# Oral Sedation

# 5

Christopher Haxhi and Michael T. Goupil

## Introduction

Dental anxiety and fear are not novel concepts to even the most novice dental professional. Dental phobia can cause patient populations to avoid regular dental care throughout their lifetime. This in turn causes a compounding effect and necessitates ultimately more extensive treatment by general practitioners and more referrals to the oral and maxillofacial surgeon for disease control and restorative work. In this modern era, where, culturally, there is more emphasis on comfort, feelings, and avoiding situations that may be uncomfortable, the demand for sedation in dentistry and oral surgery has increased exponentially. Sedation in dentistry has become, to some, an expectation. To adequately treat patients who may otherwise refuse basic dental care, and for commercial success, the practitioner should be familiar with oral sedation methods. This same concern can be expanded to other healthcare situations where patients can exhibit anxiety when undergoing non-dental, office procedures. This chapter is designed to familiarize clinicians with their sedation medication arsenal, the pharmacologic effects of these drugs, and techniques for safely providing oral sedation. The goal of oral sedation is to relieve dental phobia and increase compliance during the treatment time.

When choosing a route of administration and a sedative agent, the clinician must assess the associated risks. In addition, a comprehensive medical evaluation should be completed on each patient regardless of whether a patient will receive sedation or not. However, the information gathered from the medical assessment will help in the decision-making process as to the most appropriate sedative medication is prescribed. The foundations of medical assessment were discussed in the first chapter of this section.

C. Haxhi
UCLA Oral and Maxillofacial Surgery Department, Los Angeles, CA, USA

M. T. Goupil (✉)
University of Connecticut School of Dental Medicine, Farmington, CT, USA
e-mail: mtgoupil@comcast.net


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## The Spectrum of Sedation

While this chapter will focus on oral conscious sedation in the dental office, in order to understand the effect this technique will have on a patient it is necessary to understand the varying degrees of sedation and anesthesia, especially the fluidity between levels. The American Society of Anesthesiologists regards the varying levels of sedation as a continuum. **Minimal Sedation** is defined as anxiolysis and is "a drug-induced state during which patients respond normally to verbal commands" [1]. At this level of anxiolysis, the patient's cognition and motor reflexes will be impaired; however, the dosage of medication is not high enough to produce any cardiac or respiratory effects. The next level along the continuum is **Moderate Sedation**, also referred to in dentistry as "Conscious Sedation" and is defined as a "drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation" [1]. Again, as in minimal sedation, there is no effect on the airway or respirations and usually cardiac function is preserved [1]. The appropriate usage of oral medications will yield this mild to moderate sedation and will be the focus of this chapter. When combined with profound local anesthesia this can facilitate the effective delivery of dental care or other office procedures. Local anesthesia is discussed in Chap. 4 of this section. Progressing along the continuum of sedation, **deep sedation/analgesia** is a "drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation" [1]. At this deep level it becomes variable from patient to patient whether respiratory function is impaired, and a patient at this level may require assistance in maintaining their airway and/or ventilations. This level is usually achieved in the outpatient clinical setting via intravenous administration of anesthetic medications. However, given that this is defined as a continuum, inappropriate administration of oral sedative agents pre- or perioperatively can result in a patient being pushed past moderate sedation and into deep sedation. With excessive levels of sedation, respiratory and cardiovascular complications can arise and the dentist or surgeon administering the sedation should be ready to recognize and manage the situation. The clinician should be prepared with the appropriate skill set and armamentarium to **rescue** the patient. Rescue is defined as the intervention to manage airway and advanced life support [1]. A patient should be returned to the intended level of sedation as it is inappropriate to continue any procedure at a level deeper than intended and discussed with the patient in the informed consent process. The last level of sedation is **general anesthesia**; it is a "drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation" [1]. This level of anesthesia is achievable by either intravenous or inhaled anesthetics, and the anesthesia received in a hospital operating room is the classic prototype of this level. A protected airway, i.e., endotracheal tube, is not always necessary; however, the patient will have impaired respiratory function and may require advanced techniques to deliver breaths.

With a deeper understanding of the levels of sedation and the often hazy boundaries between them, it should be clear to the clinician as to what should be the goal

of oral conscious sedation (mild to moderate sedation). The choice in sedative drugs delivered should be based on the desired level of sedation combined with patient and procedure specific factors. The additional levels of anesthesia and routes of delivery highlighted in this section are described in Chap. 6 of this section.

## Advantages vs. Disadvantages

As sedation dentistry becomes more and more popular, due to successful advertising, depictions in popular culture, and increased access to care, it becomes important for the clinician to integrate the patient's current medical condition, level of anxiety, and scope of treatment to be rendered in deciding which modality of sedation to administer, i.e., nitrous inhalation, oral, intramuscularly, or intravenous. In order for the clinician to develop a decision-making algorithm, it is important for the clinician to be aware of the advantages and disadvantages of the methods of delivery. Oral sedation is always worth consideration when treatment planning a patient's care as the method of administration is accepted by the general population [2]. This is due to the oral route being the most prevalent method of administration for medications and also the relative ease of administration of the drugs through the p.o. (per oral) route [2]. Dental anxiety can be exacerbated by apparatuses for delivery of inhalational agents or intravenous needles. Intravenous (IV) line placement has the potential for syncopal responses in those with dental phobia pertaining to needles. Oral medications are relatively lower cost than those of the IV variety [2]. Additional advantages of the p.o. route of administration are the decreased incidence of adverse reactions and decreased severity of the adverse reactions [2].

Most medications taken orally undergo an extensive first pass metabolism requiring quite substantial dosages of the medication in order to cause toxicity. Of course, the dosages to produce an effect can vary based on age, sex, ethnicity, and genetics. The intravenous route bypasses the mechanisms of first pass metabolism and has a sharper curve of titration. It is important to understand that oral sedative drugs can lead to adverse effects, including but not limited to anaphylaxis or cardiovascular; however its incidence is much less common [3]. As alluded to previously in this section, there is no special equipment needed for the sedation, i.e., needles and syringes [2]. This again helps with patient anxiety and, equally important, from an operations standpoint cuts down on preparation and recovery time, cost, and other practices that decrease efficiency and productivity. An important point must be made that a patient will usually still be under the effect of the medication after completion of the procedure and will require some recovery and cannot leave without an escort. As of the writing of this chapter, there are no specialized education requirements for oral sedation in the dental office, which is another advantage [2].

Oral medications can be administered at home before the patient arrives to the office; however, this brings up one of the major disadvantages of oral sedation in dentistry, which is patient compliance [2]. Patient compliance becomes an issue with both actual dosing and perioperative factors. Patients often forget to take their

medication, do not follow the instructions for dosing, or do not take it at the recommended time interval. Any clinician with patient's requiring antibiotic prophylaxis can attest to the problems of patient compliance.

## Drugs

This upcoming section will be a brief survey of the drugs used for oral conscious sedation. There are multiple classes of medications that a practitioner should be aware of and have in their arsenal. These classes include benzodiazepines, histamine blockers (H1), and opioids [4]. The chapter will go through their pharmacology, dosing, and warnings including specific examples of each class. There are other categories of oral drugs (i.e., chloral derivatives); however, much of their use is historical and will not be discussed for ease and speed of reference for the clinician.

### Benzodiazepines

Benzodiazepine drugs are subdivided into two categories based on effect: antianxiety and sedative-hypnotic. Both categories belong to a larger group of antianxiety and sedative-hypnotic which include other drugs which are not benzodiazepines. The antianxiety drugs are CNS depressants and can provide relief of anxiety without altering a patient's alertness, responsiveness, or motor function, making them a viable option for patients with mild to moderate dental phobia [5]. The sedative-hypnotic drugs produce either a calming effect (sedation) or inducing a sleep-like state (hypnosis) depending on the dose amount of the drug administered [5]. Benzodiazepines are considered first-line medications for most procedural sedations in the outpatient clinic [4]. The main reasons behind this are the high therapeutic index and the shallow dose-response curve [4]. Therapeutic index is "the range of doses at which a medication is effective without unacceptable adverse events" [6]. A high therapeutic index will mean that there is a wide range of doses that can produce the desired effect without toxicity. A dose-response means "that a dose required to produce minimal to moderate sedation is well below that required to produce hypnosis" [3]. The magnitude and duration of effect is dependent on patient specific factors including age, medication history, and health history [7]. For example, drug clearance of benzodiazepines in elderly patients is slower than younger patients and total elimination will thus take longer [7]. The benzodiazepine class of drugs is relatively safe and toxic effects would require very high dosages.

### Mechanism of Action

The benzodiazepine class of drugs work to enhance the effects of the inhibitory neurotransmitter gamma-aminobutyric acid (GABA). GABA has inhibitory effects on neurons throughout the central nervous system by binding "GABA receptors"

and opening chloride channels on the neuronal membrane. This leads to an influx of chloride and hyperpolarizes the cell membrane decreasing the likelihood of an action potential stimulating the neuron [4]. Benzodiazepine drugs bind the same GABA chloride channels at the $GABA_A$ receptor and increase the frequency of chloride channel activation in a GABA-dependent manner. Independent activation of these channels with benzodiazepines is not possible, drugs like propofol can open GABA chloride receptors independent of GABA [4]. The benzodiazepine drugs acts in a similar mechanism to the way that alcoholic beverages affect the central nervous system. It is not uncommon for patients to feel "drunk" after being given a dose of a benzodiazepine, either orally or intravenously.

## Respiratory Effects

At appropriate doses, there is a very low likelihood of any significant respiratory depression with oral benzodiazepines. This makes them the agent of choice for most anxiety and phobia related issues, both in relation to dentistry and overall [8]. However, as with any CNS depressant there are reported cases of respiratory depression and one can never rule out this adverse effect [8]. In patients with respiratory disease, the stress of the dental appointment can trigger bronchospasm, in asthmatics or COPD populations, if severe enough. The reduction of anxiety by benzodiazepines can provide a protective mechanism [8]. Overall, the benzodiazepines are generally considered safe in regard to adverse respiratory effects, but still necessitate monitoring of a patient's pulmonary health preoperatively and breathing intraoperatively.

## Cardiovascular Effects

Benzodiazepines have a similar safety profile between respiratory and cardiovascular systems. This class of medication has minimal cardiovascular effects in healthy patients. A study done in critically ill patients found that benzodiazepines, out of multiple classes of sedative drugs, provide the best amnestic profile while maintaining cardiac stability [9]. The study recognized that there is a risk for significant hypotension in patients who are already hemodynamically unstable [9]. Benzodiazepines are already employed in cardiac patients to reduce stress and anxiety issues that provide extra strain on the myocardium [8]. In the outpatient setting, in previously health patients with no history of heart disease, benzodiazepines are not only safe but also effective.

## Hepatorenal Effects

Benzodiazepines are metabolized by the liver and their specific reactions varies based on formulation. Diazepam (Valium) is broken down into an active metabolite

that persists with continued sedative properties [8]. Two benzodiazepines lorazepam and oxazepam are conjugated in the liver, which makes them water soluble, and they are excreted via the urine [4]. In patients with preexisting hepatic dysfunction or on medications that inhibit liver enzymes, clearance of the drugs may be prolonged [7]. In general, the benzodiazepines are considered among the safest sedative drugs with respect to hepatic function, especially in the setting of dental procedures when taken in a one-off scenario [8]. The clinician should consider smaller doses in the elderly, children, and those with hepatic dysfunction.

## Central Nervous System Effects

As previously discussed in this section, benzodiazepines are central nervous system depressants. They potentiate the effect of the inhibitory neurotransmitter GABA. These effects are widespread and act at various centers of the brain to reduce emotions of fear, stress, anger, frustration, etc. This class of drugs is also well known and desired for their ability to create anterograde amnesia. An interesting phenomenon that has been noted in patients receiving benzodiazepines either orally or IV has been referred to as the paradoxical disinhibition. This phenomenon can cause aggression, talkativeness, emotional release, excitement, and excessive movement [10]. It is difficult to predict which patients will have this response and one study puts the incidence at approximately 1% of patients receiving benzodiazepines [10]. Some risk factors identified are patients with a history of psychological disturbance, history of alcohol abuse, children, and geriatric patients who are likely to be disinhibited by benzodiazepines [10].

It is a well-known fact the benzodiazepines are anticonvulsants and are not contraindicated in the use of the epileptic dental patient, as they may provide a protective role. The anticonvulsant effects are primarily when the drug is administered via the intravenous route. It should be noted that given their anticonvulsant properties, if ever flumazenil, the benzodiazepine reversal agent, was administered to a patient, even someone without a history of epilepsy, this patient is at risk for the onset of a seizure.

## Contraindications

With a relatively favorable safety profile there are few contraindications to the use of benzodiazepines via the oral route. The main contraindications would be those with a history of anaphylaxis or hypersensitivity reaction to benzodiazepines, as well as, narrow-angle glaucoma [11].

## Warnings

In addition to the contraindications, benzodiazepines can have adverse effects on patients, primarily if used chronically. The clinician should be aware of these even

if the use is only for occasional surgery procedures. The most likely adverse effect that the practitioner may experience in the dental setting is transient or persistent psychomotor depression [12]. The patient will require an escort as the operation of an automobile or any other kind of equipment is inadvisable for patients that have taken a sedative. It also puts the patient at risk for falls and injuries due to this, which the provider may be held liable for. The primary concern for patients taking chronic benzodiazepine is the idea of tolerance and the drug history of the patient should be fully elucidated during the medical history taking [12]. Additionally, through chronic usage of benzodiazepines a patient can develop both psychological and physical dependence in patients [12]. Psychological dependence would see patients exhibiting drug seeking behaviors while physical refers primarily to withdrawal symptoms. Given that benzodiazepines act in a similar manner to alcohol, it is not difficult to understand the consequence of physical dependence. Concomitant use of benzodiazepines and alcohol is strongly advised against.

## Pregnancy

Studies on diazepam have shown that is potentially a teratogen and should not be used in pregnancy [13]. There have been studies on diazepam usage in the third trimester that has been linked to floppy infant syndrome [13]. Additionally, there is concern of diazepam being linked to facial clefts in children [13]. Most of these studies, again, have investigated chronic usage of benzodiazepines. Most benzodiazepines have either a teratogenicity rating of either D or X. If considering oral surgical procedures in any pregnant patient, it is prudent to contact the obstetrician for consultation regarding the procedure and use of any drug.

## Diazepam

Diazepam, marked as Valium, out of the other benzodiazepines that will be discussed in this chapter, is the oldest oral benzodiazepine and considered to be the model for oral benzodiazepine medications. Diazepam's effects are typical of the benzodiazepine group, which include anxiolysis, anterograde amnesia, sedation, anticonvulsant effects, and muscle relaxation [14]. The drug is lipophilic and absorption will be delayed with the concomitant ingestion of a moderately fatty meal [14]. In a fasted patient, between 90% and 100% of the drug is absorbed [14]. The peak plasma concentration is achieved approximately between 1 and 1.5 h [14]. Diazepam is highly bound to plasma proteins and so are its active metabolites and this drug and its metabolites cross the blood-brain barrier, the placental barrier, and into breast milk [14]. Due to the active metabolites, Valium has a long half-life, up to 48 h, according to the FDA. After it is broken down in the liver, the metabolized are conjugated and excreted in the urine [14]. Its use as a sedation agent has decreased in favor of drugs without active metabolites and shorter half-lives.

*Availability*: Valium is available for oral administration as tablets containing 2 mg, 5 mg, or 10 mg diazepam [14].

*Dosing*: To relieve anxiety, 2–10 mg, 2–4 times daily depending on the severity of the symptoms of anxiety [14].

## Alprazolam

Alprazolam, belonging to the benzodiazepine family, is widely known and famous in popular culture as Xanax. It produces anxiolysis and amnesia and is indicated for anxiety and panic disorders [15]. It is quickly absorbed in the GI tract, reaches its peak plasma concentration between 1 and 2 h, and is approximately 80% bound to albumin in plasma [15]. The drug is metabolized by the CYP3A4 hepatic enzymes with no active metabolites and is excreted in the urine [15]. The CYP3A4 enzyme can be inhibited and induced by various medications, supplements, and foods, so a careful history should be taken. Patients with a history of alcohol abuse, geriatric, or with liver problems should be sedated with this medication with caution.

*Availability*: 0.25, 0.5, 1.0, or 2.0 mg tablets under the brand name Xanax [15].

*Dosing*: Initial dose of 0.25–0.5 mg given three times daily for patients with anxiety [15]. The dose may be increased to achieve a maximum therapeutic effect, at intervals of 3–4 days, to a maximum daily dose of 4 mg, given in divided doses [15].

## Midazolam

Midazolam, previously branded as Versed, belongs to the sedative-hypnotic class of benzodiazepines, as opposed to the previously discussed antianxiety examples. It is available as both an IV and oral formulation and is the drug of choice in many surgical appointments. The drug induces sedation, anterograde amnesia, and anxiolysis. Midazolam is classified as a water-soluble benzodiazepine [16]. It is rapidly absorbed from the GI tract and produces drowsiness in about 30 min [16]. The time to peak plasma concentration in studies is approximately 20 min and its half-life is 1–5 h [16, 17]. Midazolam circulates bound to protein at approximately 95%-bound [17]. Oral Versed is commonly used by anesthesiologists in OR settings to facilitate preoperative preparations, including IV placement and induction of general anesthesia. It is a very short acting benzodiazepine which had made it popular among outpatient providers and dentists. It has favorability with those dealing with pediatrics, but it should not be used in pediatric populations below the age of 6 months.

*Availability*: Oral midazolam is available in a syrup that is 2.0 mg/mL [17].

*Dosing*: In patients between 6 months and 16 years old, 0.25–0.5 mg/kg PO (Max: 20 mg/dose) as a single dose 30–45 min before procedure [17].

## Lorazepam

Lorazepam, branded under the name Ativan, is a long-acting benzodiazepine that is available in both oral and IV forms. It is a sedative-hypnotic benzodiazepine that when used in appropriate dosages has a tranquilizing effect with no impairment of cardiopulmonary function [18]. The bioavailability of the drug is approximately 90%, it is absorbed slower in comparison to the other medications discussed and will reach peak plasma concentration at 2 h [18]. A 2 mg oral dose will reach a peak plasma level of 20 ng/mL at 2 h [18]. Lorazepam will circulate at about 80% protein bound and its excretion half-life is 20 h [18]. It is excreted in the urine after conjugation and does not have active metabolites. Integrating the above data, lorazepam clearly has a long duration of action and should be considered in longer surgical procedures. As with the other benzodiazepines, use should be attenuated in geriatric patients.

*Availability*: Oral lorazepam tablets are available in 0.5 mg, 1 mg, and 2 mg tablets [18].

*Dosing*: The dosage of Ativan is 2–6 mg per day divided into multiple doses [18]. For anxiety, most patients require an initial dose of 2–3 mg/day given two times a day or three times per day [18].

## Triazolam

Triazolam, marketed as Halcion, is another sedative-hypnotic benzodiazepine that is popular for dental clinical procedures. This hypnotic drug has a short half-life of 1.5–5.5 h; it reaches peak plasma concentration at 2 h and has peak plasma concentrations from 1 to 6 ng/mL when given in the p.o. formulation [19]. Additionally, it has no active metabolites and is excreted in the urine after conjugation by hepatic enzymes [19]. Its popularity is mainly due to its quick onset and short half-life. The safety profile and warnings are typical of the benzodiazepine group, which has been extensively discussed in this section. Due to its quick onset this makes it an ideal drug to be administered under supervision in the office setting.

*Availability*: Halcion is available in 0.25 mg tablet [19].

*Dosing*: The recommended dose for most adults is 0.25 mg before bedtime [19]. A dose of 0.5 mg should be used only for exceptional patients who do not respond adequately to a trial of a lower dose [19]. A dose of 0.5 mg should not be exceeded [19].

| Name | Onset of Action | Elimination Half-Life | Peak Plasma Concentration | Active Metabolites | Excretion |
|---|---|---|---|---|---|
| Diazepam (Valium) | 40 min | Up to 48 h | 1–1.5 h | Yes | Urine |
| Alprazolam (Xanax) | 60 min | 6.3–26.9 h | 1–2 h | No | Urine |

| Name | Onset of Action | Elimination Half-Life | Peak Plasma Concentration | Active Metabolites | Excretion |
|---|---|---|---|---|---|
| Midazolam (Versed) | 30 min | 1–5 h | 20 min | No | Urine |
| Lorazepam (Ativan) | 20–40 min | 20 h | 2 h | No | Urine |
| Triazolam (Halcion) | 20–40 min | 1.5–5.5 h | 2 h | No | Urine |

## Histamine Blockers

Histamine blockers are drugs with a primary action that is intended to be involved in attenuating the allergic response in patients [20]. While its intended use is for this, this class of medications became well known for drowsiness and the induction of sedation [8]. These drugs soon became marketed for that purpose as well. The efficacy of sedation, especially in the setting of dental phobia and anxiety, is well below that of the benzodiazepines [4]. It is for this reason that antihistamine drugs are not recommended as the primary drugs for oral conscious sedations and why benzodiazepines take the top spot [4]. However, it is important to be aware of this class of drugs and how they work for instances in which patients cannot use drugs from another class of medication. You may consider histamine blockers in patients who have narrow-angle glaucoma and cannot tolerate benzodiazepines for example. The two main examples of H1 Blocker sedatives are hydroxyzine and promethazine.

## Mechanism of Action

The main action of the H1 blockers is to prevent the allergic response in patients by acting as an antagonist at the histamine receptors. These histamine subtype 1 receptors are located throughout the CNS neurons, glandular cells, and smooth muscles [20]. Histamine granules, among other cytokines and inflammatory mediators, are released by mast cells in response to antigen and this histamine increases smooth muscle contractions in various organs (respiratory tract, GI tract) and increases vascular permeability which can cause a dangerous drop in blood pressure. One of the main side effects of this mechanism was sedation. The prevailing theory of the mechanism of action for this sedation is that, in the normal physiologic response, when histamine binds H1 receptors on neurons there is a partial depolarization of the neuronal membrane [21]. This partial depolarization increases the likelihood of excitation of the neurons. When there is a blockade of this depolarization it is likely that this contributes to the sedative effect of the drug [21]. It is important to understand that H1 receptor antagonists also likely exert their effect through non-selective and low affinity binding for muscarinic, adrenergic, and serotonergic receptors [21]. The final important point about the mechanism of H1 blockers is that they are independent of the GABA receptor channels that are targeted by the benzodiazepine

medications [4]. This is important because an H1 blocker can be used to potentiate the effects of a benzodiazepine without administering more of the benzodiazepine [4]. These drugs are generally considered safe, with less potential for side effects than with benzodiazepines [4]. The major warnings and physiologic effects vary from drug to drug and will be discussed individually. The main drugs this section will cover are promethazine and hydroxyzine.

## Promethazine

Promethazine, branded as Phenergan, is a phenothiazine derivative as well as an antihistamine and has long been used not only for sedation but also as an anti-emetic [8]. It has been available in the United States since 1951 and it is popular in the use of pediatric dental patients [8, 22]. Oral promethazine is readily absorbed and sedation can be appreciated within 20 min, with effects lasting between 4 and 6 h [23]. The drug is metabolized in the liver and excreted in the urine [23]. Of note, Phenergan is not addictive which differentiates it from the benzodiazepine class of drugs [5].

*Availability*: Phenergan is available in 12.5 mg, 25 mg, and 50 mg tablets [23].

*Dosing*: Pediatric sedation: 12.5–25 mg oral route at bedtime, Adults: 25–50 mg for preoperative sedation [23].

## Warnings

Promethazine in dosages used for sedation do not induce an actual unconscious state (similar to general anesthesia) or incite any deficits in cardiovascular function, however, according to the manufacturer, there have been cases of fatal respiratory depression [5, 23]. There is a black box warning for Phenergan stating that the drug should not be used in children less than 2 years old due to fatal respiratory complications [23]. Additional warnings include the potential for extrapyramidal side effects, the lowering of seizure threshold, bone marrow depression, and it is a considered a Category C teratogen [5, 23]. It should also be noted that in geriatric patients with dementia and Alzheimer's disease antihistamines should be avoided [4].

### Adverse Reactions

The most common adverse reactions from the use of promethazine are anticholinergic side effects including dry mouth and blurry vision, among others [23].

## Hydroxyzine

Hydroxyzine, marketed as Vistaril, is another class of H1 blocker that is unrelated to promethazine. Its primary effects in addition to sedation are skeletal muscle relaxation, bronchodilation activity, antihistaminic, anti-emetic and analgesic effects

[24]. Hydroxyzine's onset is approximately 15–30 min with peak effect at about 2 h [8, 24]. The drug effects begin to decline after 3 4 h [24]. There is a very small side effect profile with this drug and there is a minimal effect on cardiovascular and respiratory function [24]. Hydroxyzine is the drug of choice in pediatric patients when compared to promethazine [22].

*Availability*: Vistaril is prepared as 25 mg and 50 mg tablets and as an oral suspension [24].

*Dosing*: Usual adult doses range from 50 mg to 100 mg [24].

### Warnings

Hydroxyzine is contraindicated in pregnancy and nursing mothers [24]. It is also contraindicated in any patient with a history of hypersensitivity reaction to the drug [24]. A reduction in the dosing should be made when used with any analgesic (narcotic and non-narcotic) and barbiturates [24].

#### Adverse Reactions

Potential adverse reactions include transient drowsiness and dry mouth [24].

### Opioid Sedation

Sedation with opioid medication is possible, however it is not routinely achieved via the oral route. Opioids produce primarily analgesia but can also have the effect of sedation, and respiratory depression [4]. The mechanism of action of opioids is as agonists of the mu and kappa opioid receptors [4]. Typically, opioid effects outside of analgesia are unpredictable when taken through the oral route, especially if there is no preoperative pain. Opioid induced sedation is primarily considered to be a side effect of the drug. The primary application of opioid administration in sedation is when administered via the intravenous route. An opioid in addition to a benzodiazepine has a synergistic effect to increase sedation, as well as to centrally blunt the pain response [4]. A multi-modal approach to deep sedations and general anesthetics is an important practice and limits the amount of each individual drug needed to produce a satisfactory effect. The drugs, techniques, and mechanisms behind intravenous sedation will be discussed in detail in Chap. 6 of this section. Due to the current opioid crisis these drugs should be used in caution.

## Summary

The use of oral sedation is an excellent adjunct when performing surgical procedures in an outpatient clinical setting. They not only reduce patient anxiety, but they have an additional benefit of proving a more relaxing and safer environment for the surgeon. Benzodiazepines are predictably effective and carry minimal risk to the

patient. No additional equipment is required for their use as patient monitoring can be accomplished with monitoring devices already available in the office (i.e., blood pressure cuff). The only downside to oral sedation is the requirement for a patient escort to transport the patient to and from the office and to watch them until the effects of the sedation wear off.

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