About the Speaker

Jason H. Goodchild, DMD
Email: drjgoodchild@gmail.com
Website: www.BestDentalCE.com

Biography:

Jason H. Goodchild, DMD received his undergraduate degree from Dickinson College in Carlisle, Pennsylvania. He went on to receive his dental training at the University Of Pennsylvania School Of Dental Medicine (Philadelphia, PA). He is currently the Director of Clinical Affairs at Premier Dental Products Company (Plymouth Meeting, PA) involved in developing innovative new products and educating clinicians to improve clinical practice.

He is also Associate Clinical Professor in the Department of Diagnostic Sciences at Creighton University School of Dentistry (Omaha, NE), and Adjunct Assistant Professor in the Department of Diagnostic Sciences at the Rutgers School of Dental Medicine (Newark, NJ).

Dr. Goodchild has published numerous peer-reviewed articles and lectures internationally on the topics of treatment planning, treatment of medical complex dental patients, restorative dentistry, pharmacology, emergency medicine in dentistry, enteral sedation dentistry, and dental photography. Dr. Goodchild serves on the editorial advisory board of Compendium and Dental Products Report.

Dr. Goodchild maintains a private general dental practice in Havertown, PA. He can be reached via email at: jgoodchild@premusa.com.

Sedation Resources:

|             | Telephone Number: 888-894-2487     |
|             | Telephone Number: 800-753-6376     |
Question?!?

1. What was the first drug presumably used for oral sedation?
   a. Benzodiazepines
   b. Barbiturates
   c. Alcohol
   d. Nitrous Oxide
   e. Opioids

2. What is the goal of minimal oral sedation?
   a. To put the patient to sleep
   b. To shut the patient up
   c. To reduce anxiety
   d. To facilitate coping

3. What organ is chiefly responsible for drug metabolism?
   a. Stomach
   b. Liver
   c. Kidney
   d. Blood
   e. Intestines

4. What basic equipment must you have to perform minimal oral sedation?
   a. Emergency drugs
   b. Positive pressure oxygen
   c. Pulse oximeter
   d. Automated external defibrillator

5. After delivering minimal oral sedation to a patient for a dental appointment, when is the patient ready to be dismissed?
   a. When they are awake
   b. After they have paid their bill
   c. When the drugs have worn off
   d. When they are ambulatory
   e. When sedation has waned
Mastering Adult Minimal Sedation: Oral and Inhalational Techniques
Jason H. Goodchild, DMD

Why is this talk important to you?
- Oral sedation is a hot topic in dentistry
- You may see advertisements for CE courses
- Your patients might see or hear advertisements for oral sedation
- It works!

Updates to the ADA Sedation and Anesthesia Guidelines: (first introduced in 1971)
- 2005: Anxiolysis & Conscious Sedation
- 2007: Minimal & Moderate Sedation
- 2012: They updated some definitions
- 2016: Updated Guidelines!

The course manual is intended to follow the agenda and slides. Additional information and reference reading is given in your workbooks!

Other Notes or Questions to Ask:
**Definitions**
(Source: ADA teaching and use guidelines for sedation and general anesthesia, October 2016)

**Enteral** – any technique of administration in which the agent is absorbed through the gastrointestinal (GI) tract (i.e., oral, rectal, sublingual)

**Parenteral** – a technique of administration in which the drug bypasses the gastrointestinal (GI) tract (i.e., IM, IV, intranasal, SM, SC, IO)

**Minimal Sedation** - a minimally depressed level of consciousness, produced by a pharmacological method, that retains the patient's ability to independently and continuously maintain an airway and respond normally to tactile stimulation and verbal command. Although cognitive function and coordination may be modestly impaired, ventilatory and cardiovascular functions are unaffected.

**Dosing for minimal sedation via the enteral route** – minimal sedation may be achieved by the administration of a drug, either singly or in divided doses, by the enteral route to achieve the desired clinical effect, not to exceed the maximum recommended dose.

**Nitrous oxide/oxygen** when used in conjunction with sedative agent(s) may produce minimal, moderate, deep sedation, or general anesthesia

**Teaching Minimal and Moderate Sedation (Oct 2016)**
- Nitrous oxide/oxygen sedation: 14 hrs with clinical component
- Minimal Sedation: 16 hrs plus clinically oriented experiences
- Moderate Sedation (either enteral or parenteral): 60 hrs plus administration of sedation for at least 20 individually managed patients

**Important Point:** The ADA makes Guidelines but your State Dental Boards make the Rules! – READ YOUR STATE RULES & REGULATIONS!


---

**Other Notes or Questions to Ask:**
Case Example...

C.O. 46 yo female
- Tx Plan: Complete extractions and insertion of full upper and lower immediate dentures
- Tx length: 5 hours
- MHx:
  - MVP with regurgitation
  - No meds
  - No Known Drug Allergies (NKDA)
  - Patient smokes 1 ppd x 25 years
- Preoperative Vitals
  - BP 127/82 mmHg
  - Pulse 80 bpm
  - SpO₂ 98%

Drug Regimen:
- Triazolam 0.50 mg total

Why Oral Sedation?
- Many people require additional measures to minimize anxiety and fear
- Anxious and fearful patients underserved
  - Costs to the patient are typically less than IV sedation or general anesthesia
  - How many people in need? Up to 100M?
  - Not enough O.S. & Anesthesiologists. Out of approximately 190,000 dentists in the US, only 10,000 are OS and DA.

Other Notes or Questions to Ask:

Source: American Society of Anesthesiologists. Continuum of Depth of Sedation: Definition of General Anesthesia and Levels of Sedation/Analgesia (last amended on October 15, 2014) Available at: www.asahq.org

Other Notes or Questions to Ask:
**Pharmacology 101 and Sedation Medications**

Pharmacology is a broad term encompassing the overall study of drugs.

**What Happens When Drugs Enter the Body?**

The answer to this question deals with two branches of Pharmacology:

1. Pharmacokinetics deals specifically with the absorption of drugs from the outside environment, the distribution to their site of action within the body, their metabolism within the body, and finally their excretion.
2. Pharmacodynamics studies the interaction of the drug with the receptors at the site of action.

Once we gain an understanding of the pharmacodynamics and pharmacokinetics, we will concern ourselves with selecting those drugs that are most appropriate for our desired clinical results. Pharmacotherapeutics involves the study of choosing drugs for their desired actions in selective situations.

Patient response to medications can be represented by a bell-shape population curve where about 70% or one standard deviation will demonstrate the intended effect at a particular dose.

**Hyper-responder:** a patient who may be *more* sensitive to the effects of the normal or usual dose of a medication.

**Hypo-responder:** a patient who may be *less* sensitive to the effects of the normal or usual dose of a medication.

Remember: the **HYPER Responder** is fairly easy to recognize preoperatively based on:

- Past Medical History
- Underlying Medical Condition(s)
- Current Medications

In general, always stick with the mantra: **“Go Low, Go Slow!”**

**Other Notes or Questions to Ask:**
Conversely, a significant percentage of patients are hypo-responders after normal or average doses of medications. These patients may require larger than normal doses of medications to achieve a desired effect. Many factors can contribute to a patient’s hypo-response to medication.

The **HYPO Responder** is more difficult to recognize preoperatively, but can be inferred if the patient has evidence of the following clues:

- High Anxiety
- Liver Enzyme Inducers
- High Degree of Body Fat
- Use of Stimulants (caffeine, nicotine, and others)
- Past History of Drug Abuse
- Psychiatric Conditions
- Not Following the Preoperative Protocol

Absorption of oral medications occurs in the gastrointestinal tract, specifically the small intestine where most drugs cross the phospholipid bilayer via passive diffusion.

Some examples of drugs that show poor bioavailability when given orally due to extensive first-pass hepatic elimination: Morphine, Midazolam, Aspirin, Lidocaine

**Pharmacokinetics vs. Pharmacodynamics**

- **Kinetics** – What the body does to a drug
  - Absorption
  - Distribution, Redistribution
  - Metabolism
  - Elimination

- **Dynamics** – What the drug does to the body
  - Drug effects (ie. analgesia, sedation, etc)

**Other Notes or Questions to Ask:**
Pharmacokinetics consists of:

- Absorption
- Distribution
- Metabolism
- Elimination

---

**Absorption**

The route of administration is the principle factor that determines the rate by which a drug reaches its receptors.

- Intravenous (IV) is the fastest route with onset usually within 1 minute.
- Inhalation is almost as fast as IV, administered as a vapor or gas through the pulmonary alveoli in the lungs.
- Subcutaneous and Intramuscular (IM) are similar and require approximately 30 minutes to reach the blood stream.
  - Absorption is largely governed by how much blood flow is present to allow drug to be carried away.
  - Large volumes cannot be given.
- Enteric routes (oral and rectal) are the slowest way of introducing drugs into the blood stream. Oral ingestion of drug usually requires about 1 hour before effects are discerned.
- Sublingual (SL) has rapid onset, no first-pass effect, but not all drugs can be absorbed this way.

Bioavailability is the physiological availability of a given amount of a drug. Regardless of the route of administration, usually only a fraction of unchanged drug reaches the systemic circulation:

<table>
<thead>
<tr>
<th>Route of Administration</th>
<th>Bioavailability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravenous</td>
<td>100% by definition</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>75 to ≤ 100%</td>
</tr>
<tr>
<td>Subcutaneous</td>
<td>75 to ≤ 100%</td>
</tr>
<tr>
<td>Oral</td>
<td>5 to ≤ 100%</td>
</tr>
<tr>
<td>Rectal</td>
<td>30 to ≤ 100%</td>
</tr>
<tr>
<td>Inhalation</td>
<td>5 to ≤ 100%</td>
</tr>
<tr>
<td>Transdermal</td>
<td>80 to ≤ 100%</td>
</tr>
</tbody>
</table>

---

**Other Notes or Questions to Ask:**
The extent of absorption is affected by such factors as: the lipophilicity of the drug; pH-dependent active transport; gut metabolism by bacteria; p-glycoprotein pump and the dissolution of some tablets.

Most drugs are given orally and are absorbed via passive diffusion through cell membranes of the GI tract. These membranes are composed of a lipid bilayer, so the drug’s lipid solubility is crucial for absorption and distribution. *Only uncharged drug is lipid soluble.*

**Absorption Effected By:**
- Presence of food in the stomach – inhibits absorption
- Mucosal surface area – less surface area will inhibit absorption
- Gastric emptying time – slower emptying time will inhibit absorption
- pH of the tissues – antacids inhibit absorption
- Dosage form of the drug – lipophilic or lipophobic
- Drug inactivation – p450 enzyme complex
- Bioavailability of the drug – plasma protein binding

**Distribution Effected By:**
- Number of drug binding sites on the protein
- Protein concentration
- Weak acids are bound more extensively than weak bases
- Competing molecules
- Disease

Drug distribution is often thought of in terms of compartments too, where highly lipophilic drugs cross readily from the plasma compartment to tissue compartments such as the brain. The *Blood-Brain Barrier* for example, is not a true “barrier”, but more like a selective gatekeeper for highly lipophilic medications whose site of action is the central nervous system.

**Other Notes or Questions to Ask:**
Metabolism:

Drugs are chemically transformed by the body to make them more water soluble, and thus more easily excretable. The primary organ of metabolism for the oral sedative medications is the liver (although some similar enzymes exist in the cells of the gastrointestinal mucosa). The enzyme complexes in the liver chemically transform the medication molecules into either active or inactive metabolites. These enzymes are known as the **Cytochrome P<sub>450</sub> (CYP<sub>450</sub>)** family of enzymes.

Drugs can act as either substrates for these enzymes, inducers or inhibitors, and these differences are the basis for drug interactions and the interpatient variability of responses to medication.

Drugs that enter the body parenterally can also be metabolized in the liver, but not until a certain proportion of the drug has had the opportunity to act at the site of action, in the case of sedative agents this would be the central nervous system (CNS). This accounts for the faster onset of action of parenterally administered drugs since the “first-pass effect” is essentially bypassed. This is also true for medications administered via the inhalation, rectal, topical and submucosal routes.

**Other Notes or Questions to Ask:**

---

Adapted from: Byrne EB. *Endodontic Topics* 2003;4:9-21.
Metabolism Effected By:
- Individual differences in metabolic rate (genetic polymorphism)
- Age of the patient (consider the very young and the very old)
- Liver disease (impairment of enzyme activity or defective formation of enzymes)
- Cardiac disease (by limiting blood flow to the liver may impair rate of metabolism)
- Pulmonary disease (especially in the case of inhaled medications)
- Endocrine dysfunction (hypothyroid patients have a slowed metabolism versus hyperthyroid patients who have a revved-up metabolism)
- Drug interactions (inhibition or induction)
- Cigarette smokers metabolize some drugs more rapidly than nonsmokers because of enzyme induction.

Metabolism determines blood levels of active drug and therefore, predictability of response.

Renal clearance is the major pathway of elimination for most drugs and their metabolites. In fact, the role of the liver in metabolism is to generally convert lipophilic (fat-soluble) molecules into more hydrophilic (water-soluble) molecules for easier excretion via the kidneys.

Elimination can also occur via the bile and feces. Sometimes an active metabolite is formed from metabolism and can target the kidney as it is eliminated. Such is the case with Ciprofloxacin, which is used to treat urinary tract infections.

Other Notes or Questions to Ask:
Factors affecting elimination include:
- Liver Function
- Kidney Disease
- Age
- Drug Half-Life
- Compartment Models

This becomes important when considering that different drugs are cleared from the body at different rates, and are therefore dosed differently and with different frequency. In terms of pharmacokinetics, we can then determine the half-life of a drug so that we may dose a patient appropriately. Half-life indicates the time it takes to attain 50% of steady state blood level. After one half-life, one half of the drug in the system will have been eliminated. After four half-lives, greater than 90% of drug in the system will have been eliminated:

100% divided by 2 = 50%  (after one half life 50% of a drug has been cleared)
50% divided by 2 = 25%   (after 2 half lives 75% of a drug has been cleared)
25% divided by 2 = 12.5% (after 3 half lives 87.5% of a drug has been cleared)
12.5% divided by 2 = 6.25% (after 4 half lives > 90% of a drug has been cleared)

The binding of drugs to receptors cannot be quantified, so clinically we describe a drugs' therapeutic level in terms of plasma levels. The therapeutic level for a drug is the plasma concentration at which we know a majority of the population will have a desired clinical effect. Although, there is a wide interpatient variability in response to medications, referenced plasma levels of medications help us guide treatment and are recorded as a balance between dose per unit time and factors which will decrease the level of active drug (metabolism, excretion, dilution). Plasma levels of drugs are always changing.

Other Notes or Questions to Ask:
A **Steady-state** can be achieved when the rate of drug accumulation in a body is equal to the rate of elimination. This is also achievable if identical multiple doses of drug are given every half-life: relatively constant levels will be produced after 4 half-lives.

**Pharmacodynamics**

**Pharmacodynamics** studies the interaction of a drug with a receptor at the site of action. Receptor occupancy explains the response of drugs.

Binding to receptors is usually reversible and falls into one of two categories: **agonists and antagonists**.

*Agonists* have an affinity for receptors and their binding to these receptors leads to the effect and efficacy of the medication.

*Antagonists* only has an affinity for binding to the receptor, but this interaction does not illicit a response and it therefore it antagonizes or blocks an active drug from combining to the receptor and causing an effect.

As we age we may have enhanced sensitivity to drugs due to: changes in receptor numbers; changes in receptor affinity or; alterations in the processes after a drug binds a receptor. *In general, elderly patients require a reduction in sedative drug dosage.*

For example, the elderly are more sensitive to benzodiazepines, more sensitive to the analgesic effects of narcotics and they have enhanced response to anticoagulants such as warfarin and heparin.

---

**Pharmacodynamics**

- As we age we may have enhanced sensitivity to drugs due to:
  - Changes in receptor numbers
  - Changes in receptor affinity
  - Alterations in the processes after a drug binds a receptor
- For example, the elderly are:
  - more sensitive to benzodiazepines
  - more sensitive to analgesic effects of narcotics
  - enhanced response to warfarin, heparin

---

**Other Notes or Questions to Ask:**
Enteral Sedation & Sedative Agents

Parenteral vs. Enteral Sedation

**Parenteral**
- IV, IM, SC
- No “First-Pass” effect
- Drug effect is rapid
- Adverse effects can be rapid
- Requires specialty training
- Patient acceptance?

**Enteral**
- Oral, SL, rectal
- Long latency period
- “First-pass” effect
- Presentation of adverse effects is slow
- Lower incidence of adverse effects
- Requires less specialty training
- Patient acceptance?

*All things considered equal, the lower the sedation level, the less chance for a serious adverse event to occur. The adage, “go low and go slow” is an excellent philosophy for the practice of sedating dental patients.*

**Who is a candidate for oral sedation?**

<table>
<thead>
<tr>
<th><strong>Good</strong></th>
<th><strong>Not Good</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pts who have difficulty achieving profound local anesthesia</td>
<td>Pts with complex medical histories</td>
</tr>
<tr>
<td>Gaggers</td>
<td>Pts taking medications which may cause adverse reactions</td>
</tr>
<tr>
<td>Fearful or anxious patients</td>
<td>Severely depressed patients</td>
</tr>
<tr>
<td>Pts needing longer procedures</td>
<td>Pts with a severe mental handicap</td>
</tr>
<tr>
<td>Helpful with invasive procedures</td>
<td>Pregnant patients</td>
</tr>
</tbody>
</table>

Other Notes or Questions to Ask:
Oral Route Advantages:

- Generally the safest route
- Decreased incidence of adverse reactions
- Decreased severity of adverse reactions
- Ease of administration (convenient)
- Almost universal acceptability
- Low cost
- No needles, syringes, equipment
- No specialized training

Oral Route Disadvantages:

- Reliance on patient compliance
- Prolonged latent period
- Erratic and incomplete absorption of drugs from the GI tract
- Gastric irritation may cause vomiting
- Inability to titrate
- Adding small doses of drug and being able to determine within seconds if the desired effect was achieved
- Prolonged duration of action
- Inability to readily lighten or deepen the level of sedation
- Requires cooperation of the patient

The Drugs

The goal of conscious sedation dentistry is to create a patient who is calm, and comfortable enough to receive dental care, and who can maintain a patent airway without assistance. Medications used for anxiolysis or conscious sedation should carry an inherent margin of safety such that overdose or unconsciousness is unlikely.

Because there are many medications that are anxiolytic (reduces anxiety) and hypnotic (involves the induction and increase of sleep duration), there may be instances that alternate regimens may be indicated. The decision to use drugs other than triazolam should be based on the practitioners’ level of training and should take into account many factors. The factors that may influence drug selection include:

- Medical History
- Drug interactions
- Allergies
- Length of appointment
- Depth of sedation needed
- Adverse reactions

Anxiolytic and Sedative agents are not new to the practice of medicine. Alcohols have been used for centuries to “numb” the mind to both painful as well as anxiety producing procedures. The use of opium has been traced back to Ancient Egypt. In the nineteenth century, drugs such as bromide (1853), chloral hydrate, paraldehyde, urethane and sulfonal (all pre-1970) were employed with varying degrees of success. Early in the twentieth century, the barbiturates were discovered (Barbital – 1903 and Phenobarbital – 1912), and the age of modern anesthesia was born. While these early drugs were effective, their level of safety was questionable.
Safety of a given medication can be measured pharmacologically by determining the **Lethal Dose 50 (LD50)**. The LD50 is that dose of a given drug that will result in mortality of 50% of the population when administered. Likewise, the **Effective Dose 50 (ED50)** is the dose of a given drug that will cause the desired results in 50% of a population. The two terms can be related to one another by the Therapeutic Index (TI = LD50/ED50), which is a relative measurement of drug safety. The greater the Therapeutic Index of a drug, the greater the margin of safety.

Chloral Hydrate, a drug that has been used as a sedative for over a century, when compared to a drug in the benzodiazepine class (Diazepam - early 1960s), is an example of the lower degree of safety as demonstrated by drugs of the past. One of the attributes that make newer classes of drugs safer than those in the past is their ability to more selectively depress areas of the central nervous system that affect consciousness. Most anxiolytic and sedative agents, if given in inappropriate doses, have the capacity to elicit undesired effects, including coma and death.

**Chlordiazepoxide** (1957), was the first drug in the benzodiazepine class to be synthesized. The benzodiazepines, being more selective in their effects on the central nervous system, are much less likely to induce coma and death; therefore they have a much higher LD50 and Therapeutic Index than drugs in other anxiolytic/sedative classes.

---

**Chloral Hydrate vs Diazepam**

![Diagram showing the comparison between Chloral Hydrate and Diazepam in terms of their therapeutic index and margin of safety.](image)

The “Ideal” Oral Agent should have the following properties:

- Fast onset
- No adverse effects – large margin of safety (respiratory, cardiovascular, others)
- “Short” acting (for office use)
- Anxiolytic with some amnesic properties
- Reversal agent available

---

**Other Notes or Questions to Ask:**
Benzodiazepines meet these requirements and have the following properties:

- ✔ Sedative-Hypnotic
- ✔ Muscle Relaxant
- ✔ Anxiolytic
- ✔ Anticonvulsant
- ✔ Antidepressant
- ✔ Anterograde Amnesia

**The Benzodiazepine Family of Medications**

All of the benzodiazepine drugs have a similar chemical structure.

**Diazepam (Valium®)**

- Produces mild sleep and mild amnesia
- Onset: 30-60 minutes
- Half-Life: 50 hours (20-100) due to active metabolites
- Duration of action can be 6-8 hours
- Supplied in 2, 5, and 10 mg tablets
- Usual Dosage is 2-40 mg
- FDA approved anxiolytic
- High Lipid Solubility

Indications for use of diazepam as approved by the FDA:

- Alcohol withdrawal syndrome
- Anxiety (>6 mos of age)
- Sedation, premedication before surgery
- Seizure, refractory, increased frequency
- Seizure, adjunct
- Skeletal muscle spasm, adjunct
- Skeletal muscle spasm - tetanus
- Status epilepticus (seizure control)

**Other Notes or Questions to Ask:**
Lorazepam (Ativan®)
- Produces mild/moderate sleep with moderate amnesia
- Onset: 60-120 minutes
- Half-Life: 10-20 hours
- No active metabolites
- Duration: 6-8 hours
- Supplied in 0.5, 1, and 2 mg tablets
- Dosage: 2-6 mg
- Moderate Lipid Solubility

Indications for use of lorazepam as listed by the FDA:
- Anxiety (>12 years of age)
- Insomnia due to anxiety of situational stress
- Predication for procedural sedation
- Status epilepticus (seizure control)

Triazolam (Halcion®)
- No active metabolites
- Plasma half-life is 1.5 – 2.5 hours
- Wide effective dose range
- Mean peak concentration is achieved at 1.3 hours
- Has anticonvulsant properties – can be used with the epileptic patient
- May act as a respiratory depressant at very high doses (greater than 2mg)
- Relaxation for adequate pain control – important for hard to numb patients
- Does not cause nausea (unlike high doses of nitrous oxide)
- $LD_{50}$ is 5 grams per kilogram in rats (very safe)

Respiratory depression represents the principal negative that is introduced with conscious sedation and left unrecognized and untreated is the cause of the most serious complication!

Indications for use of triazolam as approved by the FDA: Insomnia (approved for adults, safety and efficacy in children have not been established)

Characteristics of Triazolam:
- Onset: within 1 hour
- Peak effect: 1.25 hours (75 minutes)
- Duration: 2-4 hours

Other Notes or Questions to Ask:
Triazolam Dosage (PDR):
- Adult: 0.5 mg Maximum for healthy adult
- Elderly or debilitated 0.125 mg
- Always use the lowest effective dose
- Child: Safety and efficacy not tested for patients below the age of 18

Midazolam (Versed®)
- Produces moderate sleep and high amnesia
- Onset: 15-30 minutes
- Half-Life: 1.5 - 5 hrs.
- No active metabolites
- Duration: 1 hr.
- Supplied in 118 ml bottles, each mL contains 2mg midazolam
- Dosage: 0.25 to 0.75 mg/kg in children >6 months (relative maximum of 10 mg)
- High Lipid Solubility
- Not an FDA approved anxiolytic

Indications for use of midazolam as approved by the FDA:
- Amnesia induction – anxiety – procedural sedation
- Induction of general anesthesia
- Procedural sedation (>6mos of age)
- Sedation for mechanically ventilated patient

Other Medications (non-Benzodiazepines)

Zaleplon (Sonata®)
- Indicated for insomnia, mild amnesia
- Onset: 30 minutes
- Half-Life: 1-2 hours
- No active metabolites
- Duration: up to 6 hours
- Supplied in 5 and 10 mg capsules
- Dosage: 10 mg (start at 5mg in the elderly or patients with liver disease)
- Overdosage can be treated with flumazenil
- Not an FDA approved anxiolytic (approved for treatment of insomnia in adults only)

Other Notes or Questions to Ask:
Zaleplon -- Cautions:
- hypersensitivity to zaleplon products
- depressed patients
- elderly or debilitated patients
- hepatic or severe renal impairment
- compromised respiratory condition
- concurrent use of alcohol
- pregnancy category C

<table>
<thead>
<tr>
<th>Drug</th>
<th>Lipid Solubility</th>
<th>Onset (mins)</th>
<th>T1/2 (hrs)</th>
<th>Site of Metabolism</th>
<th>Active Metabolite</th>
<th>Usual Dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diazepam</td>
<td>High</td>
<td>30-60</td>
<td>&gt;24</td>
<td>CYP 1A2, 2C8, 2C19, 3A3-4</td>
<td>Yes</td>
<td>2-40 mg per day</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>Moderate</td>
<td>60-120</td>
<td>10-20</td>
<td>Hepatic glucuronidation</td>
<td>No</td>
<td>2-6 mg</td>
</tr>
<tr>
<td>Triazolam</td>
<td>High</td>
<td>15-30</td>
<td>1.5-2.5</td>
<td>CYP 3A4, 5-7</td>
<td>No</td>
<td>0.125-0.25 mg</td>
</tr>
<tr>
<td>Midazolam</td>
<td>High</td>
<td>0 (IM) 15-30 (PO)</td>
<td>1.5-5</td>
<td>CYP 3A3-5</td>
<td>No</td>
<td>0.25-0.75 mg/kg</td>
</tr>
<tr>
<td>Zaleplon</td>
<td>Moderate</td>
<td>30</td>
<td>1-2</td>
<td>Aldehyde oxidase, CYP 3A4</td>
<td>No</td>
<td>10-20 mg</td>
</tr>
</tbody>
</table>

Triazolam is a near ideal sedative agent due to its pharmacological properties. It not only is highly effective for dental sedation purposes, but it inherently has a large margin of safety.

Triazolam: Cautions and Contraindications (Nearly all of these cautions and contraindications apply to all benzodiazepines):

Absolute Contraindications
✓ Known hypersensitivity
✓ Pregnancy – benzodiazepines are known teratogens (esp. 1st trimester)
✓ Lack of Knowledge
✓ Inability to resuscitate
✓ Concurrent with CYP3A4 inhibitors: grapefruit juice, ketoconazole,itraconazole, nefazodone, cimetidine, and macrolide antibiotics

Other Notes or Questions to Ask:
Relative Contraindications for Triazolam (and other benzodiazepines)
(Risk benefit should be considered when the following medical conditions exist)
- Alcohol intoxication – additive CNS depression
- Glaucoma
- Drug abuse or dependence
- Pediatric patients
- Elderly (oversedation, dizziness, or impaired coordination)
- Psychiatric patients
- Renal impairment
- Severe hepatic impairment
- Lactating patients

Precautions
✓ Cardiovascular Disease (tachycardia 0.5%)
✓ Patients on Steroids (stimulation, mania, increased agitation)
✓ Potential Drug Interactions: alcohol & CNS depressants
✓ Potential Herb Interactions: golu kola, kava, melatonin, SAMe, St. John’s Wort, valerian (may increase CNS depression)
✓ Food may decrease the rate of absorption

“Triazolam is chemically related to diazepam and is used for the short-term treatment of insomnia. Its rapid onset, short duration of action, and lack of active metabolites also makes it a near ideal anti-anxiety medication for dental patients”.


Benzodiazepine Reversal Agent

Flumazenil (Anexate®, Romazicon®)

Other Notes or Questions to Ask:
Flumazenil (Romazicon® in U.S., Anexate® in Canada):

✔ First clinical trials done in 1979
✔ Displaces BDZ’s from their receptor site, reversing their sedative action
✔ Onset of reversal after I.V. injections is 1-2 minutes (neutral ligand)
✔ Duration of effect depends on the dose of flumazenil and the dose of the BDZ
✔ Adult dose is 0.2mg q1min up to 5 doses

Flumazenil, a nonspecific competitive antagonist of the benzodiazepine receptor, is used for reversal of benzodiazepine-induced sedation, and overdose. It binds to GABA-receptor sites, but has no agonist activity.

*** It is not recommended for routine reversal as seizures and cardiac dysrhythmias can occur with flumazenil administration, and although the majority of these effects are uncommon and well tolerated. Co-ingestion of drugs with proconvulsant properties is associated with an increased risk of seizures, presumably due to loss of the benzodiazepine’s protective anticonvulsant effect when the antagonist is administered. Combined overdose of benzodiazepines with tricyclic antidepressants accounts for 50% of these seizures. Coingestants possessing prodysrhythmic properties, such as carbamazepine or chloral hydrate, may increase the likelihood of cardiac effects by a similar mechanism.

*** Although flumazenil reverses benzodiazepine-induced sedation, it does not consistently reverse respiratory depression. The initial adult dose of flumazenil is 0.2 mg given intravenously over 30 seconds. A second dose of 0.2 mg may be given, followed by 0.2mg doses at 45-60 second intervals, to a total of 1mg in twenty minutes. Most patients will respond to less than 1 mg.

*** In children, the initial dose is 0.01 mg/kg.

*** Because the duration of action of flumazenil is short (40-80 minutes), resedation occurs in up to 65% of patients and requires either redosing or continuous infusion (0.25 to 1.0 mg/hr).

In summary, flumazenil should be used for selected patients with significant symptoms from a known benzodiazepine overdose, and not routinely used on patients following an oral sedation procedure.

Other Notes or Questions to Ask:
Flumazenil -- Other points to note are:

1. Insoluble in water
2. Slightly soluble in acidic solutions
3. Dilute concentration of 0.1mg/mL
4. 5 ml and 10 ml vial
5. One hour duration (triazolam’s half-life is about 2 hours so patients could re-sedate)
6. Can be given sublingual in the canine to first molar area, 2-3 mm under the mucosa, not in the midline
7. Buy the 5mL vials and be aware of expiry dates!

Contraindications:
- Known hypersensitivity to benzodiazepines
- Patients with known seizure disorders treated with a benzodiazepine

Several studies support the use of flumazenil in the treatment of benzodiazepine overdose. Two examples are listed below:

✓ “Respiratory depression mediated by benzodiazepines can be reversed using the specific antagonist flumazenil (Romazicon). It can be titrated intravenously or injected sublingually in 0.2 mg increments every 2-3 minutes, up to 1 mg. Flumazenil should not be administered to patients with a history of seizure disorder or dependence on benzodiazepines.” (Page 289)

✓ “Clinical trials using flumazenil to reverse the CNS depression associated with intravenous diazepam sedation for third molar extractions have demonstrated its efficacy.” (Page 135)

✓ “Although intended for intravenous administration in 0.2 mg increments up to 1 mg, it may be injected submucosally as well.” (Page 135)


✓ “Intraoral submucosal injection of flumazenil appears to be a viable concept based upon the following findings. The drug is rapidly and complete absorbed into the systemic circulation, as evidenced by comparable serum concentrations to those obtained by IV administration.”


Other Notes or Questions to Ask:
Some Definitions

- **Synergism:** When two or more drugs with similar pharmacologic effects act together to produce a greater effect than either drug alone. Synergism can either be additive or potentiating.
  
  o **Additive:** The combined drug effects are essentially the algebraic sum of their individual effects (eg. $1 + 1 = 2$).
  
  o **Potentiating:** The combined drug effects are greater than the sum of their individual effects (eg. $1 + 1 > 2$).

### Antihistamines

- There are several other drugs that are effective for oral sedation, but don’t fall into the previous drug classes that have been discussed.
- The H₁-receptor antagonist hydroxyzine (Atarax) has both sedative and hypnotic properties.
- The OTC anti-histamine diphenhydramine (Benadryl) have hypnotic properties and can be an inexpensive and safe adjunct to sedation.
- Both Atarax and Benadryl are useful in allergic rhinitis and urticaria, and are antiemetic.

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Half-Life (hrs)</th>
<th>Dose Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenhydramine</td>
<td>Benadryl</td>
<td>2-8</td>
<td>25-50 mg</td>
</tr>
<tr>
<td>Dimenhydrinate</td>
<td>Dramamine</td>
<td>4-6</td>
<td>50-100 mg</td>
</tr>
<tr>
<td>Hydroxyzine</td>
<td>Atarax, Vistaril</td>
<td>3-7</td>
<td>50-100 mg</td>
</tr>
<tr>
<td>Promethazine</td>
<td>Phenergan</td>
<td>2-6</td>
<td>25-50 mg</td>
</tr>
</tbody>
</table>
Hydroxyzine (Atarax® or Vistaril®)
- H1-receptor antagonist
- Bronchodilator
- Antihistaminic, Decongestant, and Antiemetic actions
- Antisialagogue (anticholinergic)
- Antiarrhythmic
- Anxiolytic
- Even at high doses produces minimal CV and respiratory depression
- High therapeutic index
- Produces moderate sleep with no amnesia
- Onset: 1 hour
- Half-Life: 3-7 hours
- No active metabolites
- Duration: 3-6 hours
- Supplied in 10, 25, and 100 mg tablets and a 10mg/5mL syrup
- Dosage: Adults 50-100 mg, Children 10-50 mg
- Overdosage: No specific antidote
- FDA approved anxiolytic and as a pre- and postoperative adjunctive medication

Contraindications:
- Early Pregnancy
- Known Hypersensitivity
- Nursing Mothers
- Children <1 year
- Acute narrow angle glaucoma
- Use with other CNS depressants cautiously

Promethazine (Phenergan®) is from the phenothiazine class but has H1-receptor effects. It has strong antihistamine properties and is commonly used in conjunction with opioid anesthesia, due to its antiemetic properties. Phenergan’s antiemetic protection is primarily due to its interaction with dopaminergic receptors in the CTZ (Chemotactic Trigger Zone).

Some important points about Phenergan:
- Will not produce unconsciousness, and even at higher doses will not cause respiratory or CV depression
- Sedative
- Antisialagogue (Anticholinergic effects)
- Strong antiemetic

Other Notes or Questions to Ask:
<table>
<thead>
<tr>
<th>Drug</th>
<th>Tmax (hr)</th>
<th>T1/2 Elim (hr)</th>
<th>Site of metabolism</th>
<th>Pharmacologic Antagonist</th>
<th>Usual PO Dose</th>
<th>Duration of Action (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triazolam (Halcion®)</td>
<td>1.25</td>
<td>2.5 (1.7-4)</td>
<td>CYP 3A4, 5-7</td>
<td>Flumazenil</td>
<td>0.125-0.5 mg</td>
<td>2-4</td>
</tr>
<tr>
<td>Midazolam (Versed®)</td>
<td>0.5-1</td>
<td>1-2</td>
<td>CYP 3A3-5</td>
<td>Flumazenil</td>
<td>0.5 mg/kg</td>
<td>1-2</td>
</tr>
<tr>
<td>Lorazepam (Ativan®)</td>
<td>1.2</td>
<td>15.7 (14-16)</td>
<td>Hepatic gluconidation</td>
<td>Flumazenil</td>
<td>1-3 mg</td>
<td>6-8</td>
</tr>
<tr>
<td>Alprazolam (Xanax®)</td>
<td>1.45</td>
<td>14.5 (12-15)</td>
<td>CYP 3A4</td>
<td>Flumazenil</td>
<td>1 mg</td>
<td>6-8</td>
</tr>
<tr>
<td>Diazepam (Valium®)</td>
<td>1.12</td>
<td>33 (20-100)</td>
<td>CYP 1A2, 2C8, 2C19, 3A3-4</td>
<td>Flumazenil</td>
<td>5-10 mg</td>
<td>6-8</td>
</tr>
<tr>
<td>Zaleplon (Sonata®)</td>
<td>0.5-1.5</td>
<td>1</td>
<td>Aldehyde oxidase, CYP 3A4</td>
<td>Flumazenil</td>
<td>10 mg</td>
<td>4</td>
</tr>
<tr>
<td>Zolpidem (Ambien®)</td>
<td>1.6</td>
<td>2.5</td>
<td>CYP 3A4, 2C9, 1A2</td>
<td>Flumazenil</td>
<td>10 mg</td>
<td>8</td>
</tr>
<tr>
<td>Ramelteon (Rozerem®)</td>
<td>0.3</td>
<td>0.5-2.6</td>
<td>CYP 1A2, 2C, 3A4</td>
<td>Unknown</td>
<td>8 mg</td>
<td>24</td>
</tr>
<tr>
<td>Eszopiclone (Lunesta®)</td>
<td>1-1.5</td>
<td>6</td>
<td>CYP 3A4, 2E1</td>
<td>Flumazenil</td>
<td>2-3 mg</td>
<td>6</td>
</tr>
<tr>
<td>Zopiclone (Imovane®)</td>
<td>1-1.5</td>
<td>3.5-6.5</td>
<td>CYP 3A4, 2E1</td>
<td>Flumazenil</td>
<td>7.5 mg</td>
<td>&lt; 24</td>
</tr>
<tr>
<td>Promethazine (Phenergan®)</td>
<td>2-3</td>
<td>7-15</td>
<td>CYP 2D6, 2B6</td>
<td>None</td>
<td>25 mg</td>
<td>2-8</td>
</tr>
<tr>
<td>Hydroxyzine (Atarax®, Vistaril®)</td>
<td>2.1</td>
<td>7-20</td>
<td>CYP 2D6</td>
<td>None</td>
<td>50 mg</td>
<td>24</td>
</tr>
</tbody>
</table>
# Approximate Benzodiazepine and Non-Benzodiazepine Equivalent Doses

<table>
<thead>
<tr>
<th>Benzodiazepine</th>
<th>Half-life [active metabolite]</th>
<th>Approximate equivalent oral dosage (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alprazolam (Xanax)</td>
<td>6-12</td>
<td>0.5</td>
</tr>
<tr>
<td>Chlordiazepoxide (Librium)</td>
<td>5-30 [36-200]</td>
<td>25</td>
</tr>
<tr>
<td>Clonazepam (Klonopin)</td>
<td>18-50</td>
<td>0.5</td>
</tr>
<tr>
<td>Diazepam (Valium)</td>
<td>20-100 [36-200]</td>
<td>10</td>
</tr>
<tr>
<td>Estazolam (ProSom)</td>
<td>10-24</td>
<td>1-2</td>
</tr>
<tr>
<td>Flunitrazepam (Rohypnol)</td>
<td>18-26 [36-200]</td>
<td>1</td>
</tr>
<tr>
<td>Lorazepam (Ativan)</td>
<td>10-20</td>
<td>2</td>
</tr>
<tr>
<td>Oxazepam (Serax)</td>
<td>4-15</td>
<td>20</td>
</tr>
<tr>
<td>Temazepam (Restoril)</td>
<td>8-22</td>
<td>20</td>
</tr>
<tr>
<td>Triazolam (Halcion)</td>
<td>2.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Benzodiazepines</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaleplon (Sonata)</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Zolpidem (Ambien)</td>
<td>2.5</td>
<td>20</td>
</tr>
<tr>
<td>Zopiclone (Imovane)</td>
<td>5-6</td>
<td>15</td>
</tr>
<tr>
<td>Eszopiclone (Lunesta)</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>
Medical Assessment of Dental Patients

The challenge for practicing dentists is to evaluate the stability of patients in order to provide safe dental care.

Medical Clearance Does Not Clear the Patient or Dentist of Risks

- "Medical Clearance" is when a dentist requests clearance from an assessing physician before performing treatment on a patient
- Cardiovascular risk is the number one reason to request medical clearance, but other risks that call for medical clearance include congestive heart failure, pulmonary embolism, anticoagulation, obesity, and high blood pressure
- Medical clearance is a misnomer because it implies that the patient is cleared and there are no risks
- No patient is free of risk when undergoing a procedure. The goals of the assessment are to determine the level of risk and to identify opportunities to mitigate risk—with the surgeon and the assessing physician working in concert
- The decision about whether to proceed with the operation belongs to the surgeon and the patient

“Unfortunately, many dentists erroneously believe they can limit their liability by requesting ‘medical clearance’ for a procedure.”

“Regardless of whether the dentist requests or the physician provides ‘medical clearance,’ it does not shift liability for the treatment rendered by the dentist from the dentist to the consulting physician.”

“The physician provides information; the dentist makes the decisions on appropriate dental care.”

Reference: JADA 2012;143(11):1180-1

Other Notes or Questions to Ask:
TEN FOOT POLE PATIENTS: Those patients that, because of their medical history or dental condition, can be risky to treat!

Focusing on Medical History, who are they?
Some possible examples:
- Recent Heart Attack or Stroke
- Recent Cardiac Stent
- On Anticoagulant or Antiplatelet
- Uncontrolled Diabetes
- Undergoing Chemotherapy
- Pregnancy
- Illicit Drug Users/Abusers

Recent Heart Attack or Stroke (JADA 2012;143(11):1190-98.)
- How long do I have to wait to treat?
- Myocardial Infarction
  - Complicated MI = 6 month or more
  - Uncomplicated MI = 1 month
- Stroke
  - Unstable = emergent care only
  - Stable = 1 month
- Tips for safer appointments
  - Short, morning appts
  - Stress mitigation
  - Control risk factors (BP, drug interactions, hemostasis)
  - Monitor vital signs
  - Judicious use of vasoconstrictors

Recent Cardiac Stents (JADA 2008;139(1):3S-24S.)
- Do I need to give antibiotic prophylaxis? Generally, NO!
- Indicated if treatment to be performed within the first 30 days after insertion
- May be useful when treating acute dental infection, regardless of time since placement
- Do not stop/interrupt antiplatelet agents
- Also, applies to pacemakers

Other Notes or Questions to Ask:
Anticoagulants and Antiplatelets (JADA 2003;134:1492-7.)
- Assess underlying medical stability
- In general, do not interrupt anticoagulants or antiplatelets unless procedure involves potential for moderate/severe bleeding
  - Platelets > 150,000 mcL (Plavix, Brilinta, Effient, ASA)
- Risk/Benefit ratio often indicates it is safer to treat patients on these medications and control bleeding with local measures
- INR ≤ 3.5 may receive conservative dental care
- INR does not apply to newer anticoagulants (eg, Pradaxa, Xarelto, Eliquis, etc.)

Uncontrolled Diabetes (JADA 2003;134 suppl 1:24S-33S)
- Assess stability (BG, HgA1c)
- Comorbid diseases (CV, Neuropathy, Kidney dz, delayed wound healing, etc)
- Medication regimen and prevention of hypoglycemia
- Emergent care only, consider Abx prophylaxis if HgA1c ≥ 9%

Patient Undergoing Chemotherapy (Burket's Oral Medicine 2014, p. 201-10.)
- Level of immune suppression (WBC, ANC)
- Abx prophylaxis may be necessary
- Drug interactions (eg, bisphosphonates)
- Palliation of xerostomia and oropharyngeal pain
- Bleeding risk?

Pregnancy (JADA 2012;143(8):858-71.)
- Dentistry is usually safe during pregnancy
- Be mindful of patient positioning
- Safest local anesthetic = Lidocaine WITH epi (or prilocaine)
- Radiographs are ok with appropriate shielding
- Pain medications (Tylenol with opioid) and Abx (penicillins, Z-pak, clindamycin) are ok

Other Notes or Questions to Ask:
“A physician cannot ‘clear’ a patient for treatment.”

“A physician’s advice and recommendation may be helpful in managing a dental patient, but the responsibility to provide safe and appropriate care lies ultimately with the oral health-care provider.”


Management of Medically Complex Patients

1. Drug actions and interactions of medications patients are taking
2. Patient’s ability to withstand the stress of dental care
3. Patient’s ability to achieve hemostasis
4. Patient’s susceptibility to infections

Review Medical History
Risk Assessment

- Infection
- Bleeding
- Drug Interactions
- Stress

Critically review the Evidence
Reject
Treat, using best available Evidence

Dentists are faced with several problems that make risk assessment difficult:

- Patients are getting older
- Patients are retaining their teeth later in life
- More ambulatory patients with medical conditions
- More patients on polypharmacology

More patients will present to the dental office with chronic medical conditions:

- $153$ billion in lost production each year due to chronic disease
- $27$ million people visit a dentist and not a physician each year
- Screening for chronic diseases in dental offices could reduce U.S. health care costs by $102.6$ million per year or...$37.72$ per patient screened

American Journal of Public Health: April 2014, Vol. 104, No. 4, pp. 744-
Question...Do your patients tell you the truth on the medical history questionnaire?

<table>
<thead>
<tr>
<th>Reasons noted for refusing to reveal information on a health history form</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unimportant information</td>
<td>17%</td>
</tr>
<tr>
<td>Privacy</td>
<td>62%</td>
</tr>
<tr>
<td>Afraid of refusal of treatment</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>14%</td>
</tr>
</tbody>
</table>

23% of respondents would be reluctant to note current drug abuse on a dental history questionnaire!

10% of respondents believed that dental health professionals do not need to be fully aware of a patient’s health status!


**Other Notes or Questions to Ask:**
Medical History Questionnaire

- Screening for medical problems
- Monitoring medical conditions
- Assessing and evaluating medical conditions and diseases that may create risks to the dental patient
- Assessing and evaluating modifications to dental care
- Verify history with verbal interview

ASA Physical Status Classification

1. A normal healthy patient
2. A patient with a mild systemic disease
3. A patient with a severe systemic disease that limits activity, but is not incapacitating.
4. A patient with an incapacitating systemic disease that is a constant threat to life.
5. A moribund patient not expected to survive 24 hours with or without operation.
6. A declared brain-dead patient whose organs are being removed for donor purposes

In the event of an emergency, precede the number with an "e"

ASA Physical Status Classification. American Society of Anesthesiologists. Available at: www.asahq.org/clinical/physical status.htm

ASA Physical Status Classification

- Devised in 1941 as a statistical tool for retrospective analysis of hospital records; the ASA physical status classification was revised in 1961 (JAMA;178:261-6).
- Originally, ASA classification was not intended to assign “operative risk”, but merely to describe the “physical status” of a patient prior to an operation.

Limitations of ASA Classifications

The classification makes no adjustments for:
- Age
- Sex
- Weight
- Pregnancy
- Type of operation
- Type of anesthesia
- Skill or training or surgeon

Therefore, the same assignment of “risk” cannot be given to a single patient undergoing different surgical procedures

Other Notes or Questions to Ask:
ASA Classification Examples

ASA 1: Patient without systemic disease; a normal, healthy patient

ASA 2: Patient with mild systemic disease

- Type II Diabetes Mellitus
- Controlled or exercise induced asthma
- Controlled epilepsy
- Controlled HTN

ASA 3: Patient with severe systemic disease that limits activity but is non-incapacitating

- Stable angina
- Myocardial infarction or Stroke (>6 mos)
- Type 1 Diabetes Mellitus
- Congestive Heart Failure (CHF)
- Chronic Obstructive Pulmonary Disease (COPD)
- Uncontrolled asthma
- BP > 160/95

ASA 4: Patient with an incapacitating systemic disease that is a constant threat to life

- Myocardial infarction or Stroke (<6 mos)
- Unstable angina
- BP > 200/115
- CHF or COPD on O₂
- Uncontrolled epilepsy
- Uncontrolled Diabetes Mellitus

ASA 5: Moribund pt. who is not expected to survive 24 hours with or without an operation

- Ruptured aortic aneurysm
- Massive pulmonary embolism

ASA 6: A declared brain dead pt. whose organs are being removed for donor purposes

An “E” can be assigned to any classification to denote emergency status

Other Notes or Questions to Ask:
Medical Risk Assessment for Dentistry

Operative Risk should be assigned based on:
- Medical Complexity (Controlled vs. Uncontrolled)
- Potential severity of adverse events
  - None
  - Minor
  - Major
- Potential modifications needed (e.g. before, during, and/or after)

Other Notes or Questions to Ask:
Medical Complexity Status

<table>
<thead>
<tr>
<th>MC-o</th>
<th>No significant medical problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC-1A</td>
<td>Controlled and stable condition/disease No anticipated complications</td>
</tr>
<tr>
<td>MC-1B</td>
<td>Controlled and stable condition/disease Anticipated/possible minor complications</td>
</tr>
<tr>
<td>MC-1C</td>
<td>Controlled and stable condition/disease Anticipated/possible major complications</td>
</tr>
<tr>
<td>MC-2A</td>
<td>Poorly controlled and/or unstable condition/disease No anticipated complications</td>
</tr>
<tr>
<td>MC-2B</td>
<td>Poorly controlled and/or unstable condition/disease Anticipated/possible minor complications</td>
</tr>
<tr>
<td>MC-2C</td>
<td>Poorly controlled and/or unstable condition/disease Anticipated/possible major complications</td>
</tr>
<tr>
<td>MC-3</td>
<td>Cardiac or other conditions needing continuous monitoring</td>
</tr>
</tbody>
</table>


Potential for Adverse Events

1. Drug actions and interactions of medication patients are taking and oral sedative given by the dentist
2. Patient’s ability to withstand the stress of dental care
3. Patient’s ability to achieve hemostasis
4. Patient’s susceptibility to infections

Modification of dental care or when to institute changes to protocol

- Before Treatment
- During Treatment
- After Treatment

Setting or the most appropriate place to treat

- Patient can be treated as an out-patient in a general dental office
- Patient can be treated as an out-patient in a hospital dental setting
- Patient requires continuous monitoring in an operating room or short-procedure unit

Other Notes or Questions to Ask:
Physiologic Monitoring For Adult Enteral Sedation

Protective reflexes intact
Patient can independently and continuously maintain an airway
Patient can respond appropriately to verbal commands

Loss of protective reflexes
Inability to independently maintain an airway
No pain sensation or reflex withdrawal from stimuli
Total unconsciousness


Source: American Society of Anesthesiology (www.asahq.org)

Other Notes or Questions to Ask:
Monitoring: “In office conscious sedation mortality & serious morbidity are exceedingly rare in modern practice.”
~ Dr. John Yagiela

Blood Pressure:
- Systolic Blood Pressure (SBP)
  Reflects peak pressure in vascular system
- Diastolic Blood Pressure (DBP)
  Reflects resting pressure in vascular system
- Mean Arterial Pressure (MAP)
  Reflects average pressure in vascular system
  \[ \text{MAP} = \text{SBP} + \left(\frac{2 \times \text{DBP}}{3}\right) \]

Heart Rate:
- Normal 60-100 bpm
- Bradycardia <60 bpm
- Tachycardia >100 bpm

On November 21, 2017 the American College of Cardiology and American Heart Association introduced new blood pressure guidelines...

---

**2017 Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults**

**BP Classification (JNC 7 and ACC/AHA Guidelines)**

<table>
<thead>
<tr>
<th>SBP</th>
<th>DBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>120–129</td>
<td>&lt;80</td>
</tr>
<tr>
<td>130–139</td>
<td>80–89</td>
</tr>
<tr>
<td>140–159</td>
<td>90–99</td>
</tr>
<tr>
<td>≥160</td>
<td>≥100</td>
</tr>
</tbody>
</table>

**JNC 7**
- Normal BP
- Prehypertension
  - Stage 1 hypertension
- Stage 1 hypertension

**2017 ACC/AHA**
- Normal BP
- Elevated BP
  - Stage 1 hypertension
  - Stage 2 hypertension
  - Stage 2 hypertension

*Blood Pressure should be based on an average of ≥2 careful readings on ≥2 occasions*
*Adults being treated with antihypertensive medication designated as having hypertension*

---

Other Notes or Questions to Ask:
Definitions:

Ventilation – refers to carbon dioxide elimination and is monitored by a stethoscope and/or end-tidal CO₂

Oxygenation – refers to O₂ being delivered to cells and is monitored by a pulse oximeter

Respiration

Monitoring the respiratory status of the patient is vitally important for sedation patients!

During sedation, changes in breathing are often noted well before cardiovascular changes

Respiration may be monitored by:

1) Determining the respiratory rate
2) Observing rise and fall of the chest wall
3) Observing the color of mucous membranes
4) Observing inflation and deflation of the reservoir bag if inhalation sedation is used

Visualization of inflation/deflation of the reservoir bag is a valid method of determining air exchange if an airtight seal of the mask is maintained

Holding a mirror or an ungloved hand in front of the patient’s mouth or nose so that air is felt (or seen fogging the mirror) is a good method of determining exchange of air is occurring

Respiration - devices used to assess respiration include:

- Precordial stethoscope
- Pretracheal stethoscope
- Esophageal stethoscope

A precordial / pretracheal stethoscope involves a weighted stethoscope head secured in place with tape to either the precordial or pretracheal area

The esophageal stethoscope is designed for placement into the patient’s esophagus through their nose or mouth

- This obviously would not be tolerated during oral sedation, but is excellent for general anesthesia

Other Notes or Questions to Ask:
Other Notes or Questions to Ask:

Note: There can be an approximately 30 second delay in the readings of pulse oximetry.

Pulse Oximeter

- \( \text{PaO}_2 \) = partial atmospheric pressure of oxygen that is dissolved in the blood. Measured in mmHg
- \( \text{SaO}_2 \) = oxygen saturation of the blood as defined as % of heme sites occupied by an oxygen molecule
- \( \text{SpO}_2 \) = estimate of oxygen saturation as calculated by the pulse oximeter

The relationship between the amount of oxygen dissolved in the blood and the amount attached to the hemoglobin is called the oxyhemoglobin dissociation curve

- 97% saturation = 97 mmHg (\( \text{PaO}_2 \)) → Normal
- 90% saturation = 60 mmHg (\( \text{PaO}_2 \)) → Danger!
- 80% saturation = 45 mmHg (\( \text{PaO}_2 \)) → Severe Hypoxia!
Oxyhemoglobin Dissociation

Changes in this curve can be caused by:
1. Alkalosis/Acidosis
2. Changes in PaCO₂
3. Hypothermia/Hyperthermia
4. Increased or decreased 2-3-DPG (a normal by-product of red blood cell metabolism)

Considerations for Pulse Oximetry:
- Effect of non-functioning hemoglobin:
- Pulse ox only measures oxygenated hemoglobin (HbO₂) and deoxygenated hemoglobin (Hb)
- When patients have large amounts of non-functioning hemoglobin pulse oximeter readings can vary widely!
  - Carboxyhemoglobin (HbCO)
  - Methemoglobin (METHb)

Other Notes or Questions to Ask:
Anemia (a lack of red blood cells causes anemia)

downward
Hemoglobin
The small of amount of hemoglobin may be well saturated with oxygen
Pulse ox readings will be normal
Changes in pulse ox are concerning b/c pt may not have enough O₂ going
to tissues

Dyes
Some surgical dyes can impact Pulse Ox use
Dyes can alter light transmission thru blood
If the patient’s blood contains the following dyes, pulse oximetry cannot be
used:
    Methylene blue
    Indocyanine green
    Indiocarmine

Bilirubin, the breakdown product of RBC, does not affect Pulse Ox
readings

Common sources of error:
- Light interference – consider covering the site
- Movement artifacts – usually pulse readings
- Sensor application – tight vs. loose
- Inadequate blood flow – BP cuff, tight clothing
- Nail polish

What else is out there for patient assessment during
in-office sedation?

Bispectral Index Monitoring (BIS)

BIS Monitoring measures EEG on a dimensionless scale from 0-100. A BIS reading of 0 corresponds to
flat-line EEG (no brain activity). A BIS of 95 to 100 is normal. A BIS reading of ≤ 60 is commonly
considered general anesthesia.

Other Notes or Questions to Ask:
What about Pulse CO-Oximetry?

Pulse CO-Oximeter measures:
1. Pulse
2. Oxygen saturation
3. Carboxyhemoglobin
4. Methemoglobin

Remember that pulse oximeters show oxygen saturation as SpO₂ (an estimate of the true oxygen saturation)

“True” oxygen saturation is written as SaO₂

In the blood, carbon monoxide combines with hemoglobin to form carboxyhemoglobin (COHb)

In smokers, the amount of COHb in the blood ranges from 5-15%.

In non-smokers the level is 0.3-1.6%
Even in places of environmental pollution the level does not exceed 1.9%
Affinity of carbon monoxide for hemoglobin is 200x that of oxygen

High levels of carboxyhemoglobin causes a left shift in the oxyhemoglobin dissociation curve – more difficult for tissues to extract oxygen. Result is chronic tissue hypoxia – body compensates with more RBC

**Net effect** = increased oxygen availability at the expense of plasma viscosity

Currently pulse oximeters can only measure oxyhemoglobin (HbO₂) and deoxyhemoglobin (HHb); COHb can not be measured.

The pulse oximeter will grossly overestimate the oxygen saturation in chronic smokers!

For every 1% of circulating carboxyhemoglobin, the pulse oximeter over reads by 1%. Fifty percent of cigarette smokers have a carboxyhemoglobin concentration of 6%.

Source: *Anesthesia Progress* 2000;47:143-150

Pulse oximeter will show HbO₂ + COHb (normal pulse oximeters can not differentiate the two hemoglobin species)

**Example:** Pulse oximeter reads 99% on a chronic smoker. If they have 10% COHb then the true reading of HbO₂ is 89%!!!

**Other Notes or Questions to Ask:**
How do Pulse Oximeters calculate SpO₂?

Fractional SpO₂ = \( \frac{O₂Hb \times 100\%}{O₂Hb + Hb + COHb + MetHb} \)

Clinically…SpO₂ = \( O₂Hb - COHb \)

What is Methemoglobinemia?

- Can occur in patients given extremely large doses of Prilocaine (>8 mg/kg or >8 carps in a 70 kg adult)
- The metabolite of Prilocaine, o-toludine, causes oxidation of the iron atom in hemoglobin from the reduced to the oxidized state. \( Fe^{2+} \rightarrow Fe^{3+} \)

Medications associated with Methemoglobinemia:

- Local Anesthetics (Prilocaine, Benzocaine)
- Analgesics (Acetaminophen, Celecoxib)
- Antibiotics (Sulfonamides)

Methemoglobinemia:

- The resultant species of hemoglobin - Methemoglobin is unable to transport oxygen
- Patient appears cyanotic
- Blood takes on a bluish hue

Fortunately, for most patients methemoglobinemia is well-tolerated

Of concern are pediatric patients, patients with cardiovascular or pulmonary disease, or patients with hereditary methemoglobinemia

Other Notes or Questions to Ask:
For compromised patients or patients with hereditary methemoglobinemia, Prilocaine & Benzocaine should be avoided

Treatment of Methemoglobinemia = IV methylene blue

Organs with high oxygen demands (ie CNS, cardiovascular) usually are the first systems to manifest toxicity

Normal methemoglobin fraction = 1%
- At 3-15% signs may include changes in skin color
- At 15-20% patients may be relatively asymptomatic, but cyanosis is likely present
- At 25-50%, the signs and symptoms are:
  - Headache
  - Dyspnea
  - Lightheadedness
  - Weakness
  - Confusion
  - Palpitations, Chest pains
  - Methemoglobinemia
- At 50-70%, the signs and symptoms are:
  - Altered mental status
  - Delirium
- Death occurs when methemoglobin fractions approach 70%

Drugs that can cause Methemoglobinemia:

<table>
<thead>
<tr>
<th>Medical Group</th>
<th>Rarely</th>
<th>Uncommon</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic - Antipyretics</td>
<td>Acetaminophen</td>
<td>Phenazopyridine</td>
<td>Phenacetin</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Fentanyl</td>
<td>Sulfonamides</td>
<td>Dapsone</td>
</tr>
<tr>
<td>Anti-Infectives Agents</td>
<td>Phenytoin</td>
<td>Primaquine</td>
<td></td>
</tr>
<tr>
<td>Local or Topical Anaesthetic</td>
<td>Chloroquine</td>
<td>Amethocaine</td>
<td>Benzocain (Topical)</td>
</tr>
<tr>
<td></td>
<td>Nitrofurantoin</td>
<td>Cetacaine</td>
<td>Prilocaine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nitroglycerin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tetracaine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metamizole</td>
<td></td>
</tr>
<tr>
<td>Vasodilators Agents</td>
<td>Lidocaine</td>
<td>Nitrites</td>
<td>Nitrites Derivatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Derivatives</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Methylene Blue</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metoclopramide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Notes or Questions to Ask:
End-Tidal CO₂ Monitoring (ET CO₂)
The ability to measure a patient’s exhaled carbon dioxide (CO₂)

Advantages
- Measures ventilation via detecting exhaled CO₂
- Rate
- Alarm

Disadvantages
- Non-intubated patient – difficult and inaccurate if patient is a mouth breather
- Expensive

Capnography:
Refers to the comprehensive measurement & display of CO₂, including end-tidal, inspired, and the capnogram (real time CO₂ waveform)

Capnometry:
Refers to the measurement and display of CO₂ in numeric form only

Normal PaCO₂ = 40 ± 5 mmHg

ET CO₂ = 0 mmHg indicates the patient is not being ventilated
- Upper airway obstruction
- Apnea
- ET misplaced
- Ventilator disconnect / malfunction
- Disconnect of sample line

Other Notes or Questions to Ask:
Minimal Oral Sedation Protocols

**Minimal Sedation** (previously known as anxiolysis) - a minimally depressed level of consciousness, produced by a pharmacological method, that retains the patient’s ability to independently and continuously maintain an airway and respond normally to tactile stimulation and verbal command. Although cognitive function and coordination may be modestly impaired, ventilatory and cardiovascular functions are unaffected. (Source: ADA Sedation & General Anesthesia Guidelines, 2016)

Anxiolysis = the elimination or diminution of anxiety

**Medications**
- Diazepam - Valium
- Zaleplon - Sonata
- Triazolam - Halcion
- Hydroxyzine - Atarax or Vistaril
- Lorazepam - Ativan
- Alprazolam - Xanax
- Nitrous Oxide - Laughing Gas
- Ramelteon - Rozerem

The same sedative drug given in different doses can cause different responses. In the case of benzodiazepines, a small dose will cause anxiolysis/MOS, while larger doses may cause sedation or deeper levels.

**Other Notes or Questions to Ask:**

________________________________________________________________
________________________________________________________________
________________________________________________________________

www.BestDentalCE.com
Pre-Sedation Checklist:

- Medical history reviewed (including past anesthesia history)
- Complete Airway Evaluation (eg, Mallampati score)
  
  Difficult Airway Patients (and the ability to rescue – open the airway)
  - Previous difficult airway
  - Obesity (BMI > 30)
  - Retrognathia, micrognathia
  - Severe Rheumatoid Arthritis (TMJ, cricoarytenoid joint)
  - Obstructive Sleep Apnea
  - Uncontrolled diabetics (with “Prayer Sign”)

Mallampati Classifications

- **Class 1**: Entire uvula vestibule, as well as hard palate, soft palate, and tonsillar pillars are visible
- **Class 2**: Only part of the uvula and part of the tonsillar pillars are visible
- **Class 3**: Uvula invisible, but soft palate and hard palate remain visible
- **Class 4**: Soft palate invisible, only hard palate remains visible

This test is performed with the patient in the **sitting position**, the head held in a neutral position, the mouth wide open, and the tongue protruding to the maximum

- If the patient arches his or her tongue, the uvula is falsely obscured
- A class I view suggests ease of intubation and correlates with a laryngoscopic view grade I (99 to 100% of the time)
- Class IV view suggests a poor laryngoscopic view, grade III or IV 100% of the time

Other Notes or Questions to Ask:
Pre-Sedation Checklist (continued)

- All potential drug interactions researched
  - When assessing potential drug interactions for oral sedation the two main types of interactions are: 1) Additive CNS depression, and; 2) Cytochrome p450 inhibition/induction
  - In addition to prescribed medications, interactions with herbals and nutritional supplements should be also considered
- All drug allergies or intolerances noted
- Baseline vitals taken
- Pre-operative instructions reviewed with the patient
- Dietary, habit, or medicine restrictions reviewed with the patient
- Informed consent given and signed
- Responsible companion identified for transportation to/from the appointment
- Post-operative condition is described
  - When to resume normal activity
  - When to resume eating/hydration
  - Pain management
- How to recognize a problem and when/how to contact the office

Early published directions for triazolam dental sedation...
(CDAJ 1988;54(7):511-4.)

1. The drug should be given one hour before the procedure begins
2. The drug should be administered with a small amount of water on a stomach that has been empty for at least 4 hours
3. As fear “slows” gastric emptying, it is often advantageous to administer a “night before” dose, and then treat the patient in the morning, following a restful sleep. In this case, the patient should be driven to the office for the treatment appointment.
4. Following treatment, the patient should be escorted from the office by a responsible adult companion and cautioned against operating a vehicle or similar activities for the remainder of the day.
5. Do not combine triazolam with other CNS depressants, especially ethanol
6. The drug, ideally, should be administered in the dental office with the patient being placed under observation in a recovery-type facility

According to the authors, “Doses should be individualized on the basis of age, size, anxiety, and medical history.”
### ASA Classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Healthy</td>
</tr>
<tr>
<td>II</td>
<td>Patient with mild systemic disease</td>
</tr>
<tr>
<td>III</td>
<td>Pt. w/severe systemic disease that limits activity but is not incapacitating</td>
</tr>
<tr>
<td>IV</td>
<td>Pt. w/ severe systemic disease that is a constant threat to life.</td>
</tr>
<tr>
<td>V</td>
<td>Morbid pt. who is not expected to survive 24 hours with or without an operation</td>
</tr>
<tr>
<td>VI</td>
<td>A declared brain dead pt. whose organs are being removed for donor purposes</td>
</tr>
</tbody>
</table>

### American Society of Anesthesiologists (ASA) Patient Physical Status Classification

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

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

Source: ADA Sedation and General Anesthesia Guidelines, 2016

**Other Notes or Questions to Ask:**
Goodchild JH, Donaldson M. Calculating and justifying total anxiolytic doses of medications for in-office use. General Dentistry 2006 Jan-Feb; 54-57.

Other Notes or Questions to Ask:
Total Anxiolytic Dose is calculated by:

- Considering age, weight, and medical status
- Three age groups
  - 18-40 (dose increased by 25% to account for ↑ metabolism)
  - 41-64
  - 65+ (dose reduced dose 50% bc of sensitivity, and ↓ metabolism)
- ASA 3 patients – reduce dose on the chart by an additional 50%
- ASA 4 patients – contraindicated
- Relative potency of triazolam to lorazepam is 4:1

Case Example 1
triazolam
- 34 yo H female
- 160 lbs
- PMHx: Mitral valve prolapse (MVP) w/o regurgitation, verified by Echo 5 years ago
- No medications
- No known drug allergies
- Vitals: BP 110/65 mmHg, pulse 60 bpm

CORRECT DOSE

Case Example 2
triazolam
- 42 yo AA male
- 200 lbs
- PMHx: Asthma
- Meds: Albuterol prn
- No known drug allergies
- Vitals: BP 135/85 mmHg, pulse 100 bpm

CORRECT DOSE

Other Notes or Questions to Ask:

________________________________________________________________
________________________________________________________________
________________________________________________________________
Case Example 3
triazolam
- 65 yo male
- PMHx:
  - Type 2 Diabetes Mellitus
  - BG range 215-250 mg/dL
  - HgA1C 12%
  - Meds: glimepiride 4 mg q.d.
  - No known drug allergies
  - Vitals: BP 135/82 mmHg, pulse 87 bpm, Height 6’0”, Weight 275 lbs.

CORRECT DOSE

Case Example 4
lorazepam
- 22 yo male, 160 lbs
- PMHx:
  - Inguinal hernia repair 5 years ago
  - Prolapsed mitral valve w/ regurgitation
  - Seasonal allergies
  - Meds: Fexofenadine
  - No known drug allergies
  - Vitals: BP 120/75 mmHg, pulse 90 bpm

CORRECT DOSE

Case Example 5
lorazepam
- 74 yo male, 225 lbs
- PMHx: Angina (2-3 attacks/week)
- Meds:
  - Metoprolol 200 mg bid
  - Atorvastatin 20 mg qd
  - Aspirin 81 mg qd
  - Nitroglycerin prn
  - No known drug allergies
  - Vitals: BP 129/85 mmHg, Pulse 80 bpm

CORRECT DOSE

Other Notes or Questions to Ask:
________________________________________________________________________
________________________________________________________________________

www.BestDentalCE.com
Case Example 6
lorazepam
- 21 yo female, 140 lbs
- PMHx: Recently gave birth (3 weeks ago) and breastfeeding
- Meds:
  - Multivitamins
  - Herbal diet medication
- Allergic to PCN → hives
- Vitals: BP 105/60 mmHg, Pulse 85 bpm
- SHx: Quit smoking 9 mos. ago. Before that 1 ppd x 3 years

CORRECT DOSE

Case Example 7
lorazepam
- 58 yo male, 215 lbs
- PMHx:
  - CABG x 4
  - MVP w/ regurgitation
  - Joint replacement (Right knee and hip)
- Meds:
  - Cyclobenzaprine 10 mg
  - Viagra prn
- Allergies:
  - PCN
  - Clindamycin (intolerance)
- Vitals: BP 150/87 mmHg, Pulse 90 bpm
- SHx: Smokes 1 cigar/day x 30 yrs

CORRECT DOSE

Other Notes or Questions to Ask:

________________________________________________________________
________________________________________________________________
________________________________________________________________

www.BestDentalCE.com

Page 55
**Are there other strategies?**

- A dose of medication could be given the night before the sedation
  - May help anxious patients to relax and get to sleep
  - Establishes a blood level of the medication that can be added to the next morning
  - Reduces total drug amounts
- Incremental dosing – “oral titration” (usually not allowed without conscious sedation/moderate sedation permit)

---

**What medications could be used the night before the sedation?**

- Stick with a Benzodiazepine or Hydroxyzine
- Use longer half-life drugs
- For patients who smoke, use Hydroxyzine the night before

<table>
<thead>
<tr>
<th></th>
<th>Diazepam 2.5 mg</th>
<th>Lorazepam 0.5 mg</th>
<th>Hydroxyzine 25 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly/Debilitated/CNS depressants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Diazepam 5 mg</td>
<td>Lorazepam 1 mg</td>
<td>Hydroxyzine 50 mg</td>
</tr>
<tr>
<td>High Fear/Resistant</td>
<td>Diazepam 10 mg</td>
<td>Lorazepam 2 mg</td>
<td>Hydroxyzine 100 mg</td>
</tr>
</tbody>
</table>

---

**Other Notes or Questions to Ask:**

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
**Incremental Oral Administration**

**Important Note:** the below incremental administration technique, in most cases, will require an oral conscious sedation/moderate oral sedation permit to utilize. It is included in this handout for informational purposes only.

**Reminder:** always verify your State’s Rules and Regulations relating to in-office sedation/anesthesia before performing any sedative technique.

---

**Table 4. Protocol for incremental oral administration.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Action Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m.</td>
<td>The patient, having gone six hours without eating, takes 0.25 mg triazolam; a responsible companion escorts the patient to the office</td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>The patient arrives at the office with the companion and compliance with preoperative instructions is verified</td>
</tr>
<tr>
<td>8:03 a.m.</td>
<td>The patient is seated in the operatory for the beginning of continuous physiologic monitoring; at that time, the patient’s wristwatch and glasses are removed and given to a companion</td>
</tr>
<tr>
<td>8:06 a.m.</td>
<td>The patient is assessed for susceptibility to the sedative medication; additional medication may be provided sublingually</td>
</tr>
<tr>
<td>8:35 a.m.</td>
<td>The patient’s sedation state is reassessed; if additional medication is necessary, the dentist should deliver it sublingually</td>
</tr>
<tr>
<td>8:54 a.m.</td>
<td>Oxygen is introduced with the appropriate protocol</td>
</tr>
<tr>
<td>8:57 a.m.</td>
<td>Nitrous oxide is introduced with the appropriate protocol</td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>Local anesthesia is administered; at this point, nitrous oxide administration is terminated and dentistry begins</td>
</tr>
</tbody>
</table>

The above graph represents a rough kinetic model of an additional dose of triazolam (ie, supplemental dosing) to maintain sedation for a longer dental appointment.

**Pharmacokinetic modeling of oral triazolam**

F = 44%
Dose = 0.25mg
Vd = 70 L
Kab = 1.5 h⁻¹
Kel = 0.35 h⁻¹
Number of doses = 8
Dose interval = 2hrs

The above graph is a representation of what the plasma concentration may be after multiple doses of oral triazolam. At a dose of 0.25mg given every 2 hours, the plasma concentration approaches 2.5 μg/mL. A single 0.5mg dose typically results in plasma concentrations of approximately 4.0 μg/mL.
Pre-Sedation Instructions

- NPO for 4-6 hours (clear liquids ok), exception – diabetic patients
- No CNS depressants or sedatives for 24 hours before/after (other than night-time anxiolytic prescribed by treating dentist)
  - Smokers
  - Coffee drinkers
  - Herbal diet medications (eg, Ephedra)
  - Herbal medications
    - (eg, Kava Kava, Valerian, Chamomile, Melatonin, St. John’s Wort)
  - Nutritional supplements
- No chance of pregnancy (triazolam is pregnancy factor X)
- No allergies to the sedative medications (possible, but very rare)
- Must have a responsible person to bring them to the office and take them home (no exceptions!)
- No contact lenses (anticholinergic effects → dry eyes)
- No driving for 24 hours after the sedation appointment
- Because of prolonged psychomotor impairment - No operating hazardous machinery
- No heavy lifting (balance disturbances)
- No stairs without assistance (balance disturbances)
- No important decisions (amnesia)

Source: American Dental Association, Sedation and General Anesthesia Guidelines, 2016

<table>
<thead>
<tr>
<th>Ingested Material</th>
<th>Minimum Fasting Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquids</td>
<td>2 hours</td>
</tr>
<tr>
<td>Breast milk</td>
<td>4 hours</td>
</tr>
<tr>
<td>Infant formula</td>
<td>6 hours</td>
</tr>
<tr>
<td>Nonhuman milk</td>
<td>6 hours</td>
</tr>
<tr>
<td>Light meal</td>
<td>6 hours</td>
</tr>
<tr>
<td>Fatty meal</td>
<td>8 hours</td>
</tr>
</tbody>
</table>

Source: American Dental Association, Sedation and General Anesthesia Guidelines, 2016
Reminders
- Always remember the definition of anxiolysis/minimal sedation...patient is conscious, responds to verbal commands, patent airway at all times
- Patients may respond that they are still awake (“You are an excellent patient”)
- Do not treat any patient that has a questionable or complex medical history! (ASA 1 and 2; ASA 3 with possible medication consult)
- Sedation patients are NEVER left unattended
- If the reversal agent (flumazenil) is used for any reason, no additional sedative medication should be administered, and the patient should be monitored for the appropriate time (at least one hour) before discharge
  - Check State Board Rules! – reporting
- Must manually record vital signs at least 3 times in the patient record (Pre-op, start of dentistry, at discharge)
- At the end of the appointment, or when more cooperation is needed, a sugar-drink (eg, juice, Gatorade) is provided
- Document your intention! (eg, “Minimal Sedation Provided”)
- Patient must satisfy discharge criteria and be ambulatory with minimal assistant before being released
  - Orientation x3 (Time, Place, Person)
- Post-operative instructions, verbal and written, must be given to patient and companion (retained a signed copy)

Patient Dismissal
Patient readiness for discharge needs to be addressed in a simple, clear, reproducible manner that meets accepted guidelines
- Aldrete Score (Phase 1 discharge)
- Postanesthesia Discharge Scoring System (PADSS)
- Modified Postanesthesia Discharge Scoring System
  - Vital Signs
  - Ambulation
  - Nausea / Vomiting
  - Pain
  - Surgical Bleeding

Other Notes or Questions to Ask:
________________________________________________________________
________________________________________________________________
________________________________________________________________

www.BestDentalCE.com
Aldrete Scoring System
Designed for assessment of patients for Phase 1 discharge (i.e., discharge from ICU or post-anesthesia care unit.

Aldrete’s score is not intended to determine home-readiness.

The modified PADSS differs from its original form by not including oral intake of fluids as a criterion for discharge.

Other Notes or Questions to Ask:
________________________________________________________________
________________________________________________________________
________________________________________________________________
**Patient Dismissal**
- The patient is always escorted by their companion, or a team member, while walking in the office
- Team member helps companion assist (or via wheelchair/companion chair) patient into departing vehicle
- Patient is taken directly home
- Make follow-up calls to all patients that night and remind them to hydrate
- Unconditional positive regard (always be encouraging!)
- Review all post-operative instructions with the patient’s companion
- Flumazenil should not routinely be used to aid in patient dismissal (short duration and possible re-sedation)

**A Second Single Dose Appointment**
Adjust on the following variables:

- Pt. Good/office good = Rx remains the same
- Pt. Good/office bad = Rx adjustment by increasing or decreasing dosage appropriately
- Pt. Bad/office bad = reassess for referral (different type of sedation) or test appt. with adjustments to protocol

**Some Important Caveats to Remember:**

... Increased number of drugs lowers safety ...

... Respiration most likely source of anesthetic mishap ...

... Be careful not to practice beyond your Level of Training ...

---

**Other Notes or Questions to Ask:**
Dr. Jason H. Goodchild, DMD – MOS/Anxiolysis Informed Consent Form

1. I understand that Minimal Oral Sedation (MOS) / anxiolysis (defined as the diminution of anxiety) will be achieved by the administration of oral medications and possibly nitrous oxide/oxygen.

I have been instructed to take a pill approximately _______ minutes before my appointment. The anxiolysis appointment will last approximately _______ to _______ hours.

2. I understand that the purpose of MOS/anxiolysis is to more comfortably receive dental care. Anxiolysis is not required to provide the necessary dental care. I understand that MOS/anxiolysis has limitations and risks and success cannot be guaranteed.

3. I understand that MOS/anxiolysis is a drug-induced state of consciousness to reduce fear and anxiety. I will be able to respond during the procedure. My ability to act and function normally returns when the effects of the sedative wear off.

4. I understand and have been informed that the alternatives to anxiolysis are:
   a. No sedation: The necessary procedure is performed under local anesthetic only.
   b. Nitrous oxide/oxygen inhalation sedation only: Commonly called laughing gas.
   c. Moderate Oral Sedation/Oral Conscious Sedation: Sedation using orally administered sedative medications to achieve a minimally depressed level of consciousness.
   d. Intravenous (I.V.) Sedation
   e. General Anesthesia

5. I understand that there are risks and limitations to all procedures. For MOS/anxiolysis these may include:
   a. Inadequate initial dosage. This may result in a sub-optimal level of MOS/anxiolysis.
   b. Atypical reaction to the sedative medications. In unusual circumstances this may require emergency medical attention and/or hospitalization. Other atypical reactions may include: altered mental states (e.g. oversedation or hyper responding to the sedative medication), allergic reactions, and nausea and/or vomiting.

6. I understand that if, during the MOS/anxiolysis procedure, a change in treatment plan is required, I authorize the dentist to make whatever change they deem in their professional judgment is necessary. I understand that I have the right to designate the individual who will make such a decision.

7. I have had the opportunity to discuss MOS/anxiolysis and have my questions answered by qualified personnel including the dentist. I also understand that I must follow all the recommended treatments and instructions of my dentist.

8. I understand that I must notify the dentist if I am pregnant, or if I am lactating. I must notify the dentist if I have sensitivity, intolerance, or allergy to any medication. I have informed the dentist of my past and present medical history, if I have recently consumed alcohol or other recreational drugs, and if I am presently on any prescription or non-prescription medications.

9. I understand that after taking oral sedatives I am not permitted to drive or operate hazardous machinery for 24 hours after my procedure. I understand and acknowledge that I will have a responsible adult drive me to and from my dental appointment on the day of the anxiolysis procedure.


Patient / Guardian
(Signature)__________________________________________ (Print)_____________________________________
Date____________________________ Witness___________________________________________________
Oral Sedation Record

Pre-Op

Date ______________________________

Patient Name ___________________________________________________________________________________

Patient Data  Height______________________Weight_____________________ Age____________________

American Society of Anesthesiologists’ Classification (ASA)_______________________________________________

Medications_____________________________________________________________________________________

Drug Allergies or Intolerances ______________________________________________________________________

Baseline Vitals:  Pulse (bpm) _________________ BP (mmHg)_________/_________ SpO2  _______________%

Peri-Op

Use the table below to record both the medications used and the times administered.
(eg, sedatives, nitrous oxide/oxygen, and local anesthesia)

Vitals at start of treatment: Pulse (bpm) _______________ BP (mmHg)_________/__________ SpO2 _______________%

<table>
<thead>
<tr>
<th>Name of medication &amp; Dosage</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post-Op

Vitals signs at discharge:
Pulse (bpm) _________________ BP (mmHg)_________/_________ SpO2 _______________%

☐ Discharge criteria satisfied
☐ Post-operative Instructions given to patient and companion
☐ Patient instructed when to resume normal eating and drinking
☐ Patient given emergency contact phone numbers
☐ Patient released to responsible adult companion

Dentist Name (Sign & Print)    Assistant’s name
Mythbusters – Local Anesthesia Edition

Myth #1: “My Dentist Still Uses Novocain”

We all know this myth is totally BUSTED, but let’s briefly look back at the history of Novocain... by the way there is no “e” in Novocain (the brand name for procaine)

Historical Perspective

- The first local anesthetic was Cocaine
- Carl Koller (September 1884) used cocaine as a local anesthetic during a surgical procedure (for glaucoma)
- “The facts are that neither Freud nor I discovered that cocaine is a local anesthetic. This was discovered by Dr. Albert Niemann, who extracted the potent principle from coca leaves in 1860” ~ Dr. Koller (JAMA 1941;117(15)1284.)
- Dr. Koller was nominated for the Nobel Prize several times but never received it, mostly because his discovery was made 17 years before the Nobel Prize was created. (www.dentaleconomics.com/articles/print/volume-89/issue-3/features/the-story-of-local-anesthesia.htm)
- William Halsted (November 1884) developed the principles of nerve block using Cocaine
- Infraorbital and IA blocks were performed on him as a “guinea pig” it took him 3 years to overcome his resulting Cocaine addiction (Ann Surg 1997 May;225(5):445-58.)
- Due to the unfavorable therapeutic index of Cocaine the search was on for a less toxic compound with LA properties:
  1904 – Alfred Einhorn synthesized the ester Procaine (Novocain)
  1943 – Nils Lofgren synthesized Lidocaine which possessed:
    - Less allergenicity
    - More potency
    - More rapid onset of action
    - First brand name = Xylocaine (Astra Pharmaceutical)
  2000 – Articaine granted FDA approval in the US
  2008 – OraVerse (phentolamine mesylate) approved

A little more info on Procaine...

- First synthetic injectable local anesthesia used in dentistry
- Produced the greatest amount of vasodilation of all currently used local anesthetics
- Ester type – capable of allergy - PABA
- pKa=9.1, slow onset (6-10 minutes) and at physiologic pH existed as 90% charged (inactive) and 10% uncharged (active)
- Duration of action (epinephrine can be added to prolong action)
- Pulpal anesthesia (mx infiltration) lasts about 5 minutes
- Soft tissue anesthesia lasts for approximately 30 minutes
- Blocks are not recommended (slow onset, ultra short duration)
- Systemic toxicity negligible because procaine is rapidly destroyed in the plasma
1.7mL vs. 1.8mL on Local Anesthetic Cartridges

- Average cartridge volume in U.S. is 1.76mL (JADA 2007;138:1104–1112.)
- During the approval process for Articaine in the 1990’s the FDA asked the manufacturer, “Can you guarantee that each and every cartridge contains at least 1.8mL of solution?” the answer was “No.” (Malamed SF. Clinical Action of Specific Agents. In: Handbook of Local Anesthesia. 6th Edition. 2014. p 56.)
- Therefore, manufacturers began printing a volume of 1.7mL on the cartridges

Lots of Brand Names for local anesthetic solutions...
- Retail costs for local anesthetics $30-50
- Exception is Bupivacaine ~$60
Myth #2: “Doctor, I’m allergic to epinephrine!”

Again, we know this myth is BUSTED, but this is such a common patient report that is worth looking into!

Pharmacokinetics of Epinephrine

- Naturally occurring
- It is on the World Health Organization’s List of Essential Medicines, the most important medications needed in a basic health system
- Onset of action: 1-2 minutes
- Duration of action: 1-2 minutes
- Acts directly on alpha and beta adrenergic receptors (50:50, alpha constricts and beta dilates)
- Antagonizes the effects of histamine
- Stimulates the liver to produce and raise blood glucose levels
- Increases HR, cardiac contractility, and systemic vascular resistance
- Increases myocardial oxygen demand

Epinephrine – Historical Progression

- In 1986, the AHA emphasized safety by concluding, “Vasoconstrictor agents should be used in local anesthesia solutions during dental practice only when it is clear that the procedure will be shortened or the analgesia rendered more profound. When a vasoconstrictor is indicated, extreme care should be taken to avoid intravascular injection. The minimum possible amount of vasoconstrictor should be used.”

- Malamed and Bennet, proposed 0.04mg as a maximum dose of epinephrine for patients with severe cardiac disease

References:
The “Reaction”
- But what about those patients who suffer from the following symptoms after local anesthetic injection?
- Heart palpitations or racing heartbeat
- Pale, sweaty skin
- Dizziness
- Nervousness
- Headache
- Most likely to occur during IANB
- Rates of positive aspiration for IANB:
  - 5.8% in approximately 6000 injections (Ann Anat 1999;181:105-6.)
  - 8.1% in 731 injections (JADA 1999;130:496-9)
  - Other authors have suggested a wider range (2.6-30%) with factors such as needle size and anatomy playing a role (JADA 1992;123:69-73)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Needle Gauge</th>
<th>Needle Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palatal Approach (ASA)</td>
<td>30</td>
<td>Ultrashort</td>
</tr>
<tr>
<td>PSA Nerve Block</td>
<td>27</td>
<td>Short</td>
</tr>
<tr>
<td>Infiltration</td>
<td>27</td>
<td>Short</td>
</tr>
<tr>
<td>Buccal (Long) Nerve Block</td>
<td>27</td>
<td>Short</td>
</tr>
<tr>
<td>PDL Injection</td>
<td>27</td>
<td>Short</td>
</tr>
<tr>
<td>IA Nerve Block</td>
<td>25</td>
<td>Long</td>
</tr>
<tr>
<td>Gow-Gates Nerve Block</td>
<td>25</td>
<td>Long</td>
</tr>
<tr>
<td>Vazirani-Akinosi Nerve Block</td>
<td>25</td>
<td>Long</td>
</tr>
</tbody>
</table>

**Take home message...**

“The addition of a suitable vasoconstrictor in adequate concentration increases the efficiency of local anaesthetic preparations and reduces the toxicity; their presence is therefore desirable. There is far greater danger of untoward reactions from the use of preparations without a vasoconstrictor than from the small amount of adrenaline normally present.”


**Recommendations:**

- The “Reaction” is most likely to occur during IANB in the mandible
- Use the right size needle (avoid 30ga for IANB in adults and kids) *(Dent Clin North Am 2010;54:745–756.)*
- Aspirate (twice)
- Slow injection technique – fast injection technique may cause back pressure within the vessel and decrease chances of positive aspiration *(Ann Anat 1999;181:105-106)*
- Consider reduced/no epinephrine dose formulations:
  - 4% articaine with 1:200,000 (multiple brands)
  - 4% Citanest Forte with 1:200,000 epi (Prilocaine, Dentsply Sirona)
  - 3% mepivacaine (multiple brands)
  - 4% Citanest (Prilocaine, Dentsply Sirona)
**Myth #3: “First, I give a local anesthetic without epinephrine to my patients, because it stings less.”**

Background: Some dentists believe that by using a plain local anesthetic solution (ie, no epi) that the patient won’t feel a pinch, sting, or burn at injection

Could be related to pH. It is well-known that solutions containing a vasconstrictor (eg, epi) have a lower pH then plain solutions

Local Anesthetic Ph (Source: *Compend Contin Educ Dent* 2016 May;37(5):e6-e12.)

- Average pH of solutions containing epinephrine: 3.82
- Average pH of plain solutions: 6.34
One more thing... who has heard of buffering local anesthetics?

- Local anesthetic buffering involves adding Sodium Bicarbonate to low pH solutions to raise the pH closer to physiologic levels
- Possible benefits include:
  - Faster onset
  - Better efficacy
  - Less injection pain

  - The data on whether buffering decreases injection pain is equivocal (Gen Dent 2015;63(6):74-78.)
  - All the studies look at buffered vs. non-buffered lidocaine or articaine
  - We need to look at buffered vs. prilocaine!
Myth #4: “I use small needles for my injections because they are less painful to the patient compared to larger needles.”

Background: There is a long-standing belief in dentistry that using a smaller gauge needle will cause less discomfort to the patient

This myth has long persisted despite some early evidence:

- “patients are unable to differentiate among 23-, 25-, 27-, and 30-gauge needles” (NY State Dent J 1972;38:425-426.)
- “no significant differences in the perception of pain produced by 25-, 27-, and 30-gauge needles during inferior alveolar nerve blocks in adults” (JADA 1979;99:822-824.)
The Verdict...UNCLEAR

Recommendations

- Use the right size needles!
- Why? Not for patient comfort but for reasons such as:
  - Needle deflection
  - Ability to aspirate (less pressure required)
  - Decreased risk of breakage
- For IANB use 25- or 27-ga long needles
- For infiltrations use 27-ga (or 30-ga) short needles
- To help avoid needle breakage:
  - Minimize bending of needles
  - Minimize reorienting needles when in tissue
  - Avoid hubbing the needle

Why Long Needles? No Hubbing!

Why Long Needles? No Hubbing!

- Recommended insertion of needle for traditional IANB is 1 inch (25.4mm)
- Average length of short needles: 21.5 mm (hub to tip)
- Average length of long needles: 33 mm (hub to tip)
Myth #5: “My Obstetrician says I can get Local Anesthesia, just no Epi.”

Changes in 2014:
- On 12/13/2014, the FDA published the Pregnancy and Lactation Labeling Final Rule (PLLR), which changed the labeling requirements for the pregnancy and lactation sections for prescription drugs and biological agents.
- The final rule removed the pregnancy letter categories, and created descriptive subsections.
- Labeling changes from this rule begin on June 30, 2015. Previously approved drugs from June 30, 2001 will switch to the new labeling gradually.
- This rule does not apply to OTC medications.

What is a TERATOGEN?
Any agent that can disturb the development of an embryo or fetus. Teratogens may cause a birth defect in the child. Or a teratogen may halt the pregnancy outright. The classes of teratogens include radiation, maternal infections, chemicals, and drugs.

<table>
<thead>
<tr>
<th>Category</th>
<th>FDA Pregnancy Risk Factor Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Controlled studies in women fail to demonstrate a risk to the fetus in the first trimester (and there is no evidence of risk in later trimesters), and the possibility of fetal harm appears remote.</td>
</tr>
<tr>
<td>B</td>
<td>Either animal reproduction studies have not demonstrated a fetal risk but there are no controlled studies in pregnant women or animal reproduction studies have shown an adverse effect (other than a decrease in fertility) that was not confirmed in controlled studies in women in the first trimester (and there is no evidence of risk in later trimesters).</td>
</tr>
<tr>
<td>C</td>
<td>Either studies in animals have revealed adverse effects on the fetus (teratogenic, embryocidal, or other) and there are no controlled studies in women or studies in women and animals are not available. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.</td>
</tr>
<tr>
<td>D</td>
<td>There is positive evidence of human fetal risk, but the benefits of use in pregnant women may be acceptable despite the risk (for example, if the drug is needed in a life threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).</td>
</tr>
<tr>
<td>X</td>
<td>Studies in animals or human beings have demonstrated fetal abnormalities or there is evidence of fetal risk based on human experience, or both, and the risk of the use of the drug in pregnant women clearly outweighs any possible benefit. The drug is contraindicated in women who are or may become pregnant.</td>
</tr>
<tr>
<td>N</td>
<td>FDA has not classified the drug</td>
</tr>
</tbody>
</table>
The Facts:

- Medication use during pregnancy is common; two out of every three women take prescription medications during pregnancy. *(American Journal of Obstetrics and Gynecology 2004; 191:398-407.)*
- Medication use during pregnancy still causes great anxiety and misunderstanding among both the public and health care professionals.
- The majority of birth defects have an unknown cause, however one early publication estimated that 2-3% of birth defects are thought to be caused by medications taken during pregnancy. *(Teratology 1973; 7:3-15.)*

<table>
<thead>
<tr>
<th>Local Anesthetics</th>
<th>Pregnancy Category</th>
<th>Safe During Pregnancy?</th>
<th>Safe during breastfeeding?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articaine</td>
<td>C</td>
<td>Use with Caution</td>
<td>Use with caution</td>
</tr>
<tr>
<td>Bupivacaine</td>
<td>C</td>
<td>Use with Caution</td>
<td>Yes</td>
</tr>
<tr>
<td>Lidocaine (with or without epinephrine)</td>
<td>B</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mepivacaine (with or without levurocaine)</td>
<td>C</td>
<td>Use with Caution</td>
<td>Yes</td>
</tr>
<tr>
<td>Prilocaine</td>
<td>B</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Benzocaine (topical)</td>
<td>C</td>
<td>Use with caution</td>
<td>Use with caution</td>
</tr>
<tr>
<td>Dyclone (topical)</td>
<td>C</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lidocaine (topical)</td>
<td>B</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tetracaine (topical)</td>
<td>C</td>
<td>Use with caution</td>
<td>Use with caution</td>
</tr>
</tbody>
</table>

Source: *JADA 2012:143(8):858-871.*

The Concern:
The effects on the uterus, specifically:

- Uterine blood flow (alpha effects)
- Uterine muscle tone (beta effects)

A true contraindication to epinephrine in local anesthetics for pregnant dental patients is if the pregnancy is complicated by hypertension.

References:

Myth #5: “My Obstetrician says I can get Local Anesthesia, just no Epi.”

- Background: Dentists and Hygienists are often faced with a request from the OB and/or patient to avoid using epinephrine in local anesthesia during dental treatment.

- The Concern:
  - The effects on the uterus, specifically:
    - Uterine blood flow (alpha effects)
    - Uterine muscle tone (beta effects)

Evidence:
A number of investigators have shown that less than 0.1 mg of epinephrine as a bolus dose prolonged the duration of epidural anesthesia without affecting the duration of labor. (equivalent to 5 cartridges 1:100,000 epinephrine)

References:

Myth #5: The Evidence

Conclusions. This study’s results suggest that use of dental local anesthetics, as well as dental treatment during pregnancy, do not represent a major teratogenic risk.

Practical Implications. There seems to be no reason to prevent pregnant women from receiving dental treatment and local anesthetics during pregnancy.

The Verdict...

This myth is BUSTED. Your safest choices if a local anesthetic is indicated for a pregnant patient are:
- Lidocaine with or without EPI
- Prilocaine with or without EPI
Myth #6: “I don’t use articaine for blocks because it causes paresthesia.”

- A paresthesia as an abnormal sensation, such as of burning, pricking, tickling, or tingling
- Paresthesias are one of the more general groupings of nerve disorders known as neuropathies
- Paresthesias may manifest as total loss of sensation (ie, anesthesia), burning or tingling feelings (ie, dysesthesia), pain in response to a normally nonnoxious stimulus (ie, allodynia), or increased pain in response to all stimuli (ie, hyperesthesia)

Articaine important dates: (Malamed SF. Articaine 30 years later. Oral Health. Feb 2016)
- 1969: Developed in Germany
- Entered clinical use
  - 1976: Germany
  - 1983: Canada
  - 1998: United Kingdom
  - 2000: United States
  - 2005: Australia
A 2003 study showed a range in the number of fascicles present within the lingual nerve, being anywhere from 1 to 8. Of the 12 nerves studied, 4 (33%) had only 1 fascicle.

The investigators speculated that a unifascicular nerve may be injured more easily than a multifascicular one.

To date, this seems to be the most plausible explanation for the finding of the predilection of the lingual nerve for permanent paresthesia.

References:
• Let's keep it real... PARESTHESIA IS A RARE EVENT!
• The mechanism is UNCLEAR
• Factors thought to be involved with Paresthesia:
  o Direct needle trauma
  o Intra-neural hematoma
  o Extra-neural hematoma
  o Edema (extra- and intra-neural)
  o Chemical neurotoxicity of articaine

“Weber Effect”:

Where a new product when introduced to the marketplace is subject to a closer level of scrutiny by users than more traditional, well-known products

At some point you see... fewer reports of adverse events despite increased use

Reference:
• JADA 2010;141(7):836-844.
• www.OralHealthGroup.com
Neurotoxicity?
- Articaine may be less neurotoxic than other local anesthetics
- 4% versus 2%?

The Verdict... UNCLEAR
- Despite reports about paresthesias and articaine – the data linking the two is largely anecdotal and of insufficient quality to make clinical guidelines - retrospective and biased
- Controlled studies are needed!
- Clinical neurotoxicity of 2% vs. 4% solutions is unclear and unproven
- The risks ratios are all over the map!
- Change technique rather than local anesthetic?

So what should I do?
- Use articaine for IANB injections
- If not convinced, use lidocaine (buffered?)
- Or, use lidocaine for IANB, use articaine via buccal infiltration
- Or, use articaine only on the maxilla or not at all
What’s in Your Emergency Kit and Why

What is an Emergency? Any condition which if left untreated may lead to patient morbidity or mortality.

Why Should You Care About Emergencies?

- In a survey of 2,704 dentists throughout North America, a total of 13,836 emergencies occurring within a 10-year period was reported.
- None of these emergencies were truly dental emergencies. They were potentially life-threatening medical problems that patients developed while they were in a dental office.
- Almost all medical emergencies that occur in a dental office are fear-related.
- If fear and apprehension are reduced, the chances of having a medical emergency are also reduced.
- Three-quarters of all of these medical emergencies developed as sequelae of pain (i.e., inadequate local anesthesia), the dentist’s failure to recognize and treat a patient’s fear of dental care, or both.


<table>
<thead>
<tr>
<th>Medical emergencies reported by 2,704 dentists.*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMERGENCY SITUATION</strong></td>
</tr>
<tr>
<td>Syncope‡</td>
</tr>
<tr>
<td>Mild Allergic Reaction</td>
</tr>
<tr>
<td>Postural Hypotension</td>
</tr>
<tr>
<td>Hyperventilation‡</td>
</tr>
<tr>
<td>Insulin Shock (Hypoglycemia)</td>
</tr>
<tr>
<td>Angina Pectoris‡</td>
</tr>
<tr>
<td>Seizures‡</td>
</tr>
<tr>
<td>Asthmatic Attack (Bronchospasm)‡</td>
</tr>
<tr>
<td>Local Anesthetic Overdose</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
</tr>
<tr>
<td>Anaphylactic Reaction</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
</tr>
</tbody>
</table>

* Source: Malamed.†
† A few emergencies with few numbers were omitted from the table.
‡ Emergencies that potentially are stress related.

How Do You Manage Emergencies?

The Best Preparation is Prevention:
- Know your patient: get a complete medical and pharmacological history.
- Review any problem areas.
- Take training.
  - Practice
  - Practice
  - Practice
- Emergency Kit.
- Equipment - Less is better.
- Phone – Cell.
- Medication - Only what you will use and are comfortable using . . .

Other Notes or Questions to Ask:
**Stress-Reduction Protocol**

- Recognize medical risk.
- Consult patient’s physician(s).
- Pharmacosedation, as indicated.
- Short appointments.
- Morning appointments.
- Excellent intraoperative pain control.
- Minimize waiting room time.
- Excellent post-operative pain control.

*Rosenberg, M. Preparing for Medical Emergencies: Essential Drugs and Equipment for the Dental Office. J Am Dent Assoc 2010; 141;14S-19S.*

### Suggested basic emergency drugs for the general dental office.

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>DRUG</th>
<th>ACTION</th>
<th>ADMINISTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchospasm (Severe Allergic Reaction)</td>
<td>Epinephrine</td>
<td>α- and β-adrenergic receptor agonist</td>
<td>Autoinjectors or preloaded syringes, ampules; 1:1,000 solution subcutaneously, intramuscularly or sublingually; adults, 0.3 milligram; children, 0.15 mg</td>
</tr>
<tr>
<td>Mild Allergic Reaction</td>
<td>Diphenhydramine</td>
<td>Histamine blocker</td>
<td>50 mg intramuscularly; 25 to 50 mg orally every three to four hours</td>
</tr>
<tr>
<td>Angina</td>
<td>Nitroglycerin</td>
<td>Vasodilator</td>
<td>Sublingual tablet: one every five minutes up to three doses; translingual spray: one spray every five minutes up to three times</td>
</tr>
<tr>
<td>Bronchospasm (Mild Asthma)</td>
<td>Bronchodilator such as albuterol</td>
<td>Selective β-adrenergic receptor agonist</td>
<td>Two or three inhalations every one to two minutes, up to three times if needed</td>
</tr>
<tr>
<td>Bronchospasm (Severe Asthma)</td>
<td>Epinephrine</td>
<td>α- and β-adrenergic receptor agonist (bronchodilator)</td>
<td>Autoinjectors or preloaded syringes, ampules; 1:1,000 solution subcutaneously, intramuscularly or sublingually; adults, 0.3 mg; children, 0.15 mg</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>Glucose, as in orange juice</td>
<td>Antihypoglycemic</td>
<td>If the patient is conscious, ingest</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>Aspirin</td>
<td>Antiplatelet</td>
<td>One full-strength tablet (165-325 mg) chewed and swallowed</td>
</tr>
<tr>
<td>Almost Anything</td>
<td>Oxygen</td>
<td>Respiratory Support</td>
<td>Ad Lib</td>
</tr>
</tbody>
</table>

### #1: Epinephrine 1:1,000 Injection

- **Uses:** to reverse hypotension, bronchospasm, and laryngeal edema that result from an acute anaphylactoid type reaction. Also used to reduce bronchospasm resulting from an acute asthmatic episode that is refractory to inhaler therapy.

- **Pharmacology:** Causes vasoconstriction that in turn increases blood pressure, heart rate, and force of contraction. Also causes bronchial dilatation. Reduces the release of histamine. Can be ineffective if the patient is taking beta-blocker.

- **Adverse Effects:**
  a) Cardiovascular: Tachycardia, Tachyarrhythmia’s, and hypertension.
  b) Central Nervous System: Agitation, headache, and tremors.
  c) Endocrine System: Increased blood glucose.
  d) Pregnant Female: Can decrease placental blood flow.

- **Dose:** Supplied in vials, ampules, or pre-loaded syringes in concentration of 1:1000 (1mg/mL); 0.3mg for adults, 0.15mg for children. IV give 0.5-2.0mg (0.5mL-2.0mL) depending on severity of hypotension, titrate to effect repeat in 2 minutes if needed.

**Other Notes or Questions to Ask:**
#1: EpiPen Instead??


**CONCLUSION**: The needle on epinephrine auto-injectors is not long enough to reach the muscle in a significant number of children. Increasing the needle length on the auto-injectors would increase the likelihood that more children receive epinephrine by the recommended intramuscular route.

#2: Diphenhydramine (Benedryl) 50mg Injection

- **Uses**: To reduce the affects of histamine release that is associated with allergic reactions, anaphylaxis, and acute asthma attack precipitated by exogenous causes.

- **Pharmacology**: An antihistamine that blocks the release of histamine in the body. It does not prevent the action of the histamine once released and thus must be given quickly. Prevents histamine responses such as bronchospasm, hypotension, rash, and edema.

- **Adverse Effects**:
  2. Central Nervous System: CNS depression (sedative effects including drowsiness, lethargy, and mental confusion).

- **Dose**: 50-100mg IM or IV. For mild cases of pruritis, urticaria, or erythema an oral dose of 50mg every 6 hours can be used.

#3: Nitroglycerin

If patients have a history of angina and you are considering giving them their nitro or yours (from the EMG kit), what **MUST** you know?

- For **Viagra** and **Levitra**, at least 24 hours should have elapsed since the last dose of a PDE5 inhibitor.
- For **Cialis**, allow at least 48 hours before using nitrates.

**Uses**: Used to relieve or eliminate chest pain associated with angina pectoris, to differentiate between angina and a myocardial infarction.

**Pharmacology**: A coronary and peripheral vasodilator and as such helps increase the flow of oxygenated blood to the heart muscle.

Other Notes or Questions to Ask:
✓ It also causes venous pooling of blood decreasing venous return to the heart thus improving the pumping efficiency of the heart. Because of this improved efficiency myocardial oxygen demand is decreased.

✓ Adverse Effects:
  a) Cardiovascular: Rapid heart rate, facial flushing, and orthostatic (Postural) hypotension.
  b) Central Nervous System: Dizziness and headache.

✓ Dose:
  a) Tablet: 1 tablet sublingually repeat after 2 minutes if no relief up to 3 doses.
  b) Metered Dose Spray: 1 spray sublingually repeat after 2 minutes if no relief up to 3 doses.

Called "remote ischemic preconditioning," the procedure developed by Toronto’s Hospital for Sick Children was found to significantly limit the amount of damage to the heart muscle caused by a blockage in a cardiac blood vessel.

Ischemic preconditioning involves using the device to interrupt blood flow in the arm, off and on over a period of 35 to 40 minutes: the cuff is inflated for five minutes, then deflated for five minutes, with the procedure being repeated consecutively four times.

http://www.cbc.ca/health/story/2010/02/26/heart-attack-blood-pressure-cuff.html#ixzzogfLoHNbP

#4: Oxygen

Bag-Valve Concentrations:
- Without oxygen - 21%
- With oxygen, no reservoir - 60%
- With oxygen and reservoir - 90 to 95%
- With demand valve attachment - 100%

Other Notes or Questions to Ask:
#5: Aspirin (for Acute Coronary Syndromes)

- **Pharmacology:** Irreversibly inhibits cyclooxygenase-1 and 2 (COX-1 and 2) enzymes, via acetylation, which results in decreased formation of prostaglandin precursors; irreversibly inhibits formation of prostaglandin derivative, thromboxane A2, via acetylation of platelet cyclooxygenase, thus inhibiting platelet aggregation; has antipyretic, analgesic, and anti-inflammatory properties.

- **Uses:** Treatment of mild-to-moderate pain, inflammation, and fever; prevention and treatment of myocardial infarction (MI), acute ischemic stroke, and transient ischemic episodes; management of rheumatoid arthritis, rheumatic fever, osteoarthritis, and gout (high dose); adjunctive therapy in revascularization procedures (coronary artery bypass graft [CABG], percutaneous transluminal coronary angioplasty [PTCA], carotid endarterectomy), stent implantation.

- **Precautions:**
  - Bleeding disorders: Use with caution in patients with platelet and bleeding disorders.
  - Dehydration: Use with caution in patients with dehydration.
  - Ethanol use: Heavy ethanol use (>3 drinks/day) can increase bleeding risks.
  - Gastrointestinal disease: Use with caution in patients with erosive gastritis or peptic ulcer disease.
  - Hepatic impairment: Avoid use in severe hepatic failure.
  - Renal impairment: Use with caution in patients with mild-to-moderate renal impairment (only at high dosages); avoid in severe impairment.

#6: Albuterol Inhaler (bronchodilator)

- **Uses:** Used during acute asthma or Anaphylaxis to reduce or control bronchospasm.

- **Pharmacology:** A β2-adrenergic drug that relaxes the bronchial smooth muscle. It has rapid onset and duration of action of up to 6 hours. Also reduces the stimulation of mucous production.

Other Notes or Questions to Ask:
✓ Albuterol and Beta-Blockers tend to inhibit each other.

✓ **Adverse Effects:**
Should be used with caution in patients with cardiovascular disorders especially coronary artery disease, arrhythmias, and hypertension.

✓ **Dose:**
2 puffs every 2 minutes to a maximum of 20 puffs. Hold inhaler about 2 inches from mouth. Have patient take two deep breaths and then exhale forcefully. Dispense one puff on slow deep inhalation. Hold breath for 10 seconds and repeat.

### #7: Glucose (for hypoglycemia)

✓ **Symptoms:**
- Appears confused
- Cool, moist skin
- May be hungry
- May seem “drunk” but not alcohol breath odor
- Slurred speech

— If patient becomes unconscious or does not respond readily after sugar/carbohydrate administration, activate EMS. They will give IV treatment.

— Never give unconscious patient anything orally!

### Should I Have Other Drugs?

- Flumazenil (Romazicon®) – YES, if office uses sedation
- Naloxone (Narcan®) – YES, if office uses sedation
- Nitrous Oxide?
- Midazolam (Versed®)?
- Corticosteroids?
- Aromatic Ammonia?

### Do Not Get Yourself Locked Into A Serious Drug Collection!

**Other Notes or Questions to Ask:**
#8: Flumazenil (Romazicon®) for Benzodiazepine Sedation Reversal

- **Uses:** Selectively blocks benzodiazepine receptors, reversing sedation and respiratory depression
- **Preparation:** 0.1 mg/ml, in 5 ml and 10 ml MDV
- **Dose:** IV or sublingual, 0.2 mg every 1 minutes up to 5 doses

“Respiratory depression mediated by benzodiazepines can be reversed using the specific antagonist flumazenil (Romazicon). It can be titrated intravenously or injected sublingually in 0.2 mg increments every 2-3 minutes, up to 1 mg. Flumazenil should not be administered to patients with a history of seizure disorder or dependence on benzodiazepines.”

*Dionne R, Phero J, Becker D; Management of Pain and Anxiety in the Dental Office. WB Saudners 2002;18:289*

“Intraoral submucosal injection of flumazenil appears to be a viable concept based upon the following findings. The drug is rapidly and complete absorbed into the systemic circulation, as evidenced by comparable serum concentrations to those obtained by IV administration.”


#9 Naloxone (Narcan®) – Narcotic Antagonist

**Indications:**
- Reversal of narcotic depression including respiratory depression induced by opioids, (both natural and synthetic narcotics), propoxyphene, and narcotic-antagonist analgesics
- Diagnosis of suspected acute narcotic overdosage
- Not effective in counter-acting depression due to barbiturates, tranquilizers or other non- narcotic anesthetics or sedatives

**Routes of Administration:**
- IM, SC - when IV route not feasible; onset of action not as prompt as with IV and may be delayed in patients who are hypotensive and have impaired peripheral circulation
- IV direct - slowly over at least 1 minute


**Dosage, Adults:**
- Known or suspected overdose: 0.4-2 mg IV; if no response, repeat 2-4 mg in minutes; in cases of large narcotic overdoses, or methadone, pentazocine, propoxyphene overdose, higher doses may

**Other Notes or Questions to Ask:**
be required; if no response after 10 mg, reassess diagnosis; effective dose may be repeated every 20-60 minutes

- Post-operative respiratory depression: 0.1-0.2 mg at 2-3 minute intervals until desired response is obtained; repeat doses may be required at 1-2 hour intervals
- Partial reversal of opioid-associated respiratory depression in palliative patient: if respiratory rate < 6/minute, administer 0.1-0.2mg IV q2-3 minutes or 0.1-0.2mg SC q5-10 minutes until respiratory rate > 10/minute. Continue to monitor respiratory rate q15 minutes until no naloxone given x 1 hour.

**Dosage, Children:**
- Known or suspected overdose:
  - Birth to 5 yrs or 20 kg: 0.1 mg/kg/dose; repeat at 2-3 minute intervals until desired response obtained
  - > 5 yrs or > 20 kg: 2 mg; repeat as above
- Post-operative respiratory depression: 0.005-0.01 mg/kg IV repeated if necessary at 2-3 minute intervals
- Onset of effect: within 1-2 minutes following IV, within 2-5 minutes following IM or SC
- Duration of effect: 45 minutes to 3-4 hours
- Since duration of action of narcotic agent may exceed that of naloxone, repeated doses or administration of naloxone via IV infusion may be required


**Midazolam (Versed®) for Seizures**

✓ **Uses:** For seizures, since it can be injected IM or subcutaneously or swallowed (orally). Realistically you want to call 911 if the seizure lasts more than a minute or if it is the first seizure for a patient.

✓ **Pharmacology:** A short-acting hypnotic-sedative drug with anxiolytic and amnesic properties. It is used in dentistry, cardiac surgery, endoscopic procedures, as preanesthetic medication, and as an adjunct to local anesthesia. The short duration and cardiorespiratory stability makes it useful in poor-risk, elderly, and cardiac patients.

✓ **Dose:** Inject 1-1.5mg (1-1.5mL) into buccal fold and repeat after a minute or two if the seizure has not stopped. If buccal fold is too difficult due to patient clenching inject IM on upper arm.

✓ **Beware:** Midazolam is also available as a 5mg/mL vial in which case 5mL would be 25mg: too much!!

**Corticosteroids for Acute Adrenal Insufficiency**

The adrenal cortex produces over 25 different steroids. These steroids are broken into three groups: sex steroids, mineralocorticoids, and glucocorticoids. Of primary concern in dentistry are the glucocorticoids. A physiologic dose of approximately 20mg/day of cortisol is produced. This plays a key role in the body’s

**Other Notes or Questions to Ask:**
ability to adapt to stress. Cortisol provides a chemical link within the cells of the body allowing regulation of vital functions including blood pressure and glucose utilization.

Cortisol production is triggered by real or threatened “stress” such as trauma, illness, fright, and anesthesia. In a patient with suppressed adrenal function a failure of this cortisol production eliminates the chemical link to regulate vital functions resulting in sudden shock and possibly death. Suppressed adrenal function or Adrenal Failure is classified as either Primary (Addison’s disease caused by Disease states such as TB, Bacteremia, Carcinoma, and Amyloidosis.) or Secondary (caused by Pituitary disorders, Hypothalamic disorders, or Steroid Therapy).

Steroid therapy suppresses the function of the adrenal cortex reducing the production of natural cortisol. Because of this suppression patient’s who have been on long term steroid therapy lose their ability to respond to stress. If these patients are stressed symptoms of acute adrenal insufficiency may result.

**Signs and Symptoms of Acute Adrenal Insufficiency:**

1. Mental confusion.
3. Fatigue.
4. Nausea and vomiting.
5. Hypotension.
6. Intense pains in abdomen, lower back, and/or legs.
7. Mucocutaneous pigmentation.
8. Hypoglycemia.
10. Increase heart rate, decreased blood pressure.

**Dental Treatment Considerations**

For patients with a history of glucocorticoid therapy use stress reduction protocols. The following guidelines can be used to determine if replacement therapy is indicated but it is always a good idea to get a medical consult in such cases.

If the patient has undergone supraphysiologic (more than 20mg/day) glucocorticoid therapy that was discontinued more than 30 days prior to the planned dental treatment no supplementation is required.

If the patients has undergone supraphysiologic glucocorticoid therapy within 30 days of the planned dental procedure considered the patients suppressed and provide steroid supplementation equivalent to 100mg of cortisol.

If the patient has undergone or is undergoing alternate day dosing schedule glucocorticoid therapy no supplementation is required but it is best to provide dental treatment on the off day of the patient’s dose schedule.

If the patient is currently receiving daily glucocorticoid therapy at a supraphysiologic level (more than 20mg) supplementation is required. If the daily dose is subphysiologic supplementation is not required.

**Equivalent Doses of Corticosteroids**

<table>
<thead>
<tr>
<th>Corticosteroid</th>
<th>Equivalent Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortisone</td>
<td>25mg</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>20mg</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>5mg</td>
</tr>
<tr>
<td>Prednisone</td>
<td>5mg</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>4mg</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>4mg</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>0.75mg</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>0.6mg</td>
</tr>
</tbody>
</table>

**Fundamentals of Emergency Preparation**

- Training (BLS, ILS, ACLS, PALS).
- Development and implementation of an emergency plan.
- Purchase and maintenance of emergency equipment and drugs.
- Periodic mock emergency drills.
- Training new staff members.
- Monitoring and Patient Assessment.

**Other Notes or Questions to Ask:**
EpiPen 2-Pak 0.3mg/0.3mL  
(contains 2 Adult pens)  
Inject one pen in to front outside of thigh. Ok to repeat if needed after 3-5 minutes.  

**Call 911 Call 911 Call 911.**  
Used for anaphylaxis: severe, rapid onset (less than 1 hour) allergic reaction, swollen throat, tongue, or lip or if patient has difficulty breathing - allergic reaction - or if patient has difficulty breathing with slow onset allergic reaction. Note that if you see children you must also carry the EpiPen Jr 2-pak 0.15mg/0.15mL.

---

Epi 1:1000 ampule 1mL  
(contains 1mg epinephrine)  
Inject into in to front outside of thigh. 0.3mL repeat every 5 minutes or more often.  
(USE 0.15mL for kids each injection to max of 3 injections).  
Used for anaphylaxis: severe, rapid onset (less than 1 hour) allergic reaction, swollen throat, tongue, or lip or if patient has difficulty breathing - allergic reaction - or if patient has difficulty breathing with slow onset allergic reaction  

**Call 911 Call 911 Call 911**

---

A can of non-diet soda  

Have patient drink 4 oz per minute until can is empty.  

This is the best treatment for a hypoglycemic conscious diabetic patient. The carbonation facilitates absorption through the stomach faster than any uncarbonated source of sugar. It is absorbed from the small intestine.  

This requires a CONSCIOUS and oriented patient.
Benadryl Injectable 50mg/mL vial

Infect 1mL (for kids aged 1-7 use 0.5mL) IM in upper arm. Used for moderate, slow onset (takes one hour or more) allergic reaction: Itching throat, swollen tongue, or lip.

Be ready for anaphylaxis if breathing difficulty starts.

Observe for 1 hour to ensure recovery
Terminate appointment
Refer to MD for oral antihistamine or steroids for 3 days

One bottle of Nitroglycerine Spray

Pump a few times to prime the pump (you should see a mist come out) then spray 1-2 doses into the floor of mouth.

May repeat every 5 minutes up to 3 times.

Call 911 if chest pain does not resolve.

Used for angina pain. Prime the pump and check to be sure no Viagra or Levitra within the last 24 hours (48 hours for Cialis) before giving the nitro. Otherwise call 9-1-1.

Nitroglycerin Sublingual Tabs

Supplied in a small, brown bottle. After opening the bottle, it must be replaced within 30 days.

Place one tablet under the tongue. Do not chew, crush, or swallow. Allow to dissolve. Can give another dose after 2 minutes, do not exceed three doses in 15 minutes.

Call 911 if chest pain does not resolve.

Used for angina pain. Check to be sure no Viagra or Levitra within the last 24 hours (48 hours for Cialis) before giving the nitro. Otherwise call 9-1-1.
A bottle of Aspirin (325mg tabs)

In the case of angina or a heart attack the patient is to chew one tablet while the staff calls 911.

One Albuterol Inhaler

Shake dispenser, have patient exhale, spray as they inhale.
May repeat every 30 seconds.

Call 911 if no relief after 1 minute.

Used for asthma, bronchial spasm.
2 vials Flumazenil 0.1mg/mL

Give 1-2mL in floor of mouth off midline adjacent to bicuspid/cuspid area. Observe effect for 5 minutes. Repeat if needed.

*Patient must be kept in office for 2 hours to see if they resedate.*

Used to reverse benzodiazepines including Triazolam, Midazolam, Diazepam, Alprazolam, Lorazepam and at least one non-benzodiazepine, Zaleplon.

2 vials Naloxone 0.4 mg/mL (1 mL)

Give 0.4-2 mg I.V., I.M. or SubQ; may need to repeat doses every 2-3 minutes; after reversal, may need to readminister dose(s) at a later interval (i.e., 20-60 minutes) depending on type/duration of opioid. If no response is observed after 10 mg total, consider other causes of respiratory depression.