactive airway disease that is managed on the above medications should not be done without a consultation with the managing physician.
**Antibiotics** are important to be aware of when discussing sedation because of the reason why they are prescribed as well as some of their side effects. Patients with active infections need to have their level of infection, or sepsis, assessed before any treatment is done. If a patient is not responding well to the antibiotics, then the level of sepsis could increase.

These patients by definition could have a higher heart rate, or tachycardia, and an increased need for fluid. If a patient with this kind of progressing infection was made NPO for oral or IV sedation without IV maintenance fluids, the patient can go into shock. Patients with active systemic infections require more investigation.

Antibiotics can also cause serious gastrointestinal issues. Clindamycin is an antibiotic often used to treat dental infections and also is used as a prophylactic antibiotic for patients with cardiac issues. The drug can cause pseudomembranous colitis or a severe form of diarrhea. Regular diarrhea also can result from a course of clindamycin. The diarrhea can cause dehydration and electrolyte imbalances that make sedation less safe.

In general, the reason why a patient is on an antibiotic needs to be investigated and the level of infection needs to be assessed. If the dental diagnosis is not the reason for the medication, then consider delaying the dental treatment. If the dental diagnosis is the reason for the antibiotic, the level of infection must be closely assessed. Any progressive level of symptoms, such as fever, swelling, or tachycardia, should be assessed before making a patient NPO for dental sedation.

Progression of infection may require the patient to be hospitalized, possibly given IV maintenance fluids, IV antibiotics, and management of the patient by an anesthesiologist for sedation. Sedation in the office should be limited to patients with local infections and no systemic symptoms of sepsis or shock.

Office treatment and sedation is appropriate for patients who are deemed stable.

**Birth control medications** require a blunt conversation between the dentist and patient. Many medications will interfere with different contraception medications. Each of these should be reviewed separately. The dentist should always err on the side of caution and recommend that other contraceptive methods be used when there is any doubt.

**Gastrointestinal** medications for reflux are numerous and are important to investigate because these patients may be more likely to vomit or have aspiration issues. The level of control and any progression of the disease need to be assessed. Uncontrolled reflux is a red flag for oral or IV sedation in the office.

Medications that deal with constipation and gut motility are also important to discuss because of possible dehydration and electrolyte issues. These patients may also move food boluses along the digestive tract more slowly, creating a higher risk that they may not truly be NPO even though they followed pre-sedation guidelines. Such patients are at a higher risk for vomiting and aspiration with sedation. Ask many follow-up questions, and always make sure to consult the physician.

**Seizure medications.** Patients who take daily seizure medications will likely be followed by a neurologist. Consultation before any kind of invasive treatment or sedation is indicated. The number of seizures and the last seizure are important to know. Other valuable information includes whether the patient has ever had or does have life-threatening seizures that require emergency medication, such as Dicstat. Has the person had any recent 911 or emergency room interventions?

Seizure medication can affect the metabolism of other medications, bleeding times, and activity level of the patients. Local anesthetics lower the threshold for seizures, and general anesthetics are the treatment for seizures. The maximum doses of local anesthetics should never be approached when working with patients on daily seizure medications.

Seizure medications can affect buffering of acids by saliva glands and lead to a higher caries rate. These patients should be treated more aggressively for their dental issues. They are not likely to stop taking seizure medications, and thus the high risk of caries in the future will not go down.

If a patient has a seizure, the dentist must be prepared to manage any side effects from giving seizure termination medications. For example, if a dentist administers Valium to stop a patient from seizing, he or she may have to suction the person's mouth to remove secretions that were serving as upper airway obstructions. The dentist also needs to be prepared to ventilate the patient if the Valium causes decreased respiratory effort or apnea.

A consultation with the neurologist is indicated. The dentist needs to know the level of control of the seizures, frequency, and medications used, and must be aware of the side effects of the medications. He or she must be comfortable managing a seizure and the complications of seizure medications if sedation is done in the office. Most of these patients are going to be treated in a hospital with the appropriate medical professionals ready to intervene, if needed.

**Anticoagulants or “blood thinners”.** When a patient presents and is taking anticoagulants daily, the dentist must ask focused questions. The first is why the person is taking the medications. The next should be whether there is a history of previous cardiac surgery. The dentist should follow up with questions about any congenital cardiac issues. These patients will require consultation with the involved cardiac specialist.

Patients taking aspirin are now thought to be safer if they are left on the aspirin and the bleeding issues are managed locally, if possible. Often, laboratory tests are not going to provide much information because with a patient taking aspirin, platelet function tests can be inaccurate for up to a month.

A dentist can learn much by interviewing these patients and completing an exam looking for bruises and hematomas. If there is a serious bleeding risk, treatment should be done in a hospital after completing a type and cross-match, and the dentist must make sure blood is available, if needed. No changes should be made to any of these medications without consulting the specialist managing the patient (UKNHS 2011).

With patients taking other, more powerful daily anticoagulants, dentists also must consult with their physicians. Patients on Coumadin or warfarin may have to have it stopped and bridged with a short-acting drug such as heparin under the close supervision of a physician. Emergency treatment may require administration of fresh frozen plasma or (FFP) if there is not time to complete a heparin bridge. These treatments would likely require hospitalization and close physician supervision (Nematullah et al 2011).

**Cardiac medications.** Very few of these patients are going to be candidates for in-office sedation. Patients taking angiotensin-converting enzymes (ACE inhibitors), angiotensin II receptor blockers (or inhibitors), beta blockers, calcium channel blockers, diuretics, vasodilators, digitalis preparations, and statins alone or in some combination to manage chronic cardiac disease require an anesthesiologist to manage their care. Some may even need a cardiac anesthesia specialist (American Heart 2010).

**Blood pressure medications** are too numerous to list. But patients taking blood pressure medications need focused questions to determine how well they are being managed. The first question to ask is why their blood pressure is elevated, although a large percentage of people have elevated blood pressures with no specific cause. Ask how often they check their blood pressure, and follow up with their physicians.
Document the range of the best and worst of the blood pressures that the person can recall. The patient’s level of energy and side effects of the medications the person has experienced also should be documented. Finally, the dentist should research the type of medication the patient takes, its location of medication action, and metabolism. A consultation with the prescribing physician is indicated before any sedation treatment is considered.

Patients with uncontrolled hypertension or recent admission to the emergency room with hypertension issues are not candidates for sedation in the office. Patients with recent medication changes because of side effects and symptoms also are not likely candidates for in office sedation.

**Hemophilia factors and other treatments.** Patients with known bleeding disorders are often well managed. Bleeding associated with dental treatment can be well managed with a consultation with the hematologist and a hemophilia management plan.

Pre-treatments for these patients can range from nasal mist drugs to IV and oral medications. These patients often are prescribed Amicar, a drug that acts as an inhibitor of fibrinolysis, or clot breakdown, for a few days after invasive treatment. Dentists should never attempt to manage treatment or sedation without consulting with the hematologist managing the case.

Special attention should be given to hemophiliacs with inhibitors, in which the immune system attacks the artificially introduced replacement therapy for the missing coagulation factor. These patients are at a higher level of risk. They should be treated in a dental home that is located in their medical home. Bleeding issues are likely to result, and the patient is likely to need intervention from a hematologist, often for several days after completion of the dental treatment.

**Chemotherapy and cancer treatment medications.** Patients who have been diagnosed with cancer currently or in the past have likely been sedated multiple times and been exposed to many drugs with long-term side effects. Some of the chemotherapies are cardio-toxic and have a profound effect on the cardiac output.

Patients in active chemotherapy can have issues with low platelets causing bleeding. No dental treatment should be done without a consultation and a plan. Dental treatment with a platelet level below 75,000 will result in excessive bleeding. As the patient heals after the dental treatment, he or she may need a unit of platelets.

Cancer patients in active chemotherapy also can have very low absolute neutrophil counts, which will have a very negative effect on healing from dental treatment. It is well documented in the dental literature that treatment with an ANC below 1,000 results in significant risk of postoperative infections and problems with healing. No elective treatment should be done below this threshold, and any emergency treatment done below an ANC of 1,000 should only be done in cooperation with the oncology team managing the patient. Special documentation of informed consent is necessary.

The level of hemoglobin and hematocrit can be low in patients actively receiving chemotherapy. Thus, the amount of blood that can be safely lost as well as the oxygen-carrying capacity of the blood are severely limited. Patients with a hemoglobin and hematocrit that are below their normal range require careful consideration. Most will need to be treated in a hospital setting or their medical home in conjunction with their oncology team. Some of these patients may need blood transfusions before or after dental treatment. No sedation or dental treatment should be done without consultation with the oncologist. Laboratory values will have to be obtained.

Patients who have completed chemotherapy and are deemed cancer free will likely now be followed in survivor clinics. These patients still require special considerations. Previous chemotherapy may have been cardio-toxic. The patient may still not be hemodynamically stable. The immune system may not have returned to baseline. Always consult the oncologist.

**Psychiatric drugs.** Patients taking drugs for depression or other psychiatric conditions require a consultation with their physician. Increased dental prevention should be planned because these patients are at high risk for developing dental disease from side effects of the medications, including dry mouth.

Dentists must assess the level of management of the mental illness as well as the compliance of the patient and understand the interaction of the medication with planned local anesthetics and sedation drugs. The dentist also must be knowledgeable about side effects of psychiatric medications, such as insomnia, increased anxiety, diarrhea, headaches, dizziness, and weight fluctuation.

Medications used to treat psychiatric disorders have varying side effects. The more common medications have predictable side effects and interactions with sedation medications. Some of the more exotic medication used to treat conditions such as bipolar disorder can have cardiac side effects. Geodon increases the cardiac Q-T interval, or causes long Q-T symptoms, and requires a special sedation or anesthesia plan. Any additional medications that affect the Q-T interval, such as the popular anti-nausea medication Zophran, are then contraindicated. A long list of medications that cannot be given if the Q-T interval is prolonged can be found in the literature.

Sedation can become very complicated when taking these drugs, and most likely should be done in a hospital setting (Geodon 2013) (Zophran 2013).

The take-home message is that all psychiatric medications have side effects, and they need to be researched and discussed with the prescribing physician. Some of these patients are not going to be candidates for in-office sedation. They also are more likely to have adverse behavior reactions to medications and require more focused attention from the staff. The analysis of their potential for risky behavior lifestyles cannot be ignored.

**The summary statement**

A summary statement can be used to describe patients’ current symptoms, mood, or energy level. It can also be used to summarize whether the condition of the patient is improving or deteriorating. This statement is also a good place to note whether the person’s overall appearance is one of health, obesity, infection, or any other obvious conditions.

**HEENT: Hearing, eyes, ears, nose, throat issues**

Any hearing impairments and corrective treatments should be documented, such as hearing aids or cochlear implants. Plan to have them in place during some treatment, but possibly turned down or off when the high-speed handpiece is used because some patients find the sound painful or unpleasant. Voice control, positive reinforcement, and other adjunctive treatments cannot be accomplished if the patient cannot hear the dental team.

Patients with active ear infections have reported more discomfort with the sounds and vibration of dental treatment. This issue is easily
addressed. Most dental treatment can be delayed to accommodate patients with these issues.

This section also should describe corrective vision devices, such as contacts or glasses. Patients need to be able to see for some adjunctive behavior management techniques to be effective. Having normal vision will make most patients more comfortable before and after sedation. Proper management of this issue can lower anxiety levels of patients.

Airway issues that involved the nose, mouth, or posterior pharynx need to be examined and addressed. Sometimes it will be obvious that a patient has a history of a cleft lip, cleft palate, or a craniofacial syndrome. Other times, dentists will have to ask many questions. With conditions that have an isolated cleft palate, there is a much higher association with syndromes such as 22q deletion.

Watch the patient breathe. Listen for any airway sounds that could be the result of any kind of obstruction. In summary, any craniofacial syndrome or condition should be considered a red flag. If there is an additional corrective surgery history, the risk for complications could be even higher.

Patients with a history of speech surgery to correct hyper-nasal speech require special consideration. The surgeries to correct this are sphincter pharyngoplasty or pharyngeal flaps. Many of these procedures will be performed on patients with craniofacial diagnoses.

However, some will be done on patients who have had a deep pharynx or soft palate with inadequate muscle function. These procedures are surgically created upper airway obstructions that help the soft palate close off the posterior pharynx. These patients have the potential for upper airway obstruction during and after sedation. They also are

### Cardiac issues

Congenital cardiac defects and syndromes, chest pain, rhythm issues, and progressive cardiovascular diseases call for extensive follow-up questions when reviewing a person’s medical history. Consultation with the physician is indicated because many of these conditions are so complicated that patients and parents cannot understand them completely.

You need to discuss any congenital conditions, surgeries, or family histories of cardiovascular problems as well as any current structural, functional, or rhythm issues.

The dentist should obtain the normal range for the person’s blood pressure and inquire about any exercise restrictions or limitations. He or she also should discuss the history of medications and current medications with the patient, and understand the overall stability of the patient’s cardiac condition.

The dentist should consult with the managing physician to determine whether the patient requires antibiotic prophylaxis. The guidelines have changed, and now much more of the decision to give prophylactic antibiotics is subjective or case-specific. If the physician or patient requests antibiotics when they are not necessary according to the guidelines, this should be documented in the chart. Certainly you would face questions about why the person was given the medication if he or she were to have an allergic reaction to the antibiotic. In general, document all deviations from the American Heart Guidelines.

Many patients who were born with congenital cardiac diseases are now living longer and are better medically managed. These patients will continue to increase in number. Always get a consultation when treating such a patient because these conditions are often more complicated than the person or a family can comprehend. A physician may recommend that a cardiac anesthesiologist perform any sedation if the cardiac issues are significant or not completely repaired.

**Pulmonary issues**

Pulmonary problems are often divided into upper and lower airway issues. Croup, laryngospasm, and obstruction by tonsils are upper airway issues. Asthma, bronchitis, and emphysema are some of the lower airway issues. Chronic obstructive pulmonary disease (COPD) includes emphysema and chronic bronchitis. Smoking and exposure to secondhand smoke are the cause of a majority of pulmonary issues.

Croup is defined as swelling and mucous buildup of the larynx and trachea. Young children have smaller airways and are more affected by the swelling and mucous. A distinctive bark-like cough develops, caused by a contagious virus, bacteria, allergies, breathing an irritant substance, or acid reflux.

It usually strikes at night in the fall and winter and can be acute or chronic. It is treated with oxygen, racemic epinephrine and steroids. However, some patients experience a rebound effect when the racemic epinephrine makes the airway worse after treatment. Therefore, treatment is done in the hospital or a doctor’s office, and the patient is required to stay for observation afterward. There is risk in doing this kind of treatment at home because medical professionals and equipment may be needed to manage this situation.

Croup can be a life-threatening event. No dental sedations should be done for at least 30 days after an acute attack, and a physician consultation is necessary.

Many upper airway obstructions have been discussed in other sections. These include enlarged tonsils, adenoids, obesity, sleep surgeries, foreign bodies or secretions.

A laryngospasm is when the vocal cords slam shut and no air can flow into the lungs. It is a common complication with the induction of...
anesthesia in children. It can happen with sedation and irritation of the vocal folds from dental treatment and is an immediate, life-threatening event. More information will be provided in the management of the airway section.

A laryngospasm can happen in adults who have uncontrolled reflux. Patients may describe not being able to breath at all for a few breaths. These patients require consultation with their physician and likely are not good candidates for in-office sedation.

Asthma must be well controlled for a patient to be sedated in the office. A good indicator of this is the number of medications required to manage the asthma. Daily medication patients are less well controlled than those who only occasionally use a rescue inhaler. Most dentists define well controlled as no emergency occurrences requiring emergency room intervention and no rescue inhaler use within the last 30 days. Sedation inside these guidelines would require additional informed consent documentation. Narcotic use should be avoided in these patients because they will cause additional histamine release.

Diagnosis of acute or chronic bronchitis requires consultation with the physician. Many of these patients will not be good candidates for in-office sedation because they can have issues with lower airway pathology. Dysuria could be a sign of a urinary tract infection. Treating the infection and delaying the dental sedation is best so the patient will be in a better state of health when challenged with the sedation.

Gastroenterology

These issues include GERD (gastroesophageal reflux), anorexia and bulimia, absorption issues, obesity, and gut motility issues.

Reflux needs to be well controlled for sedation to be safe. These patients may experience aspiration of stomach contents into the lungs, creating pulmonary issues. The dentist must know the number of medications the patient takes and whether they control symptoms. Consultation with the managing physician is necessary if it is more than a mild problem.

Anorexia and bulimia raises issues with sedation because many of these patients have problems with their electrolytes caused by excessive vomiting. They also can have acid erosion of the airway and pharyngeal tissues. With these patients, a dentist should consult with the patient’s physician. It’s likely that blood work, including a CBC and electrolytes, will be necessary. Move forward with caution when considering sedation for dental treatment.

Gut absorption diseases affects the way medications are taken into the body, and the patient may also have hydration and electrolyte problems. Hemoglobin and hematocrit issues also may be present if the patient has a history of ulcerations and bleeding. These patients require labs, consultation with their physicians, and a thorough understanding of the disease before any in-office sedation is done.

Obesity is a major issue when discussing sedation. Airway issues will likely develop because of the extra tissue; such a patient is not likely to be able to maintain his or her own airway. Medication doses would be above the suggested maximum if traditional dose/weight calculations were used. Consultation with physicians may be necessary and include an ENT evaluation.

Patients who are extremely obese should be treated in a hospital setting. They likely will require observation and even an ICU bed for the day of the dental treatment. Proceed with caution, and have blunt conversations when obtaining informed consent.

Gut motility disease can affect sedation and general anesthesia risk. Patients may follow the suggested NPO guidelines and still have undigested food they could vomit during the sedation or anesthesia. Again, consultation with the physician is necessary. Most of these patients will not be candidates for sedation in the dental office.

Genitals and urine

Issues such as hematuria or dysuria can be important when sedation is planned. Hematuria, or blood in the urine, can be an important finding, and could be a sign of undiagnosed high blood pressure or a sign of pathology. Dysuria could be a sign of a urinary tract infection. Treating the infection and delaying the dental sedation is best so the patient will be in a better state of health when challenged with the sedation.

Patients with a history of venereal disease need to be questioned because some conditions like herpes, both oral and genital, may surface from the stress of sedation and treatment. Pretreatment with acyclovir may be indicated. Other venereal diseases also have oral presentations.

Patients need to be as healthy as possible when challenged with sedation and invasive treatment. Any infection or outbreak that makes the body weaker can lead to more complications and longer recovery times.

Females who have a history of excessive bleeding with their menstrual cycle require a consultation with their physician. Labs may need to be done to make sure the hemoglobin and hematocrit are at acceptable levels for invasive dental treatment.

Pregnancy

Anesthesiologists and hospitals not will perform elective general anesthesia on a female patient without evidence that she is not pregnant. This evidence includes the date of their last period or a simple pregnancy test done in the office. Not addressing this issue with all females who have started their menstrual cycle is an unacceptable risk. Dentists who are not comfortable addressing this issue should not be sedating these patients.
Neurological issues

Neurological conditions affecting sedation include seizures, cerebral spinal fluid issues, strokes, and infections.

A neurologist should manage seizures. If a patient has a history of one or two febrile seizures associated with an illness and fever, it likely will not affect a plan for sedation in the office. Patients with chronic seizures or epilepsy usually will be on medications.

The dentist should gather information about the last seizure, type, duration, intervention (if necessary), emergency room visits, and 911 calls. He or she also should ask whether the patient has ever had a life-threatening seizure requiring Diastat or Valium. Consultation with the neurologist will be necessary (Malamed 1993).

Local anesthetics lower the threshold for seizures, and general anesthetics are the treatment for seizures. Thus, many of these patients will be better served if they are treated in the hospital with general anesthesia.

It is important to find out whether the patient has any type of shunt or issues with cerebral spinal fluid. If the patient has a shunt, then he or she should have a current shunt series CT scan and regular follow-up with the neurosurgeon. No sedation or treatment should be done without consultation and a current shunt series. Treatment likely will be recommended to be in the hospital.

Any history of cerebral vascular accident, or stroke, requires a consultation with the physician to assess the risk for future strokes and the patient’s medications and overall medical health. Not many of these patients are going to be candidates for in-office sedation; management of an acute stroke would be much better in a hospital environment than a dental office.

In patients with a history of viral or bacterial meningitis, any permanent repercussions need to be assessed. Most of these infections were life-threatening events, and patients will have a great deal of information to share about these infections. If these patients have few permanent changes and are now healthy, they may be good candidates for sedation in the office.

Endocrine issues

Diabetes, thyroid pathology, and adrenal insufficiency can affect sedation and dental treatments.

Diabetic patients must be very well controlled to be even considered for sedation in the office. Issues will arise on NPO status and managing their blood sugar. It is important to develop an understanding of the range of blood sugars, length of time the individual has had the disease, and any known organ damage. Most of these patients will require hospital treatment.

Hyperthyroid patients can develop acute crisis or thyrotoxic crisis. A dental office is not the place to manage this medical problem. With patients who are well controlled, a consultation with their physician is indicated. Treatment will likely be done in the hospital.

For uncontrolled patients, sedation in the office is absolutely contraindicated (Little et al 1993).

Hypothyroid patients can have exaggerated responses to CNS medications and sedation. They belong in a hospital environment (Little et al 1993).

Adrenal insufficiency requires consultation from the physician. Standard guidelines have been developed describing when steroid supplementation is needed. Even after taking precautions, an acute adrenal crisis can result. Treatment is an immediate dose of 4 mg of IM dexamethasone and immediate transfer to a medical center. These patients are not good candidates for sedation in the office (Little et al 1993).

Skin

It’s important to obtain the history of the skin system. Ask the patient to describe reactions to allergens and other insults, such as significant allergic reactions. Healing can also be assessed by looking and learning about the skin condition. A simple question about the healing of a laceration or hematoma provides information that is valuable. Hyper-reactive skin issues are a red flag and need further exploration.

Psychiatric disorders

These are being diagnosed more frequently than in the past. Depression, anxiety, bipolar, and schizophrenia are some of these conditions, but many patients are able to live a basically normal life when the right medications are prescribed. All of these medications and medication changes should be documented.

Many of the medications will interact with local anesthesia and some with systemic sedation medications. If the mental disease is significant, a consultation with the physician is indicated. These patients may not have typical behavior responses to some sedation medications.

Immune system

Diseases of the immune system should be documented. These patients are likely to have increased healing times and more potential for postoperative infections. Consult with the patient’s physician to discuss antibiotic coverage because side effects of antibiotics need to be considered.

Special consideration must be given to these patients. For example, any aspiration of fluids during a procedure could lead to an aspiration pneumonia that could be fatal. If the patient has a port for regular infusions, the dentist needs to discuss antibiotics needs with the immunologist. The decision to use the port or start a peripheral IV line also should be discussed because there is risk of infection each time a port is accessed. Many of these patients may not be good candidates for in-office sedation.

Laboratory tests and x-rays

The dentist should review lab tests and x-rays and then write a summary of the person’s state of health, including any additional consults or letters from other providers. As health care providers, dentists must obtain information from physicians and specialists and incorporate it into their plan of care.

The term “medical clearance” is not acceptable, and it is not acceptable to ask another physician or provider for a clearance. The dentist must assimilate all information from the medical history, dental history, social history, consults, physical exam, and finally determine the anesthesia classification (Chester and Glick 2012).
The ASA physical status classification system is used to assess fitness of a case before surgery. In 1963, the American Society of Anesthesiologists (ASA) adopted this system. A sixth category was added later:

- ASA 1 – A normal healthy patient.
- ASA 2 – A patient with mild systemic disease (controlled asthma).
- ASA 3 – A patient with severe systemic disease (active wheezing or sickle cell disease).
- ASA 4 – A patient with severe systemic disease that is a constant threat to life (status asthmaticus).
- ASA 5 – A moribund patient who is not expected to survive without the operation (severe cardiomyopathy requiring a heart transplant).
- ASA 6 – A brain-dead individual whose organs are being harvested for transplant. (AAPD Guidelines, 2010)

The guidelines for sedation in the dental office clearly state that patients who are ASA class I and some in mild class II are good candidates for in-office sedation. Other patients would be best treated in a hospital with an anesthesia team. There is little medical-legal protection for dentists who choose to sedate patients in their office who do not meet these criteria.

The complete dental history

The complete dental history is developed when patients establish a dental home. A dentist doing sedation and dental treatment does not have to be the dental home for quality treatment to be completed as long as the patient has an established dental home.

Dental home components include accessibility, and being family centered, continuous, comprehensive, coordinated, compassionate, and culturally competent. The dental history should document which dental office is the dental home. The patient will require a post-operative check and future preventive care for quality treatment to be completed (Nowak and Cassamassimo 2002).

The dental diagnosis and preventive treatment plan should be documented and the dental history summarized. The dentist needs to know about exposure to fluoride levels.

Use the caries risk assessment tool for pediatric patients. This is a forward-looking tool that is designed to increase prevention to match dental risk for future disease. It is based on medical history, dental history, socioeconomic factors, education, and level of dental treatment needs.

The most important factor to understand about the caries risk assessment is that it does not decrease as soon as the treatment is complete. The risk level stays high for a period of time after the treatment is completed.

Postoperative care, dental home care, frequency of care, diet plans, and other risk factors must be planned for in advance. Single office visits, where extensive treatment is done with sedation, are only a small component of overall patient care.

Medications taken need to be addressed if they have dental side effects, and the dentist can discuss alternative medications with medical providers. Salivary supplements and toothpaste with higher concentrations of fluoride can be used to offset the elevated risk of dry mouth.

The dentist must discuss medical issues related to higher incidence of dental disease and create dental prevention plans that match the risk level. For example, if cardiac disease has caused reduced cardiac output and medications for it have a side effect of dry mouth, then the dental professional should tell the patient to increase use of topical fluorides, salivary supplements, and schedule more frequent visits.

The goal should always be to treat existing disease and make changes going forward that will reduce and eliminate the need for future dental treatment. When the disease process is controlled, cosmetic and functional treatment can be safely planned.

The complete social history

Many factors of the disease process are better understood and managed when a dental professional has a complete understanding of the patient’s social history.

The location of the family residence and with whom the patient lives are important to know. This information can help the dental team understand what resources are available for prevention and treatment, and who might be able to aid in home care. A large difference exists in patients who are in custody or living in a group home than for an adolescent from a county club community – although both of these circumstances can present challenging issues to manage.

It is important to understand the education level of the family because the dentist must communicate information in a way that will be understood and then applied. Conversations about the scientific process of the progression of dental caries will be wasted on some populations. Other populations want and need extensive information about the science to change their behavior.

A patient who speaks a different language or who cannot read presents unique challenges. Dentists have to connect to their patients where they are if they are going to change patients’ behavior.

Understanding patients as people and what they value will help make this connection. An analysis and documentation of risky behaviors can be very powerful because behaviors such as smoking, excessive alcohol intake and recreational drug use will affect decision processes. Extensive tattoos or body piercings tell us more about the patient.

Patients who are extremely into fitness, with low body fat and taking dietary supplements, represent the opposite end of the spectrum, but they also bring a set of unique risk factors to the table. Neither extreme is without issues.

It is well documented in the dental literature that sometimes when tongue and other oral piercings are done, high quality “street cocaine” is put on the tissue to be pierced. Cocaine is a powerful vasoconstrictor and local anesthetic; it is a drug still used in ENT surgical procedures for those desired effects. Medical doctors and dentists working in emergency rooms have learned that when they see complications from oral piercings, such as hematomas or infections, drug screenings should be done first to accomplish safe treatment.

Local anesthetics can contain epinephrine. If people who have ingested cocaine are given local anesthesia with epinephrine, they can develop arrhythmias and die. Sometimes bluntly asking difficult questions can save the life of the patient.

A few questions about regular medical care are very important. Patients who are closely followed by a physician are going to be managed
THE LIMITED PHYSICAL EXAM FOR DENTAL SEDATION

The limited physical exam includes the overall assessment of the patient, examination of the airway, examination of potential IV access sites, and obtaining vital signs and weight.

The first part of the physical exam is to look closely at the patient. Some findings should be readily apparent. Does the patient look tired and stressed or relaxed and well-rested? Does being in the dental office make the patient seem more stressed than most other patients? The level of planned sedation should mesh with the dental treatment planned and anxiety or behavior issues.

Next, focus on the breathing of the patient. Do you hear any sounds of congestion, coughing, or upper airway obstruction? Does the patient use any accessory muscles to breathe? Listen to the lung sounds of the patient in three different lung fields, two in front and at least one on the back. Listen for wheezing or crackles.

Attach a pulse oximeter lead to the patient and document the oxygen saturation level. If the oxygen saturation is lower than 96 percent, the dentist should investigate further before going forward with the sedation. This process gives baseline data as well as desensitizes the patient to the monitors, the sounds, and the overall environment of the planned sedation.

During the physical exam is a good time to select the size of nasal trumpet, oral airway, LMA, or intubation tube that would be used if needed. There are multiple smartphone apps that can do this very quickly, but the data returned must match the physical exam.

Have the patient open wide and look at the person’s range of motion and maximum opening. Look at the posterior pharynx with a mirror or tongue blade. Take a minute to study and visualize the airway.

Do a standardized airway analysis using the Mallampati system. This system is used to evaluate the size of the tongue base relative to the oral cavity and predict potential difficulty with direct laryngoscopy. There is a chart with four pictures showing progressive obstruction in the literature. Copying the picture and matching the anatomy of the patient to the chart would be advisable. Levels 3 and 4 correlate with difficult mask airways and the presence of obstructive sleep apnea (Mallampati 1985). Sedation in the office should be limited to airway classes 1 and 2.

Calculating medications should all be done as dose/weight-dependent. The only exception is for obese patients, who are not likely to be candidates for in-office sedation. Other methods, such as using body mass index weight for dosing, have been found to be safe for some sedation drugs. However, proceed with caution if sedation is planned on an obese patient in the office.

The pre-sedation form should include:
- The weight of the patient.
- The sedation drugs doses to be given.
- Maximum local anesthesia doses that could be given.

The complications section should include:
- Reversal drug doses for sedation drugs (Narcan IV for narcotics and flumazenil IV for Versed).
- Atropine doses IM and IV.
- Epinephrine doses for IM and IV.
- Succinylcholine doses IV and IM.
- Albuterol doses.
- Steroid doses (Decadron) IV and IM.

In summary, taking a few minutes to get to know the patient can be a powerful tool to make better treatment and prevention decisions. When an invasive procedure including sedation is to be done, a thorough social history can be important to limit treatment complications.

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Pre-sedation

Patients and parents need to have NPO guidelines explained. Most offices will say the patient should have nothing to eat or drink after midnight and clear liquids up to two hours before the sedation.

The term “clear liquids” needs to be described. Breast milk should not be consumed for usually four hours before the procedure, and for formula, it usually is six hours. Light meals are usually six hours as well. The instructions must clearly explain that this is done to reduce aspiration risk. Note that some liquids should be taken up to the time limit to prevent dehydration (AAPD Guidelines 2010).

A discussion about what, if any, medications should be taken the morning of the sedation with a little water should be very clear. For example, most dentists will have patients who take seizure medications take them with a few sips of water the morning of the sedation.

Individuals being sedated need to plan for someone to come with them. Someone will need to help the patient return home and should stay with the patient that day. Leaving a patient who has been sedated at home alone is not a good plan.

The person’s diet after the sedation needs to be discussed; patients usually will be told to start with clear liquids in small amounts and work their way up to higher-calorie liquids. If the dental treatment was invasive, patients should avoid “hot” (flavored), spicy, salty or acidic foods. Bland and boring is best for the first 24 hours. Patients may want to have some soft comfort foods, such as ice cream or yogurt, at home. They should plan to not take medications on an empty stomach.

The most likely complications need pre-sedation education:

- **Vomiting**: Patients who start to vomit should return to the start of the diet and take small amounts of clear liquids. Then they should work their way up to a more substantial diet in small amounts. Anti-nausea medications can be prescribed in advance or if the patient calls the dentist with issues. Patients and parents need to know that if it gets progressively worse, they are to call the dentist and will likely have to go to the local emergency room for IV fluids and additional medications.
- **Bleeding**: When patients start to bleed from surgical areas, the first thing they should do is to hold pressure with gauze. The saturated gauze should be saved so they can estimate blood loss if they have to call the dentist. If it does not stop or gets worse, they should call the dentist and go to office or local emergency room.
- **Pain**: Patient should know which pain medications the dentist would like them to take, how often, and any anticipated side effects. Narcotics can cause histamine release and constipation; ibuprofen products can cause bleeding. Patients need to call their dentist if the pain is not well controlled.

The morning of sedation

The first thing to do is to confirm that the patient followed the NPO guidelines as given in the pre-sedation visit. Next, make sure there are no changes in the patient’s medical, dental, and social histories. Then finally, repeat a quick physical exam. Observe the patient, check the airway, give or document any medication changes, and obtain baseline vitals.

The data obtained from the quick exam should be compared to the data gathered at the pre-sedation visit. The pulse oximeter reading, airway evaluation, blood pressure, and listening to the lungs also are all important. Any changes should generate follow-up questions, with their answers documented. Any changes in medical history, including new-onset illness and changes in medications or symptoms, should be documented.

The blood pressure should be taken at the same location where the pre-op visit blood pressure was taken. This will make the reading more reliable. Some “white coat” or doctor anxiety is to be expected. However, any significant elevations in blood pressure should be a cause for alarm and a reason to cancel any sedation or treatment. When children are to be sedated, use a chart to document a normal blood pressure for the age and the blood pressure the patient presents with for the sedation. The blood pressure normals of a child should be documented.

The pulse oximeter should be placed on the patient in the same location, if possible. The reading should be consistent with previous documentation of the oxygen saturation at rest. The saturation should be at 96-100 percent at rest. Remember that the pulse oximeter is a late sign of an oxygen deficit. Proceeding with a sedation when the oxygen saturation is decreased is never a good plan. Special informed consent would be necessary.

Use a stethoscope to listen to the breath sounds of the patient, oscillating at least three different locations, the back, and the right and the left lungs. Any wet sounds or crackles are a sign of fluid in the lungs. This fluid could potentially interfere with gas exchange and compromise respiration.

Listen for upper airway and lower airway sounds. Make sure the patient can breathe through the nose, especially if you plan to use a rubber dam or a nitrous oxide inhalation device as part of the sedation plan.

Re-evaluate the airway. Have the patient open wide, stick out the tongue, and use an instrument to depress the tongue. Visualize the posterior pharynx and analyze and classify the size of the tonsils.

This is an important part of the informed consent. The dentist must be able to visualize that there is enough space for air to move to the lungs. Both the Mallampati and Brodsky scores should be recorded.

Summarize all of the data in a systematic way on a pre-sedation checklist. Using a checklist will ensure safety.

At this time, the dentist should call a “time out,” when all staff members must stop what they are doing. Using a standardized format, the entire team must give full attention to the situation, using eye contact and engagement, and do the following:

1. Confirm the patient’s name, date of birth, and at least one other patient identifier.
2. Check the patient’s weight.
3. Discuss any IV access or route of administration of any emergency drugs that may have to be given, and make sure a secondary plan is clear.
4. Announce the planned treatment.
5. Name the type of sedation planned.
6. Verify that informed consent has been obtained.
7. Discuss allergies and any plans to deal with them, if necessary.
8. Discuss any additional medications, such as antibiotics, that may be needed.
9. Discuss any potential complicating issues that could occur, such as medical problems, blood loss, and any variations of treatment that may be necessary.
10. Ensure that staffers understand emergency protocols and the roles they will fill.
11. Verify communication methods.
SEDATION, AIRWAY MANAGEMENT, AND COMPLICATIONS (NON-EMERGENCIES)

This section is about complications and not emergencies because most of the issues that arise during sedation are predictable. Planning for these in advance makes managing them much less of an emergency.

Sedation

Medications for dental sedation can be given per os, IM, IV, and inhaled. Many of them can be given via multiple routes of administration. Some of the drugs have reversal agents.

Planning which drugs to use in combination goes beyond the scope of this course, but many dentists use drug cocktails or regimens they were trained to use in residency programs or continuing education classes. Increasing your clinical exposure in varied clinical teaching environments will make you aware of different options for sedation.

Dentists must always be prepared for regular sedation drug doses to cause more sedation than desired, and they must be prepared to manage the side effects of the medications. It is also important to remember that many of reversal drugs need to be given IV to be effective and that many of them do not last as long as the sedation drug. Thus, reversal agents are likely to have to be repeated. That is another important reason for a time-based record of events.

Below is a list of some common sedation drugs used in clinical dentistry and a few clinically relevant facts about each:

- **Nitrous oxide** is extremely safe. Dry air can irritate airways of asthma and other pulmonary patients, so it may be contraindicated if it cannot be humidified. Individuals deficient in certain folate chain enzymes may be contraindicated for nitrous oxide use.
- **Versed** is a very safe drug that causes minimal respiratory depression. However, patients can have adverse reactions to it, and if so, should not have it again. This does not mean they are allergic to Versed. If respiratory depression becomes an issue, Versed has a reversal agent, flumazenil, and it needs to be given IV.
- **Valium** is a great drug to relax a patient in the dental chair. Valium can also be given to a patient having a seizure. The dentist must always be prepared to give bag-mask-assisted ventilation if respiratory depression occurs.
- **Propofol** is a great IV sedation drug. However, patients who are allergic to eggs, soybeans, and those who have a highly allergic profile are at risk from using it.
- **Ketamine** is a great drug for IV sedation and also can be given orally. It can cause post-sedation problems with susceptible patients, including anxiety, dysphoria, disorientation, flashbacks and hallucinations. It will increase the heart rate.
- **Demerol** is a great oral sedation drug when a longer treatment time is needed. The drug causes histamine release, so it must be used with caution in asthmatic and other pulmonary patients. If this happens, respiratory depression can be reversed for about five minutes with IV Narcan.
- **Chloral hydrate** is an older sedation drug. It can cause respiratory depression and does not have a reversal agent. The sedation properties are not thought by many to give a predictable response.
- **Fentanyl** is a short-acting IV narcotic that is very good at pain relief. Respiratory depression can occur as well as histamine release. IVs can reverse the respiratory depression, but it only lasts about five minutes.

Airway management

**Head and body position.** Patients should be positioned on their backs on a hard surface so emergency treatment can be provided. Some providers have a stiff board they can insert under patients in the dental chair, and others plan how they would move them to the floor. CPR will be ineffective without the patient in a supine position on a hard surface.

Patients’ heads should be positioned in a way that is comfortable, but that also maximizes the opening of the airway. Most people use a position that is similar to the head-tilt, chin-lift position taught in CPR. Of course, patients may have to be moved some to gain access to surgical sites, but maintaining an open airway is a must.

Management of an upper airway obstruction

**Obstruction with saliva, blood, water from the handpiece, or irrigation** can quickly develop during treatment. This kind of obstruction can be seen and heard. A dental suction is usually all that is needed to clear the fluid. Listen for sounds of fluid in the precordial, even when nothing is visible. Deliver oxygen immediately if there is any significant obstruction.

The first monitors to alarm the dentist are the precordial stethoscope and the capnograph. Ideally, the secretions would be removed before you see any oxygen desaturation on the pulse oximeter.

**Obstructions of foreign bodies** should never be blindly finger swept. Suctions and Magill forceps can be used to grab objects. Stridor may be heard on inspiration, and wheezing on expiration. If partial blockage of the airway occurs, give oxygen and monitor the patient. If the obstruction becomes complete, progress to basic life support, including the appropriate treatment for the age and size of patient. The Heimlich maneuver, chest thrust, and back blows may be necessary. Make sure to call 911 early.

After a series of maneuvers to try to dislodge the foreign object, look for the object, return to trying to move air with positive pressure, and prepare for further decompensation. Plan to advance to chest compressions once oxygen saturation decreases and the heart rate decreases to below 30. The oxygen saturation will drop slowly at first and then rapidly after the 80s. The heart rate may initially speed up, but then bradycardia will develop.

When the heart rate reaches about 30, compressions should begin. Do not wait until zero because emergency drugs do not move when there is no circulation, and no oxygen will reach the brain and other vital organs. Do not stop CPR until additional help relieves the dental team. Make sure a code sheet or sedation record is filled out to document all medications, efforts, and downtime. The entire resuscitation must be orderly, with minimal chaos.

**Laryngospasm** is another upper airway obstruction. This is when the muscles of the vocal folds slam closed because of irritants. It is more likely to happen when the patient is an excited state or hiccupping.
This represents a true emergency because air will not move at all. Stop everything immediately and mask-bag the patient with 100 percent oxygen. Give the spasm just a minute or a few breaths to see whether you can get any air into the lungs. Then give preferably IV or IM succinylcholine. The dentist will then have to breathe for the patient until the effect of the drug terminates. Immediately call for local help in the office for IVs, drugs, and extra hands. When dentists are out of their comfort zone in such situations, they should call 911 because this can be life-threatening.

The dentist will see no end-tidal carbon dioxide on the capnograph, and hear no breath sounds on the stethoscope. The pulse oximeter will drop one to three minutes after the patient has stopped getting oxygen into the lungs. When there is any significant obstruction, oxygen should be immediately and continuously given. Oxygen and bagging the patient should be continuous throughout the process even when drugs are given.

**Poor positioning and lack of regular muscle tone can cause upper airway obstruction.** The tongue can fall back or swell from retractors pushing on it during dental procedures. The tongue can also swell from fluid and lack of muscular activity when the patient is sedated or from allergic reactions.

**Floppy and enlarged tonsils** can obstruct the airway. Fluid in the posterior areas of the mouth can occlude the airway faster when the tonsils are enlarged. Obese patients can also have additional floppy tissue, which makes airway management difficult.

Painful stimulation, such as a sternum or chest rub, can help arouse the patient and increase muscle tone. A nasal trumpet or oral airway with a bag-mask-oxygen positive-pressure system can be extremely helpful to get air moving to the lungs. These may be needed until the patient is more awake. If the patient cannot be aroused and adequate air cannot be moved, a more advanced airway may be needed.

The next level of airway advancement would be to place an LMA or intubation tube. The most experienced team member should place the airway. If there is difficulty progressing to a more advanced airway, bag-mask positive-pressure ventilation with an oral airway or nasal trumpet should continue because some air will likely get to the lungs.

Be prepared for the situation to deteriorate and to execute the algorithm for pediatric advanced life support (PALS) or advanced cardiac life support (ACLS). Respiratory failure will lead to cardiac failure in children; in adults, cardiac issues often will be the initial factor.

In summary, call for help in the office immediately so all other dentists and staff come to help. If there is not immediate resolution of the issue, call 911 and activate the in-office staff plan. Call early and document all events on the sedation record or code sheet. Try to avoid panic while applying a systematic and organized approach.

**Management of a lower airway obstruction**

**Asthma attack.** When an asthma attack starts, breath sounds and respiratory effort will become more labored. The patient will be wheezing. Stop all treatment immediately. Position the patient for comfort and open the airway. Suction any secretions, and put the patient on 100 percent oxygen. Initially, use blow-by oxygen, then progress to a face mask and finally a bag-mask-oxygen positive-pressure delivery device. If the patient becomes unconscious, an advanced airway may be needed. The most experienced provider should place the airway.

Use an albuterol inhaler immediately if the patient can be stimulated enough to participate. A nebulizer can also be used. It is acceptable to physically stimulate the patient to arouse him enough to make use of the inhaler. Draw up epinephrine and prepare to inject it if there is no improvement. Start an IV because this may be needed for emergency drugs.

Make sure the staff calls for office help early and 911 fast if the asthma attack is not immediately resolved. Use your clinical judgment to decide when to call for help. If treatment is not immediately making improvements in clinical signs, airway sounds, expired carbon dioxide, and the oxygen saturation level, call 911. Even if the patient makes progress, if he or she looks more labored or tired, still call 911. Prepare to follow the directives for PALS or ACLS. Avoid panic and chaos by staying focused on providing treatment in a systematic methodology.

**Vomiting with possible aspiration pneumonia.** At the first sign or sounds of vomiting, treatment should be stopped. The patient should be turned toward the assistant because assistants normally have the suction in their hands. Suction everything immediately. Get the patient on 100 percent oxygen. Listen to the breath sounds in at least two different areas for crackles or wet sounds. Watch the monitors closely. The patient will likely show he or she is moving air, but gas exchange may not be occurring.

The oxygen level likely will not remain high, but may not fall below the 80s. Give positive-pressure oxygen if needed. Albuterol will help open the airways, and steroids will decrease the inflammation. Be ready to give epinephrine if needed. Call 911 to transport the patient to the hospital. The patient will need a chest film and labs to determine whether aspiration occurred.

**COPD, including emphysema and chronic bronchitis.** Patients with COPD are not good candidates for in-office sedation. No discussion should be necessary about managing their airways. These patients with chronic pulmonary conditions are difficult for anesthesiologist to manage. There are risks for oxygen dependence, not being able to extubate the patient, and overall patient deterioration. Sedation for elective dental treatment in the office is not an option.

**Common complications occurring during sedation for dental treatment**

- **Syncope.** The patient faints. Lay the person down, raise the legs, and get him or her to move muscles, such as arms and legs, because this returns blood to the heart. Aromatic ammonia and stimulation should be used. If the patient becomes unresponsive, monitor oxygen, use atropine (if bradycardia), and call 911 for help.
- **Local anesthesia toxicity.** Stop working, suction, and clear the airway. The person may be in an excited state and then exhibit depression. Check all monitors. Plan for airway management with bag-mask positive pressure, and supportive care. Call 911. Plan for Valium if the patient has a seizure, and be prepared to deal with more respiratory depression from the drug. Supportive care will be needed until help arrives.
- **Seizures.** Stop treatment. Suction the airway and position the person to keep the airway open. Use blow-by oxygen and be ready to bag-mask ventilate. Check all monitors. If the seizure stops, monitor vitals and call 911. If the seizure does not stop, administer Valium, IM most likely or IV if possible. Watch the capnograph and listen for breath sounds. If apnea or respiratory depression occurs, give a few breaths and continue to monitor. Respiratory depression from the medication is normal. Be prepared for the situation to progress.
● **Allergic reactions without airway involvement.** Stop all dental treatment. Change to 100 percent oxygen. Keep the patient on all monitors because the reaction can progress. Give antihistamine. Call 911 early.

● **Allergic reactions with anaphylactic shock symptoms, including laryngeal edema.** Stop dental treatment immediately. Change to 100 percent oxygen and keep monitors on the patient. Give epinephrine, steroids, and antihistamine. Start BLS, PALS, or ACLS. Call 911 immediately. Prepare for the patient to deteriorate. Advanced airways may not pass if the patient has significant laryngeal edema. Bag-mask positive pressure may be the best treatment until help arrives.

● **Hypoglycemia** may have developed in a patient who becomes clammy, cold, and distant. Check the person’s blood sugar with a portable device. If sugar is low (below 70-100), give about 15 grams of oral carbohydrate if the person is awake. If the patient is not awake, give glucagon IM or IV. Start an IV and consider adding 50 percent IV dextrose if needed. Recheck the blood sugar. Call 911 early, keep the patient on monitors, and be prepared for the situation to deteriorate.

Most important for all sedation complications is to stop all dental treatment. Put the patient on 100 percent oxygen and observe the monitors. Make a diagnosis and treat the complication. Re-evaluate continuously. Call for help in the office immediately, and call 911 early. Keep a good record or code sheet that documents an organized progression and escalation of treatment. Avoid chaos and panic by using a systematic approach.

**Post-sedation procedure**

When treatment is complete, the patient may recover in the same treatment room or be moved to a recovery room. The monitors should remain in place as well as the trained individuals tasked with monitoring the patient until baseline vitals and behaviors are returned. The same emergency intervention equipment and staff must be at the ready to deal with any medical issues. The post-treatment sedation patient should not be left alone or with family.

Plans for post-operative issues should have been made in advance, and the most obvious or patient-specific complication plans should be in place. Post-operative plans should be in place for respiratory issues, bleeding issues, pain, and dehydration caused by vomiting.

Plan for a phone call checkup later that day. Offices that provide quality care will check on patients in the afternoon after sedation. This pre-emptive strike will often prevent issues with pain, bleeding, dehydration, and other complications from getting to the point where medical or dental treatment in the emergency room is required. Sometimes nothing can be done to prevent complications, but good communication and early treatment will always be necessary.

**NECESSARY EQUIPMENT FOR THE OFFICE**

Sedation treatment requires that you set up an area of the office with all the necessary equipment that is immediately accessible. The environment needs to be patient friendly, but at the same time, functional.

The equipment listed below is necessary. This means that to be practicing at the standard of care for the community, none of the equipment described below is optional:

- **A pulse oximeter.** This monitor is used to measure the amount of saturation of the hemoglobin of the blood. It is considered a late monitor because the oxygen saturation level drops 1-3 minutes after a patient stops breathing. The drop in oxygen saturation occurs slowly from the 90s to the 80s and then can drop very low very fast because of the oxygen-binding properties of hemoglobin.

- **A capnograph** is a device that measures end-tidal or expired carbon dioxide. This is an early monitor. Normally, a wave of expired carbon dioxide is visible on the monitor screen. It can be seen the second a patient stops breathing. This device is a relatively new monitor, but is now the standard of care. The capnograph allows early intervention in airway issues.

- **A precordial stethoscope** allows the dentist to hear the patient breathing and some heart sounds. This monitor is manual or without an electronic alarm. When used properly, it is an early monitor that is a great aid in detecting airway obstruction.

- **Blood pressure (manual or automatic) readings** are essential. A baseline number should be recorded as well as what is normal for the age of the patient. The cuff must be the correct size because small cuffs give false high readings, and large cuffs will give low readings. The blood pressure is very important to know and manage if the patient develops complications.

- **Suction equipment** must be available. Dental suction is sufficient most of the time, but medical suctions such as the Yankauer and flexible suctions have their place in management of complications. Smaller suction tubes to go inside endotracheal and laryngeal mask airway tubes are also needed.

- **Oral airways** are plastic devices that are inserted into the mouth to keep the mouth open and put forward pressure on the tongue. They are very effective for patients who are upper airway-obstructed when used in conjunction with bag-mask positive-pressure ventilation. As patients wake up from sedation, they are not well tolerated and cause gagging.

- **Nasal trumpets** are flexible tubes that can be lubricated and inserted into the nose. They will usually pass one of the nares, although both may have to be tried. The tubes are long enough to get past upper airway obstructions. These work well with bag-mask positive-pressure ventilation. Again, they are not tolerated well by awake patients.

- **Laryngeal mask airways** are the first in line of the advanced airways. The size possibly needed should be selected in advance. They are relatively easy to place in an unconscious patient with minimal training. Although they can be very effective, in an emergency situation, bag-mask positive pressure can be just as effective. Often, calling for help and bagging the patient is more effective for ventilation when providers do not have much experience with advanced airways. Dentists who have these in their office are expected medically and legally to know how to use them.

- **Intubation tubes and laryngoscopes.** Tube size and type of blade should be selected before the start of any sedation treatment. Intubation skills require regular practice, and calling for help and bagging the patient often are a better choice for an inexperienced provider. If the office has this equipment, the provider will be
expected medically and legally to be able to use it. Connectors for albuterol inhalers are also necessary.

- **IV fluid and needles** to start an IV should be maintained. Check expiration dates on the fluid. Plan for possible IV sites during the pre-sedation physical exam. Tourniquets and latex-free tourniquets should be available. IV access could be very important in an emergency situation, but when the provider is not very experienced, calling for help, doing basic CPR, and giving IM injections of emergency drugs may be a better choice.

- **IO needles or intraosseous needles** could be very valuable in a true emergency situation. These are large needles inserted into bone to administer medications. They are very easy to learn to place and very effective in emergency situations.

- **Magills** are large instruments that look like forceps or pliers. They are used to reach down into the airway and grab foreign bodies. They can also be used to aid in the insertion of an intubation tube.

### Emergency medications

- Epinephrine.
- Atropine.
- Valium.
- Albuterol.
- Steroid.
- Antihistamine.
- Sugar or glucagon.

There should be a specific plan of how each medication will be given. If there is more than one possibility, multiple preparations may need to be stored. Epinephrine can be kept in vials that need to be drawn up into syringes to be put into an IV or given IM. Keeping an epiPen and epiPen Jr in the clinic is a quick way of introducing epinephrine into the patient without having to draw it up or start an IV.

The expiration dates must be monitored on these medications. Appropriate supplies, such as needles, syringes, saline flushes, IV fluids, and IV tubing, also must be maintained.

It should be clearly stated that most dentists are experts in managing dental treatment – but not medical emergencies. Many dentists complete all of their sedation training without ever having to truly manage any serious complications. Keeping emergency treatment simple and calling for help are the most important concepts to remember.

### SEDATION PERMITS

States require a specific conscious sedation permit, deep sedation permit, and general anesthesia permits. No didactic course can prepare a candidate to do sedation in the office without exposure to clinical sedation treatment.

Most states will require a candidate to complete a residency program, with a log of sedations the candidate has completed under supervision. While in training and shortly thereafter, candidates should keep very detailed information about their involvement with sedations. A location specific site visit will also likely be necessary.

Other post-graduate continuing education courses are now teaching sedation. The requirements for each state are different. Most states are requiring didactic training, a log of a certain number of sedations completed with supervision, and a site visit to inspect the area where sedation will be done.

The application for a state sedation permit will likely require completion of a training program, such as a residency, a log of sedations completed, and a site visit.

During the application process, the state board will likely send out a dentist who is very experienced with sedation in the office to make sure the site has all of the necessary emergency equipment in place as well as proper monitoring equipment. The state also will evaluate the plan for dealing with any emergencies as well as your staffing plan. The inspector also will discuss the plan to transfer a patient to a local hospital if complications result. These individuals are charged with making sure sedation will be provided at the standard of care in the community.

### Necessary staff training and planning

Staff members helping with the care of a sedated dental patient are very important. The minimal training should include basic CPR and in-office emergency planning. Offices that provide deep sedation may be required to have additional professionally educated staff present, depending on the state laws. The office should have a well-organized and systematic plan for dealing with emergencies.

Staff members should know their specific jobs in the event of an emergency. Someone should call 911 and keep the line open to relay important information. Another staff member should go outside to flag down the ambulance or hold the elevators; EMS personnel summoned to help should have no issues finding your office. Easy access to the patient should be ensured.

Other more experienced and educated staff members, such as RNs, anesthesia staff, and more experienced assistants, should be ready chairside to assist.

Record the emergency treatment on a time record or code sheet. Emergency medication amounts should have been pre-calculated. Adjunctive equipment, such as mask size selection, oral airway size, nasal trumpet size, blade size on the laryngoscope, and selection of size of LMA or intubation tube, also should have been selected in advance as well as routes of drug injection.

The dentist should be able to focus on the patient while the staff handles all the other emergency issues. As soon as an emergency is announced, staffers should bring emergency equipment to the dentist and patient. All other treatment should stop to stabilize the emergency.
Special note

States all have their own specific requirements for permits for conscious and deep sedation or general anesthesia. Most states will require proof of didactic training, documentation of successful supervised sedations, and a site visit at the location where sedation will be performed. Advanced levels of training in pediatric advanced life support or adult cardiac life support certifications usually have to be maintained. Please refer to the specific laws of your state.

This course alone in no way prepares a dental professional to sedate patients in their office.

References and citations

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SEDATION AND AIRWAY MANAGEMENT IN THE DENTAL OFFICE

Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on page 136, or for faster service complete your test online at Dental.EliteCME.com.

1. Sedation can progress from a mild and conscious state to a deep sedation or general anesthesia extremely quickly, and dentists must be prepared, because people can react differently to the same dose of sedation medication.
   - True
   - False

2. Informed consent for sedation can be done in general terms without discussing the specific drug side effects, risks or progression of the level of sedation.
   - True
   - False

3. Most people taking medication for seizures on a daily basis, who require sedation, are going to be treated in a hospital with the appropriate medical professionals ready to intervene, if needed.
   - True
   - False

4. Succinylcholine is the preferred drug for stopping a laryngospasm.
   - True
   - False

5. Allergic reactions without airway involvement, but some mild skin reactions should be treated with antihistamine and 911 should be called.
   - True
   - False